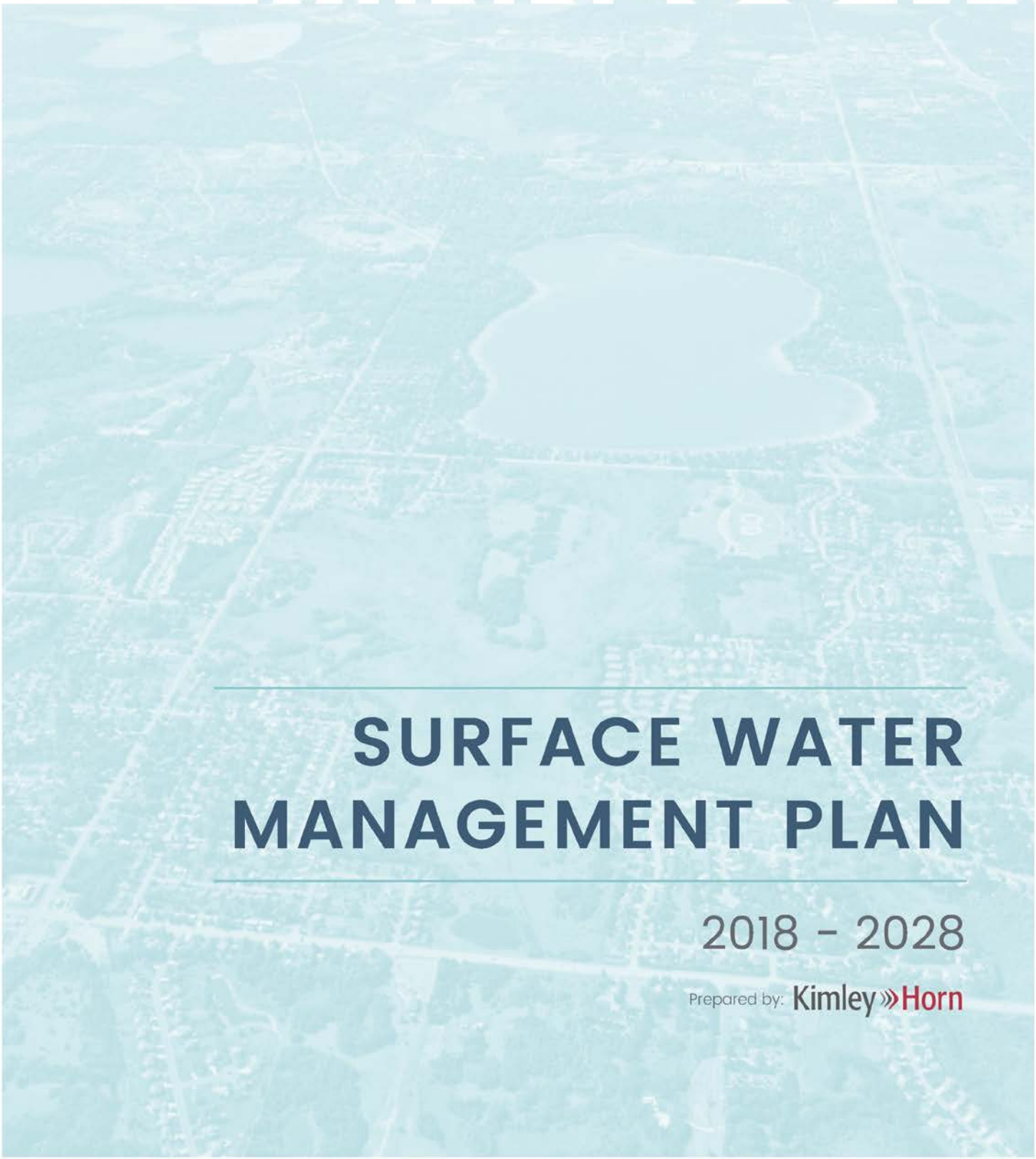
APPENDIX III
SURFACE WATER MANAGEMENT PLAN

MINNESOTA



SURFACE WATER MANAGEMENT PLAN

2018 - 2028

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Shoreview

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EXECUTIVE SUMMARY

Shoreview has completed this 2018-2028 Surface Water Management Plan (SWMP or Plan) to establish an up-to-date guide for future surface water management activities throughout the City. This Plan builds on the City's previous plans from 1990 and 2005, its National Pollutant Discharge Elimination System Permit (NPDES) permit program and input from the Metropolitan Council, Ramsey County, and the local watershed organizations. Areas of focus for this Plan update include engineering standards for projects that fall below the watershed and state permit program thresholds, compiling a summary of the modeled high-water levels throughout the City and placing a greater emphasis on maintenance of the system.

PURPOSE

The purpose of this Plan is to establish the framework of a comprehensive program that does more than protect and improve the quality of existing water resources within the City. This updated Plan will continue to serve as a reference and a toolbox with information on the regulatory requirements relating to surface management, information on the physical environment and specific water resources within the City, recognition of some of the activities and accomplishments from past work and up-to-date design standards. This 2018-2028 SWMP will serve to:

- Provide the framework for management, improvement, and protection of surface water resources
- Contribute to the quality of life by preserving and enhancing the high environmental quality of the community
- Protect public investments and private property related to or affected by surface water
- Help to understand the larger context of surface water management issues in relation to land use and land use policy
- Balance environmental protection and enhancement needs with economic needs and capabilities
- Meet regulatory requirements

REGULATORY BASIS FOR THE PLAN

The Minnesota Board of Soil and Water Resources (BWSR) provides guidance resources for Metro Area Surface Water Management Plans.[1] These Statutes and Rules require the preparation of watershed plans by watershed management organizations (WMOs) and watershed districts (WDs) and the preparation of local water management plans that are consistent with the respective WMO/WD plans. The most current SWMP for RWMWD, 2017-2026 Watershed Management Plan,[2] was adopted in April 2017 and for RCWD, 2010 RCWD Management Plan,[3] was adopted in January 2010 and amended in November 2016.

[1] Metro Area Surface Water Management, Minnesota Board of Soil and Water Resources. Available at http://www.bwsr.state.mn.us/planning/metro/index.html
[2] 2017-2026 Watershed Management Plan for the Ramsey-Washington Metro Watershed District (April 2017). Available at http://www.rwmwd.org/plandraft
[3] 2010 RCWD Watershed Management Plan (November 2016). Available at http://www.ricecreek.org/index.asp?SEC=28FBDA95-21DC-43C7-B00F-874ABE5945FA&Type=B_BASIC

The purpose of the Surface Water Management Plan (SWMP) is that through policies and thoughtful program implementation, goals for proper water and wetland resource management can be realized and water quality can be protected. Through proper planning and implementation, informed decisions can be made which allow for the protection and/or enhancement of water quality, prevention of ground water degradation, and reduction of local flooding.

PLAN OVERVIEW

The two previous versions of the Plan included a set of goals and corresponding policies intended to guide surface water and water resource management activities over the roughly ten-year term of each Plan. This 2018-2028 Plan has retained the nine goal categories listed in Table 1 along with the corresponding goal statements (provided in the Goals and Accomplishments Section of the Plan). However, the policies under each goal section have not been carried forward, as most had been incorporated in some manner into design standards, ordinances, and overall program activities over the course of the past two decades.

Table 1. Shoreview Storm Water Management Plan Goal Categories

Goal Number	Goal
1	Water Quality
2	Water Quantity and Flooding
3	Wetlands
4	Erosion Control
5	Groundwater
6	Recreation, Habitat, and Shoreline Management
7	Public Participation, Information, and Education
8	Maintenance and Inspection
9	Regulatory Responsibility

KEY WATER RESOURCES ISSUES

This Plan identifies several key issues related to storm water management that the City is likely to encounter in the coming years. These issues include: meeting the requirements of the impaired waters program; addressing known and potential future localized flooding problems, meeting the challenges of an increased need for maintenance of the public and private stormwater system and coordinating efforts with natural resource improvement areas to find more cost-effective approaches. The issues equate to a need for continued long-term financial commitments and likely increased funding for the surface water management program into the future.

- Water Quality Improvements: Continued efforts towards improved water quality through coordination with local watersheds and implementing the City's updated design standards that fall under the thresholds established by the watersheds
- Water Quantity and Flooding: Continue to address localized flooding areas to protect life and property and reduce the burden of reactive maintenance efforts. As weather trends are indicating, and as observed through the greater frequency of larger storm events that cause flooding, the potential for localized issues will continue. This realization places a higher level of urgency on the need to maintain Shoreview's storm

water conveyance system so that it functions well during the design events as well as during extreme events. While some debris blockages of pipes and structures will almost certainly continue to occur, the efforts placed on identifying problem areas and conducting maintenance and/or installing physical improvements, will reduce the potential for problems or reduce the extent of damages.

- Maintenance of the System: In addition to maintaining the system for flood protection, the need for maintenance of the water quality treatment system will also be a critical issue in the years ahead. Current costs for disposing of sediment collected in stormwater practices could potentially place a great financial burden on municipalities that own these systems. Continuing to approach pond cleanout and maintenance needs on a prioritized basis will be essential to delivering the program in a cost-effective manner.
- Partnerships and Funding. The final critical area of focus will be the continued close coordination with the local watershed organizations, Ramsey County, and other project-specific partners to take full advantage of opportunities to gain water quality improvements and enhance other natural resources. These efforts are a priority for the City, especially on public capital improvement projects, storm water system and utility maintenance activities, public outreach and education activities and on private development projects. This cooperative approach will allow the City to leverage the limited funding that is currently available by being in a better position to access available grant funds from the watersheds and state programs.

IMPLEMENTATION PLAN

The City's overall surface water management program involves a wide range of implementation projects and activities including capital improvement projects, studies, ongoing maintenance and inspection activities, monitoring and other management activities. The program is shifting towards more collaboration and partnership with the local watershed districts to implement water quality improvements and towards a more focused effort on maintaining the system. The Implementation Plan section of this updated 2018-2028 SWMP includes a summary of those activities and highlights for the next ten years. Estimated costs of recommended actions are not provided recognizing that planning-level cost estimates often set unrealistic expectations of the actual costs of projects and/or activities.

The City's water bodies and wetlands are truly exceptional resources for City residents. They offer a range of recreational opportunities and are generally in very good shape from a water quality perspective. The City's challenge in the years ahead will be to successfully implement this SWMP and the requirements of the NPDES MS4 program to maintain, and where feasible, improve these existing resources.

The financial goal for this Plan is to fit within the existing funding sources to pay for water resources management activities. For the activities called out in this Plan, planning-level estimates of capital expenditures have not been made. The primary funding source for Plan activities is the City's Surface Water Management Fund. In addition, a focus will be placed on securing grants, enlisting regional watershed funding, seeking local partnerships with adjacent communities and investigating other innovative financing mechanisms.

Except for the activities that are taken from the City NPDES SWPPP, the Implementation Plan is not a hard and fast commitment to complete each-and-every activity in the time frame suggested. Rather, it is a suggested course of action that will accomplish the major goal of this plan; to accommodate in-fill development and redevelopment in the community while protecting and improving Shoreview's water

resources. Infrastructure replacements and/or additions will be reviewed, approved, and administered in accordance with Shoreview's Capital Improvement Program. The following list summarizes some of the key efforts and activities the City will implement in the years ahead to help address the identified issues.

- **WATER QUALITY**
  - Continue efforts to reduce chloride use.
  - Review CIP projects, new and redevelopment areas in advance of construction to evaluate needs and opportunities for water quality improvements. Where improvement opportunities exist, work with watershed(s) to identify state and/or local grants. Apply for Grants if eligible.
  - Review City facilities, including buildings and parks for water quality BMP opportunities.
  - Partner with Ramsey-Washington Metro and Rice Creek Watershed District on water quality improvement studies and implementation projects.
- **WATER QUANTITY**
  - Work with RCWD and Ramsey County to complete a Ramsey County Ditch (RCD) 1 Drainage System study for the Marsden Lake drainage areas north of County Rd I. The City would like RCWD to lead the effort, but efforts are subject to RCWD Board approval.
  - Continue work with RWMWD to better assess the interaction between Grass and Vadnais Lakes. Work with RWMWD (as lead) to develop an operations plan for managing water levels on Grass Lake system.
  - Complete a stormwater vulnerability assessment on City infrastructure to assess the risks and possible risk reduction options.
- **EROSION CONTROL; PUBLIC PARTICIPATION, INFORMATION, AND EDUCATION; REGULATORY RESPONSIBILITY**
  - Continue Programs established in NPDES MS4 Program
- **GROUNDWATER**
  - Create an infiltration vulnerability map based on DWSMAs located within the City boundary. Identify prohibited and restricted infiltration areas.
  - Shoreview is one of four Minnesota cities participating in the MN DNR Water Conservation Reporting System pilot program to gather ground water use data for municipalities in Minnesota on an annual basis with an overall goal of reducing water use.
  - Shoreview implemented the WaterSmart program for its residents in 2016. WaterSmart is an online portal that allows participating residents to view and monitor their at-home water usage on a more frequent basis than quarterly billing allows. This program also retains usage data, so residents can compare current and past usage patterns; monitors for leaks through unusual usage readings; and contains a variety of information on water conservation strategies that residents are free to implement.
- **MAINTENANCE AND INSPECTION**
  - Develop BMP Maintenance Agreement Program through standards and/or City Code.
  - Implement prioritized pond cleanout program based on results of study completed in 2017.

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INTRODUCTION

The City of Shoreview is located in the northern suburbs of the of the Twin Cities metropolitan area in north central Ramsey County as shown in Figure 1. The City is bordered by Mounds View and Arden Hills to the west; Blaine, Circle Pines and Lino Lakes to the north; North Oaks, Vadnais Heights, and Little Canada to the east; and Roseville to the south.

The City of Shoreview (City) has completed this 2018-2028 Surface Water Management Plan (SWMP or Plan) to establish a more useful and up-to-date guide for future surface water management activities throughout the City. This Plan builds on the City's previous two versions of the SWMP that were completed in 1990 and 2005 and addresses several key issues related to storm water management that the City is likely to encounter in the coming years. This introductory section begins with a brief description of the purpose and basis for this Plan, followed by an outline of the major sections and the nine overriding goals that were used to guide development of the Plan.

PURPOSE

The purpose statement developed during development of the 2005 Plan still applies and is carried forward to help establish the City's overall vision for the SWMP:

The Surface Water Management Plan seeks to:

- *Provide for the use, management, improvement, and protection of the City's surface water resources based on the best available information;*
- *Contribute to the quality of life by preserving the high environmental quality of the community;*
- *Protect public investments and private property related to or affected by surface water;*
- *Recognize the larger context of surface water management issues;*
- *Balance environmental protection with community and economic needs and capabilities; and*
- *Meet regulatory requirements.*

REGULATORY BASIS

In 1995, the Metropolitan Land Planning Act was amended to require that each community's comprehensive plan include a local water management plan. A local water management plan shows how communities will protect and improve water quality and quantity over the life of the plan. Since the requirement was put in place, the City of Shoreview has prepared two such plans; the City's initial Surface Water Management Plan (1990) and the Second Generation Surface Water Management Plan (2005). Since the previous plan was adopted, the requirements of the plan including the frequency of which a plan needs to be updated, has changed.

As of July 2015, there are two Minnesota pieces of legislation that govern surface water management plan development and review; Minnesota Statute, Section 103B.235[4] and Minnesota Rule, Chapter 8410.[5] The Metropolitan Council and Minnesota Board of Soil and Water Resources (BWSR) oversee the Metropolitan Surface Water Management Program (MSWMP) which provides guidance for metropolitan

[4] Minnesota Statute, Section 103B.235. Available at https://www.revisor.mn.gov/statutes/?id=103B.235
[5] Minnesota Rules, Chapter 8410. Available at https://www.revisor.mn.gov/rules/?id=8410

area SWMPs, including Shoreview's.[6] These Statutes and Rules require the preparation of watershed plans by watershed management organizations (WMOs) and watershed districts (WDs) and the preparation of local water management plans that are consistent with the respective WMO/WD plans.

METROPOLITAN SURFACE WATER MANAGEMENT PROGRAM

The purpose of the Metropolitan Surface Water Management Program (MSWMP) is that through policies and thoughtful program implementation, goals for proper water and wetland resource management can be realized and water quality can be protected. Such a program requires cooperation with neighboring communities, the County, state agencies and WMOs/WDs. Through proper planning and implementation, informed decisions can be made which allow for the protection and/or enhancement of water quality, prevention of ground water degradation, and reduction of local flooding.

The purposes of the water management programs required by Minnesota Statute §103B.235 is to:

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

WATERSHED DISTRICTS

Shoreview is located within the boundaries of two major WDs; the Rice Creek Watershed District (RCWD)[7] and the Ramsey Washington Metro Watershed District (RWMWD).[8] Formerly, the city was partially located within the Grass Lake Watershed Management Organization (GLWMO) which has since been dissolved into the RWMWD and the Vadnais Lake Area Watershed Management Organization (VLAWMO) which has transferred the Shoreview portion to RWMWD. Current watersheds and boundaries are shown in Figure 2. Due to the City being located within the boundaries of the RCWD and RWMWD, both must review and approve the City's SWMP to evaluate consistency with the respective WD Plan in accordance with the MSWMP. The most current SWMP for RWMWD, 2017-2026 Watershed Management Plan,[9] was adopted in April 2017 and for RCWD, 2010 RCWD Management Plan,[10] was adopted in January 2010 and amended in November 2016.

[6] Metro Area Surface Water Management, Minnesota Board of Soil and Water Resources. Available at http://www.bwsr.state.mn.us/planning/metro/index.html
[7] Rice Creek Watershed District website: http://www.ricecreek.org/
[8] Ramsey Washington Metro Watershed District website: http://www.rwmwd.org/
[9] 2017-2026 Watershed Management Plan for the Ramsey-Washington Metro Watershed District (April 2017). Available at http://www.rwmwd.org/explore/management-plan
[10] 2010 RCWD Watershed Management Plan (November 2016). Available at http://www.ricecreek.org/index.asp?SEC=28FBDA95-21DC-43C7-B00F-874ABE5945FA&Type=B_BASIC

This Plan addresses each of the required elements in Minnesota Statutes and Rules and is consistent with the Metropolitan Council's guidelines for Water Management Plans. The Plan is also consistent with the RCWD and RWMWD watershed management plans. The criteria set forth in this Plan, as a minimum, establish the degree of performance necessary to achieve improvement in water quality and water quantity management. These criteria are not intended to dictate or preempt the design process, but rather provide guidelines to proper development and redevelopment.

This Plan represents a unique combination of resource management, regulatory controls, and public works management. As discussed above, State Statutes and Rules require that a plan be prepared for each watershed in the Metropolitan Council planning area, including the City of Shoreview. Local (i.e., City) plans must also be prepared and approved by the applicable watersheds and the Metropolitan Council. Once approved, the Plan becomes part of the City's overall Comprehensive Plan.

NPDES MS4 STORM WATER PERMIT PROGRAM

The NPDES MS4 Storm Water Permit Program is a federal regulatory program that requires owners of Municipally Separate Storm Sewer Systems (MS4s) to prepare and implement a Storm Water Pollution Prevention Program (SWPPP) and obtain a permit from the administrative agency. In Minnesota, the Minnesota Pollution Control Agency (MPCA) administers the MS4 program in the state (http://www.pca.state.mn.us) and the City submitted their original permit application and SWPPP on March 10, 2003 and obtained coverage under the permit. The term of the permit is a maximum of five years and the City updated its program in 2005 and 2013 to comply with permit revisions completed by MPCA. MPCA is currently planning to revise the permit again in 2018 and the City will again need to update its SWPPP and reapply for continued coverage under the permit. The overall goal of the City's MS4 Program since 2003 has been to reduce the extent of pollutants carried in storm water runoff from reaching surface waters.

PLAN OVERVIEW

Using the best available sources is an important component to developing a SWMP. The 2018-2028 SWMP builds on the previous two versions of the Plan, the *1990 Surface Water Management Plan* and *2005 Second Generation Surface Water Management Plan*. The Plan also incorporates applicable information from the most up to date Shoreview Comprehensive Plan, Watershed District plans, the MPCA NPDES Program, and other relevant sources. Following this introductory section, the Plan presents a summary of the information reviewed and evaluated. The subsequent sections provide a brief background and history and describe the existing physical environment; present specific information regarding the major subwatersheds and water bodies within the City and establishes an implementation plan to guide future projects and management activities for the protection and future enhancement of the City's water and wetland resources.

The Plan is intended to be a resource for surface water information in the City of Shoreview and guide for future surface water management projects and activities. Recognizing that the water resource related regulatory programs change on a more frequent cycle compared to the 10-year update cycle for this Plan, the Plan purposely has numerous future decision points related to recommended capital improvements and ongoing inspection, maintenance, and monitoring activities. Where applicable, staff and financial resources of the City, Watershed Districts, and adjacent communities are called on to maximize the effectiveness of the results. The Plan was developed recognizing the need for proper land utilization and redevelopment and, at the same time, emphasizing the need to prioritize management actions and decisions based on the assigned category of a receiving water (i.e., lake or wetland).

BACKGROUND, HISTORY, AND PHYSICAL ENVIRONMENT

As the name implies, Shoreview has a variety of lakes, wetlands and waterways that provide aesthetic, environmental and recreational value to the community. The City's total surface area is approximately 8,100 acres (12.7 square miles), of which, approximately 2,200 acres are a combination of surface water and wetland features. From an administrative perspective, there are two Watershed Districts that have jurisdiction within the City (see Figure 2), including the Ramsey-Washington Metro Watershed District (RWMWD) and the Rice Creek Watershed District (RCWD). The RWMWD encompasses approximately 3,300 acres, and the RCWD encompasses approximately 4,800 acres. Most of the seven major lakes in the City have public boat access facilities and water quality that support aquatic recreational uses. The City has a long history of preserving the natural environment through proactive planning, long-range fiscal planning for infrastructure, and the first-class parks and trails.

Residential development throughout the City occurred primarily between the 1960s and 1990s. Edgetown Acres, north of County Road I and adjacent to the old Twin Cities Army Ammunition Plant (TCAAP), was the first development in the City, largely due to expectations that the Korean War would generate jobs on the TCAAP property. Since, development generally resulted in transitioning agricultural land to residential. Due to this pattern of development, the age of housing in the City ranges from the original farmsteads dating back to the 1850's to the early 2000s. The peak in housing development occurred in the 1970s and 1980s; the City was one of the state's ten fastest growing suburbs in the mid-1980s.

The City is now nearly fully developed and will rely on infill and redevelopment to meet the changing needs of residents. Overall, the low-density residential development pattern will remain with some areas transitioning to higher density residential uses, employment centers, and shopping areas. Population is expected to remain relatively flat for the next ten to twenty years.

SOILS, GEOLOGY, AND TOPOGRAPHY

Shoreview's underlain geology coupled with the actions of erosive glacial activity have shaped the city's landscape, formed the city's soils, and influenced natural resources from waters to woodlands. The Anoka sand plain, a broad expanse of sands deposited by glacial melt waters, covers a large portion of the land area in Shoreview; specifically, all area north of Highway 96 and the southeast portion of the city, east of Snail Lake and Grass Lake. The topography of this area is generally flat although steep slopes may occur adjacent to drainages and depressions. Soils generally consist of deep sandy soils and the infiltration rate and permeability of these soils is rapid (soils classified in Hydrologic Group A and B, shown in Figure 3), resulting in relatively low runoff volumes. The water table in these soils is generally below 6 feet; however, this region includes areas of organic or poorly drained sandy soils where a shallow water table may occur at 0 to 2 feet below ground surface.

Hilly deposits of glacial till dominate the southern part of Shoreview west of Snail and Grass Lakes. The tills are a mixture of two separate glacial advances into the area. The reddish till material was carried from the northeast by the Superior lobe, a glacier that scoured the Lake Superior basin and brought iron-rich reddish soil into the area. A second glacial advance, known as the Grantsburg sub lobe, brought gray calcareous soils from the Canadian prairie and North Dakota plains. This second glacier overrode and intermixed with the earlier deposits from the Superior lobe.

Topography in this area is moderately rolling with occasional steep slopes and depressions. Soils generally consist of brownish or grayish loamy till, reddish sandy or silty loam, or a mixture of both. These soils are typically moderately to well-drained with a water table below 6 feet in depth. Small lakes, depressions, and drainage ways are scattered throughout the area. Wetlands in this portion of the City are generally the result of a perched water table.

Infiltration capacities of soils can affect the amount of direct runoff resulting from a rainfall event. Generally, the higher the infiltration rate is for a given soil, the lower the runoff potential. Conversely, soils with low infiltration rates produce relatively high runoff volumes and high peak discharge rates. The Natural Resource Conservation Service (NRCS) have classified soils into four general hydrologic groups based on texture and slope:

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

The Minnesota Stormwater Manual contains a more detailed breakdown of soils types and corresponding recommendations for infiltration rates to be used during the design stages of a project.

Soil characteristics are essential for completing hydrologic analyses and are also important when developing erosion control plans. Special attention to erosion control measures and establishment of interim cover during construction must be considered in areas of steep slopes, in areas with highly erodible soils and in areas with prolonged land disturbance. The Minnesota Stormwater Manual and Construction Stormwater Manual,[11] published by the Minnesota Pollution Control Agency (MPCA) and the Construction SWPPP includes guidelines for erosion prevention and sediment control practices. Figure 4 illustrates the general erosion potential throughout the City based on the predominate slope of the land.

CLIMATE AND PRECIPITATION

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 about 32 inches as shown in Table 2. The average annual snowfall is approximately 57 inches, equivalent to roughly 5.7 inches of water.

[11] Minnesota Stormwater Manual-Construction Activity Requirements, Minnesota Pollution Control Agency (2017). Available at https://stormwater.pca.state.mn.us/index.php?title=IV._CONSTRUCTION_ACTIVITY_REQUIREMENTS#IV.B._EROSION_PREVENTION_PRACTICES

Table 2. October 1981 to August 2017 Precipitation Data Summary[12]

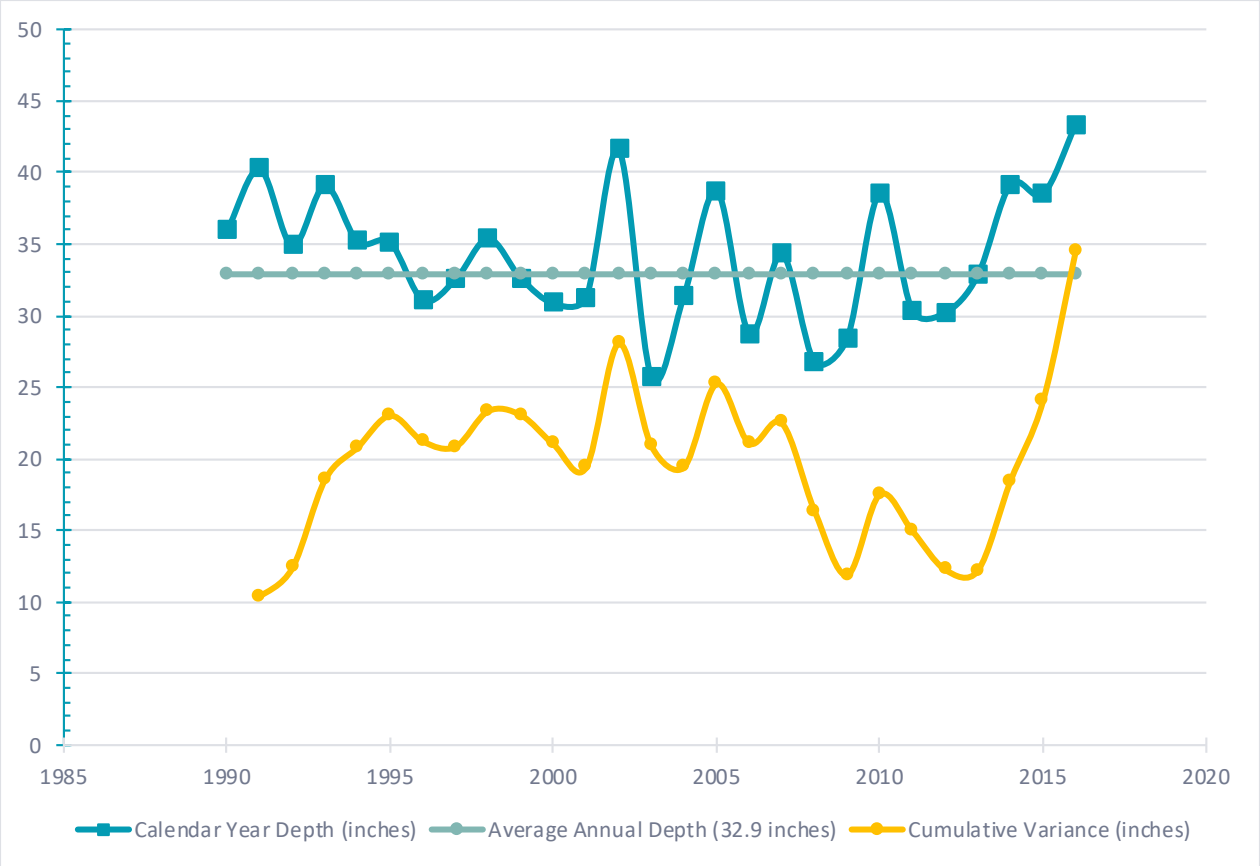
Total Precipitation (Inches)					Snow (Inches)		Mean No. of Days with Precip. ≥ 0.01 inches
Month	Mean	High Year	Low Year	1-Day Max Year	Mean	High Year	
Jan	0.70	2.17 1996	0.03 2008	No Data (ND)	8.67	23.9 2013	7.11
Feb	0.68	2.39 2012	0.14 1982	ND	7.23	18.1 2012	4.74
Mar	1.58	4.01 1990	0.22 2014	ND	5.53	21.1 2005	7.17
Apr	2.66	7.64 2001	0.16 1987	ND	0.73	16.7 2012	9.74
May	4.15	9.02 1991	0.37 2009	ND	0.00	N/A	11.57
Jun	4.67	9.76 1984	0.29 1988	ND	0.00	N/A	11.00
Jul	4.68	11.19 1987	1.20 2007	ND	0.00	N/A	10.26
Aug	4.39	9.26 1993	0.66 2003	ND	0.00	N/A	8.95
Sep	3.21	7.28 1991	0.10 2011	ND	0.00	N/A	9.23
Oct	2.59	6.41 2009	0.24 2011	ND	0.38	2.5 1991	9.04
Nov	1.64	5.31 1996	0.009 2002	ND	3.40	41.5 1991	7.63
Dec	1.13	2.47 2010	0.12 1986	ND	16.83	34.5 2010	6.88
Annual	32.08	44.58 2016	20.93 2008	ND	57.40	77.5 2010	114.40

While average weather imposes little strain on the typical stormwater system, longer term trends and short-term extremes of precipitation and snowmelt are very important for designing stormwater conveyance and detention systems. The high and low monthly data shown above provides a sample of the range of rainfall and snow depths on a monthly and annual basis for the reported period. Evaluating trends in these data can help to explain and understand at least a portion of what we observe in the landscape. One example is looking at the recent trends in annual precipitation as shown in Graph 1 considering observed water levels on Grass Lake. In the top portion of the graph, the average annual precipitation of about 33 inches is plotted along with the actual annual precipitation for each year dating

[12] Minnesota DNR Climate Data through NOAA Regional Climate Center. Vadnais Lake Station

back to 1990 (for years having no missing data). In the bottom portion of the graph, the cumulative precipitation depth relative to the average depth is plotted. The trend shows a wetter period in the early 1990's, a fairly normal period from 1995 to 2005, a relatively dry period between 2005 to 2010 and a wetter period again in 2015 and 2016.

Graph 1. Shoreview Area Precipitation Trends 1984-2016



Extremes of snowmelt most often affect major rivers, the design of stormwater storage/detention areas, and landlocked basins. Extremes of precipitation most often affect the design of conveyance facilities. Appendix D provides information on 100-year event peak water surface elevations and peak discharge rates for surface water features throughout the City.

In 2013, the National Weather Service (NWS) released NOAA Atlas 14, Volume 8 which updates the 1961 TP-40 precipitation frequency estimates for the Midwestern states. The new estimates are based on improvements with denser datasets, longer term datasets to include more recent precipitation trends, and advanced statistical methodologies. As a result of the updated rainfall frequency estimates, the City of Shoreview has updated its current design standards and ordinances to be consistent with this new information. An example of the significance of the new data relates to the total rainfall depth for a 100-year 24-hour storm event changing from 6.0 inches to a depth of 7.29 inches. Table 3 summarizes the precipitation frequency estimates obtained from the NOAA Precipitation Frequency Data Server (PFDS) for a data point in central Shoreview.

Table 3. Rainfall in the Shoreview Area (inches)

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.36	0.42	0.53	0.62	0.75	0.86	0.96	1.07	1.23	1.34
10-min	0.52	0.62	0.77	0.91	1.10	1.25	1.41	1.57	1.79	1.97
15-min	0.64	0.75	0.94	1.11	1.34	1.53	1.72	1.92	2.19	2.40
30-min	0.90	1.06	1.34	1.58	1.91	2.18	2.45	2.73	3.11	3.41
60-min	1.17	1.38	1.74	2.07	2.56	2.97	3.40	3.88	4.54	5.08
2-hr	1.45	1.69	2.14	2.55	3.20	3.75	4.36	5.02	5.97	6.75
3-hr	1.61	1.87	2.37	2.85	3.62	4.30	5.06	5.90	7.12	8.14
6-hr	1.89	2.18	2.76	3.35	4.30	5.15	6.11	7.18	8.75	10.10
12-hr	2.14	2.49	3.16	3.82	4.87	5.79	6.82	7.97	9.65	11.00
24-hr	2.45	2.81	3.51	4.19	5.28	6.24	**7.29**	8.47	10.20	11.60
2-day	2.86	3.19	3.85	4.52	5.61	6.58	7.68	8.91	10.70	12.20
3-day	3.15	3.47	4.12	4.78	5.87	6.85	7.96	9.21	11.10	12.60
4-day	3.38	3.71	4.39	5.06	6.16	7.14	8.24	9.48	11.30	12.80
7-day	3.88	4.34	5.17	5.94	7.10	8.08	9.14	10.30	11.90	13.30
10-day	4.36	4.92	5.87	6.71	7.93	8.92	**9.96**	11.10	12.60	13.80
20-day	5.92	6.64	7.81	8.79	10.10	11.20	12.30	13.30	14.80	15.90
30-day	7.32	8.16	9.52	10.60	12.10	13.20	14.40	15.50	16.90	18.00
45-day	9.15	10.20	11.80	13.10	14.80	16.10	17.30	18.40	19.80	20.80
60-day	10.70	12.00	13.90	15.40	17.30	18.70	19.90	21.10	22.40	23.30
Notes: Latitude: 45.0820° Longitude: -93.1343° Date/time (GMT): Thu Aug 3 15:13:16 2017										

The return period is related to the probability of a given event being equaled or exceeded. The probability that the "100-year event" will be exceeded in a given year is 1 percent. Conventional wisdom holds that if a 100-year event occurs in one year, then it cannot occur for another 100 years. This belief is false because it implies that rainfall occurs deterministically rather than randomly. Because rainfall occurs randomly, there is a finite possibility that the 100-year event could occur in two consecutive years or more frequently than one occurrence in any given year.

LAND USE

The City of Shoreview is considered a fully-developed community with approximately 96 percent of its land area developed as of 2017. The predominant land uses include single-family residential, parks, open space, and natural areas. Existing land uses are shown in Figure 5. With only four percent of the land area remaining vacant, the City's challenge is to provide areas for commercial and industrial redevelopment and other residential opportunities while preserving natural areas. Planned land uses are shown in Figure 6. The existing and planned future land use throughout the City are available in the City's 2018-2028 Comprehensive Plan.

The City and its residents place the highest value on preserving the natural environment and ensuring that new development fits the character of existing neighborhoods. For more information on land use within the City of Shoreview refer to Chapter 4 of the City's *Year 2018 Comprehensive Plan*.

Considering land use in the context of surface water management is important as significant changes in land use can increase runoff rates and volumes due to the additional impervious surface and as a result, can increase pollutant load and runoff volume. On a smaller project-specific scale, establishing reasonable and effective standards for development or redevelopment activities that fall under the regulatory jurisdiction of the MPCA and local watersheds is a focus of this 2018 Plan update. With projects impacting an acre or more being held to MPCA and watershed standards, the City has updated its standards for addressing projects impacting less than an acre.

The City of Shoreview has numerous park areas and outlots, or natural areas, are incorporated into developments. While many of these outlots are marginal lands for development, most contain wetlands or are used for storm water detention. These areas also provide important wildlife habitat and aesthetic benefits for the City.

SUBWATERSHEDS AND FLOW RATES

According to hydrologic and hydraulic modeling completed by the RCWD and RWMWD, there are 15 major subwatersheds in the City of Shoreview (see Figure 7). Seven of these subwatersheds are in the RCWD and nine are in the RWMWD. The Major Subwatershed section of this Plan provides detail regarding each subwatershed including a summary of the hydrologic and hydraulic modeling completed for each area. Hydrologic and hydraulic summary data including high water level and flow rate estimates is available in Appendix D.

Both local watershed districts require an assessment of discharge rates (i.e., flow rates) from the City into adjacent communities. For Rice Creek Watershed District, district wide modeling, updated annually, identified two intercommunity flow points where water is leaving Shoreview including Rice Creek flowing south into Arden Hills at County Road I and Ramsey County Ditch 8 flowing north into Lino Lakes. The District has provided these flow rates and the City has established standards that address discharge rates for new and redevelopment projects. A combination of City and District standards will ensure that these rates will not increase.

For Ramsey-Washington Metro Watershed District, recent model updates by the District are used as the basis to determine regulatory flow rates on a regional/intercommunity basis. Again, a combination of City and District standards will ensure that these rates will not increase.

STORMWATER SYSTEMS, DRAINAGE SYSTEMS, AND CONTROL STRUCTURES

The City currently has eleven (11) properties that use Subsurface Sewage Treatment Systems (SSTS) including ten residential properties and one business. The City's Development Ordinance regulates SSTS sites and is consistent with Minnesota Pollution Control Agency Rule 7080 which includes SSTS inspection and maintenance requirements.

Shoreview has, since the mid 1960's, been a full-service drinking water producer/supplier that owns and operates its own infrastructure that relies solely on groundwater. The Prairie du Chien-Jordan aquifer, located approximately 400 feet below the ground surface, serves as the City's municipal water source. The City appropriates water from this aquifer under a permit from the Minnesota Department of Natural Resources (DNR). All of the City's water supply wells are within a half-mile radius of City Hall.

A significant portion of the City's drainage system is storm sewer (see Figure 8). Construction of new storm sewer and improvement of existing storm sewer throughout the City is controlled by new development and street maintenance or reconstruction activities. In an effort to manage and maintain

storm system infrastructure, and as part of its NPDES MS4 permit program, the City maintains a complete storm sewer system map in GIS format including pipes, treatment practices and lift stations.

SURFACE WATERS AND WATER-BASED RECREATION AREAS

The City has a variety of lakes, wetlands and waterways that provide aesthetic, environmental, and recreational value to the community. According to the Minnesota Department of Natural Resources (MnDNR) National Wetland Inventory (NWI) East-Central update (2017),[13] Shoreview contains approximately 2200 acres of wetlands in the city, almost 30% of the city's area. The wetlands range greatly in size and type[14] and serve an important role in surface water management in addition to harboring aquatic ecosystems and wildlife. Wetlands boundaries are shown in Figure 9. Of those wetlands, 29 are considered MnDNR protected waterbodies as identified on the Public Waters Inventory (PWI).[15] In addition, five MnDNR protected watercourses are located fully or partially with the City of Shoreview. These water bodies and watercourses, as shown in Figure 10, are under the jurisdiction of the MnDNR. Several parks located on or near these protected waters provide boat ramps, fishing access and/or swimming beaches, along with trails and picnic areas. Table 4 summarizes the water-based recreational facilities at these parks.

Table 4. Summary of Water-Based Recreational Facilities at MnDNR Public Waters

Waterbody/ Watercourse	Park or Area	Boat Ramp	Fishing Access	Swimming Beach	Trails or Picnic Areas
Island Lake	Island Lake County Park	X	X	X	X
Lake Owasso **Lake Wabasso**	Lake Owasso County Park	X	X	X	X
Snail Lake **Grass Lake**	Snail Lake Regional Park	X	X	X	X
Turtle Lake	Turtle Lake County Park	X	X	X	X
Lake Judy	Lake Judy Park				X
Brennans Pond	Shoreview Commons				X
Evergreen Ponds	Bucher Park				X
Unnamed wetland (PWI 62-256) and Turtle Creek	McCullough Park and Turtle Creek Open Space				X
Rice Creek	Rice Creek North Regional Trail	X	X		X

Due to the abundance and diversity of surface waters within City limits and the role they play in serving the community, the City will continue to prioritize their protection through policies and adherence to local regulation and enhance their accessibility through preservation of parkland and open spaces.

FISH AND WILDLIFE HABITAT

Due to Shoreview's unique combination of open water, wetlands, and associated upland areas (see Figure 11 for Minnesota Land Cover Classification System), the City is home to a variety of rare plants

[13] National Wetland Inventory of East-Central Minnesota, Department of Natural Resources (2017). Available at https://gisdata.mn.gov/dataset/water-nat-wetlands-inv-2009-2014

[14] Wetland type refers to both the Circular 39 system (Shaw and Fredine, 1971) and the NWI habitat types (Cowardin et al, 1979). Wetland types are shown in Figure 9; more information available at http://www.bwsr.state.mn.us/wetlands/wca/Wetlands_in_MN.pdf

[15] Public Waters Inventory, Minnesota Department of Natural Resources (2017). Available at https://gisdata.mn.gov/dataset/water-mn-public-waters

and animals. According to the MnDNR Natural Heritage Information System (NHIS),[16] within the city limits are seven listings of rare plant species and four listings of rare animal species. In addition, the US Fish and Wildlife Service (USFWS) lists two animal species that may habituate the City. These species add to the City's biological wealth and diversity. A summary of the rare species found within the City is provided in Table 5.

Table 5. Rare Species and Natural Communities

	Common Species Name[17]	Status (listing origin)[18]	Habitat[19]
Plants	Autumn Fimbry	Special Concern (state)	Moist, sandy soil
	Black Huckleberry	Threatened (state)	Sandy or rocky woodlands or prairie shrublands
	Small Green Wood Orchid	Special Concern (state)	Wetland meadows
	Toothcup	Threatened (state)	Sandy shores of small, shallow lakes in savanna landscapes
	Kinnickinnick Dewberry	Special Concern (state)	Moist, sandy soil
	Swamp Blackberry	Threatened (state)	Moist, sandy oak forest
	Lance-leaf Violet	Threatened (state)	Sandy wetland meadows
Animals	Blanding's Turtle	Threatened (state)	Wetland complexes and adjacent sandy uplands; calm, shallow waters, including wetlands associated with rivers and streams, with rich, aquatic vegetation
	Least Darter	Special Concern (state)	Clear streams and lakes with cool to warm waters, especially those with dense, submerged, aquatic vegetation
	Red-Shouldered hawk	Special Concern (state)	Large tracts of mature deciduous forests within a rolling landscape containing scattered wetland openings
	Pugnose Shiner	Threatened (state)	Clear lakes and low gradient, small-to-moderately sized streams in areas of little current
	Northern Long-Eared Bat	Threatened (federal)	Hibernates in caves and mines, swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer.
	Rusty-Patched Bumble Bee	Endangered (federal)	Grasslands with flowering plants from April through October, underground and abandoned rodent cavities or clumps of grasses above ground as nesting sites, undisturbed soil for hibernating queens to overwinter

[16] A database containing locational records for rare plants, rare animals, and other rare sensitive natural resources including native plant communities, geologic features, and animal aggregations. Data is current as of July 2017 per license agreement LA-843.

[17] Copyright 2016, State of Minnesota, Department of Natural Resources (DNR). Rare Features Data included here were provided by the Division of Ecological and Water Resources, Minnesota DNR, and were current as of (July 2017). These data are not based on an exhaustive inventory of the state. The lack of data for any geographic area shall not be construed to mean that no significant features are present.

[18] Status for is available from the MnDNR, state listed species, and USFWS, federally listed species.

[19] Source: MnDNR Rare Species Guide. Available at http://www.dnr.state.mn.us/rsg/index.html Accessed July 2017

POLLUTANT SOURCES

Information on pollutant sources is available from the MPCA What's in My Neighborhood (WIMN) website.[20] The MPCA has information on various pollutant sources and related regulatory programs. The WIMN map will identify leaking underground storage tank (LUST) sites, maintain a list of registered above and underground storage tanks (ASTs and USTs) within the City, and has information on permitted wastewater discharges and hazardous waste sites.

CONNECTIONS BETWEEN SURFACE WATER AND GROUNDWATER

Shoreview has an established Wellhead Protection Area (WPA) for the drinking water supply wells operated by the city, six in all. As part of that study, a drinking water supply management area (DWSMA) was delineated, and vulnerabilities to the area determined. This information can be found in the Wellhead Protection Plan for the City (2010). In addition, WPAs for the Cities of Saint Paul, New Brighton, and Mounds View are located within the city. See Figure 12 for WPA boundaries, DWSMA boundaries, and DWSMA vulnerability ratings.

Water levels in lakes and streams can have an impact on an aquifer level if it is unconfined and can contribute to contaminant migration if there is a geologic connection between the two. Figure 13 shows the surface water connections with the groundwater system as well as the type of connection within the city. In addition, areas with a combination of soils with high infiltration rates and associated shallow groundwater levels are vulnerable to groundwater contamination. These areas may be designated as restricted or prohibited use areas for infiltration practices based on the provisions of the NPDES Construction Stormwater Permit and in the NPDES MS4 Permit. Also, surrounding high capacity wells in the same aquifer can influence aquifer levels if the withdrawal rate is large enough. Shoreview will continue to work with the Minnesota Department of Health (MDH) and Ramsey County Conservation District in sustaining groundwater supplies in the region and working to prevent contamination.

[20] Minnesota Pollution Control Agency, What's in My Neighborhood. Available at https://www.pca.state.mn.us/data/whats-my-neighborhood

GOALS AND ACCOMPLISHMENTS

Prior to the changes made in 2015, Minnesota Rules Chapter 8410[21] required local governments to establish goals and policies for the effective management of water resources within their local Surface Water Management Plan. While not specifically required for this 2018-2028 Plan Update, the goals and goal statements established in the City's 2005 Plan have been carried forward here to help frame the range of issues the City must continue to address through implementation activities of this Plan as well as the related NPDES MS4 Permit Program. Table 6 summarizes the City's nine goals and corresponding goal statements taken from the 2005 SWMP. The corresponding policies from 2005 have not been included in this Plan. These past policies have largely been incorporated directly into the City's overall surface water management program, through engineering and development design standards, ordinances and/or implementation actions.

Table 6. Plan Goals and Goal Statements

Goal Number	Goal	Goal Statement
1	Water Quality	Maintain or improve water quality to meet established standards consistent with the intended use and classification.
2	Water Quantity (Flooding)	Control flooding and protect property while minimizing public expenditures necessary to control volumes and rates of runoff
3	Wetlands	Preserve and improve wetlands acreage, functions and values and achieve no net loss of wetlands in conformance with the Minnesota Wetland Conservation Act and associated rules
4	Erosion Control	Minimize soil erosion and sedimentation
5	Groundwater	Protect the quality and quantity of groundwater resources and promote groundwater recharge
6	Recreation, Habitat, and Shoreline Management	Protect and enhance fisheries and wildlife habitat, surface water recreation and shoreland areas
7	Public Participation, Information, and Education	Public participation information and education. Provide information and educational resources to improve knowledge and promote an active public role in management of water resources
8	Maintenance and Inspection	Preserve function and performance of public infrastructure through continued implementation of a maintenance and inspection program
9	Regulatory Responsibility	Maintain primary responsibility for managing water resources at the local level but continue coordination and cooperation with other agencies and organizations

The following pages provide a brief discussion of each goal section, highlight accomplishments, and outline some issues the City has resolved since creation of the 1990 SWMP.

GOAL 1. WATER QUALITY

Water quality is often directly related to the level of available nutrients in a water body. While nutrients comprise only one category of substances that can affect water quality, nutrients, principally phosphorous, must be controlled to achieve the water quality goals of this Plan. Phosphorous is most

[21] Minnesota Rules, Chapter 8410. Available at https://www.revisor.mn.gov/rules/?id=8410

often the limiting factor for plant growth; excess phosphorus increases algae growth, inhibiting the growth of other aquatic plants on lakeshore, open water, or marshland. When algae die and decay, they exert a biological oxygen demand on the lake, depleting available oxygen for fish and other aquatic species. Limiting nutrient is the key to maintaining and improving water quality in City water bodies.

There are several key activities that can be followed to minimize the delivery of phosphorus into the City's priority water bodies. Housekeeping practices such as removing leaves from streets and storm drains, limiting the use of phosphorus fertilizers, and controlling pet waste are examples of simple ways individuals (residents) and the City can make improvements in water quality. Once in the lakes, these organic materials decay, releasing phosphorus. One of the primary mechanisms to improve water quality is the implementation of state (i.e., NPDES Construction permit) and watershed district standards and rules on development and redevelopment projects. Likewise, one of the primary actions the City takes towards improving water quality is the implementation of its engineering standards for projects that fall below the state and watershed regulatory thresholds.

GOAL 2. WATER QUANTITY AND FLOODPLAINS

Floodplains are protected by local, state, and federal legislation because of their ecological value and functionality. The federal laws protecting floodplains include Section 404 of the Clean Water Act, the Rivers and Harbors Act, Executive Order 11988, and Executive Order 13690. State and local protection is enforced through Minnesota Department of Natural Resources (DNR) public waters work permits, watershed districts, water management organizations/commissions, or city permits. Impacts to floodplains require permitting from various agencies and regulatory bodies.

The City of Shoreview continues to manage floodplains through its Floodplain Management Ordinance which prevents designated floodplains from being used or have structures constructed upon without full compliance of city ordinance and other applicable regulations. In Shoreview, surface runoff regulations are enforced by city Floodplain Management Ordinance[22] and through the Rules and Standards of the RWMWD and RCWD.

Since completion of the City's 2005 SWMP, both the RCWD and RWMWD have updated their hydrologic models to reflect the best available precipitation data. Currently, each watershed is using updated precipitation values based on recent storm events (i.e., Atlas-14), to estimate flood elevations and has completed updates to models for areas within their jurisdiction. A review of the updated model results was completed to assess the extent of change in the estimated high water levels. Somewhat surprising is how well the results from the 2005 HEC-HMS Model compare to recent model updates for most water bodies throughout the City. There are certainly exceptions and there are also differences in the details of the drainage areas and characteristics used to develop the models.

A summary of the high-water elevations from the Flood Insurance Study (FIS)[23], the RCWD or RWMWD Models and the City's 2005 Plan update model are provided as a reference in Appendix D. Data summary tables from the 2005 Plan and maps with high water levels from the RWMWD Plan are also included in Appendix D. These data are intended to inform the user of the various estimates for 100-year event high water levels. Users should note that the current regulatory elevation may be different than those listed in Appendix D and are advised to contact the watersheds and FEMA Flood data directly.

[22] City of Shoreview Code 205.091, available at https://www.shoreviewmn.gov/home/showdocument?id=46
[23] A Flood Insurance Study is a compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community.

One of the primary actions the City takes towards managing water quantity (i.e., potential flooding) is implementation of its engineering standards for projects that fall below the state and watershed regulatory thresholds. In addition to watershed standards and rules relating to floodplains, the City administers the official FEMA Floodplain regulations through its Floodplain Management Ordinance.

GOAL 3. WETLANDS

Nearly 30% of Shoreview's area is open water or wetland. To preserve and enhance this area, the city adheres to achieving no net loss of wetland areas in accordance with the Minnesota Wetland Conservation Act (WCA). More information about WCA is provided at the BWSR website.[24] RCWD and RWMWD are the Local Government Units (LGU) responsible for WCA within Shoreview. The city will continue to partner with the watershed districts on projects impacting wetlands.

To provide a basis for the protection of wetlands, the functions and values of wetlands are assessed. Both WDs have developed permitting programs that protect wetlands based on quality, with emphasis for protection given to higher quality wetlands.

The RWMWD has developed a wetland management classification system and evaluated all wetlands in their borders wetland.[25] Each wetland has received a quality rating which equates to the level of protection required by the district. Classifications include:

- Manage A: This category is for exceptional and highest-functioning wetlands or those sensitive wetlands receiving conveyed stormwater runoff that have yet retained a medium level of vegetative diversity/integrity. These wetlands are those that should be preserved in (or improved to) their most pristine or highest functional capacity with wide, natural buffers, in perpetuity.
- Manage B: In this category are high-quality wetlands that should be protected from development and other pressures of increased use, including indirect effects. Maintaining natural buffers will help to retain the significant function these wetlands provide.
- Manage C: Manage C wetlands provide medium functional levels and the wetland extent should be maintained. Maintaining natural buffers will help to retain the significant function these wetlands provide. These wetlands often provide optimal restoration opportunity.
- Water Quality Ponds: Constructed stormwater ponds that are not protected by WCA.

The RCWD has not evaluated the wetlands within their borders; however, they require permit applicants within their borders to perform a functional assessment[26] to determine the quality of the wetland.

In addition to the wetlands themselves, an associated undisturbed buffer area adjacent to wetland areas is critical to preserving the ecological functions and environmental benefits of downstream wetlands, lakes, and streams. The presence of undisturbed vegetated buffers or similar best management practices reduces the erosion potential of shorelines and banks through reductions in runoff flow velocities. Buffer also promote water quality, reduce flooding by allowing for infiltration and absorption

[24] Minnesota Board of Soil and Water Resources (BWSR). Available at http://www.bwsr.state.mn.us/wetlands/wca/index.html
[25] More information available in the RWMWD Plan, Section 1.11.
[26] The functional assessment used to assess wetland quality in Minnesota is the Minnesota Routine Assessment Method for Evaluating Wetland Functions, Version 3.4 (MnRAM 3.4). More information available on the BWSR website.

and limit algae growth by providing shade via vegetation, keeping water temperatures down in the summer months. Recognizing the importance of buffers, the RCWD, RWMWD, and MnDNR have regulations in place that protect wetlands, lakes, and streams. The RCWD and RWMWD have a dynamic buffer rule, where buffer width depends on the quality and location of the wetland in relation to resources. The City intends to continue a combination of the two policies in assessing wetland quality within its borders. See Figure 14 for wetland map showing classifications and Appendix C for buffer standards.

GOAL 4. EROSION CONTROL

As discussed previously in Goal 1, water quality problems are frequently linked to high phosphorus concentrations. Phosphorus is often transported to surface water through soil erosion, stressing the importance of erosion control in water quality improvement efforts. Additionally, Soil erosion and sediment deposition can create pond and drainage way performance and maintenance problems.

Soil erosion and sediment accumulation impacts ponds, drainage facilities, and water bodies via a variety of sources including construction sites and winter street sanding operations. The coarse sediment can accumulate in water bodies where runoff or flow velocities are relatively low. One example of a drainage system impacted by sediment and in need of maintenance is the appearance of sand deltas at storm sewer outfalls. As sediment builds up, it can reduce the capacity of drainage system and the pollutant removal capabilities of a pond by reducing dead storage volume (i.e., the volume below the outlet elevation). Fine sediment from erosion can also reduce infiltration rates in basins or BMPs design for groundwater recharge.

The first line of defense towards extending the life of drainage facilities involves source control and elimination of problem causing sediment. Regulatory initiatives including effective street sweeping have the potential to control a major portion of the sediment sources.

RCWD and RWMWD have jurisdictional authority over erosion control measures for land disturbing activities that meet certain project size or type criteria as part of their permitting process. RCWD has jurisdiction over and requires a permit for: soil disturbance or removal of vegetation on one or more acres of land; soil disturbance or removal of vegetation on 10,000 square feet or more of land of land if any part of the area is within 300 feet of and drains to any lake, stream, wetland, or public drainage system. RCWD also requires an erosion control plan for any activity that requires a permit under most of their other rules. RWMWD has jurisdiction over land disturbance activities of one acre or greater. Both the RCWD and RWMWD erosion control requirements are consistent with city policies.

The primary action the City takes towards erosion control is implementation of its engineering standards for projects that fall below the state and watershed regulatory thresholds. The City also plays a significant role when implementing its own construction projects on streets, parks, and other municipal facilities.

GOAL 5. GROUNDWATER

The City of Shoreview relies solely on groundwater as its water supply source. The Prairie du Chien-Jordan aquifer, located approximately 400 feet below the ground surface of Shoreview, serves as the City's municipal water source.

Ramsey County published *The Ramsey County Ground Water Quality Protection Plan: A Guide to Preventing Ground Water Contamination for Local Governments* in 1996. The Ramsey County Plan identifies groundwater contaminated areas and predicts areas that are potentially susceptible to

groundwater contamination. The Ramsey County Plan also contains a comprehensive topographic and geological overview describing groundwater aquifers in the County.

The Minnesota Department of Health (MDH) has completed a Source Water Assessment for Shoreview. The assessment includes information on Wells 2-7 as the City's primary source as well as several interconnections to adjacent municipalities for emergency use. Five of the six wells are identified as vulnerable. A source water protection plan for Shoreview was approved by MDH on August 7, 2013. The City has an existing Wellhead Protection Plan (WHPP) as required by the MDH. The goal of the WHPP is to protect the public water supply from contaminants. It is a preventative program, keeping harmful contaminants from entering the public water supply system. The City is responsible for formulating and implementing the WHPP in accordance with Minnesota Rules Chapter 4720. Note that Ramsey County has a Ground Water Quality Protection Plan that was adopted in 1996.

Several areas throughout the City have soils that are very conducive to storm water infiltration practices and groundwater recharge (see Figure 13). In addition, the watershed districts have requirements for certain projects to infiltrate a portion of the storm water from a rainfall event. As the City moves towards implementing the various state and local requirements and addressing the Individual Sewage Treatment Systems (ISTS) located throughout the City, evaluation of the soils and surface water features will be an important task. The City has developed design standards to protect groundwater sources.

GOAL 6. RECREATION, HABITAT, AND SHORELINE MANAGEMENT

The goal of the Minnesota Department of Natural Resources (DNR) Division of Fish and Wildlife is to protect and enhance the fisheries and wildlife resources and the aquatic biological community for their long-term recreational, ecological, aesthetic, and economic benefits to the state. The DNR is the agency with exclusive responsibility for the management of fisheries in waters of the state. Specifically relating to this SWMP, the concept of ecosystem management requires that not just a species of interest be managed in a given water body, but that all plants, animals, and the physical and chemical constituents of the environment be part of the management program.

The City of Shoreview has developed policies to help support the Recreation, Habitat, and Shoreline Management goal to help protect and enhance recreational opportunities for City residents, and to improve the quality of shoreland areas for fish and wildlife habitat.

GOAL 7. PUBLIC PARTICIPATION, INFORMATION, AND EDUCATION

Public participation and involvement is a strategy that recognizes people want to be involved in decisions that affect any facet of their life. The process of involving the public creates and implements opportunities for the public to participate in the processes that lead to decision- making and result in more ownership in the outcome.

Rice Creek Watershed District (RCWD) and Ramsey-Washington Metro Watershed District (RWMWD) provide the technical data and coordination necessary to implement each district's strategy to expand their public information and education efforts. Both will rely on the municipalities, including Shoreview, to distribute the information. The City has developed the public information and participation activities as part of its National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit Program.

The City has numerous lake associations and committees who focus on the interests and the protection of the lakes and other water resources within the City limits. The City also has a website where information regarding the City's committees and commissions, their mission statements and past

agendas and meeting minutes are available.[27] As part of the NPDES MS4 Stormwater Permit the City has also created a storm water management page on their website that includes the contents of this Plan and the related NPDES permit submittals. As part of the NPDES program, the City is required to implement a public education and outreach program, along with a public participation and involvement program and to incorporate public information into each of the other four minimum control measures of the permit.

The City's web site is an alternative medium to provide municipal information to both City residents and those people who live outside Shoreview. An electronic version of the completed and approved water resources management plan will ultimately be accessible on the web. Because the Plan has such a wide audience from engineers and planners, to developers and citizens, to scientists and educators, electronic access to the text and mapping creates a better understanding of the goals, policies, and activities of this Plan.

The City will continue to distribute information on pertinent water and wetland management issues via the Shoreview Newsletter and will promote opportunities for residents to participate in water resources management activities. The City will also make an ongoing effort on both a City-wide and watershed level toward educating the public by distributing information to its residents on responsible practices they should employ to protect water resources within the community. The program will educate residents on things such as the benefits of using phosphorus-free fertilizer and the proper use of a wide range of lawn chemicals.

GOAL 8. MAINTENANCE AND INSPECTION

Inspections of stormwater system infrastructure (pipes, structures, ponds, rain gardens, etc.) help to spot potential problems before they become major problems. Routine maintenance reduces the long-term costs related to drainage system maintenance, while helping to achieve water quantity and quality goals. The application of development standards ensures consistency in the work produced and the documentation of the constructed systems. Appropriate land use controls can be used to maximize the preservation of the natural drainage systems and to control increases in runoff rate, volume, and pollutant loading. Inspections and long-term maintenance of these systems is a critical step to ensure the planned long-term benefits of the system.

One often forgotten aspect of storm water facility maintenance is private ponds. Maintenance agreements with private pond owners can ensure that ponds are kept in good operating condition and that routine maintenance occurs. An example stormwater facility maintenance agreement is provided in Appendix C that can be modified to address other BMPs (e.g., infiltration basins, bio-retention areas, grit chambers, etc.). Recommended maintenance activities and schedules for a wide range of BMPs can be found on many online sources including the Minnesota Stormwater Manual[28] and other sources.

GOAL 9. REGULATORY RESPONSIBILITY

A summary of the water related regulatory responsibilities and roles is found in the Implementation Program Section of this Plan. In general, the City's water-related permitting requirements for developments fills some gaps beyond what the state and watershed programs address. The City's primary regulatory responsibilities are to operate and maintain the stormwater system as required

[27] City of Shoreview City Council Meeting Agendas and Minutes available at https://www.shoreviewmn.gov/government/city-council/city-council-agendas-and-minutes

[28] Minnesota Stormwater Manual available at https://stormwater.pca.state.mn.us/index.php?title=Main_Page

under the NPDES MS4 Program and to implement the local Floodplain Management Ordinance.

The primary agencies within Shoreview that have regulatory controls over activities that affect lakes, rivers, streams, and wetlands include:

- The U.S. Army Corps of Engineers (USACE), through Section 404 of the Clean Water Act, regulates all Waters of the US (WOTUS)[29]
- The Minnesota Department of Natural Resources (DNR), through the Public Waters Work Program,[30] regulates all waters below the Ordinary High Water Level[31]
- The RCWD and RWMWD, through the Minnesota Wetland Conservation Act (WCA), regulate all wetlands covered by Minnesota Rules, Chapter 8420[32]

Ramsey County and the Minnesota Department of Health have regulatory authority over groundwater issues within the City. Erosion control is the responsibility of the City, RCWD, RWMWD, and the Minnesota Pollution Control Agency (MPCA). In addition, the Ramsey Soil and Water Conservation District assists the cities and watershed districts with erosion control inspections. The MPCA also has regulatory authority over individual septic systems within the City limits.

As with any regulatory program, funding and financing issues are a critical consideration. As such this section contains a summary of funding programs that related specifically to water resources and surface water management activities.

The City currently has a storm water utility (Surface Water Management Fund) in place and often look to its Watershed District partners to supplement funding needs and explores grant opportunities for specific projects.

PAST PROJECTS / ACCOMPLISHMENTS

In order to provide some context to how this Plan helps to guide future activities and improvements throughout the City, it is helpful to review some of the past projects the City has implemented towards achieving these goals. The following project summaries provide a small sample of the types of projects and activities the City has implemented through its surface water management program. A location map is provided in Figure 15.

[29] More information related to Waters of the US available at https://www.epa.gov/wotus-rule/about-waters-united-states
[30] Minnesota Department of Natural Resources Public Water Work Program; more information available at https://www.dnr.state.mn.us/waters/watermgmt_section/pwpermits/index.html
[31] Ordinary High Water Level for Shoreview DNR Public Waters are listed in the Major Subwatersheds Sections.
[32] More information related to the Wetland Conservation Act available at http://www.bwsr.state.mn.us/wetlands/Wetlands_Regulation_in_Minnesota.pdf

Target Pond Sand Filter

This basin, commonly known as the Target Pond Sand Filter, is a stormwater facility located southeast of the intersection at Lexington Avenue and Red Fox Road between Lexington Avenue and the Super Target. The facility includes a pretreatment settlement basin (as seen as the wet pond on the left of the photo below) that overflows through five concrete culverts into a sand filtration system. The basin was originally a privately-owned facility that the City assumed ownership of when the system was modernized as part of a public infrastructure project. The project consisted of enlarging the previous existing, and undersized, pond and added a sand filtration component to improve the dissolved phosphorus treatment function of the system.

Photo Courtesy of City of Shoreview

Island Lake Biofiltration Basin with Water Quality Unit

The end of Milton Street, adjacent to Island Lake, was previously an untreated, direct discharge of runoff into Island Lake. The improvements consist of a two-part treatment train that starts with street runoff entering a biofiltration basin through curb cuts. Larger storms that overflow the biofiltration basin are directed to an underground chamber, similar to what is shown in the second photograph.

Biofiltration System

Photo Courtesy of ADS Pipe

Permeable Concrete Block Pavement

Since 2009, the City has installed a few different types of porous pavements throughout its boundaries. One such installation is the permeable concrete block roadway section on Oak Ridge Avenue near the south end of Turtle Lake. The improvements consisted of a 600-foot long by 22-foot wide permeable block roadway with rock layer beneath the pavement consisting of about 30% void space to provide stormwater storage. The project eliminated a direct stormwater discharge into Turtle Lake and provides water quality treatment at a volume to meeting state and local standards.

A second permeable concrete block project occurred on Grand Avenue (shown below) which consisted of a 300-foot long by 24-foot wide roadway with rock storage layer. This project eliminated a direct stormwater discharge into Wabasso Lake and again provided the required water treatment volume to meet state and local standards.

Photo Courtesy of City of Shoreview

Pervious Concrete Pavement

A second type of porous pavement system the City has installed is the pervious concrete pavement in the neighborhood just east of Lake Owasso. The project consisted of poured in place porous concrete on a roughly¾-mile, 24-foot wide roadway. This project provided the full treatment volume for the project area and eliminated a direct, untreated discharge, into Lake Owasso.

Photo Courtesy of City of Shoreview

Media Filtration Units

Media Filtration Units, similar to that shown below, have been installed at three locations in Shoreview as of 2017. The runoff water is routed into the first chamber of the system for removal of larger sediment and floatable debris. The water is then filtered through granular media cartridges that remove dissolved pollutants including phosphorus before entering the receiving water. The cartridges need to be replaced on the order of every 3-5 years, depending on the level of pollutants entering the chamber.

Photo Courtesy of City of Shoreview

Water Quality Unit

The end of this road was previously an untreated, direct discharge of runoff into Turtle Lake. The improvements consist of an underground chamber, similar to what is shown in the photograph and schematic below. The system works by routing low flows through the treatment unit that is designed with two weir plates to trap oils and solids as the storm water flows through the system. The units also use a bypass system, which helps to avoid resuspension of collected solids by diverting higher flows.

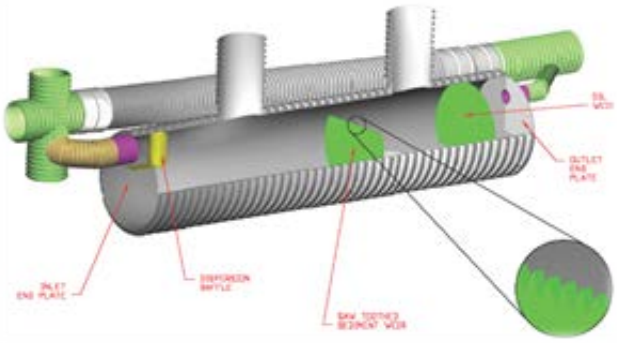


Photo and Diagram Courtesy of ADS Pipe.

MAJOR SUBWATERSHEDS

According to hydrologic and hydraulic modeling completed by the RCWD and RWMWD, there are 16 major subwatersheds in the City of Shoreview. Seven of these subwatersheds are in the RCWD and nine are in the RWMWD. The following section includes a general description of the subwatershed (as it relates to Shoreview and as Shoreview relates to the larger subwatershed and regional drainage system), a summary of surface water resources and associated drainage characteristics within the subwatersheds, and a discussion of past studies and existing issues.

The section reviews monitoring, studies, and modeling completed by various agencies, including the MnDNR, MPCA, RCWD, RWMWD, and the City of Shoreview. General drainage characteristics are derived from the RCWD Modeling Tools and Products,[33] which is updated on an annual basis, and the RWMWD 2017-2026 Watershed Management Plan.[34] Water levels and water quality data for waterbodies and major tributaries is compiled by the MnDNR and the MPCA. Elevations listed, unless otherwise indicated, are based on modeling completed by either the RCWD or RWMWD which are based off recent climate conditions (incorporating extreme storm events) applied on a localized basis. Additional hydraulic summary data, including past studies by the City of Shoreview and a 2015 Flood Insurance Study, is available in Appendix D. For further information regarding any specific subwatershed, see the respective SWMP referenced below.

The two major drainage systems in Shoreview include the Grass Lake Area and the Rice Creek Area. The Grass Lake Area (located within RWMWD) discharges to Vadnais Lake and the Rice Creek Area (located within RCWD) discharges to Rice Creek. The following subwatersheds are located within the city of Shoreview and are named for the major waterbody or tributary within the drainage area (note that some tributaries are not located within City limits):

- RWMWD
  - Grass Lake
  - Snail Lake
  - Lake Emily
  - Lake Wabasso
  - Shoreview Pond
  - Lake Owasso
  - Gervais Creek
  - Sucker Lake / Vadnais Rice[35]
- RCWD
  - Lower Rice Creek
  - Ramsey County Ditch 8 (Kerry Lakes)
  - Ramsey County Ditch 4 (Island Lake)
  - Ramsey County Ditch 1 (Turtle Lake and Martha Lake)

[33] Rice Creek Watershed District has authorized the City of Shoreview to use the Rice Creek Watershed District Modeling Tools and Products under a License Agreement. The RCWD model is updated on an annual basis. More information is available with the RCWD.

[34] Ramsey Washington Metro Watershed District 2017-2026 Watershed Management Plan, April 2017. Available at http://www.rwmwd.org/plan

[35] The subwatersheds for Charlie Lake, Sucker Lake, and Vadnais-Rice Lake are included within the boundaries of the watershed districts for administrative efficiencies but excluded from the watershed district's management plans.

- Anoka County Ditch 25 (Poplar Lake)
- Anoka-Ramsey Judicial Ditch 1
- Charlie Lake[35]

See Figure 7 for a map showing the subwatersheds broken into hydrologic boundaries and flow directions.

GRASS LAKE

GENERAL DESCRIPTION

The Grass Lake subwatershed is located in the center of the city and is approximately 1400 acres in size. The subwatershed receives inflow from the Snail Lake (during extreme precipitation events), Shoreview Pond, and Lake Wabasso subwatersheds. The total area draining to the subwatershed is approximately 5,700 acres (almost nine square miles). The subwatershed was formerly part of the Grass Lake Watershed Management Organization (GLWMO) but is now within the RWMWD. The watershed drains to West Vadnais Lake, under the jurisdiction of the Vadnais Lake Area Watershed Management Organization (VLAWMO).

Although the name implies it is a lake, Grass Lake is a wetland. At approximately 16 acres in size, the large wetland complex consists of a relatively shallow basin with extensive areas of emergent vegetation and is a MnDNR public water wetland (PWI # 62-0074W). The wetland is entirely surrounded by Vadnais-Snail Lakes Regional Park operated by Ramsey County Parks and Recreation; however, because there is not a public access the wetland is not frequently used for water-based recreational activities. See the RWMWD plan, Section 2.19 for more information regarding the Grass Lake Subwatershed. Table 7 shows Grass Lake Subwatershed facts.

Table 7. Grass Lake Subwatershed Facts[36]

Tributary Area (Direct)	1412 acres
Tributary Area (Total)	5688 acres
Wetland area*	275 acres
Downstream Watershed	West Vadnais Lake (VLAWMO)
MnDNR Public Water Number	62-0074W
Ordinary High Water Level*	881.54 ft
Lake Surface Area	16 acres
Lake Outlet Type	36” Reinforced Concrete Pipe
Lake Outlet Elevation	881.0 ft
100-Year Flood Level	883.2 ft
MPCA Designations	Wetland
MS4s in the Direct Tributary Area	Shoreview, Vadnais Heights, Ramsey County
RWMWD Nutrient Water Quality Classification	N/A (wetland)

[36] Except where noted by asterisk, Grass Lake Subwatershed Facts are sources from the RWMWD Comprehensive Plan, Table 2.19-1, page 2-274

DRAINAGE PATTERNS, WETLANDS, AND WATERBODIES

The Grass Lake Subwatershed consists of 23 smaller drainage areas that have been divided for hydrologic modeling and management purposes through RWMWD modeling. Direction of drainage flows and 100-year flood elevations can be found in Section 2.19 of the RWMWD plan. Grass Lake has a relatively large drainage area considering the size of the wetland. Drainage originates from the southwest and northwest of the wetland. During extreme precipitation events, water will overflow from Snail Lake and flow east into a wetland complex in the Grass Lake subwatershed. Drainage also flows from the south as Lake Wabasso discharges through culverts underneath I-694. The total tributary area is almost 5700 acres. Grass Lake outlets towards West Vadnais Lake via a 36-inch reinforced pipe at an elevation of 881 feet. There are restrictions in place on the outflow to West Vadnais Lake to prevent flooding of home on Gervais Creek and Gervais Lake. During times of high water levels, water will flood a pedestrian tunnel then flow north of Grass Lake, and flow into a large landlocked wetland complex. A combination of high water levels and flow restrictions causes flooding across the wetland complex.

The subwatershed consists of a high percentage of wetlands considered as high quality (Manage A) by the RWMWD, including nearly all of the Grass Lake wetland complex (see Figure 14).

WATER QUALITY

Shoreview and Vadnais Heights share an intercommunity surface water connection through the Grass Lake subwatershed and so achieving high quality of drainage originating in and draining through the watershed is of high importance.

Currently, there is little water quality data for the subwatershed. The MPCA classifies Grass Lake as a wetland meaning water quality parameters were not evaluated in the RWMWD Watershed Restoration and Protection Study (WRAPS);[37] however, subwatersheds downstream of the Grass Lake subwatershed were included in the WRAPS. Strategies for protecting these downstream surface waters will rely on identifying sources for impairments; thus, in addition to applying RWMWD and City water quality standards to development in the Grass Lake subwatershed, targeting any point source pollutants identified in the subwatershed as part of the WRAPS will be a prioritized.

PAST STUDIES AND EXISTING ISSUES

The biggest challenge facing the Grass Lake subwatershed is managing water levels. Water level data has been collected on Grass Lake since 1965 by the Minnesota DNR and the past 20 years of data collection has experienced the lake's lowest recorded water level (873.6 feet in October 1996) and highest recorded water level (884.18 feet in May 2016). As stated above, the unique drainage conditions of the subwatershed can lead to high water levels in Grass Lake and associated wetlands north of Gramsie Road. Extreme precipitation events between 2012 and 2017 have led to times where high water has remained for extended periods, leading to flooding of a section of Gramsie Road and trails in Vadnais-Snail Lakes Regional Parks and in yards of homes in the vicinity.

The City of Shoreview has partnered closely with the RWMWD, Ramsey County Parks and Recreation, and other local, regional, and federal agencies to determine the best possible solutions to the problem. As of late 2017, the City and RWMWD have been updating models in the drainage area and are continuing monitoring efforts. The study aims to evaluate options for establishing outlet and overflow

[37] Ramsey-Washington Metro Watershed District Watershed Restoration and Protection Strategy (WRAPS) Project: TMDL Project (2017). Available at https://www.pca.state.mn.us/water/tmdl/ramsey-washington-metro-watershed-district-watershed-restoration-and-protection-strategy

elevations for wetlands in the vicinity of Gramsie Road through updated modeling, establishing a permanent overflow elevation for Grass Lake and evaluating regional storage options for high water.

See Figure 13 and RWMWD Plan, Figure 2.19-5, for maps indicating areas where the water levels of waterbodies in the watershed may be vulnerable to changes in groundwater level and particularly well suited for recharging aquifers through targeted infiltration. Generally, areas in the north portion of the subwatershed have higher composite infiltration rate scores than those in the south. This data will be used to evaluate areas the City might prioritize for water reuse or target for infiltration.

SNAIL LAKE

GENERAL DESCRIPTION

The Snail Lake subwatershed is located in the center of the city and is approximately 960 acres in size. The subwatershed is landlocked under normal hydrologic circumstances but a high-water overflow was constructed to prevent flooding of homes adjacent to Snail Lake during high water conditions. The overflow drains to a wetland complex south of Snail Lake Road in the Grass Lake subwatershed only during periods of extreme high water. The City and RWMWD may investigate altering the overflow routing to alleviate flooding in the wetland complex south of Snail Lake Road. Snail Lake does not receive drainage from adjacent subwatersheds. See Table 8 for Snail Lake Subwatershed facts.

Table 8. Snail Lake Subwatershed Facts[38]

Tributary Area (Direct)	961 acres
Tributary Area (Total)	961 acres
Wetland area*	231 acres
Downstream Watershed	Grass Lake (only during periods of extreme high water)
MnDNR Public Water Number	62-0073P
Ordinary High Water Level*	883.7 ft
Lake Surface Area	190 acres
Lake Outlet Type	None (landlocked)
Lake Outlet Elevation	887.9 ft (overflow elevation)
100-Year Flood Level	884.2 ft
Lake Littoral Area	87%
MPCA Designations	Deep Lake; Impaired for Aquatic Consumption (mercury food consumption advisory)
MS4s in the Direct Tributary Area	Shoreview, Ramsey County
RWMWD Nutrient Water Quality Classification	Stable

Snail Lake is the only waterbody in the subwatershed and is a DNR Public Waterbody (PWI #62-0073P). The surface area of the lake covers 190 acres, of which 35 acres is wetland on the northwest side of the basin. The maximum depth of Snail Lake is 28 feet in the southern bay, with an average depth of about 6

[38] Except where noted by asterisk, Snail Lake Subwatershed Facts are sources from the RWMWD Comprehensive Plan, Table 2.22-1, page 2-308

feet. Snail Lake is an important recreational lake in Shoreview, providing boating access, along with fishing and swimming. Snail Lake Regional Park which is located on the southern shore also provides public access and pedestrian trails. See the RWMWD plan, Section 2.22 for more information regarding the Snail Lake Subwatershed.

DRAINAGE PATTERNS, WETLANDS, AND WATERBODIES

The Snail Lake Subwatershed consists of 34 smaller drainage areas that have been divided for hydrologic and management purposes through RWMWD modeling. Much of the subwatershed flows to a large wetland complex northwest of Snail Lake and then into Snail Lake. Direction of drainage flows and 100-year flood elevations can be found in Section 2.22 of the RWMWD plan. The subwatershed is landlocked, and the Snail Lake basin has been identified as a seepage lake; meaning that it contributes to groundwater recharge (see Figure 13). Water does not typically outflow from Snail Lake, unless high water levels reach the elevation of the overflow outlet. The drainage outlet for Snail Lake is routed to a series of wetlands east of Snail Lake and south of Snail Lake Road.

Until 1990, groundwater was pumped by Ramsey County into Snail Lake to augment the water levels when the DNR suspended all augmentation pumping permits. In 1993, the City initiated the Snail Lake Augmentation project which pumps water from Sucker Lake in Vadnais Heights into Snail Lake. This allows the City to purchase water from the St. Paul Water Utility (which controls Sucker Lake) when necessary. The project was constructed as a cooperative project between the City of Shoreview, the Snail Lake Improvement District, and Ramsey County. The City and the Snail Lake Improvement District are responsible for the operation of the augmentation system. Snail Lake has a maximum lake level of 883.6 according to the Minnesota DNR permit which governs the pumping.

Wetlands and RWMWD management classifications in the Snail Lake subwatershed are shown in Figure 14.

WATER QUALITY

The MPCA classifies the lake as a deep lake, see Figure 2.22-3 in the RWMWD plan for the average total phosphorus, chlorophyll *a*, and Secchi disk measurements. According to the MPCA deep lake eutrophication standards for the ecoregion, Snail Lake has acceptable levels of TP and chlorophyll *a* and above average Secchi disk visibility for the lake. An analysis completed by the RWMWD shows pollutant parameters either improving or showing no significant trend. Further water quality monitoring including study methodology is available in the RWMWD WRAPs report.[37]

Despite acceptable pollutant levels as indicated by continued monitoring, Snail Lake has been listed as impaired for Mercury in fish tissue since 2002.

PAST STUDIES AND EXISTING ISSUES

Snail Lake has seen considerable fluctuations of high water levels in recent years. According to the MnDNR, the lake had the highest ever recorded water level in 2017 (885.76 feet). Snail Lake is only connected to downstream watersheds when water levels exceed the lake outlet (887.9 feet) and is otherwise landlocked. The existing overflow path is being evaluated to determine options to alleviate flooding risk to homes near downstream wetlands including in the vicinity of the Crestview neighborhood, Gramsie Road, and Grass Lake. The evaluation will involve coordination with the RWMWD, MnDNR, and Ramsey County to explore permitting options for changing the outlet and overflow elevations of Snail Lake without putting any additional homes at risk of flooding.

A statewide TMDL plan for Mercury reduction is underway that covers Snail Lake. The plan was approved in 2007 with goals of major reduction to occur in 2018 and 2025. A target date for acceptable Mercury Levels has not yet been identified for Snail Lake.

See Figure 13 and RWMWD plan, Figure 2.22-9, for maps indicating areas where the water levels of waterbodies in the watershed may be vulnerable to changes in groundwater level and particularly well suited for recharging aquifers through targeted infiltration. As stated above, groundwater has a large effect over the water levels in Snail Lake so close attention should be given to maintaining groundwater levels in the region to sustain water levels in the lake. In general, areas in the vicinity of Snail Lake have high composite infiltration rate scores. This data will be used to evaluate areas the City might prioritize for water reuse or target for infiltration.

LAKE EMILY

GENERAL DESCRIPTION

The Emily Lake subwatershed is located in the southwest part of the city and is approximately 244 acres in size. The small subwatershed is part of the larger Lake Owasso watershed.

Lake Emily and Lake Judy, also known as Mud Lake, are the two main waterbodies in the subwatershed. Lake Emily is the only waterbody considered a DNR Public Waterbody (PWI #62-0080P). The surface area of the lake covers 13 acres; the maximum depth is about 15 feet and average depth is about 7 feet. All land around the lake is privately owned. Residents use the lake for fishing and boating. See the RWMWD plan, Section 2.24 for more information regarding the Lake Emily Subwatershed. See Table 9 for Lake Emily Subwatershed facts.

Table 9. Lake Emily Subwatershed Facts[39]

Tributary Area (Direct)	244 acres
Tributary Area (Total)	244 acres
Wetland area*	30 acres
Downstream Watershed	Lake Owasso
MnDNR Public Waters Number	62-0080P
Ordinary High Water Level*	919.5 ft
Lake Surface Area	13 acres
Lake Outlet Type	48" Reinforced Concrete Pipe
Lake Outlet Elevation	919.53 ft
100-Year Flood Level	929.8 ft
Lake Littoral Area	100%
MPCA Designations	Shallow Lake
MS4s in the Direct Tributary Area	Shoreview, Ramsey County
RWMWD Nutrient Water Quality Classification	At Risk

[39] Except where noted by asterisk, Lake Emily Subwatershed Facts are sources from the RWMWD Comprehensive Plan, Table 2.24-1, page 2-337

DRAINAGE PATTERNS, WETLANDS, AND WATERBODIES

The Lake Emily Subwatershed consists of four smaller drainage areas that have been divided for hydrologic and management purposes through RWMWD modeling. All drainage areas eventually flow to Lake Emily; Lake Emily then flows through a wetland, then into Charlie Pond in Roseville via a 48" Reinforced Concrete Pipe. Direction of drainage flows and 100-year flood elevations can be found in Section 2.24 of the RWMWD plan. Wetlands and RWMWD management classifications in the Lake Emily subwatershed are shown in Figure 14.

WATER QUALITY

The MPCA classifies the lake as a shallow lake, see Figure 2.24-3 in the RWMWD plan for the average total phosphorus, chlorophyll *a*, and Secchi disk measurements. According to the MPCA shallow lake eutrophication standards for the ecoregion, Lake Emily is below state standards for acceptable TP and chlorophyll *a* and above state standards for acceptable Secchi disk visibility. In addition, the RWMWD classifies the nutrient water quality of the lake as At Risk based on water quality data that exceed the MPCA standards and RWMWD goals. An analysis completed by the RWMWD shows pollutant parameters either improving or showing no significant trend. Further water quality monitoring including study methodology is available in the RWMWD WRAPs report. The City will continue to partner with the RWMWD and local residents to monitor water quality conditions and ensure the protection of the lake through applicable adjustment of management activities.

PAST STUDIES AND EXISTING ISSUES

For a list of studies related to Lake Emily and the Lake Emily subwatershed see the RWMWD plan.

According to Figure 13 and the RWMWD plan, Figure 2.24-9 and there are no areas identified where the water levels of waterbodies in the watershed may be vulnerable to changes in groundwater level and particularly well suited for recharging aquifers through targeted infiltration (see Figure 13). According to the RWMWD WRAPS study,[37] the highest priorities of the subwatershed are achieving water quality standards and healthy ecosystems through shoreline management.

LAKE WABASSO

GENERAL DESCRIPTION

The Lake Wabasso subwatershed is located in the southeast part of the city and is approximately 147 acres in size. The subwatershed receives inflow from the much larger Lake Owasso subwatershed via a culvert underneath Owasso Boulevard North, and has a total tributary area of approximately 3,300 acres. Lake Wabasso drains north and outlets to the Grass Lake subwatershed.

Lake Wabasso is the only waterbody in the subwatershed and is a DNR Public Waterbody (PWI #62-0082P). The surface area of the lake covers 52 acres, of which 46 acres is wetland. Despite the small size, Lake Wabasso has a maximum depth of 66 feet, with an average depth of about 16 feet. Lake Wabasso is an important recreational lake in Shoreview, providing boating access via Lake Owasso County Park, along with fishing and swimming. See the RWMWD plan, Section 2.25 for more information regarding the Lake Wabasso Subwatershed. Table 10 contains Lake Wabasso Subwatershed Facts.

Table 10. Lake Wabasso Subwatershed Facts[40]

Tributary Area (Direct)	147 acres
Tributary Area (Total)	3,287 acres
Wetland area*	46 acres
Downstream Watershed	Grass Lake
MnDNR Designation	62-0082P
Ordinary High Water Level*	886.34 ft
Lake Surface Area	52 acres
Lake Outlet Type	7.3 foot wide weir
Lake Outlet Elevation	885.73 ft
100-Year Flood Level	887.7ft
Lake Littoral Area	60%
MPCA Designations	Deep Lake; At risk of Impairment for Aquatic Life (Chloride)
MS4s in the Direct Tributary Area	Shoreview, Ramsey County
RWMWD Nutrient Water Quality Classification	Stable

DRAINAGE PATTERNS, WETLANDS, AND WATERBODIES

The Lake Wabasso Subwatershed consists of six smaller drainage areas that have been divided for hydrologic and management purposes. Historically, high water levels have been a concern of residents in the vicinity of Lake Wabasso. The outlet for Lake Wabasso is a channel which has overflowed in the past, resulting in localized flooding of adjacent residential yards. The issue was credited to minimal downstream capacity at the culvert under I-694 appears that caused ditch overflowing. No modifications to the Lake Wabasso outlet have occurred to date. RWMWD evaluated the issue in 2015 and determined that no modifications to the outlet should be made.

Wetlands and RWMWD management classifications in the Lake Wabasso subwatershed are shown in Figure 14.

WATER QUALITY

The MPCA classifies the lake as a deep lake, see Figure 2.25-3 in the RWMWD plan for the average total phosphorus, chlorophyll *a*, and Secchi disk measurements. Lake Wabasso has relatively high water quality for the region. According to the MPCA deep lake eutrophication standards for the ecoregion, Lake Wabasso is above state standards for acceptable levels of TP and chlorophyll *a* and Secchi disk visibility for the lake. An analysis completed by the RWMWD shows pollutant parameters or showing no significant trend. Further water quality monitoring including study methodology is available in the RWMWD WRAPs report.[37]

PAST STUDIES AND EXISTING ISSUES

See Figure 13 and RWMWD plan, Figure 2.25-9, for maps indicating areas where the water levels of waterbodies in the watershed may be vulnerable to changes in groundwater level and particularly well suited for recharging aquifers through targeted infiltration. Groundwater has a large effect over the

[40] Except where noted by asterisk, Lake Wabasso Subwatershed Facts are sources from the RWMWD Comprehensive Plan, Table 2.25-1, page 2-350

water levels in Lake Wabasso so close attention should be given to maintaining groundwater levels in the region to sustain water levels in the lake. In general, areas in the vicinity of the lake have high composite infiltration rate scores. This data will be used to evaluate areas the City might prioritize for water reuse or target for infiltration.

SHOREVIEW LAKE

GENERAL DESCRIPTION

The Shoreview Lake subwatershed is located in the south-central part of the city and is approximately 28 acres in size. The subwatershed has a relatively small, self-contained drainage area that only receives drainage from the immediate vicinity.

Shoreview Lake is the only waterbody in the subwatershed and is a DNR Public Waterbody (PWI #62-0079P). The surface area of the lake covers 11 acres. Shoreview Lake is generally not used for recreational activities and there is no surrounding public access or land. The MnDNR does not manage fish populations in the lake nor has an OHWL for the waterbody. See the RWMWD plan, Section 2.21 for more information regarding the Shoreview Lake Subwatershed.

Table 11. Shoreview Lake Subwatershed Facts[41]

Tributary Area (Direct)	28 acres
Tributary Area (Total)	28 acres
Wetland area*	11 acres
Downstream Watershed	Grass Lake (only during significant hydrologic events)
MnDNR Public Water Number	62-0079P
Ordinary High Water Level*	N/A
Lake Surface Area	11 acres
Lake Outlet Type	18" Reinforced Concrete Pipe
Lake Outlet Elevation	945.46 ft
100-Year Flood Level	945.9ft
Lake Littoral Area	N/A
MPCA Designations	Shallow Lake
MS4s in the Direct Tributary Area	Shoreview, Ramsey County
RWMWD Nutrient Water Quality Classification	At Risk

DRAINAGE PATTERNS, WETLANDS, AND WATERBODIES

The Shoreview Lake Subwatershed consists of one drainage area covering the immediate vicinity of the lake. Shoreview Lake overflows towards Grass Lake only during significant hydrologic events.

Wetlands and RWMWD management classifications in the Shoreview Lake subwatershed are shown in Figure 14.

[41] Except where noted by asterisk, Shoreview Lake Subwatershed Facts are sources from the RWMWD Comprehensive Plan, Table 2.21-1, page 2-298

WATER QUALITY

The MPCA classifies the lake as a shallow lake, see Figure 2.21-3 in the RWMWD plan for the average total phosphorus, chlorophyll *a*, and Secchi disk measurements. According to the MPCA shallow lake eutrophication standards for the ecoregion, Shoreview Lake is above state standards for acceptable levels of TP and chlorophyll *a* and Secchi disk visibility for the lake. In addition, the RWMWD classifies the nutrient water quality of the lake as At Risk due to the limited amount of water quality data available. An analysis completed by the RWMWD shows pollutant parameters generally improving over a five-year period. Further water quality monitoring including study methodology is available in the RWMWD WRAPs report.[37]

PAST STUDIES AND EXISTING ISSUES

According to the RWMWD plan (see Figure 13 and Figure 2.21-6 from plan), there are no areas identified where the water levels of waterbodies in the watershed may be vulnerable to changes in groundwater level and particularly well suited for recharging aquifers through targeted infiltration. According to the RWMWD WRAPS study,[37] the highest priorities of the subwatershed are achieving water quality standards and healthy ecosystems through shoreline management.

LAKE OWASSO

GENERAL DESCRIPTION

The Lake Owasso subwatershed is located in the south-central part of the city and is approximately 2,175 acres in size with approximately 370 acres located in the City of Shoreview. The subwatershed receives inflow from the Bennett Lake and Lake Emily subwatersheds increasing the total drainage area to approximately 3,140 acres. The subwatershed discharges to Lake Wabasso via a culvert underneath Owasso Boulevard North and eventually drains to the Grass Lake subwatershed.

The northern portion of Lake Owasso is located in Shoreview and the rest of the lake is located in Roseville. The lake's total surface area is 410 acres and is a DNR Public Waterbody (PWI #62-0056P). Lake Wabasso is an important recreational lake for Shoreview, providing boating access via Lake Owasso County Park, along with fishing and swimming. The MnDNR manages the fishery of Lake Owasso, additional information available on their website. See the RWMWD plan, Section 2.23 for more information regarding the Lake Owasso Subwatershed. Table 12 shows Lake Owasso Subwatershed facts.

Table 12. Lake Owasso Subwatershed Facts[42]

Tributary Area (Direct)	2,175 acres
Tributary Area (Total)	3,140 acres
Wetland area*	201 acres
Downstream Watershed	Lake Wabasso
MnDNR Public Water Number	62-0056P
Ordinary High Water Level*	887.1 feet
Lake Surface Area	375 acres (in Shoreview and Roseville)
Lake Outlet Type	10-foot by 10-foot box culvert
Lake Outlet Elevation	886.71 feet
100-Year Flood Level	889.0 feet
Lake Littoral Area	78%
MPCA Designations	Deep Lake, impaired for Aquatic Consumption (mercury food consumption advisory)
MS4s in the Direct Tributary Area	Shoreview, Roseville, Ramsey County
RWMWD Nutrient Water Quality Classification	At Risk

DRAINAGE PATTERNS, WETLANDS, AND WATERBODIES

The Lake Owasso Subwatershed consists of 27 smaller drainage areas, nine in Shoreview, that have been divided for hydrologic and management purposes. Generally, drainage flows from areas of the outer subwatershed towards the lake which then flows to a 10-foot by 10-foot box culvert under Owasso Boulevard routed to Lake Wabasso.

Lake Owasso has suffered from both extremes of low and high water levels. Historically, Ramsey County Public Works pumped groundwater into Lake Owasso to augment water levels during extreme low periods until 1991, when all metro pumping permits were suspended. Historically, high water on Lake Owasso led to flooding of adjacent properties. To address the problem, the existing outlet was modified in 1990 to reduce lake drawdown times, reduce outlet plugging, and lower peak flood elevations.

Wetlands and RWMWD management classifications in the Lake Owasso subwatershed are shown in Figure 14.

WATER QUALITY

A primary goal of the City and the RWMWD is to maintain or improve surface-water quality to support healthy ecosystems and provide the public with a wide range of water-based benefits. The MPCA classifies Lake Owasso as a deep lake, see Figure 2.23-3 in the RWMWD plan for the average total phosphorus, chlorophyll *a*, and Secchi disk measurements. Lake Owasso has relatively high water quality for the region. According to the MPCA deep lake eutrophication standards for the ecoregion, Lake Owasso is above state standards for acceptable levels of TP and chlorophyll *a* and Secchi disk visibility for the lake. An analysis completed by the RWMWD shows pollutant parameters either improving or showing no significant trend. That being said, the RWMWD classifies the nutrient water quality for the lake as At Risk based on recent water quality data at or near the MPCA and RWMWD nutrient water

[42] Except where noted by asterisk, Lake Owasso Subwatershed Facts are sources from the RWMWD Comprehensive Plan, Table 2.23-1, page 2-321

quality standards. Further water quality monitoring including study methodology is available in the RWMWD WRAPs report.[37]

Despite acceptable pollutant levels as indicated by monitoring efforts, Lake Owasso has been listed as impaired for Mercury in fish tissue since 1998.

PAST STUDIES AND EXISTING ISSUES

For a list of studies related to Lake Owasso and the Lake Owasso subwatershed see the RWMWD plan, Section 2.23.1.1.

Due to the importance of Lake Owasso as a recreational resource, there continues to be an emphasis in the City and RWMWD to closely manage improve water quality and prevent further degradation. Shoreview and RWMWD will continue to look for ways to implement BMPs in the subwatershed to further reduce the risk of nutrient loading.

A statewide TMDL plan for Mercury reduction is underway that covers Lake Owasso. The plan was approved in 2007 with goals of major reduction to occur in 2018 and 2025. A target date for acceptable Mercury Levels has not yet been identified for the lake.

See Figure 13 and the RWMWD plan, Figure 2.23-9, for maps indicating areas where the water levels of waterbodies in the watershed may be vulnerable to changes in groundwater level and particularly well suited for recharging aquifers through targeted infiltration. As stated above, groundwater has a large effect over the water levels in Lake Owasso so close attention should be given to maintaining groundwater levels in the region to sustain water levels in the lake. In general, areas in the vicinity of the Shoreview portion of Lake Owasso have high composite infiltration rate scores. This data will be used to evaluate areas the City might prioritize for water reuse or target for infiltration.

GERVAIS CREEK

A small portion, approximately 25 acres of the Gervais Creek subwatershed is located within the southeast border of Shoreview. The Shoreview portion of the watershed drains directly towards Black Tern Pond. The Black Tern Pond was formerly a landlocked basin until occasionally flooding led the RWMWD to construct an outlet to downstream drainage areas.

There are no wetlands or areas suitable for infiltration identified in the Shoreview portion of the subwatershed.

The RWMWD has conducted extensive water quality monitoring and completed several projects, none of which has occurred in the Shoreview portion of the Gervais Creek subwatershed; more information is available in the RWMWD plan, Section 2.5.

LOWER RICE CREEK

GENERAL DESCRIPTION

The Shoreview portion of the Lower Rice Creek subwatershed is located in the northwest and north-central part of the city and is approximately 920 acres. The subwatershed receives inflow from the Middle Rice Creek subwatersheds and discharges, ultimately, to the Mississippi River about five miles west of Shoreview.

Rice Creek is a DNR Public Watercourse that runs through portions of Washington County, Ramsey

County (including Shoreview), and Anoka County. Approximately 1.8 miles of Rice Creek flows through the City, entering just east of Lexington Avenue and County Road J and exiting just west of I-35W and County Road I. Rice Creek is an important regional tributary for wildlife and fauna as well as a significant recreational resource for the City and surrounding area. Ramsey County operates the Rice Creek North Regional Trail Corridor, a park with scenic trails and water access. This portion of Rice Creek is also home to Rice Creek Water Trail, a canoe trail. Table 13 provides Lower Rice Creek Watershed facts.

Table 13. Lower Rice Creek Subwatershed Facts[43]

Tributary Area (Direct)	9,600 acres (920 within Shoreview)
Tributary Area (Total)	118,960 acres
Wetland area	237 acres
Downstream Watershed	Mississippi River
MnDNR Public Water Number	M-059
100-Year Flood Level	Variable[44]
MPCA Designations	Impaired for Aquatic Life (may not support a thriving community of fish and other aquatic organisms) and E. Coli
MS4s in the Direct Tributary Area	Shoreview, Ramsey County

DRAINAGE PATTERNS, WETLANDS, AND WATERBODIES

The Lower Rice Creek Subwatershed consists of 96 smaller drainage areas, 15 of which are in Shoreview, that have been divided for hydrologic and management purposes through RCWD modeling. Rice Creek contributes to the water quality of multiple lakes connected to the drainage system including Long Lake and Locke Lake. Several other lakes in the region are connected to Rice Creek via groundwater. The overall system is fed by smaller streams and ditches that drain lakes and wetlands and receive runoff from developed areas. The ultimate outfall of Rice Creek is the Mississippi River, about five miles west.

The Lower Rice Creek Subwatershed contains an intercommunity flow location, meaning a location where drainage is transferred between cities. This point is located where Rice Creek crosses underneath County Road I from Shoreview to Arden Hills. See Table 14 for the peak flow rates at this location. The city and RCWD evaluate project impacts as they affect intercommunity flow rates.

Table 14. Intercommunity Flow Rate Between Shoreview and Arden Hills

Discharging City	Receiving City	Watercourse	Peak Flows (cubic feet per second)[45]			
			2-Year, 24-Hour Rainfall	10-Year, 24-Hour Rainfall	100-Year, 24-Hour Rainfall	100-Year, 10-day Snowmelt
Shoreview	Arden Hills	Rice Creek	160	338	814	1328

The Shoreview portion of Rice Creek, relative to the upper reaches of the Creek, is shallower, has faster velocities, and encounters greater vertical relief. It also has a wide floodplain consisting of many wetland areas. The RCWD has established long-term sampling sites where streamflow is monitored and measurements are conducted at localized sites as the need arises, information is available from RCWD upon request.

[43] Lower Rice Creek subwatershed facts are derived from RCWD Model Tools.
[44] More information available from RCWD.
[45] Peak flows are from the 2017 version of the RCWD District-Wide Model. The model, which is updated annually, was created at a regional scale and contains a very limited amount of site-level data. Users of the model and its outputs are solely responsible for confirming the accuracy of assumptions within the model.

WATER QUALITY

As stated above, the Shoreview reach of Rice Creek is shallower, has faster velocities, and encounters greater vertical relief relative to other portions of the Creek. These characteristics, combined with having a large, developed tributary area, causes the Creek to transport large amounts of sediment which are deposited in open water bodies downstream. Additionally, the MPCA lists Rice Creek as impaired for aquatic life, meaning the Creek may not support a thriving community of fish or other aquatic organisms, as indicated by fish population assessments and macroinvertebrate population assessments. Water quality as it relates to recreation was not assessed by the MPCA; however, poor water quality would reduce the appeal of fishing or canoeing the Creek.

PAST STUDIES AND EXISTING ISSUES

RCWD is aggressively addressing water quality within this reach of Rice Creek as part of the Long Lake Targeted Watershed Demonstration Project.[46] The project incorporated grant funding from the Clean Water, Land, and Legacy Amendment to improve water quality in Long Lake by implementing a series of project throughout the 100,000 acre watershed. RCWD has identified projects that provide water quality and flood control benefits to areas downstream of Shoreview. No initiatives were identified within the city of Shoreview as Rice Creek mostly meanders on undeveloped park land through this reach; however, the City acknowledges the regional approach to watershed management and will work with RCWD to meet water quality goals.

The larger Rice Creek watershed is included in the Upper Mississippi Bacteria TMDL.[47] In developing the TMDL plan, potential sources of E. Coli were identified within each subwatershed. In the Rice Creek Watershed, the vast majority of E. Coli is likely produced from pets and wildlife with a moderate amount attributed to humans. This TMDL applies to all subwatersheds within the RCWD watershed district.

Portions of Shoreview have been identified by the DNR to be a groundwater management area in need of proactive water management. In order to address concerns and conserve groundwater use, the city is proposing to retrofit the existing irrigation system for the Rice Creek Fields ballfield to use water from Rice Creek Ponds, located adjacent to the east of Rice Creek Parkway just north of County Road I. The project would reduce groundwater use by an average of six million gallons per year. The project is included in the implementation section of this Plan.

RAMSEY COUNTY DITCH 1, TURTLE LAKE, AND MARTHA LAKE

GENERAL DESCRIPTION

The Ramsey County Ditch 1 (RCD 1) subwatershed is located in the northwest and central part of the city and covers approximately 1750 acres in Shoreview. The total tributary area is approximately 3000 acres and includes Turtle Lake, a DNR Public Waterbody (PWI # 62-0061P) and RCD 1, a county ditch that is under the authority of the RCWD. The subwatershed discharges to Marsden Lake in Arden Hills, then to Rice Creek via RCD 1 south of Lexington Avenue and County Road J.

Turtle Lake is located in the north-central part of Shoreview just south of County Road I. It is the City's largest recreational lake with a surface area of 452 acres and has a maximum depth of about 35 feet.

[46] More information available from the RCWD at http://www.ricecreek.org/index.asp?SEC=31ABD821-A665-4BD3-BD8C-94D2358D5FE0&DE=3F0A0A44-9BE2-48AF-8658-C4C317230DEC&Type=B_PR

[47] More information available from the MPCA at https://www.pca.state.mn.us/water/tmdl/upper-mississippi-river-bacteria-tmdl-project

Turtle lake is used for boating, fishing, and swimming with public access provided by Turtle Lake County Park in the southeastern corner of the lake.

Martha Lake is located in the central portion of Shoreview north of Highway 96 and just west of the City's maintenance facility on Victoria Avenue. Table 15 shows RCD 1 Subwatershed facts, Table 16 shows Turtle Lake facts, and Table 17 shows Martha Lake facts.

Table 15. RCD 1 Subwatershed Facts[48]

Tributary Area (Direct)	3000 acres (1750 acres within Shoreview)
Tributary Area (Total)	3000 acres
Wetland area	675 acres
Downstream Watershed	Lower Rice Creek
MnDNR Public Water Number	M-059-002 (Unnamed Stream)
100-Year Flood Level[44]	Variable
MPCA Designations	None
MS4s in the Direct Tributary Area	Shoreview, Ramsey County

Table 16. Turtle Lake Facts[49]

Tributary Area (Direct)	833 acres
Wetland area	450 acres
Downstream Watershed	Marsden Lake/RCD1
MnDNR Public Water Number	62-0061P
Ordinary High Water Level	892.4 feet
Lake Surface Area	452 acres
Lake Outlet Type	Weir connected to 24" culvert
Lake Outlet Elevation	891.15
100-Year Flood Level[44]	892.7 feet
Lake Littoral Area	46%
MPCA Designations	Deep Lake, impaired for Aquatic Consumption (mercury food consumption advisory)
MS4s in the Direct Tributary Area	Shoreview, Ramsey County

[48] Lower Rice Creek subwatershed facts are derived from RCWD Model Tools.
[49] Turtle Lake facts are derived from RCWD Model Tools.

Table 17. Martha Lake Facts[50]

Tributary Area (Direct)	120 acres
Wetland area	33 acres
Downstream Watershed	Marsden Lake/RCD1
MnDNR Public Water Number	62-0064W
Ordinary High Water Level	892.4 feet
Lake Surface Area	31 acres
Lake Outlet Type	N/A
Lake Outlet Elevation	896
100-Year Flood Level[44]	Variable
Lake Littoral Area	None
MPCA Designations	Deep Lake, impaired for Aquatic Consumption (mercury food consumption advisory)
MS4s in the Direct Tributary Area	Shoreview, Ramsey County

DRAINAGE PATTERNS, WETLANDS, AND WATERBODIES

The watershed draining to Turtle Lake is relatively small compared to the surface area of the lake. This leads to a smaller amount of surface runoff contributing to water quality of the lake but also makes water levels harder to maintain. Historically, the waterbody fluctuates about 2.5 feet from year to year. When lake levels are fluctuating at the low end, it takes relatively longer for the levels to recover than in other lakes due to the small watershed size.

The lake discharges to Marsden Lake and RCD 1 via a weir structure connected to a 24-inch culvert. From Turtle Lake, drainage is collected from various tributaries and stormwater pipes from residential areas in RCD1 until it ultimately discharges to Rice Creek south of County Road J and just east of Lexington Avenue. Wetlands in the subwatershed are mapped in Figure 9.

WATER QUALITY

Turtle Lake has an abundance of water quality data that has been collected by Ramsey County Public Works and Metropolitan Council Environmental Services. The MPCA classifies Turtle Lake as a deep lake and has relatively high water quality for the region. According to the Southwest Urban Lakes Study conducted by the RCWD in 2009, Turtle Lake is above state standards for acceptable levels of TP and chlorophyll *a* and Secchi disk visibility for the lake.[51]

Despite acceptable pollutant levels as indicated by continued monitoring, Turtle Lake has been listed as impaired for Mercury in fish tissue since 2002.

There has been no water quality data collected on Martha Lake.

The subwatershed contributes runoff to Rice Creek and downstream waters. The City will be working with RCWD to develop any potential management techniques for targeting runoff in the watershed.

[50] Martha Lake facts are derived from RCWD Model Tools.
[51] Southwest Urban Lakes Study, Rice Creek Watershed District (2009). Available at https://www.pca.state.mn.us/sites/default/files/wq-iw11-19e.pdf

PAST STUDIES AND EXISTING ISSUES

The biggest perceived challenge facing Turtle Lake is fluctuating water levels. As stated above, the lake's relatively small watershed causes about 2.5 feet in water fluctuations. It was previously thought that fluctuations may be due to groundwater pumping at nearby facilities; however, a study by RCWD[51] determined that recent water level fluctuations are within the historic norm for the lake.

RCWD is aggressively addressing water quality within this reach of Rice Creek as part of the Long Lake Targeted Watershed Demonstration Project. The project incorporated grant funding from the Clean Water, Land, and Legacy Amendment to improve water quality in Long Lake by implementing a series of project throughout the 100,000 acre watershed. RCWD has identified projects that provide water quality and flood control benefits to areas downstream of Shoreview. No initiatives were identified within the city of Shoreview as the RCD1 subwatershed and Turtle Lake have high relative water quality for the region; however, the City acknowledges the regional approach to watershed management and will work with RCWD to meet water quality goals.

A statewide TMDL plan for Mercury reduction is underway that covers Turtle Lake. The plan was approved in 2007 with goals of major reduction to occur in 2018 and 2025. The target date for acceptable Mercury Levels for the lake is 2020.

RAMSEY COUNTY DITCH 4 AND ISLAND LAKE

GENERAL DESCRIPTION

The Ramsey County Ditch 4 (RCD 4) subwatershed is located in the southwest and central part of the city and covers approximately 820 acres in Shoreview. The total tributary area is approximately 3000 acres and includes Island Lake, a DNR Public Waterbody (PWI # 62-0075P). The subwatershed discharges to Rice Creek via RCD4 outside of city limits.

Island Lake is located in the south-central part of Shoreview and is divided into north and south basins by I-694. The combined basins have a surface area of approximately 56 acres. Both basins have a maximum depth of about nine feet. Island Lake is used for boating, fishing, and swimming with public access provided by Island Lake County Park in the western shore of the south basin.

Table 18 shows RCD 4 and Island Lake Subwatershed facts.

Table 18. RCD 4 and Island Lake Subwatershed Facts[52]

Tributary Area (Direct)	3000 acres (820 acres within Shoreview)
Tributary Area (Total)	3000 acres
Wetland area	97 acres within Shoreview
Downstream Watershed	Lower Rice Creek
MnDNR Public Waters Number	62-0075P
Ordinary High Water Level	946.76 feet
Lake Surface Area	56 acres
Lake Outlet Type	Available from RCWD
Lake Outlet Elevation	Available from RCWD
100-Year Flood Level[44]	Available from RCWD
Lake Littoral Area	100%
MPCA Designations	Deep Lake, impaired for nutrients and aquatic consumption (mercury food consumption advisory)
MS4s in the Direct Tributary Area	Shoreview, Ramsey County

DRAINAGE PATTERNS, WETLANDS, AND WATERBODIES

The watershed draining to the south basin of Island Lake is approximately 92 acres and the watershed draining to the north basin is approximately 183 acres; both watersheds are small relative to the size of the basins. The south basin is connected via a channel under I-694 to the north basin which then discharges to the northwest towards Valentine Lake and Long Lake, outside of city limits. The south portion of the watershed drains through the stormwater system toward Lake Josephine and Johanna Lake located west of city limits. The eventual outfall of the subwatershed is Long Lake. Wetlands in the subwatershed are mapped in Figure 9.

WATER QUALITY

Island Lake water quality data has been collected by Ramsey County Public Works and the MPCA. According to the Southwest Urban Lakes Study conducted by the RCWD in 2009, Island Lake is below state standards for acceptable levels of TP and chlorophyll *a* and narrowly above state standards for Secchi disk visibility for the lake.[51] Generally, water quality has worsened since the 1990s. The MPCA lists the lake as impaired for nutrients since 2002 and for mercury since 2012.

PAST STUDIES AND EXISTING ISSUES

The biggest challenge facing Island Lake is nutrient loading. According to the Southwest Urban Lakes TMDL, the RCWD has a list of management techniques that will address nutrient loading. These are addressed in the implementation plan below.

A statewide TMDL plan for Mercury reduction is underway that covers Island Lake. The plan was approved in 2007 with goals of major reduction to occur in 2018 and 2025. The target date for acceptable Mercury Levels for the lake is 2025. The City will continue to partner with the RCWD, MPCA, Ramsey County, and local residents to monitor water quality conditions, identify potential BMP

[52] RCD 4 subwatershed facts are derived from RCWD Model Tools.

locations, and ensure existing conditions are at least maintained or improved. the protection of the lake through applicable adjustment of management activities.

RAMSEY COUNTY DITCH 8 AND KERRY PONDS

GENERAL DESCRIPTION

The Ramsey County Ditch 8 (RCD 8) subwatershed is located in the northeast and central part of the city and covers approximately 842 acres in Shoreview. The total tributary area is approximately 976 acres and includes RCD8, a DNR Public Watercourse (#M-059-003) and a county ditch that is under the authority of the RCWD. The subwatershed discharges to The Lower Rice Creek subwatershed north of the city. The subwatershed contains a high proportion of wetlands within the city of Shoreview connected by the RCD 8 drainage system. Table 19 shows RCD 8 Subwatershed facts.

Table 19. RCD 8 Subwatershed Facts[53]

Tributary Area (Direct)	976 acres (842 acres within Shoreview)
Tributary Area (Total)	976 acres
Wetland area	306 acres
Downstream Watershed	Lower Rice Creek
MnDNR Public Waters Number	M-059-003 (Unnamed Stream)
100-Year Flood Level[44]	Variable
MPCA Designations	None
MS4s in the Direct Tributary Area	Shoreview, Ramsey County

DRAINAGE PATTERNS, WETLANDS, AND WATERBODIES

The ditch system drains southwesterly through Shoreview and then northwesterly beyond city limits connecting Evergreen Ponds (also known as Kerry Lake), Sherwood Ponds, and two unnamed ponds before exiting the city; all of which are DNR public waterbodies (PWI #62-095W, 62-096W, and 62-097W, 62-256W respectively). The first three aforementioned ponds are known as the Kerry Lakes system and were expanded in the 1980s to facilitate recreational use by the nearby Evergreen Shores development. Wetlands are shown in Figure 9.

The RCD 8 Subwatershed contains an intercommunity flow location, meaning a location where drainage is transferred between cities. This point is located where RCD 8 crosses underneath County Road J from Shoreview to Lino Lakes.

See Table 20 for the peak flow rates at this location. The city and RCWD evaluate project impacts as they affect intercommunity flow rates.

Table 20. Intercommunity Flow Rate Between Shoreview and Lino Lakes

Discharging City	Receiving City	Watercourse	Peak Flows (cubic feet per second)[54]			
			2-Year, 24-Hour Rainfall	10-Year, 24-Hour Rainfall	100-Year, 24-Hour Rainfall	100-Year, 10-day Snowmelt
Shoreview	Lino Lakes	Rice Creek	8	16	28	28

[53] RCD 8 subwatershed facts are derived from RCWD Model Tools.

[54] Peak flows are from the 2017 version of the RCWD District-Wide Model. The model, which is updated annually,

WATER QUALITY

There are no water quality reports for the Kerry Lakes pond system nor other DNR public waters in the subwatershed. According to an inspection report in 1998,[55] the ditch and drainage system for RCD8 was generally in good condition and functioning properly. Sediment accumulation was noted in a few of the outlets but not to a point that was inhibiting proper flow. The subwatershed contributes to water quality conditions in the Lower Rice Creek Watershed.

PAST STUDIES AND EXISTING ISSUES

Historically, there have been various flooding issues along the drainage system but those have since been fixed and the drainage system and associated stormwater is functioning well.

ANOKA COUNTY DITCH 25 AND POPLAR LAKE

GENERAL DESCRIPTION

The Anoka County Ditch 25 (ACD 25) subwatershed is located in the northeast corner of the city and covers approximately 250 acres in Shoreview. The total tributary area is approximately 2860 acres and includes ACD 25, a county ditch that is under the authority of the RCWD; however, the ditch system does not begin until north of the city. The Shoreview portion of the subwatershed contains Poplar Lake, a DNR Public Water (PWI #62-44W). The lake is a large wetland complex that drains north towards ACD 25, then to Reshanau Lake, then to Rice Creek. The subwatershed contains the Poplar Lake Open Space area, an open area maintained by Ramsey County Parks. The park contains no developed infrastructure and has a number of footpaths. Table 21 and Table 22 show ACD 25 Subwatershed facts and Poplar Lake facts, respectively.

Table 21. ACD 25 Subwatershed Facts[56]

Tributary Area (Direct)	2860 acres (250 acres within Shoreview)
Tributary Area (Total)	2860 acres
Wetland area	106 acres
Downstream Watershed	Middle Rice Creek
MnDNR Public Water Number	Not DNR Protected in Shoreview
100-Year Flood Level[44]	Variable
MPCA Designations	None
MS4s in the Direct Tributary Area	Shoreview, Ramsey County

was created at a regional scale and contains a very limited amount of site-level data. Users of the model and its outputs are solely responsible for confirming the accuracy of assumptions within the model.

[55] RCD 8 inspection report. Available at http://rcwd.houstoneng.net/ditchportal/Historic%20Documents/Scans/RCD%208/Report-Inspection/RCWD_RCD8_RPT-I_01011998_3.PDF

[56] ACD 25 Inspection Report. Available at http://rcwd.houstoneng.net/ditchportal/Historic%20Documents/Scans/ACD%2025/Report-Inspection/RCWD_ACD25_RPT-I_10042007_7.PDF

Table 22. Poplar Lake Facts[57]

Tributary Area (Direct)	833 acres
Wetland area	450 acres
Downstream Watershed	ACD 25
MnDNR Public Water Number	62-0044P
Ordinary High Water Level	N/A
Lake Surface Area	36 acres (12 acres in Shoreview)
Lake Outlet Type	N/A
Lake Outlet Elevation	N/A
100-Year Flood Level	Available from RCWD
Lake Littoral Area	100%
MPCA Designations	None
MS4s in the Direct Tributary Area	Shoreview, Ramsey County

DRAINAGE PATTERNS AND WATERBODIES

The ACD 25 subwatershed contains 88 different subcatchments, five of which are located in Shoreview, and is a component of the larger Middle Rice Creek drainage system. Immediate drainage in Shoreview flows toward Poplar Lake via stormwater pipes which drains northeast out of the city. Wetlands are shown in Figure 9.

WATER QUALITY

There are no water quality reports for the Poplar Lake pond and wetland system. The subwatershed contributes to water quality conditions in the Middle Rice Creek Subwatershed and Reshanau Lake; however, this area is relatively small when compared to other drainage areas outside the city.

PAST STUDIES AND EXISTING ISSUES

A 2007 study of the drainage system determined that the ditch and some drainage structures are in a state of disrepair with no feasible repair being recommended at that time. Issues include erosion and flooding overtopping roadways as the ditch system moves toward Reshanau Lake. As stated above, the drainage system does not reach the limits of Shoreview, so the issues are downstream of city boundaries; however, the ACD 25 subwatershed is included in the Lino Lake Chain of Lakes TMDL.[58] The TMDL aims to reduce TP loading to Reshanau Lake by reducing loading to small lakes, managing to urban ditch system, and restoring partially drained wetlands. An implementation plan has yet to be approved for this TMDL.

ANOKA-RAMSEY JUDICIAL DITCH 1

GENERAL DESCRIPTION

The Anoka-Ramsey Judicial Ditch 1 (ARJD 1) subwatershed is located in the northwest corner of the city and covers approximately 38 acres in Shoreview. The total tributary area is approximately 2800 acres

[57] Poplar Lake facts are derived from RCWD Model Tools.
[58] Lino Lake Chain of Lakes TMDL, Rice Creek Watershed District. Available here: https://www.pca.state.mn.us/sites/default/files/wq-iw11-13e.pdf

and includes the ARJD1 system of ditches, which are under the authority of the RCWD; however, the ditch system does not begin until north of the city. The Shoreview portion of the subwatershed contains mostly developed land that drains to stormwater system. The ultimate outfall of ARJD 1 is Rice Creek. Table 23 shows ARJD 1 Subwatershed facts.

Table 23. ARJD 1 Subwatershed Facts[59]

Tributary Area (Direct)	2800 acres (38 acres within Shoreview)
Tributary Area (Total)	2800 acres
Wetland area	2 acres within Shoreview
Downstream Watershed	Lower Rice Creek
MnDNR Designation	Not DNR Protected in Shoreview
100-Year Flood Level[44]	Variable
MPCA Designations	None
MS4s in the Direct Tributary Area	Shoreview, Ramsey County

DRAINAGE PATTERNS AND WATERBODIES

The Shoreview portion of the subwatershed drains to the stormwater system before eventually discharging to Branch 2, Lateral 1 of ARJD1 north of the city. Wetlands are shown in Figure 9.

PAST STUDIES AND EXISTING ISSUES

RCWD contains a historical document summary of work along the ARJD1 drainage system.[60] There are currently no drainage issues associated with the Shoreview portion of the subwatershed.

IMPAIRED WATERS AND TOTAL MAXIMUM DAILY LOAD PLANS

This section summarizes the MPCA impaired waters and associated Total Maximum Daily Load (TMDL) plans within the City of Shoreview as of May 2018.

MPCA IMPAIRED WATERS

The MPCA maintains a list of impaired waters,[61] some of which are located in Shoreview. According to MPCA, the number of waters in Minnesota on the draft 2018 impaired waters list totals 5,101 impairments on a total of 2,669 water bodies (with many water bodies being impaired by several pollutants). While monitoring continues to identify more impairments, the overall percentage of impaired waters in Minnesota remains at 40%. The other 60% are in good condition and need protective strategies to stay healthy. Table 24 lists impaired waters located at least partially in Shoreview, its associated watershed, the impairment, and any approved or active Total Maximum Daily Load (TMDL) associated with the water.

[59] ARJD 1 Inspection Report. Available at http://rcwd.houstoneng.net/ditchportal/Historic%20Documents/Scans/ACD%2025/Report-Inspection/RCWD_ACD25_RPT-I_10042007_7.PDF

[60] ARJD 1 summary of work. Available at http://rcwd.houstoneng.net/ditchportal/Historic%20Documents/ARJD1%20Historic%20Document%20and%20Summary%20Listing.pdf

[61] 2018 list available at http://www.pca.state.mn.us/index.php/water/water-types-and-programs/minnesotas-impaired-waters-and-tmdls/maps-of-minnesotas-impaired-waters-and-tmdls.html

Table 24. Impaired Waters in Shoreview

Receiving Water	Associated Subwatershed	Assessment ID or DNR Lake #	Affected Use	Pollutant or Stressor	Target TMDL Start/Completion Date
Island Lake - South	Ramsey County Ditch 4	62-0075-01	Aquatic Consumption	Mercury in fish tissue	2012/2025
			Aquatic Recreation	Nutrient/eutrophication indicators	Plan approved 2015
Island Lake-North	Ramsey County Ditch 4	62-0075-02	Aquatic Consumption	Mercury in fish tissue	2012/2025
			Aquatic Recreation	Nutrient/eutrophication indicators	Plan approved 2015
Lake Owasso	Lake Owasso	62-0056-00	Aquatic Consumption	Mercury in fish tissue	Plan approved 2007
Snail Lake	Snail Lake	62-0073-00	Aquatic Consumption	Mercury in fish tissue	Plan approved 2007
Turtle Lake	Ramsey County Ditch 1	62-0061-00	Aquatic Consumption	Mercury in fish tissue	2012/2025
Rice Creek (Long Lake to Locke Lake)	Lower Rice Creek	07010206-583	Aquatic Life	Aquatic macroinvertebrate bioassessments	2020/2025
				Fishes bioassessments	2020/2025
			Aquatic Recreation	E. Coli	Plan approved 2014

TMDL PLANS

The City understands that the TMDLs will be used by the MPCA and local entities to further prioritize management actions on impaired waters. The City considers the nutrient and bacteria listings of the lakes within the City and that the City discharges to and works to meet required actions of those plans in enforcement and management decisions. However, the city recognizes that waters listed with mercury as the pollutant are, and must be, managed more regionally. More detail on the progress of the statewide mercury TMDL process can be found on the MPCA's website. Table 25 lists TMDL plans within Shoreview, affected waters, a summary of the required actions identified in the plans, and current city actions and programs aimed at meeting the TMDL requirements.

Table 25. TMDL Plans within Shoreview

TMDL Plan	Affected Waters[62]	Required Action(s)	Current City Action(s)/Programs
Lino Lakes Chain of Lakes *Nutrient* TMDL	Marshan Lake Reshnau Lake Rice Lake Baldwin Lake	Categorical Wasteload Allocation Reduction (group of MS4s specific to affected water)	Enforce City standards in Appendix C of this Plan
Upper Mississippi River *Bacteria* TMDL	**Rice Creek**	Identify and map potential bacteria hotspots	Shoreview has installed waste receptacles in all public spaces including dog parks and will continue to work with County and WDs to identify areas where bacteria hotspots may be located.
		Update and enforce pet waste ordinances	Shoreview enforces ordinance. City Code Section 601.030
		Direct flow pathways between contributing areas to infiltration/treatment basins or away from impervious areas to prevent direct pathway to receiving waters.	Redevelopment standards require infiltration/treatment prior to discharge to downstream waters
		Develop, implement, and enforce a program to detect and eliminate illicit discharges	Part of City's MS4 program (See Appendix E)
		Inspect/ monitor stormwater outfalls to reduce dry weather flow	The City regularly inspects stormwater systems as part of MS4 Program
		Install Filtration/Biofiltration BMPs where feasible	The City supports RCWD stormwater requirements which emphasize infiltration where feasible
		SSTS Maintenance	SSTS Ordinance. City Code Section 209.090
		Install buffers or other applicable BMPs near waterbodies	City standards include a 16.5 foot minimum buffer
Southwest Urban Lakes *Nutrient* TMDL	**Island Lake, North Basin** **Island Lake, South Basin** Long Lake, South Basin Lake Valentine	Categorical Wasteload Allocation Reductions (group of MS4s specific to affected water)	Enforce City Standards in Appendix C of this Plan

[62] Bolded waters indicate waters within of the City of Shoreview. Non-bolded waters are outside the City of Shoreview but are waters whose watershed includes a portion of the City.

IMPLEMENTATION PROGRAM

The Implementation Program is intended to provide guidance in carrying out the overall objectives of the Plan. This section begins by presenting the major goals that have been the basis for the first two versions of the plan dating back to 1990. A description of the regulatory roles and responsibilities governing surface water management in Shoreview follows, including an outline of existing and proposed official controls (i.e., ordinances and standards), planned capital improvements (i.e., physical improvements, studies, ongoing maintenance, inspection and monitoring, and other management activities directly related to the City's NPDES MS4 SWPPP) and procedures for amending the Plan are presented.

OVERVIEW AND GOALS

Prior to the changes made in 2015, Minnesota Rules Chapter 8410[63] required local governments to establish goals and policies for the effective management of water resources within their local Surface Water Management Plan. While not specifically required for this 2018-2028 Plan Update, the goals and goal statements established in the City's 2005 Plan have been carried forward here to help convey the range of activities the City has and will continue to engage in. Table 26 summarizes the City's nine goals and corresponding goal statements. Many of the action-implementation activities correspond directly to actions committed to in the City's NPDES Permit submittal known as the Storm Water Pollution Prevention Program (SWPPP).

Table 26. Plan Goals and Goal Statements

Goal Number	Goal	Goal Statement
1	Water Quality	Maintain or improve water quality to meet established standards consistent with the intended use and classification.
2	Water Quantity (Flooding)	Control flooding and protect property while minimizing public expenditures necessary to control volumes and rates of runoff
3	Wetlands	Preserve and improve wetlands acreage, functions and values and achieve no net loss of wetlands in conformance with the Wetland Conservation Act
4	Erosion Control	Minimize soil erosion and sedimentation
5	Groundwater	Protect the quality and quantity of groundwater resources and promote groundwater recharge
6	Recreation, Habitat, and Shoreline Management	Protect and enhance fisheries and wildlife habitat, surface water recreation and shoreland areas
7	Public Participation, Information, and Education	Public participation information and education. Provide information and educational resources to improve knowledge and promote an active public role in management of water resources
8	Maintenance and Inspection	Preserve function and performance of public infrastructure through continued implementation of a maintenance and inspection program
9	Regulatory Responsibility	Maintain primary responsibility for managing water resources at the local level in coordination and cooperation with other agencies and organizations

[63] Minnesota Rules, Chapter 8410. Available at https://www.revisor.mn.gov/rules/?id=8410

ROLES AND RESPONSIBILITIES

This Section summarizes the roles and responsibilities of the City and water management agencies having direct roles and responsibilities related to this Plan. Table 3-1 from the Ramsey-Washington Metro Watershed District Plan, and included in Appendix B of this Plan, contains a more complete overview of the range of water related agencies and types of approvals needed for specific projects.

CITY OF SHOREVIEW

The City's role in surface water management is summarized below:

- **Local Surface Water Management Plan:** Shoreview must prepare a local plan that conforms to the requirements of Minnesota Rules 8410 and the Watershed Plans. This SWMP will be completed and adopted in 2018 and will be updated again in 2028.
- **Project Review & Permitting**: The City of Shoreview is a Level 1 City and has deferred permitting of most projects to the watershed organizations. The City is responsible for informing developers and other project applicants regarding RWMWD and RCWD rules and permits. The City is also responsible for informing permit applicants that they must obtain a NPDES Construction Site Stormwater Permit from the MPCA for projects disturbing 1 acre or more. The City has developed standards and a permit program for certain projects that fall below the thresholds of the RCWD and RWMWD.
- **City Official Controls:** The City must maintain official control for the management of surface water systems and resources. Updates to city ordinances and official controls must be consistent with, the RWMWD and RCWD Rules and updates to the NPDES MS4 Permit Program. Table 27 shows Shoreview's surface water related official controls.

Table 27. Shoreview's Surface Water Related Official Controls

General Category	City Code Section[64]	Title
Illicit Discharge Protection	209.060	Stormwater Management (A) Illicit Discharge Detection and Elimination
Construction Site Erosion and Sediment Control	209.040	Soils, Slopes, Grading and Erosion Control.
Post-construction Stormwater Management	209.065	Surface Water Management
Wetlands (Buffers) **Wetlands (Protected Areas)**	209.065 209.070	Surface Water Management Wetlands
Shoreland Standards	209.080	Shoreland Management
Individual Sewage Treatment Systems	209.090	Subsurface Sewage Treatment Systems
Floodplains	205.091	Floodplain Management Ordinance

- **Public Works Group:** Participate in opportunities for staff training and advance public works issues and NPDES MS4 implementation.

[64] Shoreview City Code available at https://www.shoreviewmn.gov/government/city-code

- **Maintenance of City Stormwater Management Systems:** Shoreview is responsible for the inspection, maintenance, cleaning, repair, and reconstruction of the city's stormwater system (storm sewers, ponding areas, ditches, water level control structures, etc.) to keep it in good working order to prevent flooding and address water quality. Maintenance requirements under the NPDES MS4 stormwater permit include responsibilities for pond assessment and maintenance. The city should coordinate with the District on prioritization of ponds that are the most needed for water quality of District resources.
- **Wetlands Management:** The RWMWD and the RCWD are the LGUs responsible for administering WCA. The City will refer permit applicants whose projects contain possible wetlands to the RWMWD and RCWD, depending on the location of the wetland as it relates to district jurisdictions.
- **Groundwater:** Shoreview is responsible for developing, adopting, and implementing a wellhead protection programs for drinking water supplies.

WATERSHED DISTRICTS

The Watershed Districts are responsible for fulfilling the duties of Minnesota Statutes 103D. Both the RWMWD and RCWD seek to collaborate with cities, businesses, and individuals to achieve their goals.

Major responsibilities of the Watershed District's generally include:

- Implementation of the District's Rules, Regulations, and Permitting Program
- Wetland and Natural Resource Management
- Maintenance of District Facilities and MS4 Permit Responsibilities
- Monitoring, Reporting and Evaluation
- Assistance to Local Governmental Units
- WRAPS and TMDL Implementation

Specific to the City of Shoreview, Both RWMWD and RCWD have permit programs that owners of projects meeting their criteria must follow and obtain permits for prior to initiating construction.

Both watersheds have a comprehensive set of rules[65] covering areas including, but not limited to, stormwater management, erosion and sediment control, floodplains, wetlands, and illicit discharges.

RAMSEY COUNTY

Counties have a wide variety of duties, including road maintenance (street sweeping, and snow/ice control), planning and zoning, parks and recreation, water quality, and solid waste management that relate to management of surface waters within the City. Specific to this Plan, Ramsey County is responsible for:

- Groundwater management, including preparing and adopting groundwater plans. The Ramsey Conservation District prepared the county's groundwater plan, which remains in draft form, in 2010.
- Adopting and implementing the county's MS4 SWPPP. Like the City's SWPPP, the County SWPPP include provisions for water quality and stormwater best management practices, including maintenance of county-owned stormwater infrastructure

[65] RCWD Rules available at http://www.ricecreek.org/ or via contacting the district, RWMWD Rules available at https://www.rwmwd.org/ or via contacting the district.

- Review and comment of the City's Draft SWMP. The County has 45 days to review and provide comment on the City's SWMP.

METROPOLITAN COUNCIL

The Metropolitan Council's Environmental Services (MCES) group provides review and comment on watershed management plans, local water management plans, and local comprehensive (land use) plans. MCES also conducts lake monitoring (including the Citizen Assisted Monitoring Program) and conducts river and stream monitoring. MCES has 45 days to review and provide comment on the City's SWMP. MCES comments are also provided to the watershed organizations to consider as they prepare their comments.

CAPITAL IMPROVEMENTS

The implementation program as described in the implementation Tables for each Plan goal includes identification and preliminary target dates for capital improvements, maintenance and inspections, permitting, plan amendments, public involvement, and monitoring programs.

The Implementation Program is not a direct commitment to complete each and every activity in the time frame suggested. Instead, the Implementation Program will be reviewed on an annual basis and each improvement will be reconsidered and advanced or adjusted based on City budgets, related activities, and other relevant factors at that time. Estimated costs of recommended actions are not provided recognizing that planning level estimates often set unrealistic expectations of the actual costs of projects and/or activities. In many cases, the City Council is required to specifically approve a project or budget prior to making the funds available.

The financial goal for this Plan is to fit within the existing funding sources to pay for water resources management activities. Except for the selected items listed below, planning-level estimates of capital expenditures and ongoing program activities have not been made. The primary funding source for Plan activities is the City's Surface Water Management Fund. The Fund is anticipated to be supplemented by special assessments, grants and other available funding on a project specific basis. In consideration of recent municipal budget situations, a renewed focus will be placed on securing grants, enlisting regional watershed funding, seeking local partnerships with watershed organizations and adjacent communities and investigating other innovative financing mechanisms.

Table 28 provides a summary of the implementation plan.

Table 28. Implementation Plan

Activity No.	Activity Description	Estimated Implementation Year(s)	Estimated Cost (City)	Estimated Cost (Others)
WATER QUALITY				
1.1	Continue efforts to reduce chloride use (including ongoing equipment operator training)	Annually	$1,000-$2,000	TBD
1.2	Review CIP projects, new and redevelopment areas in advance of construction to evaluate needs and opportunities for water quality improvements. Complete feasibility study where grant applications may be pursued.	Annually	$10,000 - $25,000	TBD
1.3	Where CIP projects, new and redevelopment water quality improvement opportunities exist, work with watershed(s) to identify state and/or local grants. Apply for Grants if eligible.	Annually	$3,000	TBD
1.4	Review City Facilities, including buildings and parks for water quality BMP opportunities.	Annually	Included with 1.2	TBD
1.5	Partner with Ramsey-Washington Metro and Rice Creek Watershed District on water quality improvement studies and implementation projects. Prioritize projects within the subwatersheds of impaired waters listed in Table 24 or at-risk waters within RWMWD (Lake Owasso, Lake Emily, Shoreview Lake)[66]	Annually	$10,000	Variable[67]
1.6	Use results for the RWMWD's macrophyte harvesting study to inform implementation of macrophyte management in Owasso Lake	2018	TBD	$100,000 (RWMWD)
1.7	Partner with RWMWD to perform a feasibility study of retrofit opportunities throughout the Shoreview Lake Subwatershed to improve water quality	2017	$2,000	$30,000 (RWMWD)
1.8	Partner with RWMWD to perform a feasibility study of retrofit opportunities throughout the Lake Owasso Subwatershed to improve water quality	TBD	$2,000	$30,000 (RWMWD)
1.9	Partner with RWMWD to perform a feasibility study of retrofit opportunities throughout the Lake Emily Subwatershed to improve water quality, including outflows from Lake Judy	2016-2017	$2,000	$30,000 (RWMWD)

[66] More information regarding specific implementation can be found in Appendix E
[67] More information regarding estimated costs of specific actions can be found in Appendix E

Activity No.	Activity Description	Estimated Implementation Year(s)	Estimated Cost (City)	Estimated Cost (Others)
WATER QUANTITY				
2.1	Partner with Ramsey-Washington Metro and Rice Creek Watershed District on water quantity studies and implementation projects.	Annually	$3,000-$5,000	TBD
2.2	Partner with RWMWD to perform a feasibility study of retrofit opportunities throughout the Shoreview Lake Subwatershed to improve water quality	2017	$3,000-$5,000	$30,000 (RWMWD)
2.3	Implement projects that are deemed feasible in the Shoreview Lake Subwatershed Feasibility Study	2018 2019-2026	$100,000 TBD	$200,000 (RWMWD)
2.4	Work with RCWD to complete a RCD 1 Drainage System study for the Marsden Lake drainage areas north of County Rd I. The City would like RCWD to lead the effort, efforts are subject to RCWD Board approval.	2019	$25,000	TBD
2.5	Continue work with RWMWD to better assess the interaction between Grass and Vadnais Lakes.	2018-2020	$5,000-$7,000	TBD
2.6	Complete a stormwater vulnerability assessment on City infrastructure to assess risks and possible risk reduction options.	2019-2020	$30,000	TBD
2.7	Work with RWMWD (as lead) to develop an operations plan for managing water levels on Grass Lake system.	2019-2020	$5,000	TBD
2.8	Create and implement an Emergency Response Plan for Owasso Lake	2017-2026	$2,000	TBD
EROSION CONTROL				
4.1	Continue project review process established in NPDES MS4 Program.	Annually	$5,000-$10,000	TBD
GROUNDWATER				
5.1	Create an infiltration vulnerability map based on DWSMAs located within the City boundary. Identify prohibited and restricted infiltration areas.	2018	$2,000	TBD
5.2	Implement Rice Creek Fields Stormwater Reuse project to cut groundwater demand of the aquifer.	2019	$200,000	$50,000 (RCWD) $150,000 (Met Council)
RECREATION, HABITAT, AND SHORELINE MANAGEMENT				
6.1	Publish information relating to shoreland and habitat management and enhancement.	Annually	$2,000	TBD
6.2	Assess and conduct buffer and natural areas restoration along the Owasso Lakes Area	2024-2026	$2,000	$70,000 (RWMWD)
6.3	Implement a shoreline management study to assist with lakeshore restoration to enhance lakeshore native habitat and stabilization	2018	$2,000	$25,000 (RWMWD)
6.4	Evaluate the carp population in Lake Owasso	2017-2018	TBD	$150,000[68] (RWMWD)
6.5	Manage the carp population in Lake Owasso	2019-2026	TBD	$240,000[68] (RWMWD)

[68] Representative of cost assessment throughout the Owasso Chain of Lakes

Activity No.	Activity Description	Estimated Implementation Year(s)	Estimated Cost (City)	Estimated Cost (Others)
PUBLIC PARTICIPATION, INFORMATION, AND EDUCATION				
7.1	Continue Storm Water Education Program established in NPDES MS4 Program.	Annually	$2,000	TBD
MAINTENANCE AND INSPECTION				
8.1	Develop BMP Maintenance Agreement Program through standards and/or City Code.	2018-2019	$2,000	TBD
8.2	Implement prioritized pond cleanout program based on results of study completed in 2017. - Dredging - Planning and Design	Annually Annually	$125,000 $50,000	TBD
REGULATORY RESPONSIBILITY				
9.1	Finalize Standards/Ordinance Updates for Projects Not Covered by RCWD and RWMWD	2018	$5,000	TBD
9.2	Update NPDES MS4 Program in response to new permit issuance	2018 2023 2028	$5,000 $5,000 $5,000	TBD
9.3	Update Surface Water Management Plan	2028	$50,000	TBD

Table 29 provides a summary of the City's annual stormwater program budget. Budget values listed are estimated based on the actual 2018 budget and are set on an annual basis by Council.

Table 29. Surface Water Operation and Improvements Budget Summary

Year	Annual Budget* (2018 Dollars)
2018	1,428,000
2019	1,506,000
2020	1,551,000
2021	1,598,000
2022	1,646,000
2023	1,695,000
2024	1,746,000
2025	1,798,000
2026	1,852,000
2027	1,908,000
2028	1,965,000

*2018 and 2019 budgets are approved amounts. Values listed for 2020-2028 are estimated based on a 3% annual increase. Actual annual adjustments are reviewed and approved annually

AMENDMENTS TO THE PLAN

AMENDMENT PROCEDURES

This Plan is intended to extend through the year 2028 corresponding to the ten-year update cycle established for the City's Comprehensive Plan. For the plan to remain dynamic, a process to amend the Plan to implement new information, ideas, methods, standards, management practices, and any other changes which may affect the intent and/or results of this Plan must be established. Amendment proposals can be requested any time by any person or persons either residing or having business within the City.

Amendments to the Plan automatically become part of the City's Comprehensive Plan. Following adoption of a major amendment by Council, the Plan will be recognized as an amendment to the City's Comprehensive Plan.

Minor amendments, which do not require Council adoptions, include the following changes:

- Formatting or reorganization of the plan;
- Clarification of existing plan goals or standards;
- Inclusion of new or additional data that does not change the intent of the Plan;
- Adjustments to related program activities referenced in the Plan (e.g., NPDES MS4 Permit Program)

Conversely, major amendments include such things that change the essence of goals, standards, and other significant procedural components of the plan.

REQUEST FOR AMENDMENTS

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

STAFF REVIEW

Following a request for Plan amendments, staff will make a decision as to the validity of the request. Three options exist:

- Reject the amendment;
- Accept the amendment as minor, with minor amendments collectively added to the Plan at a later date; and
- Accept the amendment as major, with major amendments requiring immediate action. In acting on a major amendment request, staff shall recommend to the City council whether or not a public hearing is warranted.

COUNCIL CONSIDERATION

Major amendments and the need for a public hearing shall be considered at a regular or special Council meeting. Staff recommendations should also be considered before decisions on appropriate action(s) are made.

PUBLIC HEARING AND COUNCIL APPROVAL

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

WD APPROVAL

All proposed amendments must be reviewed and approved by the appropriate Watershed District prior to final adoption of the amendments.

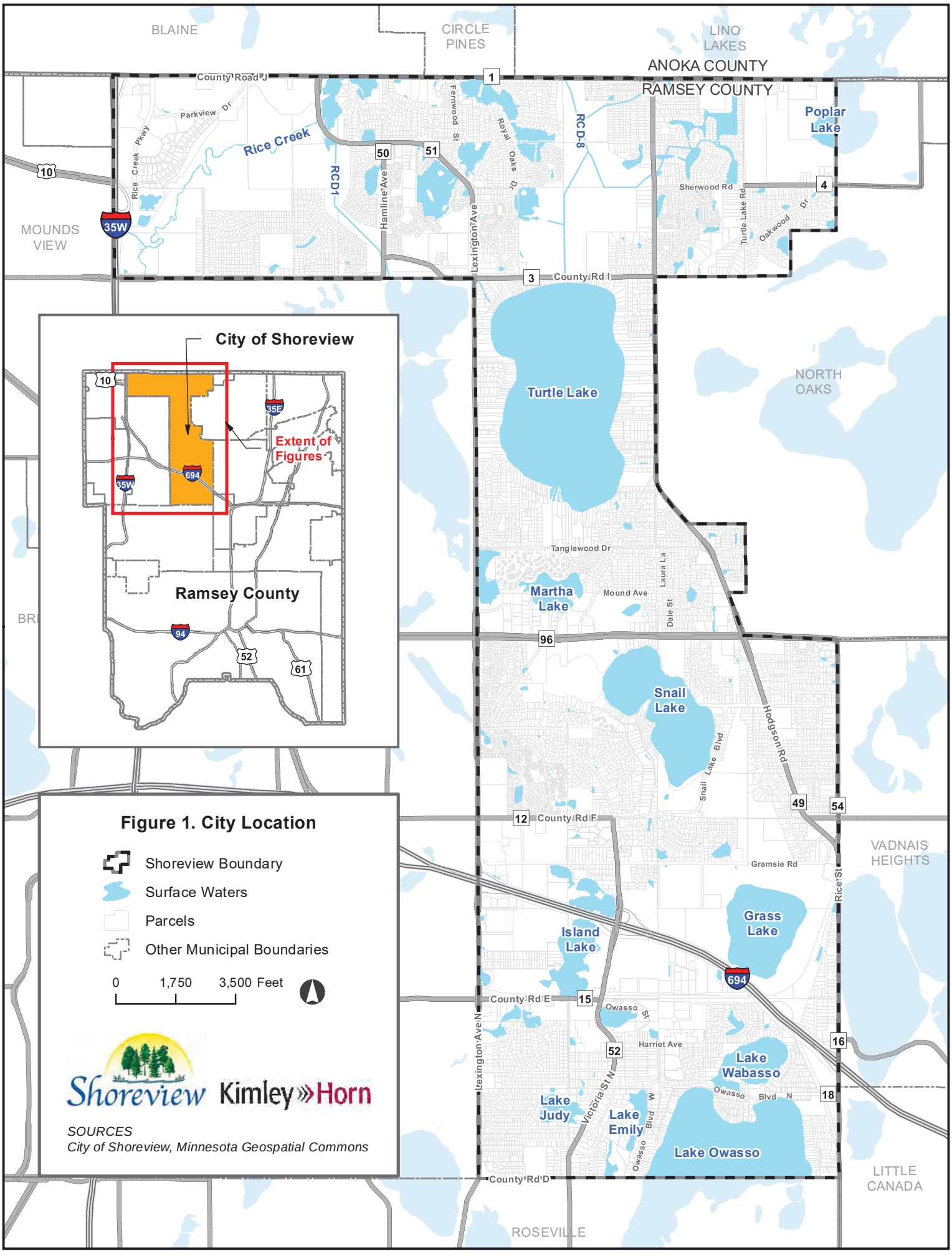
COUNCIL ADOPTION

Final action on an amendment, following approval by the WD is Council adoption.

ANNUAL REPORT TO COUNCIL

An annual report will be completed by City staff summarizing water resource management activities that have been completed over each calendar year. To the extent practicable, and to avoid duplication of efforts, the annual report will be coordinated with preparation of the NPDES MS4 Program annual report.

Staff's intent is to revisit the goals, standards, tools, and progress of the Plan on a three to five-year basis. Water quality trends will be reviewed, the effectiveness of regulatory programs will be evaluated, and the success of public improvement projects will be assessed.


BLAINE
CIRCLE PINES
LINO LAKES
ANOKA COUNTY
RAMSEY COUNTY
MOUNDS VIEW
NORTH OAKS
VADNAIS HEIGHTS
LITTLE CANADA
ROSEVILLE
BR
County Road J
Parkview Dr
Rice Creek Pkwy
Rice Creek
RCD1
RCD-8
Fernwood St
Royal Oaks Dr
Hamline Ave
Lexington Ave
Sherwood Rd
Turtle Lake Rd
Oakwood Dr
Poplar Lake
Turtle Lake
Tanglewood Dr
Martha Lake
Mound Ave
Laura La
Dale St
Snail Lake
Snail Lake Blvd
Hodgson Rd
Gramsie Rd
Rice St
Grass Lake
Island Lake
County Rd E
Owasso St
Harriet Ave
Victoria St N
Lake Judy
Lake Emily
Owasso Blvd W
Lake Owasso
Lake Wabasso
Owasso Blvd N
County Rd D
County Rd I
County Rd F
1
3
4
10
12
15
16
18
49
50
51
52
54
61
94
96
35W
35E
694
City of Shoreview
Extent of Figures
Ramsey County
Figure 1. City Location
Shoreview Boundary
Surface Waters
Parcels
Other Municipal Boundaries
0
1,750
3,500 Feet
Shoreview
Kimley»Horn
SOURCES
City of Shoreview, Minnesota Geospatial Commons

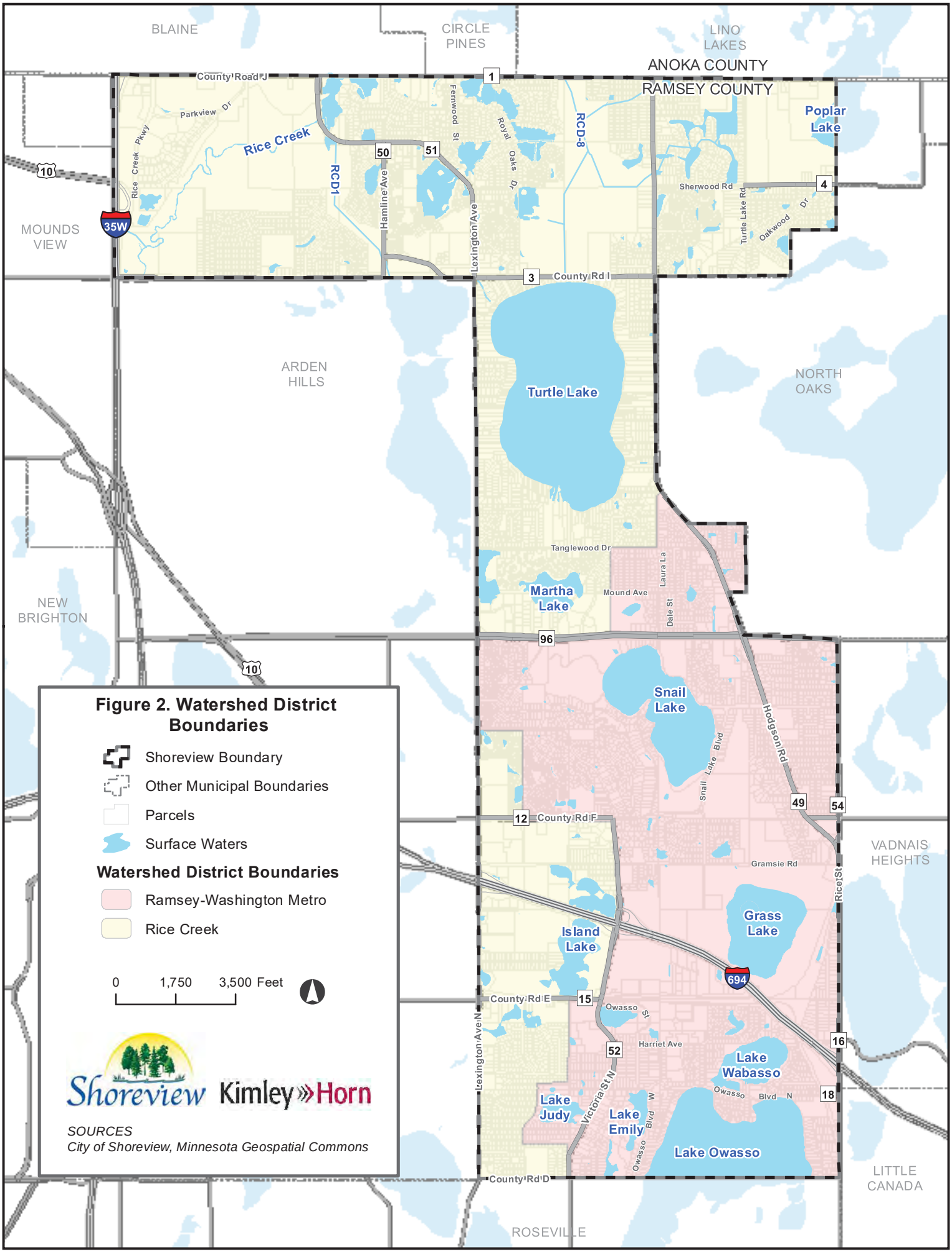


Figure 2. Watershed District Boundaries

- Shoreview Boundary
- Other Municipal Boundaries
- Parcels
- Surface Waters

Watershed District Boundaries

- Ramsey-Washington Metro
- Rice Creek

0 1,750 3,500 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Minnesota Geospatial Commons

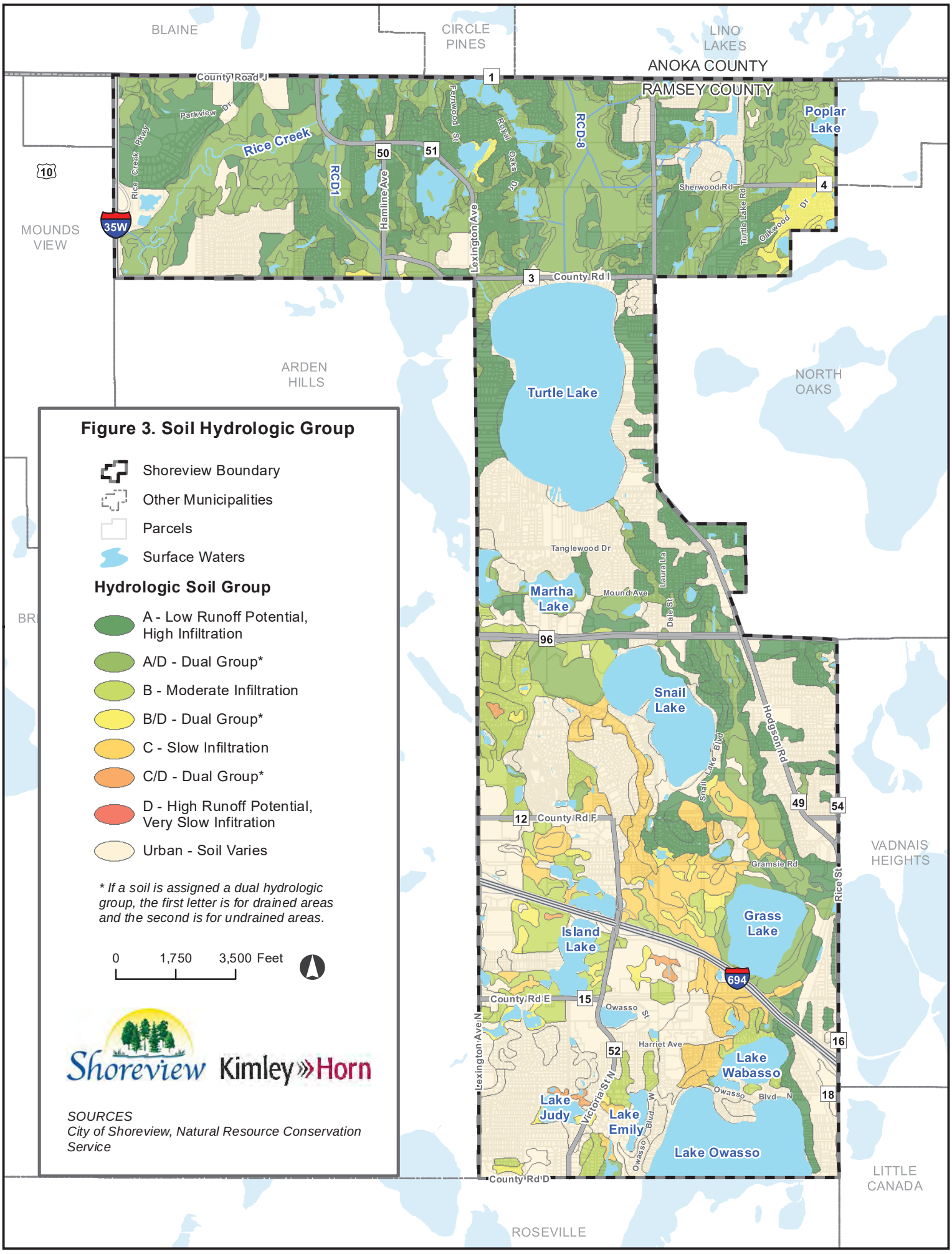


Figure 3. Soil Hydrologic Group

- Shoreview Boundary
- Other Municipalities
- Parcels
- Surface Waters

Hydrologic Soil Group

- A - Low Runoff Potential, High Infiltration
- A/D - Dual Group*
- B - Moderate Infiltration
- B/D - Dual Group*
- C - Slow Infiltration
- C/D - Dual Group*
- D - High Runoff Potential, Very Slow Infiltration
- Urban - Soil Varies

** If a soil is assigned a dual hydrologic group, the first letter is for drained areas and the second is for undrained areas.*

0 1,750 3,500 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Natural Resource Conservation Service

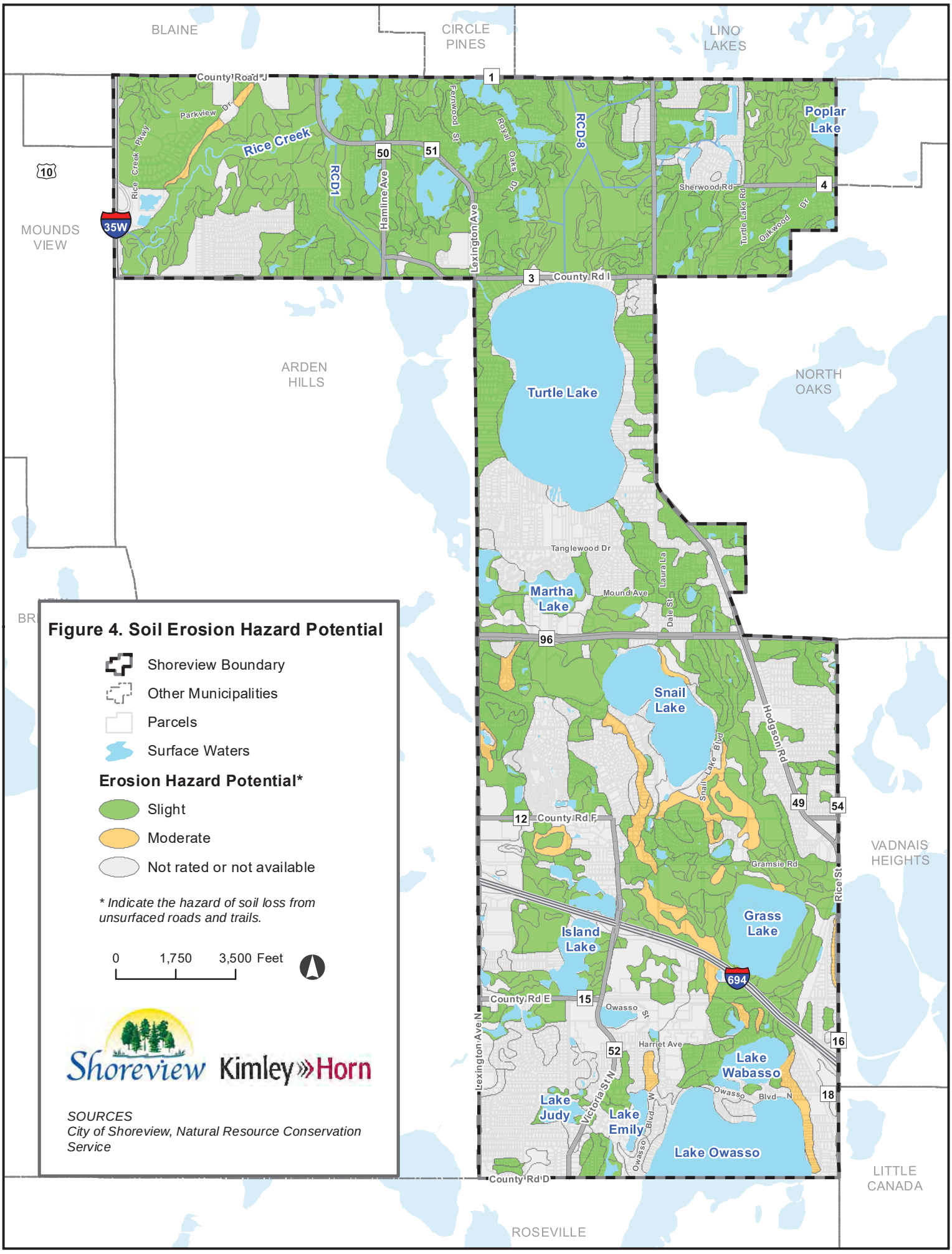


Figure 4. Soil Erosion Hazard Potential

- Shoreview Boundary
- Other Municipalities
- Parcels
- Surface Waters

Erosion Hazard Potential*

- Slight
- Moderate
- Not rated or not available

** Indicate the hazard of soil loss from unsurfaced roads and trails.*

0 1,750 3,500 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Natural Resource Conservation Service

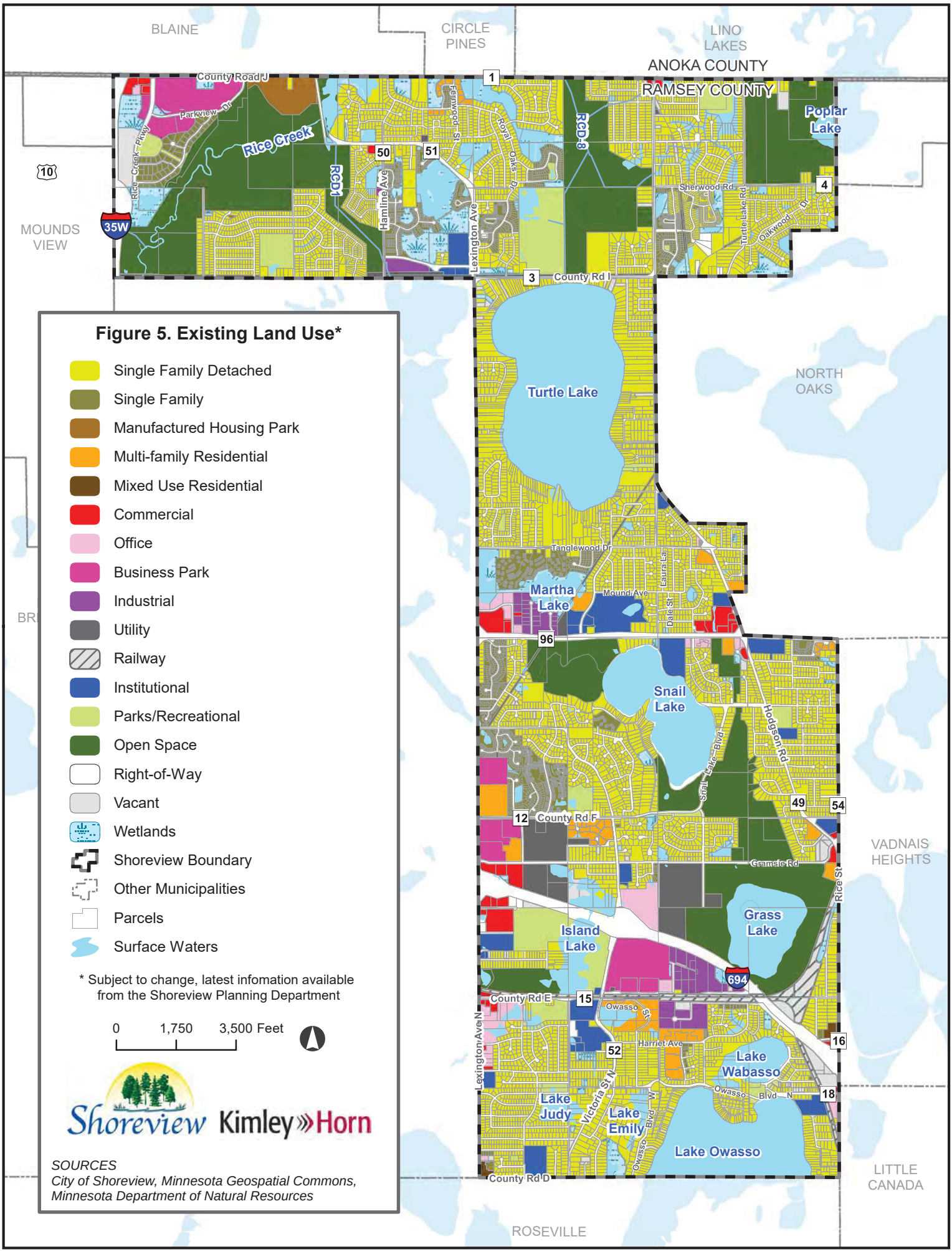


Figure 5. Existing Land Use*

- Single Family Detached
- Single Family
- Manufactured Housing Park
- Multi-family Residential
- Mixed Use Residential
- Commercial
- Office
- Business Park
- Industrial
- Utility
- Railway
- Institutional
- Parks/Recreational
- Open Space
- Right-of-Way
- Vacant
- Wetlands
- Shoreview Boundary
- Other Municipalities
- Parcels
- Surface Waters

* Subject to change, latest infomation available from the Shoreview Planning Department

0 1,750 3,500 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Minnesota Geospatial Commons, Minnesota Department of Natural Resources

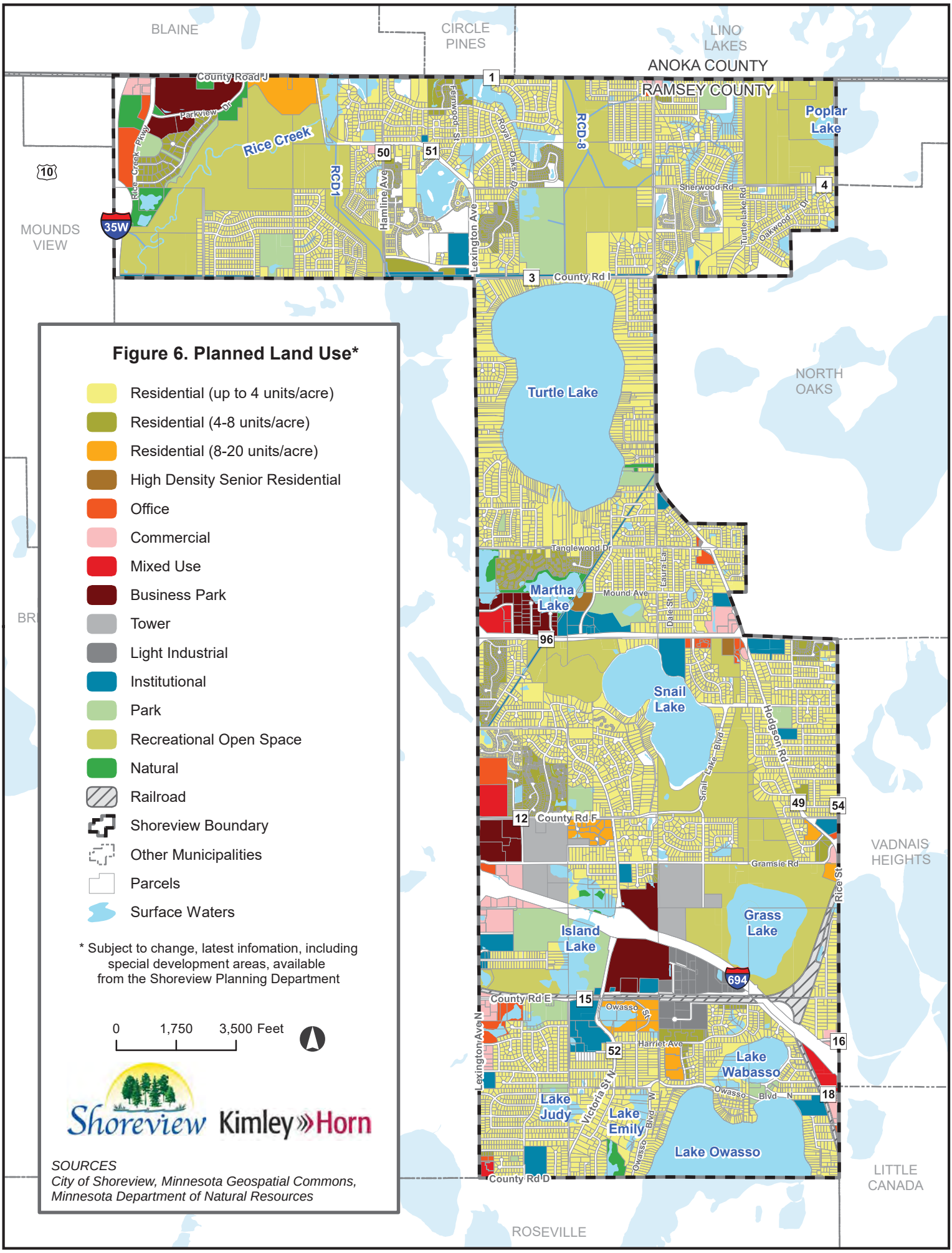


Figure 6. Planned Land Use*

- Residential (up to 4 units/acre)
- Residential (4-8 units/acre)
- Residential (8-20 units/acre)
- High Density Senior Residential
- Office
- Commercial
- Mixed Use
- Business Park
- Tower
- Light Industrial
- Institutional
- Park
- Recreational Open Space
- Natural
- Railroad
- Shoreview Boundary
- Other Municipalities
- Parcels
- Surface Waters

* Subject to change, latest infomation, including special development areas, available from the Shoreview Planning Department

0 1,750 3,500 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Minnesota Geospatial Commons, Minnesota Department of Natural Resources

Figure 7. Watershed and Drainage Areas

- Shoreview Boundary
- Other Municipalities
- Parcels
- Surface Waters
- Hydrologic Boundaries **(XX_XX)**
- Flow Direction

Rice Creek Subwatersheds

- Charlie Lake*
- Anoka County Ditch 25
- Anoka-Ramsey Judicial Ditch 1
- Ramsey County Ditch 1
- Ramsey County Ditch 4
- Ramsey County Ditch 8
- Rice Creek - Direct Drainage

Ramsey-Washington Metro Subwatersheds

- Sucker Lake / Vadnais-Rice*
- Gervais Creek
- Grass Lake
- Lake Emily
- Lake Owasso
- Lake Wabasso
- Shoreview Pond
- Snail Lake

** Subwatershed included within the administrative boundary of the respective watershed district but excluded from the management plan*

0 1,125 2,250 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Minnesota Geospatial Commons, Rice Creek Watershed District, Ramsey-Washington Metro Watershed District

BLAINE
CIRCLE PINES
LINO LAKES
ANOKA COUNTY
RAMSEY COUNTY
MOUNDS VIEW
ARDEN HILLS
NEW BRIGHTON
NORTH OAKS
VADNAIS HEIGHTS
ROSEVILLE
LIT CA

Anoka-Ramsey Judicial Ditch 1
Rice Creek - Direct Drainage
Rice Creek
Ramsey County Ditch 1
Ramsey County Ditch 8
Anoka County Ditch 25
Poplar Lake
Turtle Lake
Martha Lake
Snail Lake
Grass Lake
Island Lake
Lake Emily
Lake Judy
Lake Owasso
Lake Wabasso
Charlie Lake
Sucker Lake
Gervais Creek

County Road J
Parkview Dr
Rice Creek Pkwy
Rice Creek Ponds
35W
Woodcrest Ponds
Woodcrest Ponds S
Hamline Pond W
Hamline Ponds E
Hamline Ave
Shamrock Pond
North Point Ponds
Cherrywood II Ponds
Cherrywoods II Ponds N
Fernwood St
Ravenswood Ponds S
Lexington Pond
Dimke Pond
Lois Pond
Lexington Ave
Royal Oaks Ponds S
Royal Oaks Dr
Serene Ponds E
Cherrywood Pond
St. Albans Pond
Georgetown Pond
Baldwin Ponds
Evergreen Ponds
Heather Ridge Ponds N
Heather Ridge Ponds S
Willow Trail Ponds
Sherwood Ponds S
Power Station Pond
Sherwood Rd
Turtle Lake Rd
Shoreview Oaks N
Shoreview Oaks S
Oakwood Dr
The Ponds C
The Ponds S
Fire Station Pond
County Rd I
Turtle Lake Pond
Sunset Pond
Schifsky Pond
Mercury Pond
Maple Pond
Tanglewood Dr
Old Farm Pond
Country Side Pond
Needs Attributes
Laura La
Dale St
Marsden Lake Pond
Mound Ave
Brennans Pond
Willow Ponds N
Willow Ponds S
Pheasant Heights Ponds
Bartlet Pond
Roberts Ponds
Milton-S
Wilson Park Ponds E
Wilson Park Ponds W
Reiland Pond
Snail Lake Blvd
Hodgson Rd
Bridge Street Pond
Harbor Place Ponds S
Tudor Ponds
Gramsie Rd
Rice St
Hotel Pond
Gramsie Pond
E MCT Ponds
W MCT Ponds
Target Pond
YMCA Pond
Evans Pond
Manor Pond W
Manor Pond
Piche Pond
Suzanne Ponds
Deluxe Pond
Stahl Pond
Lange Pond
Richmond Ponds
St Odila Pond
Harriet Pond
Harriet Ave
Kroiss Pond
Cannonball Pond
Arboreast Ponds
Victoria St N
Lexington Ave N
Owasso St
Owasso Blvd W
Owasso Blvd N
Johnston Pond
County Rd E
County Rd F
County Rd D

1
50
51
3
4
96
12
49
54
15
52
16
18
694

Figure 8. City Stormsewer System

- Shoreview Boundary
- Other Municipalities
- City Storm Pipes
- Parcels
- Surface Waters

Rice Creek Subwatersheds

- Charlie Lake*
- Anoka County Ditch 25
- Anoka-Ramsey Judicial Ditch 1
- Ramsey County Ditch 1
- Ramsey County Ditch 4
- Ramsey County Ditch 8
- Rice Creek - Direct Drainage

Ramsey-Washington Metro Subwatersheds

- Sucker Lake / Vadnais-Rice*
- Gervais Creek
- Grass Lake
- Lake Emily
- Lake Owasso
- Lake Wabasso
- Shoreview Pond
- Snail Lake

** Subwatershed included within the administrative boundary of the respective watershed district but excluded from the management plan*

0 1,125 2,250 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Minnesota Geospatial Commons, Rice Creek Watershed District, Ramsey-Washington Metro Watershed District

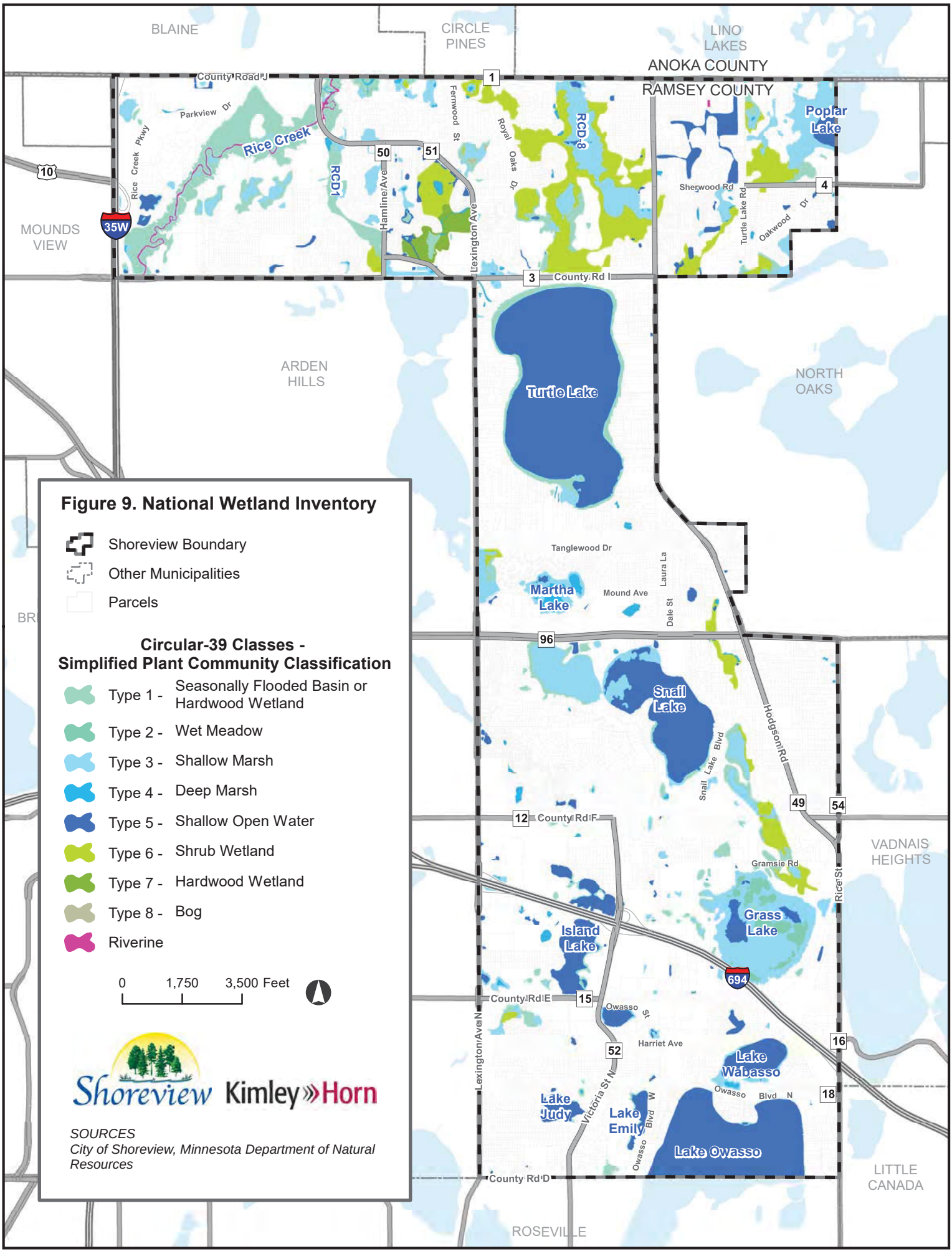


Figure 9. National Wetland Inventory

- Shoreview Boundary
- Other Municipalities
- Parcels

Circular-39 Classes - Simplified Plant Community Classification

- Type 1 - Seasonally Flooded Basin or Hardwood Wetland
- Type 2 - Wet Meadow
- Type 3 - Shallow Marsh
- Type 4 - Deep Marsh
- Type 5 - Shallow Open Water
- Type 6 - Shrub Wetland
- Type 7 - Hardwood Wetland
- Type 8 - Bog
- Riverine

0 1,750 3,500 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Minnesota Department of Natural Resources

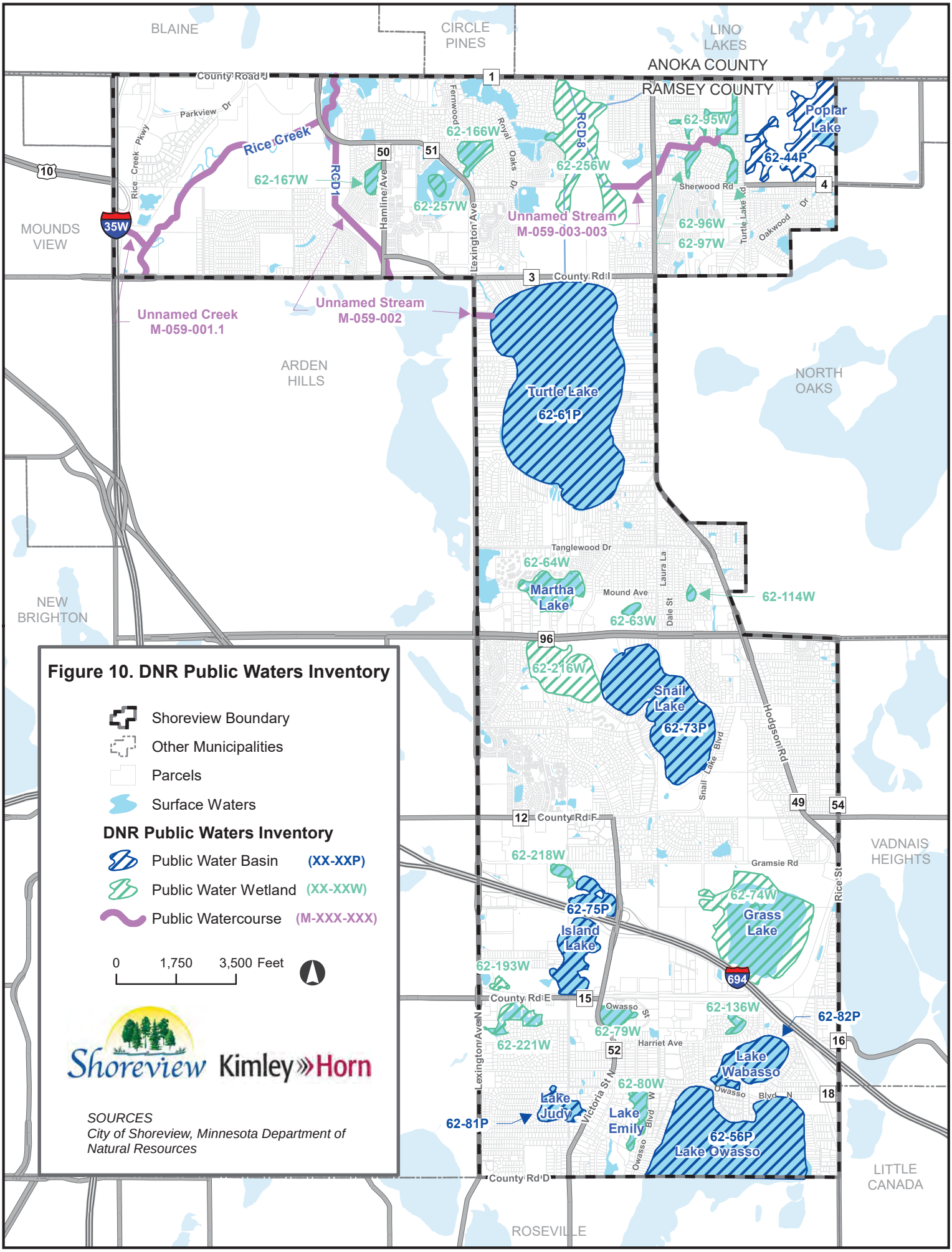


Figure 10. DNR Public Waters Inventory

- Shoreview Boundary
- Other Municipalities
- Parcels
- Surface Waters

DNR Public Waters Inventory

- Public Water Basin (XX-XXP)
- Public Water Wetland (XX-XXW)
- Public Watercourse (M-XXX-XXX)

0 1,750 3,500 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Minnesota Department of Natural Resources

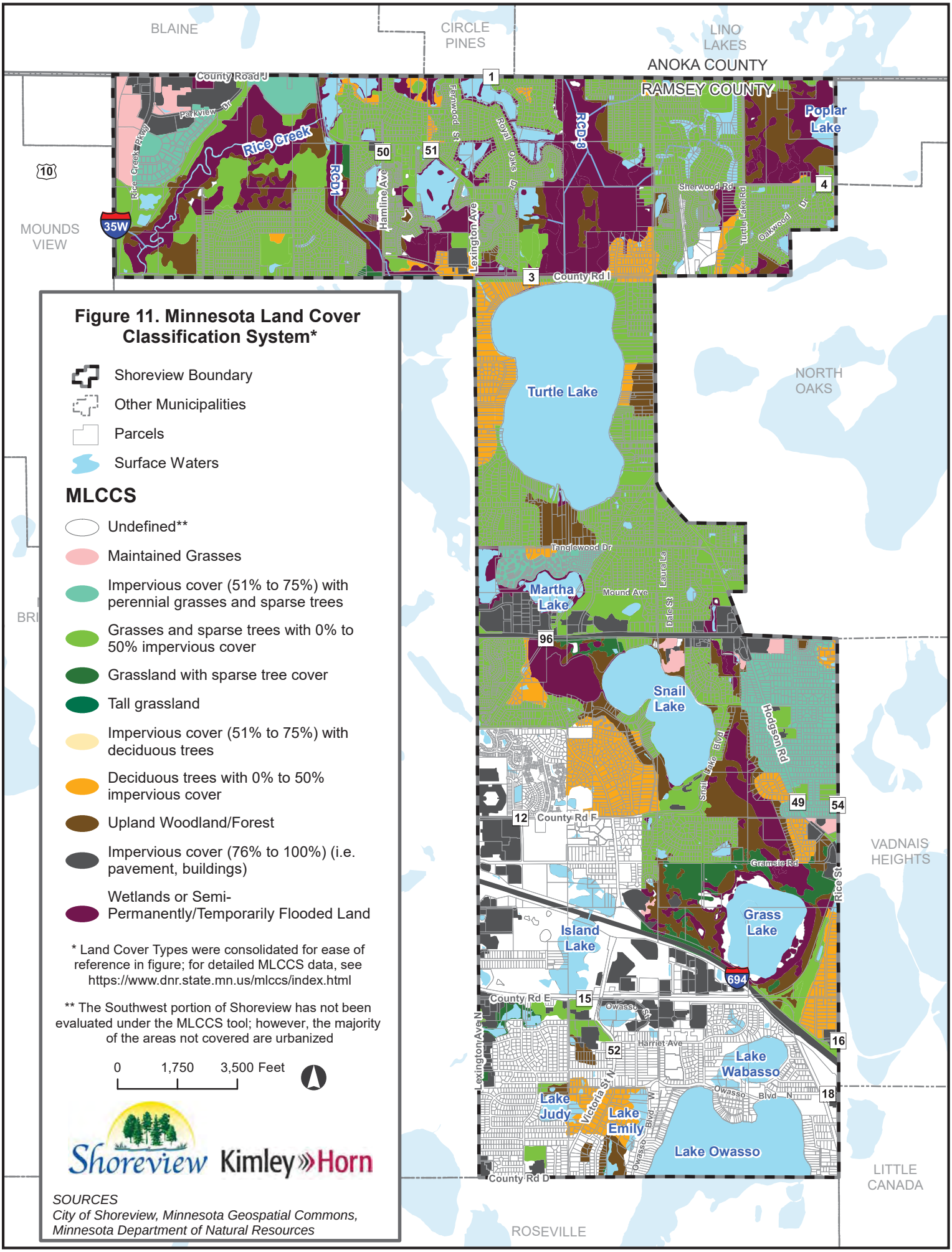


Figure 11. Minnesota Land Cover Classification System*

- Shoreview Boundary
- Other Municipalities
- Parcels
- Surface Waters

MLCCS

- Undefined**
- Maintained Grasses
- Impervious cover (51% to 75%) with perennial grasses and sparse trees
- Grasses and sparse trees with 0% to 50% impervious cover
- Grassland with sparse tree cover
- Tall grassland
- Impervious cover (51% to 75%) with deciduous trees
- Deciduous trees with 0% to 50% impervious cover
- Upland Woodland/Forest
- Impervious cover (76% to 100%) (i.e. pavement, buildings)
- Wetlands or Semi-Permanently/Temporarily Flooded Land

* Land Cover Types were consolidated for ease of reference in figure; for detailed MLCCS data, see https://www.dnr.state.mn.us/mlccs/index.html

** The Southwest portion of Shoreview has not been evaluated under the MLCCS tool; however, the majority of the areas not covered are urbanized

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Minnesota Geospatial Commons, Minnesota Department of Natural Resources

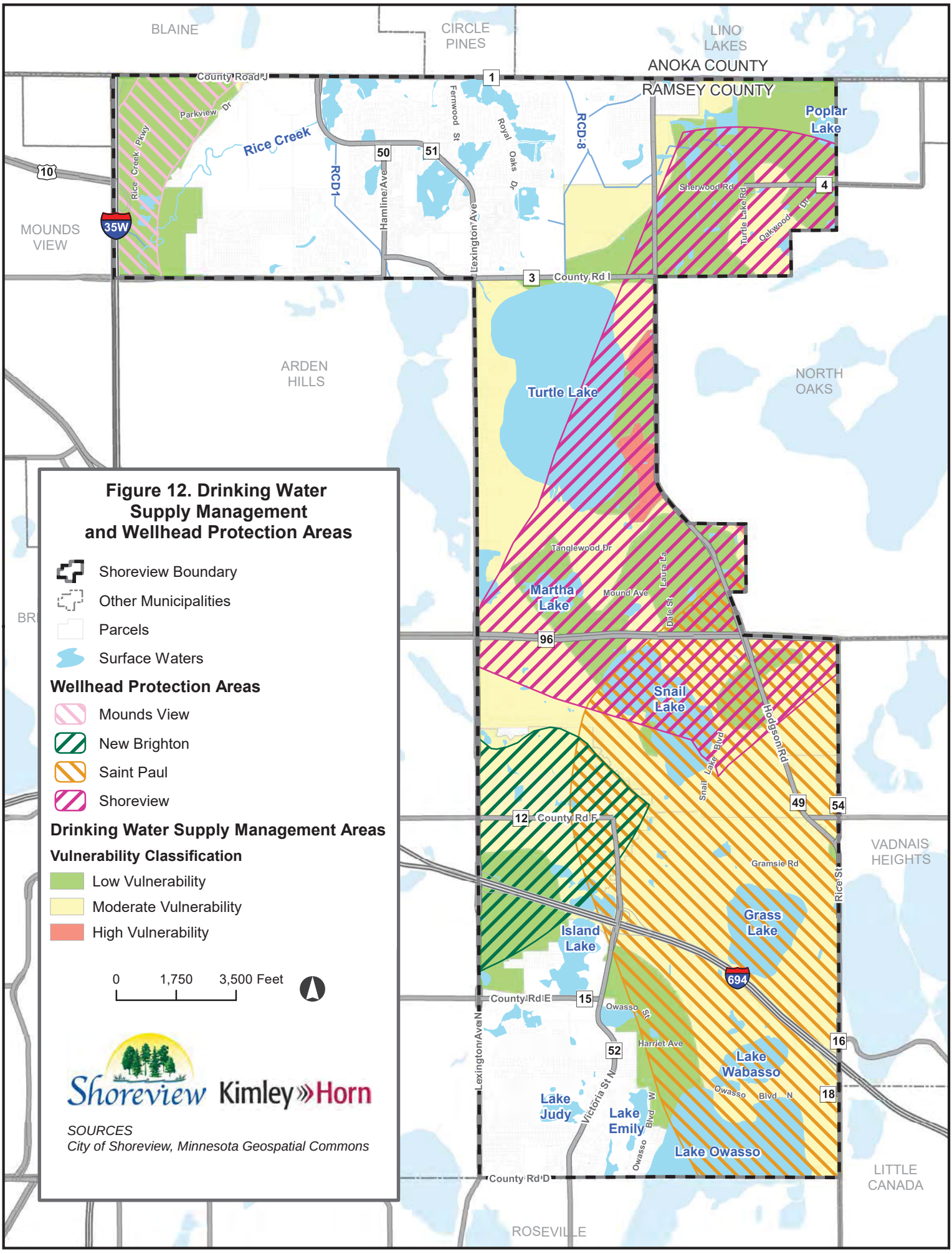


Figure 12. Drinking Water Supply Management and Wellhead Protection Areas

- Shoreview Boundary
- Other Municipalities
- Parcels
- Surface Waters

Wellhead Protection Areas

- Mounds View
- New Brighton
- Saint Paul
- Shoreview

Drinking Water Supply Management Areas

Vulnerability Classification

- Low Vulnerability
- Moderate Vulnerability
- High Vulnerability

0 1,750 3,500 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Minnesota Geospatial Commons

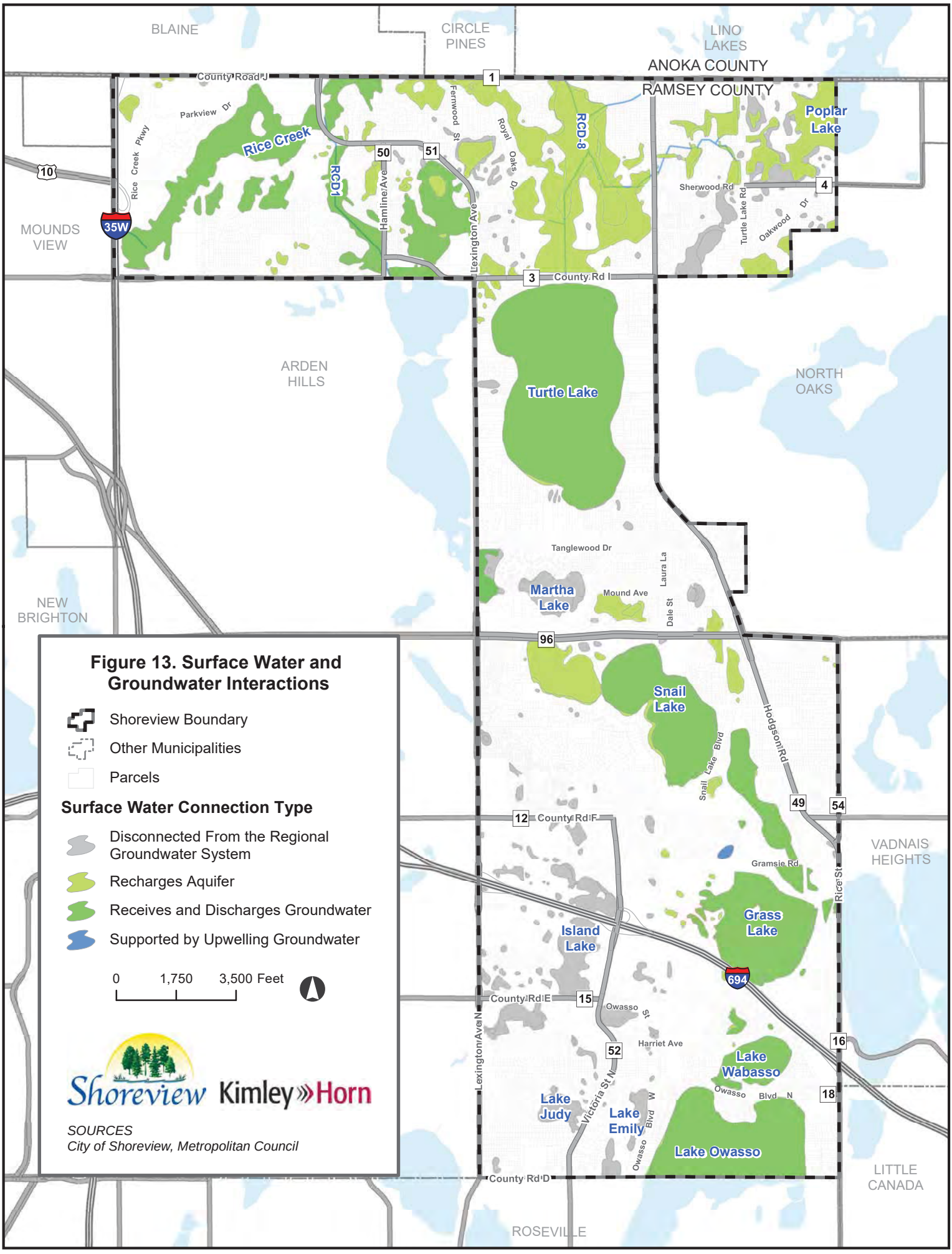


Figure 13. Surface Water and Groundwater Interactions

- Shoreview Boundary
- Other Municipalities
- Parcels

Surface Water Connection Type

- Disconnected From the Regional Groundwater System
- Recharges Aquifer
- Receives and Discharges Groundwater
- Supported by Upwelling Groundwater

0 1,750 3,500 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Metropolitan Council

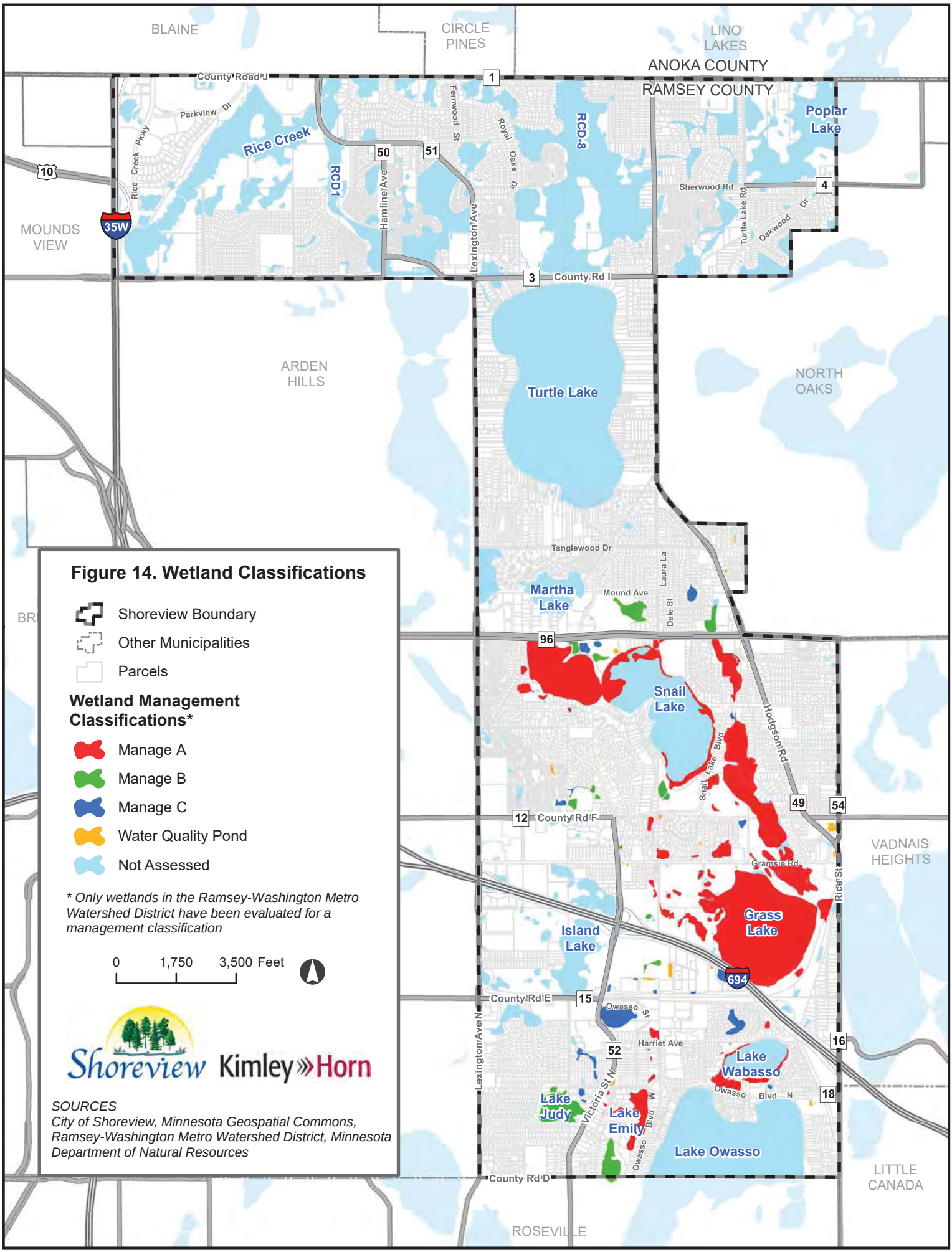


Figure 14. Wetland Classifications

- Shoreview Boundary
- Other Municipalities
- Parcels

Wetland Management Classifications*

- Manage A
- Manage B
- Manage C
- Water Quality Pond
- Not Assessed

** Only wetlands in the Ramsey-Washington Metro Watershed District have been evaluated for a management classification*

0 1,750 3,500 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Minnesota Geospatial Commons, Ramsey-Washington Metro Watershed District, Minnesota Department of Natural Resources

1 - Underground Infiltration Chambers

- Installed nearly 8000 feet since 2010
- Eliminated direct discharge to Turtle Lake and Wabaaso

2 - Permeable Concrete Block Roadway

- Installed 600 feet at Oak Ridge Ave, eliminating direct discharge to Turtle Lake
- Installed 300 feet at Grand Ave, eliminating direct discharge to Wabasso Lake

Grand Avenue

3 - Pervious Concrete

- Installed ¾ miles of pervious concrete
- Eliminated direct discharge to Lake Owasso

Near Lake Wabasso

4 - Media Filtration Units

- Filter water through granular catridges
- Three locations installed in the city

Near Lake Wabasso

5 - Target Pond Sand Filter

Target Pond

6 - Water Quality Unit

Solids and Oil Removal Device

7 - Biofiltration

- Installed on direct discharge to Island Lake
- Larger storm events directed to biofiltration area

Biofiltration System

8 - Underground Storage Tank with Lift Station

- 100,000 gallon tank and lift station
- Pumps water from low area to regional stormwater complex
- Eliminated direct discharge to Lake Owasso

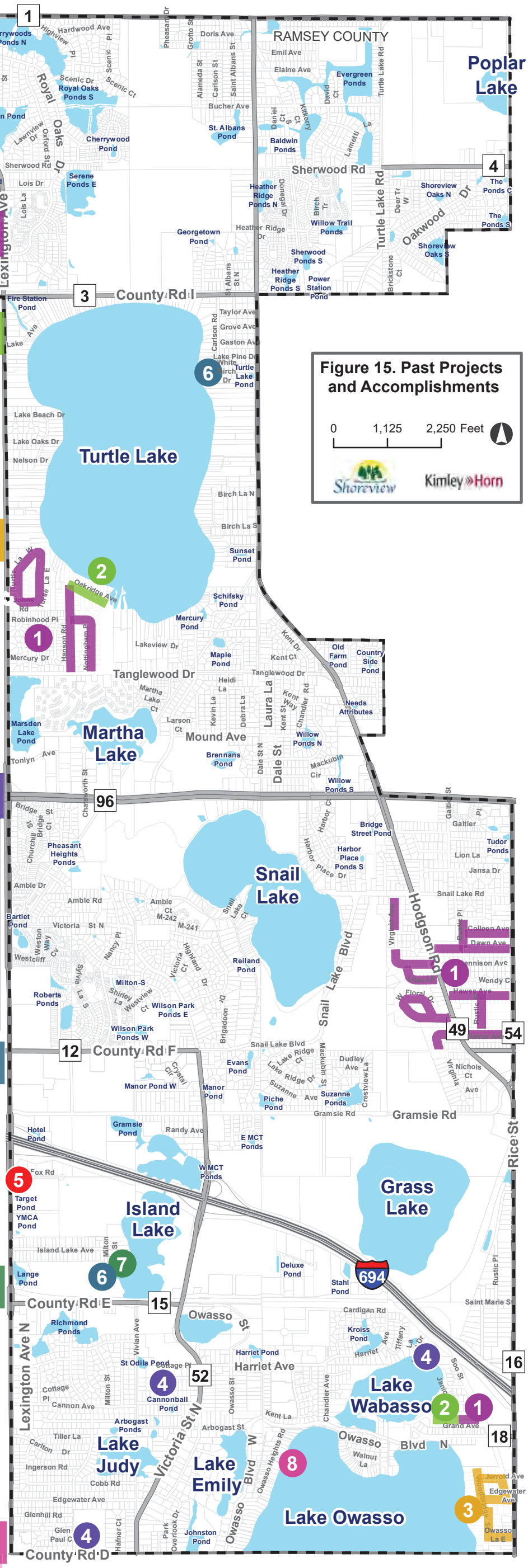


Figure 15. Past Projects and Accomplishments

APPENDIX A – ACRONYMS, GLOSSARY

For a current list of surface water acronyms and a glossary of common terms, please refer to the Minnesota Stormwater Manual: https://stormwater.pca.state.mn.us/index.php/Main_Page

APPENDIX B – SURFACE WATER RELATED REGULATORY AGENCIES

Numerous agencies and organizations in Minnesota have varying authorities and/or interest in surface water management activities within the City of Shoreview. In addition to the agencies directly involved in review and approval of this Plan as discussed in the Implementation Program Section of this Plan, Table 3-1 of the Ramsey-Washington Metro Watershed District's 2017-2026 Watershed Management Plan provides an overview of the federal and state agencies that have jurisdiction over and issues permits for specific activities. That table is reproduced below. More detailed information is available on each agency's webpage including contact information.

Table 3-1 Summary of State and Federal Regulatory Authorities within the RWMWD

Agency	Type of Approval	Description
Federal		
U.S. Army Corps of Engineers (USACE)	Section 10 of the Rivers and Harbors Act	Applies to placement of structures and/or work in, or affecting, navigable waters of the United States.
	Section 404 Permit	Applies to the discharge of dredged or fill material into waters of the United States. There are two types of Section 404 permits: regional and nationwide general permits, and individual permits.
Note: Section 401 Certification is implemented in coordination with the MPCA.	Section 401 of the Clean Water Act Water Quality Certification	Applies to activities that require a Corps of Engineers Section 10, Corps of Engineers Section 404 or Federal Energy Regulatory Commission permit. These activities must first obtain Section 401 water quality certification.
State		
Minnesota Department of Natural Resources (MDNR)	Public Waters Work Permit	Applies to any work that will alter the course, current or cross-Section of any MDNR public water lake, wetland or watercourse; also applies to any work below the ordinary high water mark of MDNR public waters.
	Groundwater or Surface Water Appropriation Permit	Applies to suppliers of domestic water to more than 25 people or for any use of groundwater or surface water that exceeds 10,000 gallons/day or 1,000,000 gallons/year.
	Dam Safety Permit	Applies to impoundments that pose a potential threat to public safety or property. Dams 6 feet high or less and dams that impound 15 acre-feet of water or less are exempt from the rules. Dams less than 25 feet high that impound less than 50 acre-feet of water are also exempt unless there is a potential for loss of life.
	Riprap Shore Protection Permit	Applies to the placement of riprap shore protection or placement of fill to recover shoreland lost to erosion.
	Aquatic Plant Management Permit	Applies to chemical or mechanical removal of aquatic plants, including submerged, emergent, and floating vegetation.
	Fisheries Permit	Applies to transport and stocking of fish and the removal of rough fish.
Minnesota Environmental Quality Board (EQB)	Environmental Assessment Worksheet	Broad environmental assessment required for certain proposed developments and other activities.

RWMWD
2017-2026 Watershed Management Plan

3-23

Agency	Type of Approval	Description
Minnesota Department of Health (MDH)	Well Management Program	Applies to drilling of new water wells and sealing of abandoned water wells. Includes Wellhead Protection Program.
	Safe Drinking Water Act	Applies to construction of new water wells and other public water supply systems
Minnesota Pollution Control Agency (MPCA)	State Discharge System/National Pollutant Discharge Elimination System (NPDES) Permit	Applies to all discrete sources of wastewater discharge to surface waters, including sanitary wastewater, process wastewater, etc.
	NPDES/SDS Construction Stormwater Permit	Applies to construction activities that disturb 1 or more acres of land.
	NPDES General Industrial Stormwater Permit	Applies to certain industrial/ commercial activities that come into contact with stormwater. Requires preparation of stormwater pollution prevention plan.
Minnesota Pollution Control Agency (MPCA)	NPDES General Storm Water Permit for small Municipal Separate Storm Sewer Systems (MS4s) Note: St. Paul is a large MS4 and operates under an individual permit.	Applies to municipal storm sewer systems serving populations fewer than 100,000 located in urbanized areas, MnDOT, counties, and other public systems (e.g., universities). Requires permitees to implement public education programs, detect and eliminate illicit discharges, control construction site and post-construction stormwater runoff on sites that disturb 1 or more acres of land, and address pollution prevention at municipal operations.
	NPDES Phase 1 MS4 Storm Water Permit	Applies to municipal storm sewer systems serving populations over 100,000 (in Minnesota, only Minneapolis and St. Paul). Requires practices similar to permit for small MS4s, plus additional requirements.
	Permit for disposal of dredged material (permit not required for stormwater ponds)	Applies to material excavated at or below the ordinary high water level of waterbasins, watercourses, public waters, or public waters wetlands (note: specific guidance provide for material removed from stormwater ponds).
Note: Section 401 Certification is implemented in coordination with the USACE.	Section 401 of the Clean Water Act Water Quality Certification	Applies to activities that require a Corps of Engineers Section 10, Corps of Engineers Section 404 or Federal Energy Regulatory Commission permit. These activities must first obtain Section 401 water quality certification.

RWMWD
2017-2026 Watershed Management Plan
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APPENDIX C – STORMWATER MANAGEMENT STANDARDS

The City of Shoreview has developed specific stormwater management standards that apply to development and redevelopment projects. These standards are intended to meet the goals of the City's Surface Water Management Plan (SWMP) and maintain compliance with the City's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit program. These standards are in addition to the requirements established by the Rice Creek Watershed District and the Ramsey-Washington Metro Watershed District. Where there is a difference between the standards, the more restrictive standard shall apply.

Project proposers should consult with City staff early in the planning stages of a specific project. Project designers and/or developers are encouraged to schedule and complete a pre-design meeting with the City before any design submittal data is submitted for review. The purpose of the meeting for storm water related issues is to specifically discuss known issues or problems in the area, required approvals and permits, and expectations for analysis methods and design details.

1) General
   a) Any project that is disturbing one or more acres of land is required to meet the requirements of, and obtain a NPDES Construction Stormwater Permit from, the Minnesota Pollution Control Agency (MPCA).
   b) Any project that is disturbing one or more acres of land within the jurisdiction of the Ramsey-Washington Metro Watershed District (RWMWD) must obtain a permit from the RWMWD.
   c) Any project within the jurisdiction of the Rice Creek Watershed District (RCWD) and that creates or reconstructs 10,000 square feet or more of impervious surface must obtain a permit from RCWD.
   d) Any project that does not trigger the requirements of A, B and C above, and that will result in one-half acre or more of disturbed area or 5,000 square feet or more of new impervious area, must meet the requirements of Section 2 (Volume Control/Water Quality), Section 3 (Water Quantity/Flood Control) and Section 4 (Rate Control), except as specifically exempted.
   e) Projects conducting mill and overlay or other surface pavement activities such as Full Depth Reclamation where the existing aggregate base is not disturbed are exempt from Section 2 (Volume Control/Water Quality), Section 3 (Water Quantity/Flood Control) and Section 4 (Rate Control).
   f) Section 7 (Erosion and Sediment Control) and Section 8 (Wetlands), apply to all projects.
   g) Any project within a Shoreland area must meet the requirements of City Code Section 209.080.
   h) Any project within a floodplain area must comply with City Code Section 205.091.
   i) Any work within a wetland, surface water, or Federal Emergency Management Agency (FEMA) designated floodplain may require additional approvals and/or permits from the City, watershed district, Department of Natural Resources (DNR), Army Corps of Engineers or other entity. All applicable permits for the specific project must be obtained prior to commencing any land disturbance activity.
   j) The City will use the Minnesota Stormwater Manual as a guide in application of these standards.

2) Volume Control / Water Quality
   a) For all new and redeveloped impervious portions of a project a runoff volume of 1.1 inch, over the new and redeveloped impervious area, must be treated in volume control practices.
   b) For sites within restricted or prohibited infiltration areas, the water quality treatment requirement may be met with the following practices.
      i) Filtration practices shall receive 55% volume control credit.
      ii) Iron enhanced filtration practices shall receive 80% volume control credit.

iii) Wet-detention ponds shall provide a treatment volume (dead storage) of not less than two and one-half (2.5) inches multiplied by the runoff coefficient calculated over the contributing drainage area to the pond.

c) For linear projects not meeting the exemption in Section 1.e., and where the lack of right-of-way precludes the installation of volume control practices that meet the requirements in Part 2, the City may allow a lesser volume requirement provided a reasonable attempt has been made to obtain right-of-way during the project planning process and:
   i) One or more of the prohibited or restricted site conditions listed in Section 2.d exists; and
   ii) The owner implements other practices (e.g., evapo-transpiration, reuse, conservation design, green roofs, etc.) on the construction site that may not fully meet the requirements of Section 2 (Volume Control/Water Quality).

d) Design Requirements
   i) Infiltration is restricted in the following areas:
      (1) With low permeability soils (i.e., Hydrologic Soil Group D soils) or where a confining layer exists below the proposed basin.
      (2) Within 1,000 feet upgradient or 100 feet down gradient of active karst features.
      (3) Within the areas designated as: Moderate Vulnerability; and Low to Very Low Vulnerability within the Drinking Water Supply Management Area (DWSMA). Refer to the Minnesota Department of Health Guidance Document, *Evaluating Proposed Storm Water Infiltration Projects in Vulnerable Wellhead Protection Areas* (December 200^) for more information.
      (4) Where soil infiltration rates are more than 8.3 inches per hour.
   ii) Infiltration systems are prohibited in the following areas:
      (1) Where industrial facilities are not authorized to infiltrate industrial stormwater under an NPDES/SDS Industrial Stormwater Permit issued by MPCA.
      (2) Where vehicle fueling and maintenance occur.
      (3) Where the bottom of the infiltration basin is less than 3 feet to bedrock or seasonally saturated soils.
      (4) Where high levels of contaminants in soil or groundwater will be mobilized by infiltration.
      (5) Within the areas designated as Very High Vulnerability and High Vulnerability within the Drinking Water Supply Management Area (DWSMA).
      (6) Within 35 horizontal feet of a water supply well as required by the Minnesota Department of Health Rule 4725.4350 as measured from the ordinary high water level of the basin. For a community public water-supply well, the basin must not be within 50 horizontal of the ordinary high water level. Refer to the Minnesota Department of Health Guidance Document, *Evaluating Proposed Storm Water Infiltration Projects in Vulnerable Wellhead Protection Areas* (December 2006) for more information.
   iii) Infiltration and filtration practices must be designed to draw down to the bottom elevation of the practice within 48 hours. The maximum ponding depth shall be based on the soil infiltration rate determined from site-specific soils investigation data taken from the location of proposed infiltration practices on the site. The soils investigation requirement may be waived for smaller practices on residential property where the maximum ponding depth is one (1) foot or less.
   iv) Infiltration and filtration practices shall provide for pretreatment of the runoff. Examples of pretreatment include a mowed grass strip between a curb-cut and a small rain garden, a sump manhole or manufactured sediment trap prior to an infiltration basin and a sediment forebay as the first cell of a two-cell treatment system. Where the system captures only clean runoff (e.g., from a rooftop) pretreatment may not be required.
   v) The design shall incorporate a diversion or other method to keep construction site sediment from entering the system prior to final stabilization of the entire contributing drainage area.

vi) The design shall incorporate provisions that will prohibit construction equipment from compacting the soils where infiltration and filtration practices are proposed.
vii) A plan for maintenance of the system must be submitted that identifies the maintenance activities, responsibilities and frequency of activities for each treatment practice on the site. The maintenance plan must provide for:
(1) Allowing the City access to the practice to conduct inspection and perform necessary maintenance, assess costs for maintenance if the owner has failed to maintain the system according to the plan.
(2) Preserving the City's right to ensure maintenance when the responsibility is transferred to another party.
(3) Provide for maintaining the overall site treatment effectiveness if one or more structural practices is subject to modification on the site.

e) Mitigation provisions. If a project is not able to meet the volume control/water quality on the specific project site, a mitigation alternative may be considered by the City. Mitigation shall consist of a new or modified structural practice completed with the construction project. Maintenance of an existing practice and payment in lieu of mitigation cannot be used for mitigation. Mitigation shall be selected based on the following order of preference:
i) Benefits to the same receiving water;
ii) Located within the same DNR catchment area;
iii) Located in the next DNR catchment area upstream;
iv) Located within the City of Shoreview.

3) Water Quantity / Flood Control.
a) The low building elevation shall be set to the higher of the following:
i) Where a Base Flood Elevation (BFE) has been established and is included in the FEMA FIS/FIRM, the low floor elevation adjacent to the water body shall be not less than one (1) foot above the BFE plus any increase due to encroachment of the floodway.
ii) The low floor elevation shall be a minimum of two (2) feet above the 100-year/24-hour event as determined by a technical evaluation by a qualified engineer or hydrologist. The owner's engineer/representative shall contact the City and watershed organization to obtain the most current available data for the project site. Preliminary data for some water bodies is available in Appendix D of the SWMP.
iii) An emergency overflow shall be incorporated into the site design at or above the BFE or modeled high water level to convey a 100-year discharge away from buildings to the next downstream water body. Existing, natural or man-made emergency overflows shall be analyzed as part of the design process. The lowest opening shall be at least 1.5 feet above the emergency overflow elevation of the adjacent water body, unless the analysis shows that adequate storage volume exists within the basin to provide a reasonable level of protection from potential flooding. Where a natural overflow does not exist, the designer shall consider the possibility of long duration events, such as multiple-year wet cycles and high runoff volume events (e.g., snowmelt events that last for many weeks) when evaluating high water elevations and outlets from landlocked basins.

4) Rate Control.
a) Discharge rates leaving the site must not exceed the existing rates for the 2, 10 and 100-year storm events.
b) On-site rate controls may not be needed if downstream (regional) facilities can be shown to adequately detain/retain the runoff to existing conditions.

c) Where a flow rate variance involves inter-community issues or significant water bodies, the regulatory jurisdiction shall have a review role. Any variances shall be reflected in subsequent plan submittals.
d) Projects resulting in no net increase in the impervious coverage on the site are not required to complete and submit rate control analyses.

5) Design Computations.
a) All hydrologic data and analyses shall be completed using standard engineering principles and practices.
b) Rainfall amounts for hydrologic analysis shall be based on Atlas 14 data. Shoreview analyses shall use the values in the following table.

Rainfall Frequency	Rainfall Depth (Inches)
2-Year / 24-Hour	2.8
10-Year / 24-Hour	4.2
100-Year / 24-Hour	7.3

c) Local storm sewer systems shall be designed for the 10-year storm event. The Rational Method shall be the preferred methodology for the design of local systems. Culvert crossings or storm systems in County or State right-of-way may have a design frequency which differs from the City's 10-year design storm. The designer shall contact each agency/unit of government to determine the appropriate design frequency for hydrologically-connected systems.
d) For culvert outlet velocities less than or equal to 4 fps, check shear stress to determine if vegetation or riprap will be adequate. If vegetation is used, temporary erosion control during and immediately follow construction shall be used until vegetation becomes established. For velocities greater than 4 fps, energy dissipaters shall be designed in accordance with MnDOT Design Criteria.

6) Design Criteria and Plan Submittals. Newly constructed or expanded/modified wet ponds, infiltration basins and filtration basins shall be designed and constructed to meet the following:
a) If the pond will have a permanent pool of water, have an aquatic bench having a 10:1 (H:V) slope for the first 10 feet from the normal water level into the basin.
b) Basin side slopes shall be 3:1 maximum (above the NWL and below the 10:1 bench, if a wet pond);
c) The design shall maximize the separation between inlet and outlet points to prevent short-circuiting of storm flows;
d) All basins shall be made accessible for maintenance. Vehicle access lane(s) of at least 10 feet shall be provided, at a slope less than 15 percent from the access point on the street or parking area to the basin, to accommodate maintenance vehicles. Maintenance agreements will be required when the basin is not located on City property.
e) Outlets shall have a skimming device designed to remove oils and floatable materials up to a five-year frequency event. The skimmer shall be set a minimum of 12 inches below the normal surface water elevation shall control the discharge velocity to 0.5 feet per second.
f) For wet ponds, an average 4 feet of permanent pool depth (dead storage depth) shall be provided. Maximum depth of the permanent pool should be less than or equal to 10 feet.
g) Must not be located within 35 horizontal feet of a water supply well as required by the Minnesota Department of Health Rule 4725.4350 as measured from the ordinary high water level of the basin. For a community public water-supply well, the basin must not be within 50 horizontal of the ordinary high water level.

h) Storm Water Plan Submittals.
   i) Property lines and delineation of lands under ownership of the project proposer.
   ii) Delineation of the subwatersheds contributing runoff from off-site, and proposed and existing subwatersheds on-site.
   iii) Location, alignment and elevation of proposed and existing stormwater facilities.
   iv) Delineation of existing on-site wetlands, shoreland and/or floodplain areas. Removal or disturbance of stream bank and shoreland vegetation should be avoided. The plan shall address how unavoidable disturbances to this vegetation will be mitigated.
   v) Existing and proposed 100-year high water level elevations on-site.
   vi) Existing and proposed site contour elevations related to NAVD 1988 datum.
   vii) Construction plans and specifications of all proposed stormwater management facilities.
   viii) Stormwater runoff volume and rate analyses for existing and proposed conditions.
   ix) All hydrologic and hydraulic computations completed to design the proposed stormwater quality management facilities. Computations shall include a summary of existing and proposed impervious areas.
   x) Provision of outlots or easements for maintenance access to detention basins, constructed wetlands and other stormwater management facilities.
   xi) Maintenance agreement between developer and city which addresses sweeping, pond inspection, sediment removal and disposal, etc.
   xii) Identification of receiving water bodies (lakes, streams, wetlands, etc) and notations of those that are listed as impaired waters and the listed impairment.

7) Site Erosion and Sediment Control.
   a) Construction site erosion and sediment control practices shall be consistent with those required by the NPDES Construction Stormwater General Permit.
   b) Prior to the start of any excavation or land disturbing activity requiring a grading permit, the owner or contractor must have in place and functional an approved method of erosion control. The contractor must have received authorization from the City prior to commencing construction activities.
   c) If applicable, the owner shall submit proof of receipt and approval by MPCA of the NPDES Permit prior to commencing construction. A copy of the SWPPP prepared in accordance with the NPDES permit requirements, shall be submitted to the City if requested by the City Engineer.
   d) Site plans shall include:
      i) Best management practices (BMPs) to minimize erosion.
      ii) BMPs to minimize the discharge of sediment and other pollutants.
      iii) BMPs for dewatering activities.
      iv) Site inspections and keeping records of rainfall events.
      v) Maintenance of BMPs during construction.
      vi) Management of solid and hazardous wastes.
      vii) Final stabilization of the site including the use of perennial vegetation and/or other methods on all exposed soils.
      viii) A description of the criteria that will be followed to use temporary sediment basins.

8) Wetlands.
   a) New development and redevelopment projects shall provide a native vegetation buffer zone around wetlands based on the location of the wetland and the classification of the wetland as specified below.

i) For projects within the Ramsey-Washington Metro Watershed District, the following buffer standards apply.

Wetland Classification	Manage A	Manage B	Manage C
Average Buffer Width (Feet)	75	50	25
Minimum Buffer Width (Feet)	37.5	25	12.5

ii) Where permitting is not required by the RCWD or RWMWD, the city shall require a buffer of 16.5-foot minimum width.

b) New discharge points to all wetlands and public waters must include pretreatment.

CITY OF SHOREVIEW, MN

MAINTENANCE AGREEMENT FOR STORM WATER MANAGEMENT PRACTICES

I. THIS AGREEMENT made this _____ day of _____, 20_____ by and among the City of Shoreview, Minnesota (hereinafter referred to as the "City") and,

_____, a _____ [corporation, individual] (hereinafter referred to as "_____") with reference to the following facts and circumstances:

A. (*)_____ is the fee owner of certain real property situated in the City of_____, legally described as follows: (Legal) _____ (hereinafter referred to as the "Subject Property").

B. As a condition of its approval of the development for the Subject Property, the City has required that the parties hereto enter into an agreement, which makes provision for the maintenance of the Storm Water Management Practice located within the boundaries of the Subject Property as the same is described and depicted in those certain construction plans drawn by_____, approved by the City and constructed by _____. The Storm Water Management Practice is located in the platted drainage and utility easement in _____.

C. The parties hereto desire to set forth their agreement with respect to the maintenance of the Storm Water Management Practice and the costs of such maintenance.

II. NOW THEREFORE, in consideration of the foregoing facts and circumstances, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto hereby agree as follows:

A. For the purposes of this Agreement, maintenance of the Storm Water Management Practice shall mean the annual inspection by a qualified individual that the Storm Water Management Practice is functioning in accordance with the approved plans and, if necessary, the periodic maintenance of the Practice has been completed as established in the approved plans to maintain the proper operation and function of the Practice. If maintenance activities and schedules are not provided in the approve plans, maintenance shall be in accordance with recommendations in the Minnesota Stormwater Manual.

B. (*)_____ shall be solely responsible for the maintenance of the Storm Water Management Practice, and shall bear all costs of such maintenance, until such time as_____ (hereinafter referred to as the "Association") is activated pursuant to Article_____, Section

_____, of the Declaration of Covenants for_____, whereupon the Association shall bear the sole responsibility for such maintenance and shall bear all costs of such maintenance. If (*)_____, or after its incorporation, the Association, does not undertake the necessary maintenance within 30 days of notification by the City, or within 30 days provide the City with a schedule for undertaking the necessary maintenance, the City may undertake such maintenance, and the costs reasonably incurred by the City for performing such maintenance shall be reimbursed to the City within 30 days by the party responsible for such maintenance and, if the responsible party does not timely reimburse the City, then the City may recover its costs by levying a special assessment against all single family house lots in the Subject Property, each lot to bear an equal share.

C. (*)_____, as present owner of the Subject Property, for itself and respective successors and assigns, hereby waives any statutory right which it may have to contest any such assessment by the City of its maintenance costs on the basis of the benefit to portions of the Subject Property.

D. Notwithstanding anything contained in this Agreement to the contrary, in the event the city shall establish a policy for maintenance by the City of Storm Water Management Practices located elsewhere in the City of Shoreview, under which policy the costs of such maintenance are to be paid either out of general City revenues or by collection of utility or service fees or charges, then any owner of any portion of the Subject Property shall be entitled to petition the City for the inclusion of the Storm Water Management Practice under such maintenance program, and the City shall consent to such request and thereupon authorize the termination of this Agreement. The recording of a certified copy of the Resolution of the City Council of the City which sets forth the consent and authorization described in the foregoing sentence shall serve the terminate this Agreement, without further action on the part of any party hereto.

E. The terms and conditions of this Agreement shall be binding upon, and shall insure to the benefit of, the parties hereto and their respective successors and assigns.

III. IN WITNESS WHEREOF, the parties hereto have caused this document to be executed as of the day and year first above written.

_____ _____
Date

Title___ for the City of Shoreview, Minnesota

_____ _____

[Corporation/individual] Date

THIS INSTRUMENT DRAFTED BY _____

APPENDIX D – HYDROLOGIC SYSTEM DATA SUMMARY TABLES

The tables in this appendix summarize the results of the hydrologic modeling the City completed in 2005 as part of a City-wide flood mapping update. While more recent data is available from FEMA and the local Watershed Organizations, the information presented here remains of value to the City in review of proposed projects and has value to the project proposers to assess the level of risk that may be present on the specific site.

The more recent data for some of the primary water bodies within the City is presented in the 100-Year High Water Level Summary, Exhibit D-1. Exhibit D-1 shows one or more elevations based on the 2015 Flood Insurance Study (FIS) for Ramsey County, the City's 2005 SWMP Data and/or the local Watershed Organization (Rice Creek or Ramsey-Washington Metro). One significant difference in the data used to develop the high-water levels for the Ramsey-Washington Metro Watershed District is that their model has used update Atlas 14 Precipitation Frequency Estimates which includes a 100-year rainfall event total rainfall depth of 7.3 inches. This is compared to 5.9 inches used in the developing the City's 2005 elevations. FEMA' s methodology varies depending on the specific water body as does Rice Creek's methodology for Turtle Lake.

One interesting observation is that while the rainfall depth that serves as the basis for some of the elevations increased by roughly 25%, the high-water levels may not have changed significantly. The Shoreview SWMP also evaluated the 100-year/10-day runoff event and that event had a total runoff depth of 7.2 inches.

Data presented in the 2005 Plan summary tables corresponds to the subwatershed ID number in the drainage areas shown in Exhibit D-1.

The remainder of the information in the table is related to the reservoir and results of the modeling hydrologic. Three storm events were modeled to determine the recommended minimum building elevation (MBE):

- Design Storm: 100-year, 24-hour, Type II distribution with normal antecedent moisture conditions (AMC-2). Total rainfall depth = 5.9 inches.
- Flood Evaluation Storm: 100-year, 24-hour, Type II distribution with antecedent moisture conditions (AMC-3). Total rainfall depth = 5.9 inches.
- 10-day Runoff: 100-year, 10-day runoff, "C" distribution (NEH-4). Total runoff depth = 7.2 inches.

The 1990 recommended MBE is listed along with the 2005 elevations. The recommended MBE is the greater of 2-feet plus the high-water elevation from the design storm or the high-water elevation from either the Flood Evaluation Storm or 10-day Runoff storm. Proposed development should plan to meet the 2005 minimum building elevations and the City Floodplain Ordinance based on the regulatory flood in effect at that time.

During development of the original model during the 1990 Plan and model creation, all survey data was collected on the National Geodetic Vertical Datum of 1929 (NGVD29). However, because one of the goals of the FEMA Map Modernization Program was to convert all flood maps from the NGVD29 to the North American Vertical Datum of 1988 (NAVD88) all effective BFE's and proposed BFE's were converted to the NAVD88 on the proposed FIRM panels in 2005. The elevations found in the 2005 HEC-HMS models are in NGVD29.

The conversion from the NGVD29 to the NAVD88 was done using the NGS VERTCON software. The maximum offset from the average conversion factor, calculated by following the FEMA conversion criteria,

is less than 0.25 foot. Because the maximum offset is less than 0.25 foot, a single conversion factor was applied. To convert elevations in feet to the NAVD88, add 0.167 to the NGVD29 elevation and to convert to the local datum (1912), add 0.44 to the NGVD29 value. See the following table for a summary of conversion factors.

Datum	Conversion from NGVD (1929) in feet
NGVD (1929)	+0.000
NAVD (1988)	+0.167
Local (1912)	+0.440

Note that elevations for most lakes and water bodies in Shoreview are listed in County and Minnesota DNR publications according to the local (1912) datum.

DATA FROM 2005 SWMP

BASIS OF DESIGN
WMO: RICE CREEK WATERSHED DISTRICT
DRAINAGE AREA: COUNTY DITCH 8
BALDWIN LAKE

City Water Body Designation		DNR Protected Water/Wetland Designation	2-year Event		10-year Event		100-year Event	
ID	NAME		Q peak (CFS)	HWL (FEET) (1)	Q peak (CFS)	HWL (FEET) (1)	Q peak (CFS)	HWL (FEET) (1)
PL-1	SHW OAKS-N	-	3.2701	910.147	4.4169	912.027	60.891	913.027
PL-2	SHW OAKS-NW	-	3.5107	896.597	5.8013	897.317	9.3944	899.967
PL-3		-	DIRECT RUNOFF TO POPLAR LAKE					
PL-4E	POPLAR WET.	-	DIRECT RUNOFF TO POPLAR LAKE					
PL-4W		-						
KL-1		-	0.26454	897.837	0.9899	898.167	2.5654	898.687
KL-2		-	0.0037369	896.667	0.060963	896.697	0.34205	896.807
KL-3		-	0.60729	896.037	2.2716	896.737	5.7134	898.307
KL-4	SHERWOOD-N	62-96W	6.1472	894.917	12.333	896.077	45.4	896.667
KL-5	EVERGREEN-S	62-96W	6.1472	894.917	12.333	896.077	45.4	896.667
KL-6	BLWN/EVGRN	62-97W/62-95W	1.1462	889.877	2.3446	890.397	4.2038	891.167
KL-7	BALDWIN-W	62-97W	1.2078	887.027	2.4996	887.417	4.4811	887.967
CD8-1	ROYAL OKS-N	-	0.36122	889.507	0.84224	889.707	1.6556	890.067
CD8-2	LEXINGTON	62-166W	0.52587	889.867	1.263	890.257	2.5258	890.967
CD8-3	ROYAL OKS-S	62-256W	0.60976	887.007	1.2207	887.417	2.1022	888.067
CD8-4	SERENE-E	-	0.09432	891.157	1.249	891.357	4.5303	891.917
CD8-5		-	2.6549	889.897	4.5254	890.277	6.5786	890.667
CD8-6	HEATHR RG-N	-	0.75682	891.067	2.7674	891.877	4.6549	892.687
CD8-7		-	2.4756	887.577	9.3668	888.477	22.697	889.667
CD8-8		-	9.0007	899.527	17.048	900.197	30.514	900.997
CD8-9	WE. PINES-E	-	9.4782	895.557	16.935	896.537	24.499	897.977
CD8-10	WE. PINES-W	-	9.4587	891.297	25.735	892.497	44.155	894.527
CD8-11		-	0.24824	887.457	1.3047	887.837	3.3595	888.667
CD8-12A		-	DIRECT RUNOFF TO CD8-15		DIRECT RUNOFF TO CD8-15		DIRECT RUNOFF TO CD8-15	
CD8-12B								
CD8-13	CHEERYWOOD	-	0.39076	886.997	0.84492	887.197	1.58	887.567
CD8-14		-	DIRECT RUNOFF TO CD8-15		DIRECT RUNOFF TO CD8-15		DIRECT RUNOFF TO CD8-15	
CD8-15	CO DITCH 8	62-256W	13.124	884.817	26.084	885.857	34.085	886.567

(1) All elevations converted to NAVD 88. See Page D-1 for conversion factors to 1912 and 1929 Datum

DATA FROM 2005 SWMP

BASIS OF DESIGN
WMO: RICE CREEK WATERSHED DISTRICT
DRAINAGE AREA: LEXINGTON AVENUE
LAKE JOSHEPHINE, LAKE JOHANNA, VALENTINE LAKE

City Water Body Designation		DNR Protected Water/Wetland Designation	2-year Event		10-year Event		100-year Event	
ID	NAME		Q peak (CFS)	HWL (FEET)	Q peak (CFS)	HWL (FEET)	Q peak (CFS)	HWL (FEET)
IL-7	MCT-W	-	2.3947	964.847	4.9847	965.947	7.0383	967.397
IL-8	ISLAND		0.002666	945.137	0.0048394	945.447	0.0080683	945.867
GR-1	CRYSTAL-E	-	2.882	973.067	6.371	973.637	10.492	974.427
GR-2	CRYSTAL-W	-	5.3505	968.837	10.62	970.477	14.557	972.727
GR-3	GRAMSIE-E	62-218W	2.3375	946.617	3.736	947.077	4.8668	947.277
LLP-1		-	9.3568	945.567	13.359	946.457	15.596	947.197
LLP-2		-	3.4087	941.307	6.0715	941.717	9.3594	942.267
LLP-3		-	DIRECT RUNOFF TO ARDEN HILLS					
LLP-4		-	DIRECT RUNOFF TO ARDEN HILLS					
LLP-5		-	5.6415	983.037	7.5474	984.207	14.083	985.197
LLP-6	ROBERTS-N	-	DIRECT RUNOFF TO LLP-7					
LLP-7	ROBERTS-S	-	4.0088	969.287	5.5515	970.227	6.5867	971.517
LLP-8		-	DIRECT RUNOFF TO ARDEN HILLS					
BD-2	LANGE-E&W	62-193W	2.5433	928.227	5.8168	929.387	9.3957	931.127
BD-5		-	DIRECT RUNOFF TO ARDEN HILLS					
BD-6		-	DIRECT RUNOFF TO ARDEN HILLS					
BD-7		-	DIRECT RUNOFF TO BD-11					
BD-8		-	4.1978	943.077	5.5422	943.687	6.959	944.477
BD-9		-	8.95	933.047	18.081	933.747	30.291	934.577
BD-11	I 694-E&W	-	DIRECT RUNOFF TO ARDEN HILLS					
BD-12		-	DIRECT RUNOFF TO ARDEN HILLS					
RP-1	ST ODILA	-	3.63	945.527	6.9422	946.297	14.473	947.187
RP-2	RICHMOND-E	62-221W	1.9717	933.817	2.8824	934.517	6.4151	935.387
RP-3	RICHMOND-W	62-221W	14.895	933.157	19.619	933.537	27.002	934.127
LJA-1		-	DIRECT RUNOFF TO ARDEN HILLS					
LLJ-1		-	DIRECT RUNOFF TO ROSEVILLE					
LLJ-2		-	DIRECT RUNOFF TO ROSEVILLE					

(1) All elevations converted to NAVD 88. See Page D-1 for conversion factors to 1912 and 1929 Datum

DATA FROM 2005 SWMP

BASIS OF DESIGN
WMO: GRASS LAKE WATERSHED MANAGEMENT ORGANIZATION
DRAINAGE DISTRICT: GRASS LAKE
ALL SUB-DISTRICTS

City Water Body Designation		DNR Protected Water/Wetland Designation	2-year Event		10-year Event		100-year Event	
ID	NAME		Q peak (CFS)	HWL (FEET) (1)	Q peak (CFS)	HWL (FEET) (1)	Q peak (CFS)	HWL (FEET) (1)
CP-1		-						
LJ-1	JUDY	62-81P	1.0554	943.677	4.4117	944.007	8.4454	944.467
LE-1	ARBOGAST-E3	-	0.011833	940.537	0.015902	941.347	0.024788	942.407
LE-2	ARBOGAST-E2	-	0.82987	942.077	1.7277	942.347	3.1815	942.717
LE-3		-	0.19696	932.267	0.94249	932.667	2.4528	933.477
LE-4		-	0.010641	922.297	0.017434	923.657	0.98888	924.657
LE-5	EMILY	62-80W	7.5751	918.547	11.095	919.077	14.103	920.167
LO-10	JOHNSTON	-	DIRECT RUNOFF TO ROSEVILLE SEE LO-11 FOR MIN. BLD. ELEVATION					
LO-11	CHARLIE	-	7.8544	897.447	15.002	898.737	17.335	902.357
LO-12	OWASSO	62-56P	2.7884	886.977	4.929	887.157	13.785	887.467
SV-1	SHOREVIEW	62-79W	1.1706	946.257	2.3133	946.527	3.9852	945.927
LW-1	HARRIET	-	2.4303	935.697	6.7305	936.147	24.36	936.697
LW-2	KROISS	62-136W	12.76	896.287	19.631	897.367	27.496	899.037
LW-3		-	13.043	885.947	20.18	886.547	28.871	887.197
LW-4	WABASSO	62-82P	6.2562	886.017	14.294	886.327	29.63	886.767
LW-5		-	6.2562	886.017	14.294	886.327	29.63	886.797
SL-1	BRENNAN	62-63W	4.4376	894.057	10.75	895.377	16.069	896.867
SL-2	SUMMIT	-	0.20739	902.267	0.41406	902.367	0.73871	902.527
SL-3	PICHE	-	0.99324	886.097	2.0819	887.217	3.5241	889.217
SL-4	EVANS	-	2.2878	888.537	4.9654	890.147	7.4599	893.237
SL-5	WILSON PK-E	-	0.66351	970.237	1.8676	970.717	6.9526	970.867
SL-6	WILSON PK-W	-	1.7367	963.987	3.8769	964.637	38.275	965.277
SL-7	TELEFARM	-	17.619	969.247	18.914	970.107	20.221	970.977
SL-8	WILSON PK-W	-	5.6546	964.677	12.96	965.437	21.961	966.907
SL-9	MILTON-S	-	17.541	958.657	53.087	959.537	101.18	959.667
SL-10	MILTON-C	-	23.186	937.167	45.206	940.797	84.948	945.307
SL-11	PHEASNT H-S	-	43.631	894.227	94.578	894.637	204.25	894.927
SL-12		-	1.1302	920.217	3.6798	920.317	8.4104	920.507
SL-13A			13.089	887.437	31.447	888.507	53.159	890.017
SL-13B			11.972	887.487	27.997	888.767	67.973	890.457
SL-13C	SNAIL	62-73P/62-216W	0.011268	882.417	0.013017	882.767	0.015576	883.267
GL-1	WILLOW-N	62-114W	0.54992	898.737	1.4417	899.657	3.0647	901.337

GL-2	WILLOW-S	-	10.684	897.667	21.407	898.867	33.796	900.347
GL-3		-	4.9738	894.517	11.456	895.117	22.517	896.127
GL-4E	SNAIL LK-E	-	0.0039607	880.957	0.00957	882.077	0.016176	883.407
GL-4W		-	0.0039607	880.957	0.00957	882.077	0.016176	883.407
GL-5	SUZANNE	-	1.1167	873.837	1.1304	875.187	6.7291	875.677
GL-5W			0	876.407	0	877.637	0.0	879.017
GL-7		-	78.881	926.957	120.95	929.847	179.37	932.807
GL-8	STAHL	-	47.5	882.777	70.794	884.677	96.397	887.227
GL-9	GRASS	62-74W	0.0048814	879.657	0.0089307	880.057	4.1577	880.667
VR-1			2.0986	900.577	4.2695	902.107	73.375	902.907

(1) All elevations converted to NAVD 88. See Page D-1 for conversion factors to 1912 and 1929 Datum

DATA FROM 2005 SWMP

BASIS OF DESIGN
WMO: VADNAIS LAKE AREA WATERSHED MANAGEMENT ORGANIZATION
DRAINAGE DISTRICT: CHARLIE LAKE
CHARLIE LAKE

City Water Body Designation		DNR Protected Water/Wetland Designation	2-year Event		10-year Event		100-year Event	
ID	NAME		Q peak (CFS)	HWL (FEET) (1)	Q peak (CFS)	HWL (FEET) (1)	Q peak (CFS)	HWL (FEET) (1)
CL-1		-	3.045	907.187	5.9337	908.147	7.3062	908.987
CL-2	SHR OAKS-C	-	0.045035	905.667	0.29004	905.767	1.0096	906.047
CL-3	SHR OAKS-S	-	3.7404	896.377	7.4434	897.067	10.454	897.817
CL-4		-	DIRECT RUNOFF TO CASEY POND		DIRECT RUNOFF TO CASEY POND		DIRECT RUNOFF TO CASEY POND	
CL-6	HEATHR RG-S	-	0.67223	898.397	2.326	899.437	3.9703	900.687
CL-8	SHERWOOD-S	-	5.5668	896.347	13.287	897.217	27.869	898.167
CL-9		-	DIRECT RUNOFF TO CASEY POND		DIRECT RUNOFF TO CASEY POND		DIRECT RUNOFF TO CASEY POND	
CL-10		-	DIRECT RUNOFF TO CASEY POND		DIRECT RUNOFF TO CASEY POND		DIRECT RUNOFF TO CASEY POND	
CL-11N		-	PART OF CL-11 DRAINING					
CL-11S		-	DIRECTLY TO CHARLIE LAKE					
CL-11			0.52342	902.337	5.8434	903.577	18.226	906.627
SuL-1		-	DRAINS TO SUCKER LAKE					
SuL-2		-	DRAINS TO SUCKER LAKE					
SuL-3		-	DRAINS TO SUCKER LAKE					

(1) All elevations converted to NAVD 88. See Page D-1 for conversion factors to 1912 and 1929 Datum

DATA FROM 2005 SWMP

BASIS OF DESIGN

WMO: RICE CREEK WATERSHED DISTRICT

DRAINAGE AREA: RICE CREEK

MARSDEN LAKE, TURTLE LAKE, UPPER RICE CREEK

ALL ELEVATIONS ARE NGVD (1929) Datum, Refer to page D-1 of Appendix D for conversion factors to 1912 (Local) and 1988 (NAVD) Datums

City Water Body Designation		DNR Protected Water/Wetland	1990 Recommended Minimum Building Elevation	2005 Recommended Minimum Building Elevation	RESERVOIR DATA [1] NORMAL		RESERVOIR DATA [1] DESIGN STORM			DRAINAGE AREA DATA				BASE DATA USED TO DETERMINE MINIMUM BUILDING ELEVATIONS HYDROLOGIC DATA (100-YEAR STORMS) RESERVOIR DATA [1]		DESIGN STORM		FLOOD EVAL. STORM		TEN-DAY RUNOFF		WETLAND BOUNCE
ID	NAME	Designation	(FEET)	(FEET)	Water Level (FEET)	Surface Area (ACRES)	Water Level (FEET)	Surface Area (ACRES)	Storage Volume (AC-FT)	Direct Tributary Area (ACRES)	Direct Tributary Area (SQ MI)	CN	Tc (HRS)	Normal Water Level (FEET)	Overflow Elevation (FEET)	Elevation (FEET)	Q (CFS)	Elevation (FEET)	Q (CFS)	Elevation (FEET)	Q (CFS)	(FEET)
TL-1	MAPLE	-	903.33	903.3	896.0	0.1	901.3	1.4	4.2	27.58	0.0431	65	0.49	896.0	901.3 +	901.3 *	2	901.7	29	901.4	8	
TL-2	SCHIFSKEY	-	895.06	897.0	892.8	0.1	895.0	0.1	0.1	11.46	0.0179	67	0.64	892.8	895.0	895.0 *	16	895.1	36	892.9	3	
TL-3	MERCURY	-	895.94	897.2	892.8	0.2	895.2	0.5	0.5	18.18	0.0284	68	0.49	892.8	895.0 +	895.2 *	50	895.5	99	895.0	16	
TL-4	TURTLE	62-61P	894.53	894.6	892.0	452.0	892.6	456.0	228.0	680.64	1.0635	88	1.80	892.0	896.0	892.6 *	2	892.7	2	892.9	3	0.3
ML-1	PARK PLACE	-	897.34	897.8	895.3	0.4	895.8	0.4	0.1	7.81	0.0122	59	0.82	895.3	899.0	895.8 *	5	896.2	12	895.5	2	
ML-2	STONE	-	893.8	894.1	890.3	0.5	892.1	0.6	0.6	12.16	0.0190	63	0.54	890.3	894.0	892.1 *	7	893.7	14	891.7	5	
ML-3		-	891.06	890.6	887.2	0.7	888.6	4.3	4.4	18.69	0.0292	69	0.99	887.2	890.0	888.6 *	6	889.1	11	888.6	6	
ML-4		TRIB. TO 62-59P	DIRECT TO MARSDEN LAKE	890.6			888.6			32.26	0.0504	80	0.66			888.6 *	20	889.1	32	888.0	13	
ML-5		-	DIRECT TO CD1-7							9.86	0.0154	82	0.76									
ML-6		-	DIRECT TO MARSDEN LAKE	894.1			892.1			41.15	0.0643	55	0.46			892.1 *	24	894.0	92	890.9	11	
ML-7		-	DIRECT TO MARSDEN LAKE							14.27	0.0223	69	0.59									
ML-8		-	DIRECT TO MARSDEN LAKE		0.0					55.36	0.0865	70	1.95									
ML-9		-	895.64	896.4	891.2	0.0	894.4	0.1	0.1	4.29	0.0067	75	0.97	891.2	895.0	894.4 *	5	894.8	7	893.2	1	
ML-10	MARTHA	62-64W	901.15	901.1	898.2	25.1	899.1	30.5	29.9	120.32	0.1880	81	0.90	898.2	899.0 +	899.1 *	13	899.3	33	899.3	25	0.90
ML-11		-	DIRECT RUNOFF TO ML-AHS							6.40	0.0100	72	0.45									
ML-AHS		-	FROM AH VIA LEXINGTON PONDS							46.75	0.0730	71	0.34			836.3	10	937.5 *	11	935.4	9	
ML-13	MARSDEN PD	62-59P	894.75	893.8	889.7	0.2	891.8	11.3	18.2	71.49	0.1117	86	0.61	889.7	896.0	891.8 *	16	892.5	23	892.4	21	2.15
ML-AHN		-	FROM AH VIA MARSDEN LK							972.80	1.5200	80	2.20			888.6 *	322	888.9	576	888.5	285	
KAL-1	BARTLETT-N	-	959.15	959.3	956.2	0.2	957.3	0.3	0.3	2.94	0.0046	79	0.52	956.2	960.0	957.3 *	4	957.7	5	956.4	1	
KAL-2	BARTLETT-S	-	958.87	958.8	955.3	1.7	956.8	1.9	3.0	16.19	0.0253	78	0.20	955.3	963.0	956.8 *	7	957.4	10	956.1	4	
KAL-3		-	DIRECT RUNOFF TO ML-AHN							2.82	0.0044	86	0.10									
CD1-1		62-257W	893.62	893.9	891.1	9.5	891.9	23.5	11.9	65.60	0.1025	82	0.51	891.1	892.5	891.9 *	4	892.1	5	891.8	4	0.85
CD1-2	SERENE-W	-	DIRECT RUNOFF TO CD1-3							25.02	0.0391	60	0.65			894.6 *	8	895.4	43	894.1	6	
CD1-3		62-257W	894.54	894.7	891.3	9.0	892.7	13.4	14.6	26.50	0.0414	86	0.61	891.3	894.5	892.7 *	1	893.1	2	893.7	4	1.40
CD1-4		62-257W	DIRECT RUNOFF TO CD1-5							4.67	0.0073	61	0.70			890.3	0	891.9	0	892.7 *	0	
CD1-5		62-257W	892.48	892.5	889.5	2.2	890.5	4.3	3.9	30.02	0.0469	66	0.82	889.5	893.0	890.5 *	3	891.0	6	890.6	4	1.00
CD1-6		62-257W	890.99	891.1	887.5	0.5	889.1	9.2	7.3	47.68	0.0745	81	0.96	887.5	892.0	889.1 *	18	889.4	30	889.0	13	1.60
CD1-7		-	890.12	890.2	883.8	0.1	888.2	9.3	18.0	25.28	0.0395	90	0.40	883.8	887.3 +	888.2 *	341	888.5	608	888.1	301	
CD1-8	WILLOW CK-W	-	893.75	893.5	889.5	0.3	891.5	1.6	2.0	21.25	0.0332	64	0.51	889.5	898.0	891.5 *	7	892.5	8	890.9	5	
CD1-9	WILLOW CK-E	-	892.92	892.7	888.0	0.1	890.7	0.6	0.9	2.82	0.0044	82	0.23	888.0	892.0	890.7 *	6	891.7	8	890.1	5	
CD1-10	HAMLINE-C	62-167W	893.52	893.7	891.2	7.2	891.7	7.4	2.2	19.52	0.0305	76	0.39	891.2	893.0	891.7 *	2	891.9	2	891.6	2	0.50
CD1-11	HAMLINE-S	-	892.42	892.1	889.1	1.6	890.1	3.5	3.7	15.81	0.0247	65	0.28	889.1	892.0	890.1 *	2	890.6	3	890.3	3	
CD1-12	SHAMROCK	-	894.26	894.8	891.3	0.8	892.8	1.0	1.0	30.98	0.0484	51	0.81	891.3	897.0	892.8 *	2	894.7	3	894.3	3	
CD1-13	NORTH POINT	-	896.29	894.2	887.0	0.7	890.5	1.4	5.1	57.15	0.0893	59	0.78	887.0	900.0	890.5	9	894.2 *	12	891.5	10	
CD1-14		-	COMBINED WITH CD1-4							5.89	0.0092	53	0.54			893.0 *	0	894.3	0	894.7	0	
CD1-15A	HAMLINE-N	-	892.25	892.9	888.0	0.0	890.9	0.8	1.1	12.16	0.0190	65	0.43	888.0	892.0	890.9 *	9	892.0	13	890.8	7	
CD1-15B		-			0.0					4.29	0.0067	58	0.25									
CD1-16		-	888.71	889.0	886.6	4.3	887.0	4.3	0.5	17.92	0.0280	71	0.43	886.6	890.0	887.0 *	7	887.3	9	886.8	4	
CD1-17	CO. DITCH 1	PROT. WTRCRS.	889.53	889.4	880.7	1.0	887.4	39.0	101.5	94.59	0.1478	72	1.86	880.7	886.5 +	887.4 *	292	887.7	612	887.5	332	
CD1-18		-	884.66	885.5	882.0	0.2	883.5	0.4	0.3	7.42	0.0116	62	0.40	882.0	886.0	883.5 *	0	884.2	0	884.4	1	
RC-1	CHRYWD II-E	-	886.65	886.8	884.1	11.5	884.8	12.3	7.6	41.47	0.0648	74	0.50	884.1	888.0	884.8 *	2	885.1	3	884.9	2	
RC-2		-	COMBINED WITH RC-3																			
RC-3	CHRYWD II-W	-	885.15	885.0	882.0	11.8	883.0	14.1	16.4	86.72	0.1355	66	0.50	882.0	885.0	883.0 *	5	883.7	8	883.5	8	
RC-4	RICE CREEK	PROT. WTRCRS.	DIRECT RUNOFF TO RICE CREEK							27.78	0.0434	69	0.69									
RC-5		-	DIRECT RUNOFF TO RC-6	ELIMINATED																		
RC-6		PROT. WTRCRS.	DIRECT RUNOFF TO RICE CREEK							32.26	0.0504	76	0.78									
RC-8	SNELLING	-	DIRECT RUNOFF TO RICE CREEK							67.39	0.1053	61	1.67									
RC-9	SNELLING	-	DIRECT RUNOFF TO RICE CREEK							27.33	0.0427	63	0.91									
RC-10		-	DIRECT RUNOFF TO RICE CREEK							93.50	0.1461	62	2.07									
RC-11		-	COMBINED WITH RC-13	908.0	902.0	1.2	906.0	2.3	7.4	36.54	0.0571	85	0.33	902.0	906.0	906.0 *	13	906.1	100	903.9	7	
RC-12E		-	COMBINED WITH RC-13	907.9	903.6	0.6	905.9	0.8	1.6	9.98	0.0156	81	0.25	903.6	910.0	905.9 *	5	906.6	6	904.6	2	
RDC-12W		-		0.0	0.0					53.82	0.0841	84	0.58									
RC-13		-	DESIGN FOR FUTURE DISCHARGE AND VOLUME ONLY	892.2	884.0	0.4	890.2	0.7	3.5	117.82	0.1841	82	0.75	884.0	894.0	890.2 *	47	892.1	52	889.6	39	
RC-14	RICE CREEK	PROT. WTRCRS.	DIRECT RUNOFF TO RICE CREEK							307.00	0.4797	65	1.69									

ALL ELEVATIONS ARE ON NGVD29 (1929 Datum, Refer to page D-1 of Appendix D for conversion factors to 1912 (Local) and 1988 (NAVD) datums

* VALUE CONTROLING MINIMUM BUILDING ELEVATION - (CRITERIA: GREATER OF THE DESIGN STORM +2.0 FT, FLOOD EVALUATION STORM, OR 10-DAY RUNOFF) REV. 9/89

+ OVERFLOW OPERATING FOR DESIGN EVENT REV. 4/03

1 RESERVOIR DATA IS FROM 1990 SWMP, EXCEPT DESIGN STORM WATER LEVEL IS FROM 2005 MODEL

AND CITY DESIGNATION RC-11, RC-12E, AND RC-13 WHICH INCLUDE INFORMATION FROM NEW PONDS.

DATA FROM 2005 SWMP

BASIS OF DESIGN

WMO: RICE CREEK WATERSHED DISTRICT

DRAINAGE AREA: COUNTY DITCH 8

BALDWIN LAKE

ALL ELEVATIONS ARE NGVD (1929) Datum, Refer to page D-1 of Appendix D for conversion factors to 1912 (Local) and 1988 (NAVD) Datums

City Water Body Designation		DNR Protected Water/Wetland	1990 Recommended Minimum Building Elevation	2005 Recommended Minimum Building Elevation	RESERVOIR DATA [1]					DRAINAGE AREA DATA				BASE DATA USED TO DETERMINE MINIMUM BUILDING ELEVATIONS HYDROLOGIC DATA (100-YEAR STORMS)								WETLAND BOUNCE
					NORMAL		DESIGN STORM							RESERVOIR DATA [1]		DESIGN STORM		FLOOD EVAL. STORM		TEN-DAY RUNOFF		
ID	NAME	Designation	(FEET)	(FEET)	Water Level (FEET)	Surface Area (ACRES)	Water Level (FEET)	Surface Area (ACRES)	Storage Volume (AC-FT)	Direct Tributary Area (ACRES)	Direct Tributary Area (SQ MI)	CN	Tc (HRS)	Normal Water Level (FEET)	Overflow Elevation (FEET)	Elevation (FEET)	Q (CFS)	Elevation (FEET)	Q (CFS)	Elevation (FEET)	Q (CFS)	(FEET)
PL-1	SHW OAKS-N	-	910.34	914.9	908.0	0.7	912.9	0.7	2.1	3.52	0.0055	76	0.26	908.0	912.5 +	912.86 *	1	909.0	2	908.4	1	
PL-2	SHW OAKS-NW	-	899.07	901.8	895.2	0.3	899.8	1.2	1.8	23.30	0.0364	68	0.99	895.2	900.0	899.8 *	7	898.9	8	897.0	6	
PL-3		-	DIRECT TO POPLAR LAKE							13.44	0.0210	77	1.37									
PL-4E	POPLAR WET.	-	DIRECT TO POPLAR LAKE							162.05	0.2532	70	1.00									
PL-4W		-								25.34	0.0396	64	0.75									
KL-1		-	900.48	900.5	897.6	0.4	898.5	0.5	0.4	7.68	0.0120	61	0.90	897.6	903.0	898.52 *	3	899.5	5	898.3	2	
KL-2		-	898.94	898.6	896.5	0.1	896.6	0.1	0.1	1.02	0.0016	48	0.65	896.5	901.0	896.64 *	0	897.0	1	896.6	0	
KL-3		-	901.54	901.4	895.7	0.4	898.1	0.7	1.9	18.18	0.0284	59	0.76	895.7	901.0	898.14	6	901.4 *	9	898.1	6	
KL-4	SHERWOOD-N	62-96W	DIRECT RUNOFF TO KL-5				896.5			21.31	0.0333	67	0.97			896.5 *						
KL-5	EVERGREEN-S	62-96W	898.3	898.5	893.5	0.0	896.5	5.5	7.0	30.21	0.0472	80	0.73	893.5	896.5	896.5 *	45	896.6	123	896.2	13	3.00
KL-6	BLWN/EVGRN	62-97W/62-95W	892.97	893.0	889.2	25.0	891.0	29.0	47.1	148.10	0.2314	75	0.98	889.2	894.0	891 *	4	891.8	6	892.0	6	1.80
KL-7	BALDWIN-W	62-97W	889.76	889.8	886.5	0.3	887.8	0.6	0.8	9.28	0.0145	66	0.47	886.5	896.0	887.8 *	4	889.2	6	889.5	7	1.30
CD8-1	ROYAL OKS-N	-	891.79	891.9	889.2	7.3	889.9	7.8	5.0	30.08	0.0470	69	0.64	889.2	892.5	889.9 *	2	890.2	3	890.1	2	
CD8-2	LEXINGTON	62-166W	892.73	892.8	889.4	8.0	890.8	9.7	12.4	70.66	0.1104	68	1.02	889.4	897.0	890.8 *	3	891.6	4	891.4	3	1.38
CD8-3	ROYAL OKS-S	62-256W	890.03	889.9	886.5	7.5	887.9	17.1	18.5	62.98	0.0984	73	0.58	886.5	890.0	887.9 *	2	888.4	3	889.4	4	1.40
CD8-4	SERENE-E	-	894.12	893.8	890.8	0.8	891.8	2.3	2.1	17.15	0.0268	64	0.48	890.8	895.1	891.75 *	5	892.4	12	891.7	4	
CD8-5		-	892.48	892.5	889.2	0.5	890.5	3.3	4.1	16.83	0.0263	82	1.46	889.2	892.0	890.5 *	7	891.0	9	890.2	5	
CD8-6	HEATHR RG-N	-	894.78	894.5	890.6	0.0	892.5	2.6	3.4	32.51	0.0508	60	1.54	890.6	894.5	892.52 *	5	893.5	6	892.6	5	
CD8-7		-	890.79	891.5	887.0	0.1	889.5	0.3	0.5	20.48	0.0320	61	0.50	887.0	895.4	889.5 *	23	890.7	35	888.9	16	
CD8-8		-	DIRECT RUNOFF TO CD8-9	902.8	898.0	0.1	900.8	0.4	0.6	9.22	0.0144	83	0.30	898.0	902.0	900.83 *	31	900.9	49	898.7	3	
CD8-9	WE. PINES-E	-	899.01	899.8	893.9	0.0	897.8	0.3	0.5	7.50	0.0117	73	0.18	893.9	899.0	897.81 *	24	899.0	30	894.7	5	
CD8-10	WE. PINES-W	-	895.31	896.4	890.0	0.5	894.4	0.7	1.8	37.80	0.0591	65	0.84	890.0	895.0	894.36 *	44	895.2	115	891.5	15	
CD8-11		-	890.74	890.5	887.2	0.1	888.5	0.2	0.3	6.66	0.0104	58	0.79	887.2	890.0	888.5 *	3	890.0	8	887.9	2	
CD8-12A		-	DIRECT RUNOFF TO CD8-15							13.51	0.0211	68	0.54									
CD8-12B										9.15	0.0143	61	0.54									
CD8-13	CHEERYWOOD	-	888.88	889.4	886.7	0.4	887.4	0.4	0.1	4.54	0.0071	77	0.30	886.7	889.7	887.4 *	2	887.7	2	887.0	1	
CD8-14		-	DIRECT RUNOFF TO CD8-15							4.60	0.0072	40	1.06									
CD8-15	CO DITCH 8	62-256W	888.28	888.4	882.9	0.0	886.4	64.5	81.1	368.00	0.5750	72	1.21	882.9	888.5	886.4 *	34	886.9	39	886.6	36	3.47

ALL ELEVATIONS ARE ON NGVD29 (1929 Datum, Refer to page D-1 of Appendix D for conversion factors to 1912 (Local) and 1988 (NAVD) datums

* VALUE CONTROLING MINIMUM BUILDING ELEVATION - (CRITERIA: GREATER OF THE DESIGN STORM +2.0 FT, FLOOD EVALUATION STORM, OR 10-DAY RUNOFF)

+ OVERFLOW OPERATING FOR DESIGN EVENT

1 RESERVOIR DATA IS FROM 1990 SWMP, EXCEPT DESIGN STORM WATER LEVEL IS FROM 2003 MODEL.

PL-4 FROM THE 1990 SWMP WAS DIVIDED INTO PL-4E AND PL-4W, AND CD8-12 WAS DIVIDED INTO CD8-12A AND CD8-12B.

REV. 9/89

REV. 4/03

REV. 8/03

DATA FROM 2005 SWMP

BASIS OF DESIGN

WMO: RICE CREEK WATERSHED DISTRICT

DRAINAGE AREA: LEXINGTON AVENUE

LAKE JOSHEPHINE, LAKE JOHANNA, VALENTINE LAKE

ALL ELEVATIONS ARE NGVD (1929) Datum, Refer to page D-1 of Appendix D for conversion factors to 1912 (Local) and 1988 (NAVD) Datums

City Water Body Designation		DNR Protected Water/Wetland	1990 Recommended Minimum Building Elevation	2005 Recommended Minimum Building Elevation	RESERVOIR DATA [1]					DRAINAGE AREA DATA				BASE DATA USED TO DETERMINE MINIMUM BUILDING ELEVATIONS HYDROLOGIC DATA (100-YEAR STORMS)								WETLAND BOUNCE
					NORMAL		DESIGN STORM							RESERVOIR DATA [1]		DESIGN STORM		FLOOD EVAL. STORM		TEN-DAY RUNOFF		
ID	NAME	Designation	(FEET)	(FEET)	Water Level (FEET)	Surface Area (ACRES)	Water Level (FEET)	Surface Area (ACRES)	Storage Volume (AC-FT)	Direct Tributary Area (ACRES)	Direct Tributary Area (SQ MI)	CN	Tc (HRS)	Normal Water Level (FEET)	Overflow Elevation (FEET)	Elevation (FEET)	Q (CFS)	Elevation (FEET)	Q (CFS)	Elevation (FEET)	Q (CFS)	(FEET)
IL-7	MCT-W	-	969.20	969.2	963.5	0.2	967.2	0.3	1.1	6.21	0.0097	91	0.66	963.5	968.0	967.2 *	7	967.7	8	964.4	2	
IL-8	ISLAND		947.57	947.7	944.6	53.9	945.7	41.6	56.1	180.60	0.2822	84	0.94	944.6	947.0	945.7 *	0	946.0	0	946.8	0	
GR-1	CRYSTAL-E	-	975.74	976.3	972.0	0.2	974.3	0.3	0.4	6.66	0.0104	81	0.55	972.0	975.0	974.3 *	10	974.9	12	972.6	2	
GR-2	CRYSTAL-W	-	973.93	974.6	967.0	0.5	972.6	1.0	3.5	24.83	0.0388	79	0.30	967.0	973.0	972.6 *	15	973.1	56	969.3	8	
GR-3	GRAMSIE-E	62-218W	949.09	949.1	945.8	4.3	947.1	65.0	14.0	39.68	0.0620	78	1.09	945.8	949.0	947.1 *	5	947.2	5	947.0	4	1.3
LLP-1		-	948.34	949.0	943.2	0.0	947.0	1.4	2.2	18.94	0.0296	92	0.20	943.2	949.0	947.0 *	16	947.3	16	945.2	8	
LLP-2		-	943.55	944.1	940.2	0.3	942.1	0.5	0.6	6.14	0.0096	92	0.69	940.2	944.0	942.1 *	9	942.2	10	940.7	2	
LLP-3		-	DIRECT RUNOFF TO ARDEN HILLS							26.50	0.0414	92	0.56									
LLP-4		-	DIRECT RUNOFF TO ARDEN HILLS							12.35	0.0193	93	0.52									
LLP-5		-	986.31	987.0	980.2	0.1	985.0	0.7	1.6	13.57	0.0212	92	0.61	980.2	985.0 +	985.0 *	14	985.1	21	981.8	4	
LLP-6	ROBERTS-N	-	DIRECT RUNOFF TO LLP-7							6.91	0.0108	79	0.20									
LLP-7	ROBERTS-S	-	973.45	973.4	968.0	1.7	971.4	3.9	8.5	20.74	0.0324	79	0.52	968.0	972.6	971.4 *	7	972.2	7	969.9	5	
LLP-8		-	DIRECT RUNOFF TO ARDEN HILLS							17.73	0.0277	86	0.96									
BD-2	LANGE-E&W	62-193W	932.2	933.0	927.2	0.3	931.0	1.2	2.7	34.24	0.0535	74	1.56	927.2	933.4	931.0 *	9	932.3	11	929.5	7	3.81
BD-5		-	DIRECT RUNOFF TO ARDEN HILLS							33.80	0.0528	77	0.73									
BD-6		-	DIRECT RUNOFF TO ARDEN HILLS							20.03	0.0313	91	0.30									
BD-7		-	DIRECT RUNOFF TO BD-11							21.10	0.0330	63	0.50									
BD-8		-	945.61	946.3	941.6	0.2	944.3	0.4	0.7	5.82	0.0091	92	0.20	941.6	945.0	944.3 *	7	944.5	7	942.2	2	
BD-9		-	935.53	936.4	931.9	1.0	934.4	0.2	2.4	19.65	0.0307	91	0.62	931.9	940.0	934.4 *	30	934.6	34	932.6	6	
BD-11	I 694-E&W	-	DIRECT RUNOFF TO ARDEN HILLS							24.00	0.0375	90	2.00									
BD-12		-	DIRECT RUNOFF TO ARDEN HILLS							0.90	0.0014	92	0.10									
RP-1	ST ODILA	-	947.07	949.0	944.2	0.6	947.0	0.9	0.8	14.65	0.0229	89	0.53	944.2	947.0 +	947.0 *	14	947.1	31	945.3	3	
RP-2	RICHMOND-E	62-221W	936.45	937.2	932.6	0.4	935.2	7.2	7.6	42.94	0.0671	75	0.87	932.6	935.2	935.2 *	6	935.3	20	934.9	3	2.65
RP-3	RICHMOND-W	62-221W	935.37	936.0	931.0	0.0	934.0	5.9	4.0	52.22	0.0816	85	1.45	931.0	935.8	934.0 *	27	934.3	31	933.0	15	2.92
LJA-1		-	DIRECT RUNOFF TO ARDEN HILLS							57.09	0.0892	78	0.63									
LLJ-1		-	DIRECT RUNOFF TO ROSEVILLE							47.50	0.0742	76	0.81									
LLJ-2		-	DIRECT RUNOFF TO ROSEVILLE							2.37	0.0037	72	0.28									

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* VALUE CONTROLING MINIMUM BUILDING ELEVATION - (CRITERIA: GREATER OF THE DESIGN STORM +2.0 FT, FLOOD EVALUATION STORM, OR 10-DAY RUNOFF) REV. 1/89

+ OVERFLOW OPERATING FOR DESIGN EVENT REV. 4/90

1 RESERVOIR DATA IS FROM 1990 SWMP, EXCEPT DESIGN STORM WATER LEVEL IS FROM 2003 MODEL. REV. 4/03

DATA FROM 2005 SWMP

BASIS OF DESIGN

WMO: GRASS LAKE WATERSHED MANAGEMENT ORGANIZATION

DRAINAGE DISTRICT: GRASS LAKE

ALL SUB-DISTRICTS

ALL ELEVATIONS ARE NGVD (1929) Datum, Refer to page D-1 of Appendix D for conversion factors to 1912 (Local) and 1988 (NAVD) Datums

City Water Body Designation		DNR Protected Water/Wetland	1990 Recommended Minimum Building Elevation	2005 Recommended Minimum Building Elevation	RESERVOIR DATA [1]					DRAINAGE AREA DATA				BASE DATA USED TO DETERMINE MINIMUM BUILDING ELEVATIONS HYDROLOGIC DATA (100-YEAR STORMS)								WETLAND BOUNCE
					NORMAL		DESIGN STORM							RESERVOIR DATA [1]		DESIGN STORM		FLOOD EVAL. STORM		TEN-DAY RUNOFF		
ID	NAME	Designation		(FEET)	Water Level (FEET)	Surface Area (ACRES)	Water Level (FEET)	Surface Area (ACRES)	Storage Volume (AC-FT)	Direct Tributary Area (ACRES)	Direct Tributary Area (SQ MI)	CN	Tc (HRS)	Normal Water Level (FEET)	Overflow Elevation (FEET)	Elevation (FEET)	Q (CFS)	Elevation (FEET)	Q (CFS)	Elevation (FEET)	Q (CFS)	(FEET)
CP-1		-	TOTAL RUNOFF CONTRIBUTION FROM ROSEVILLE VIA CENTRAL PARK	TOTAL RUNOFF CONTRIBUTION FROM ROSEVILLE VIA CENTRAL PARK						1617.00	2.5266	75	0.90									
LJ-1	JUDY	62-81P	946.3	946.3	943.3	15.5	944.3	18.3	24.7	108.61	0.1697	79	0.80	943.3	947.0	944.3 *	8	944.7	11	944.4	9	1.05
LE-1	ARBOGAST-E3	-	944.4	944.2	938.2	0.0	942.2	0.4	0.6	1.92	0.0030	70	0.51	938.2	945.4	942.2 *	0	942.6	0	942.6	0	
LE-2	ARBOGAST-E2	-	944.3	944.6	941.6	0.4	942.6	1.2	0.5	8.70	0.0136	74	1.49	941.6	944.5	942.6 *	3	942.9	5	942.2	2	
LE-3		-	934.9	935.3	930.7	0.0	933.3	0.2	0.2	3.90	0.0061	65	0.52	930.7	936.7	933.3 *	2	934.2	4	932.6	1	
LF-4		-	926.4	926.5	920.9	0.3	924.5	0.7	1.8	7.81	0.0122	69	0.45	920.9	928.4	924.5 *	1	925.4	3	925.1	2	
LE-5	EMILY	62-80W	921.8	922.0	918.0	14.0	920.0	15.0	28.0	114.56	0.1790	78	1.02	918.0	928.0	920.0 *	14	920.9	16	919.9	14	0.91
LO-10	JOHNSTON	-	DIRECT RUNOFF TO ROSEVILLE SEE LO-11 FOR MIN. BLD.	DIRECT RUNOFF TO ROSEVILLE SEE LO-11 FOR MIN. BLD. ELEVATION						49.09	0.0767	72	0.72									
LO-11	CHARLIE	-	904.9	905.2	894.0	1.9	902.2	4.9	25.0	114.60	0.1791	70	0.40	894.0	900.0 +	902.2	17	905.2 *	22	902.8	18	
LO-12	OWASSO	62-56P	889.7	889.3	886.6	393.0	887.3	625.0	600.0	956.22	1.4941	84	0.58	886.6		887.3 *	14	887.5	21	888.6	44	0.70
SV-1	SHOREVIEW	62-79W	948.6	948.8	945.7	9.7	946.8	10.4	8.0	35.90	0.0561	88	0.48	945.7	949.0	946.8 *	4	946.0	5	946.5	3	0.06
LW-1	HARRIET	-	938.5	938.5	935.2	1.1	936.5	1.6	1.8	17.98	0.0281	73	0.48	935.2	936.5 +	936.5 *	24	936.6	66	936.0	7	
LW-2	KROISS	62-136W	900.7	900.9	895.0	2.9	898.9	5.3	16.5	95.42	0.1491	80	1.00	895.0	906.0	898.9 *	28	900.2	29	897.1	19	3.87
LW-3		-	889.1	889.0	884.0	0.0	887.0	0.9	1.5	9.15	0.0143	75	0.41	884.0	888.0	887.0 *	29	887.3	33	886.4	20	
LW-4	WABASSO	62-82P	COMBINED WITH LW-5	888.6	885.5	50.0	886.6		70.0	134.98	0.2109	81	0.65	885.5	893.0	886.6 *	30	886.9	34	887.8	47	1.10
LW-5		-	888.7							10.80	0.0169	80	0.25									
SL-1	BRENNAN	62-63W	897.9	898.7	893.0	3.1	896.7	7.4	13.0	163.84	0.2560	66	1.20	893.0	899.0	896.7 *	16	897.9	18	896.8	16	3.70
SL-2	SUMMIT	-	904.3	904.4	902.0	0.7	902.4	0.7	1.0	9.09	0.0142	78	0.12	902.0	908.0	902.4 *	1	902.5	1	902.3	1	
SL-3	PICHE	-	891.4	891.5	884.9	0.7	889.1	1.7	4.1	25.15	0.0393	76	0.72	884.9	897.0	889.1	4	891.5 *	5	888.5	3	
SL-4	EVANS	-	890.6	896.2	887.0	1.0	893.1	1.3	3.8	63.49	0.0992	73	0.57	887.0	909.2	893.1	7	896.2 *	10	893.1	7	
SL-5	WILSON PK-E	-	972.6	972.7	969.8	0.2	970.7	1.5	0.8	9.15	0.0143	68	0.55	969.8	970.6 +	970.7 *	7	970.8	14	970.6	2	
SL-6	WILSON PK-W	-	966.5	967.1	962.6	1.3	965.1	1.4	2.1	26.50	0.0414	73	0.56	962.6	965.0 +	965.1 *	38	965.1	155	964.9	6	
SL-7	TELEFARM	-	971.8	972.8	965.5	0.4	970.8	1.3	0.9	12.29	0.0192	91	0.12	965.5	977.0	970.8 *	20	971.0	21	966.1	3	
SL-8	WILSON PK-W	-	968.7	968.7	962.6	0.9	966.7	1.1	1.8	15.81	0.0247	76	0.18	962.6	970.0	966.7 *	22	968.7 *	27	965.1	11	
SL-9	MILTON-S	-	961.4	961.5	965.5	0.0	959.5	0.3	0.3	26.24	0.0410	73	0.35	965.5	964.0	959.5 *	101	959.6	144	958.6	18	
SL-10	MILTON-C	-	945.8	947.1	933.6	0.0	945.1	0.7	1.2	19.58	0.0306	70	0.70	933.6	945.0 +	945.1 *	85	945.7	170	937.1	24	
SL-11	PHEASNT H-S	-	896.1	896.8	890.0	0.0	894.8	1.2	0.3	57.86	0.0904	73	0.28	890.0	894.0 +	894.8 *	204	895.0	294	892.1	16	
SL-12		-	922.1	922.3	920.0	0.0	920.3	0.4	0.1	6.98	0.0109	66	0.38	920.0	925.0	920.3 *	8	920.6	15	920.1	2	
SL-13A				892.0	885.8	1.4	890.0	1.8	6.7	45.38	0.0709	83	0.28	885.8	890.1	890.0 *	53	890.6	99	887.2	12	
SL-13B				892.3	885.8	0.7	890.3	1.1	4.0	37.31	0.0583	79	0.28	885.8	890.1	890.3 *	68	891.0	132	887.2	10	
SL-13C	SNAIL	62-73P/62-216W	885.0	885.1	881.9	167.0	883.1		230.0	491.97	0.7687	82	0.67	881.9	893.0	883.1 *	0	883.5	0	884.8	0	1.20
GL-1	WILLOW-N	62-114W	904.5	903.6	898.0	2.0	901.2	2.2	9.1	55.68	0.0870	64	0.27	898.0	915.0	901.2	3	903.6 *	5	902.8	5	3.17
GL-2	WILLOW-S	-	900.3	902.2	896.3	0.2	900.2	0.7	1.3	27.20	0.0425	81	0.22	896.3	908.0	900.2 *	34	900.7	36	897.6	11	
GL-3		-	897.3	898.0	893.9	2.4	896.0	5.9	13.3	110.27	0.1723	69	0.71	893.9	911.0	896.0 *	23	897.1	32	895.8	21	
GL-4E	SNAIL LK-E	-	886.6	885.9	880.0	5.3	883.2	52.5	117.7	236.35	0.3693	68	0.30	880.0	885.7	883.2	0	884.8	0	885.9 *	25	
GL-4W		-								44.42	0.0694	62	0.42									
GL-5	SUZANNE	-	877.5	877.5	872.0	1.3	875.5	4.0	9.2	46.44	0.0726	76	0.12	872.0	875.5 +	875.5 *	7	875.6	71	875.5	3	
GL-5W				881.4	874.0	0.0		0.3	0.8	2.90	0.0045	76	0.12	874.0	888.0	878.9	0	879.9	0	881.4	0	
GL-7		-	931.7	934.6	921.7	0.4	932.6	0.8	3.7	79.94	0.1249	91	0.45	921.7	934.0	932.6 *	179	933.2	192	923.4	22	
GL-8	STAHL	-	887.3	889.1	879.0	0.2	887.1	3.6	16.6	68.35	0.1068	88	0.36	879.0	890.0	887.1 *	96	887.9	102	881.8	37	
GL-9	GRASS	62-74W	884.2	883.7	879.0	141.0	880.5		364.0	431.74	0.6746	81	0.57	879.0	900.0	880.5	4	880.9	8	883.7 *	50	1.50
VR-1				904.7	899.5	0.9	902.7	1.2	3.4	47.62	0.0744	57	0.33	899.5	902.5	902.7	73	903.4	168	902.5	50	

ALL ELEVATIONS ARE ON NGVD29 (1929 Datum, Refer to page D-1 of Appendix D for conversion factors to 1912 (Local) and 1988 (NAVD) datums

* VALUE CONTROLING MINIMUM BUILDING ELEVATION - (CRITERIA: GREATER OF THE DESIGN STORM +2.0 FT, FLOOD EVALUATION STORM, OR 10-DAY RUNOFF) REV. 1/89

\+ OVERFLOW OPERATING FOR DESIGN EVENT REV. 4/90

1 RESERVOIR DATA IS FROM 1990 SWMP, EXCEPT DESIGN STORM WATER LEVEL IS FROM 2003 MODEL REV. 4/03

AND CITY DESIGNATIONSL-13A, SL-13B, AND VR-1 WHICH INCLUDE INFORMATION FROM NEW PONDS. REV. 8/03

DATA FROM 2005 SWMP

BASIS OF DESIGN

WMO: VADNAIS LAKE ARE WATERSHED MANAGEMENT ORGANIZATION

DRAINAGE DISTRICT: CHARLIE LAKE

CHARLIE LAKE

ALL ELEVATIONS ARE NGVD (1929) Datum, Refer to page D-1 of Appendix D for conversion factors to 1912 (Local) and 1988 (NAVD) Datums

City Water Body Designation		DNR Protected Water/Wetland	1990 Recommended Minimum Building Elevation	2005 Recommended Minimum Building Elevation	RESERVOIR DATA [1]					DRAINAGE AREA DATA				BASE DATA USED TO DETERMINE MINIMUM BUILDING ELEVATIONS HYDROLOGIC DATA (100-YEAR STORMS)								WETLAND BOUNCE
					NORMAL		DESIGN STORM							RESERVOIR DATA [1]		DESIGN STORM		FLOOD EVAL. STORM		TEN-DAY RUNOFF		
ID	NAME	Designation	(FEET)	(FEET)	Water Level (FEET)	Surface Area (ACRES)	Water Level (FEET)	Surface Area (ACRES)	Storage Volume (AC-FT)	Direct Tributary Area (ACRES)	(SQ MI)	CN	Tc (HRS)	Normal Water Level (FEET)	Overflow Elevation (FEET)	Elevation (FEET)	Q (CFS)	Elevation (FEET)	Q (CFS)	Elevation (FEET)	Q (CFS)	(FEET)
CL-1		-	909.10	910.8	905.9	0.1	908.8	0.2	0.2	6.00	0.0094	82	0.18	905.9	911.5	908.8 *	7	909.3	8	906.5	2	
CL-2	SHR OAKS-C	-	909.09	907.9	905.5	0.4	905.9	0.4	1.5	5.95	0.0093	52	0.60	905.5	911.0	905.9 *	1	906.6	13	906.0	1	
CL-3	SHR OAKS-S	-	898.83	899.7	895.5	2.8	897.7	3.6	4.0	32.45	0.0507	81	0.64	895.5	898.5	897.7 *	10	898.3	13	896.9	8	
CL-4		-	DIRECT RUNOFF TO CASEY POND	REMOVED FROM MODEL						12.32	0.0193	61	0.84									
CL-6	HEATHR RG-S	-	902.22	902.5	897.8	0.1	900.5	0.7	0.7	16.96	0.0265	64	0.87	897.8	902.0	900.5 *	4	901.9	5	900.1	4	
CL-8	SHERWOOD-S	-	900.00	900.0	895.1		898.0	1.3	2.1	33.90	0.0530	78	1.50	895.1	899.8	898.0 *	28	898.5	33	896.9	11	
CL-9		-	DIRECT RUNOFF TO CASEY POND	REMOVED FROM MODEL						3.91	0.0061	70	1.08									
CL-10		-	DIRECT RUNOFF TO CASEY POND	REMOVED FROM MODEL						34.16	0.0534	66	0.54									
CL-11N		-	908.00	COMBINED INTO CL-11						24.20	0.0378	56	0.37									
CL-11S		-	PART OF CL-11 DRAINING DIRECTLY TO CHARLIE LAKE	COMBINED INTO CL-11						13.89	0.0217	52	0.62									
CL-11				908.5	902.0	0.2	906.5	0.2	0.6	42.00	0.0656	53	0.37	902.0	907.7	906.5 *	18	908.1	143	904.4	11	
Sul.-1		-	DRAINS TO SUCKER LAKE							25.28	0.0395	64	0.33									
Sul.-2		-	DRAINS TO SUCKER LAKE							60.35	0.0943	65	0.50									
Sul.-3		-	DRAINS TO SUCKER LAKE							90.94	0.1421	66	0.67									

ALL ELEVATIONS ARE ON NGVD29 (1929 Datum, Refer to page D-1 of Appendix D for conversion factors to 1912 (Local) and 1988 (NAVD) datums

* VALUE CONTROLING MINIMUM BUILDING ELEVATION - (CRITERIA: GREATER OF THE DESIGN STORM +2.0 FT, FLOOD EVALUATION STORM, OR 10-DAY RUNOFF) REV. 1/89

+ OVERFLOW OPERATING FOR DESIGN EVENT REV. 4/90

1 RESORVOIR DATA IS FROM 1990 SWMP, EXCEPT DESIGN STORM WATER LEVEL IS FROM 2003 MODEL. REV. 4/03

FIS - Data from 2015 Flood Insurance Study
City - Data from 2005 SWMP Summary Tables
WD - Data from 2017 RWMWD Plan Figures and RCWD Model Summary

Exhibit D-1. 100-Year High Water Level Summary

- Shoreview Boundary
- Other Municipalities
- Parcels
- Surface Waters
- Hydrologic Boundaries (XX_XX)
- Flow Direction

Rice Creek Subwatersheds

- Charlie Lake*
- Anoka County Ditch 25
- Anoka-Ramsey Judicial Ditch 1
- Ramsey County Ditch 1
- Ramsey County Ditch 4
- Ramsey County Ditch 8
- Rice Creek - Direct Drainage

Ramsey-Washington Metro Subwatersheds

- Sucker Lake / Vadnais-Rice*
- Gervais Creek
- Grass Lake
- Lake Emily
- Lake Owasso
- Lake Wabasso
- Shoreview Pond
- Snail Lake

** Subwatershed included within the administrative boundary of the respective watershed district but excluded from the management plan*

0 1,125 2,250 Feet

Shoreview Kimley»Horn

SOURCES
City of Shoreview, Minnesota Geospatial Commons, Rice Creek Watershed District, Ramsey-Washington Metro Watershed District

FIS 890.3
City 885.1

FIS 891.0
City 891.0

FIS 883.6
City 883.7

FIS 890.3
City 890.2

FIS 888.5
City 888.4

FIS 891.8
City 891.8

FIS 892.8
City 892.7
WD 892.7

FIS 891.5
City 891.6

FIS 893.2
City 893.1
City 893.7 (10 d)
WD

FIS 887.8
City 887.5
WD

FIS 887.0
City 886.9

FIS 899
City 899.3
WD

FIS 897.4
City 897.9
WD

FIS 883.3
City 883.5
WD 884.15

FIS 883.1
City 883.7 (10 d)
WD 883.24

FIS 888.8
City 887.8 (10 d)
WD 887.69

FIS 889.1
City 888.6 (10 d)
WD 888.98

FIS 945.9
City 946.0
WD

FIS NA
City 946.8
WD 946.9

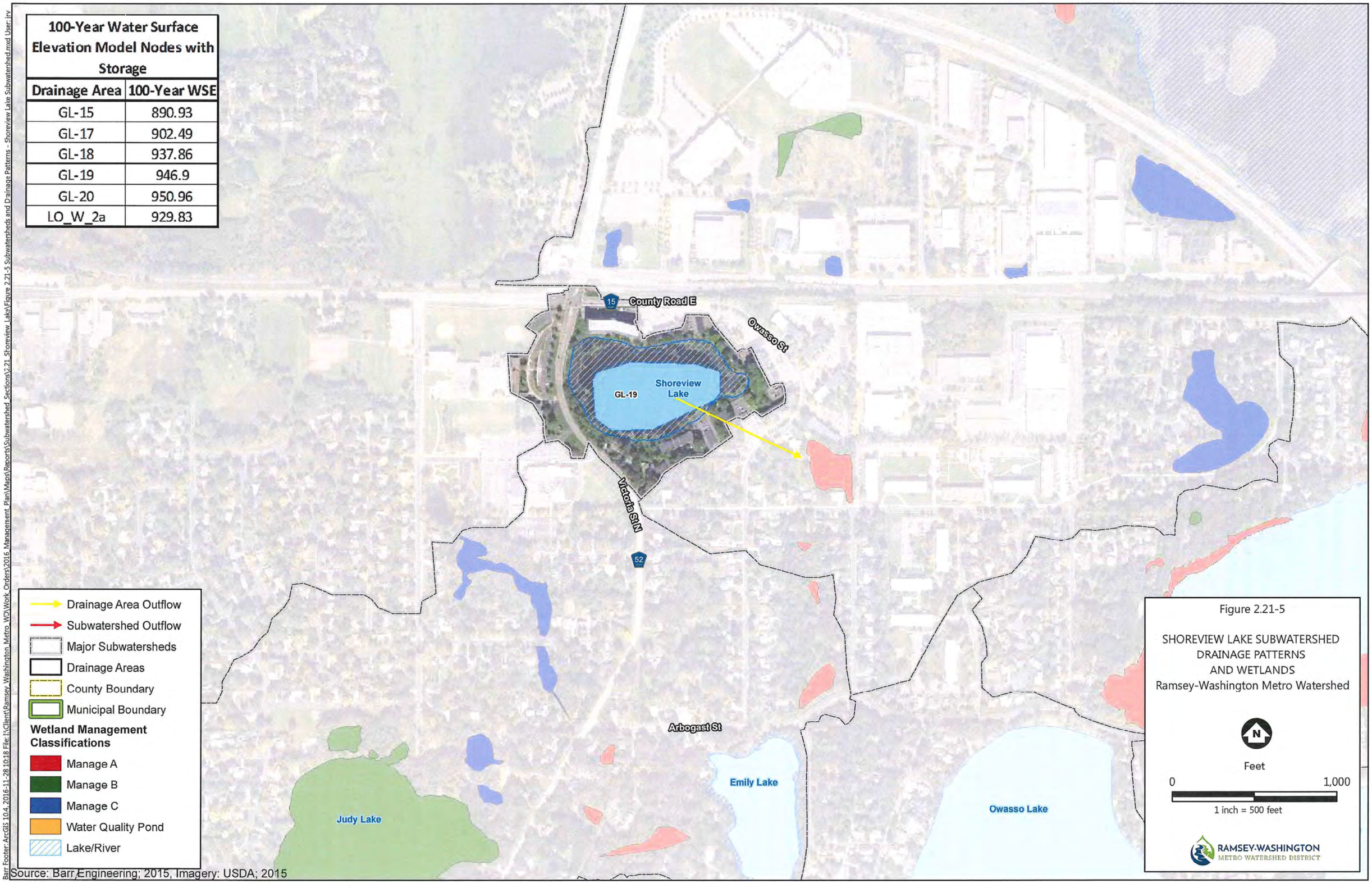
FIS 920.2
City 920.9
WD 919.91

FIS 944.5
City 944.7
WD 944.3

BLAINE
CIRCLE PINES
LINO LAKES
ANOKA COUNTY
RAMSEY COUNTY
MOUNDS VIEW
ARDEN HILLS
NORTH OAKS
NEW BRIGHTON
ROSEVILLE
VADNAIS HEIGHTS

Anoka-Ramsey Judicial Ditch 1
County Road J
Rice Creek - Direct Drainage
Rice Creek
Ramsey County Ditch 1
Ramsey County Ditch 8
Anoka County Ditch 25
Poplar Lake
Turtle Lake
Martha Lake
Snail Lake
Grass Lake
Island Lake
Lake Wabasso
Lake Emily
Lake Judy
Lake Owasso
Sucker Lake
Charlie Lake
County Rd I
County Rd F
County Rd E
County Rd D
Sherwood Rd
Tanglewood Dr
Mound Ave
Harriet Ave
Hodgson Rd
Gramsie Rd
Snail Lake Blvd
Lexington Ave
Hamline Ave
Fernwood St
Royal Oaks Dr
Parkview Dr
Rice Creek Pkwy
Turtle Lake Rd
Oakwood Dr
Shoreview Oaks S
Shoreview Oaks N
Dale St
Laura Ln
Victoria St N
Owasso Blvd
Rice St
Lexington Ave
Owasso St
Woodcrest Ponds
Cherrywood II Ponds
Cherrywoods II Ponds N
Royal Oaks Ponds S
Evergreen Ponds
Lexington Pond
Ravenswood Ponds S
Hamline Ponds E
Hamline Pond W
Woodcrest Ponds S
Dimke Pond
Lois Pond
Serene Ponds E
Cherrywood Pond
St. Albans Pond
Baldwin Ponds
Heather Ridge Ponds N
Heather Ridge Ponds S
Georgetown Pond
Willow Trail Ponds
Sherwood Ponds S
Power Station Pond
Turtle Lake Pond
Fire Station Pond
North Point Ponds
Shamrock Pond
Rice Creek Ponds
Sunset Pond
Schifsky Pond
Mercury Pond
Maple Pond
Old Farm Pond
Country Side Pond
Needs Attributes
Willow Ponds N
Willow Ponds S
Bridge Street Pond
Harbor Place Ponds S
Tudor Ponds
Marsden Lake Pond
Pheasant Heights Ponds
Bartlet Pond
Milton-S
Roberts Ponds
Wilson Park Ponds E
Wilson Park Ponds W
Relland Pond
Evans Pond
Manor Pond W
Manor Pond
Piche Pond
Suzanne Ponds
Gramsie Pond
Hotel Pond
E MCT Ponds
W MCT Ponds
Target Pond
MCA Pond
Lange Pond
Deluxe Pond
Stahl Pond
Richmond Ponds
St Odilia Pond
Arbogast Ponds
Cannonball Pond
Kroiss Pond
Harriet Pond
Johnston Pond
Dschg52
Dschg50
Dschg2
Dschg3
CD16-20
BR2L1_001
BR2L1_002
BR2L1_005
MT_072
MT_071
MT_038
MT_073
MT_040
MT_039
MT_037
MT_033
MT_041
MT_074
MT_043
MT_075
MT_001
MT_002
MT_003
MT_005
MT_004
MT_012
MT_006
MT_010
MT_009
MT_044
MT_011
MT_013
MT_014
MT_026
MT_025
MT_008
MT_018
MT_019
MT_021
MT_023
MT_022
MT_042
MT_020
MT_015
MT_017
BR1_002
BR1_001
MT_007
KARTH_001
MARDSEN_001
MARDSEN_002
MARDSEN_003
MARDSEN_005
TURTLE_001
VALENTINE_004
VALENTINE_006
VALENTINE_008
ISLAND_001
JOHANNA_002
JOHANNA_003
JOSEPHINE_001
L_JOSEPHIN_001
SL-01
SL-02
SL-03
SL-04
SL-05b
SL-05a
SL-06
SL-07
SL-08b
SL-09
SL-10a
SL-10b
SL-11
SL-12
SL-13
SL-14
SL-15
SL-16
SL-17
SL-18
SL-19
SL-20
SL-21
SL-22
SL-23
SL-24
SL-25
SL-26
SL-27
SL-28b
SL-28a
SL-29
SL-30
SL-31
GL-01
GL-01a
GL-02
GL-03
GL-04
GL-05
GL-06a
GL-06b
GL-07
GL-08
GL-09
GL-10
GL-11
GL-12
GL-13
GL-13a
GL-14
GL-15
GL-16
GL-16a
GL-17
GL-18
GL-19
GL-20
GL-21
LW-01
LW-02
LW-03
LW-04
LW-05
LW-06
LW-07
LO_W_1a
LO_W_1c
LO_W_1d
LO_W_2a
LO_W_3
LO_W_4
LO_N_1
35W
694
1
3
4
12
15
16
18
49
50
51
52
54
96

100-Year Water Surface Elevation Model Nodes with Storage	
Drainage Area	**100-Year WSE**
GL-15	890.93
GL-17	902.49
GL-18	937.86
GL-19	946.9
GL-20	950.96
LO_W_2a	929.83



Source: Barr Engineering; 2015, Imagery: USDA; 2015

100-Year Water Surface Elevation Model Nodes with Storage	
Drainage Area	100-Year WSE
SL-01	884.15
SL-02	898.68
SL-03	884.26
SL-04	905.71
SL-05a	885.06
SL-05b	885.06
SL-06	897.11
SL-07	892.31
SL-08b	903.59
SL-09	965.48
SL-10a	921.25
SL-10b	920.97
SL-10c	919.24
SL-11	906.12
SL-12	896.69
SL-13	991.14
SL-14	914.77
SL-15	942.24
SL-16	964.73
SL-17	968.38
SL-18	968.38
SL-19	973.04
SL-20	969.31
SL-21	894.41
SL-22	888.8
SL-23	902.6
SL-24	890.1
SL-25	888.37
SL-26	899.92
SL-27	888.64
SL-28a	909.52
SL-28b	891.95
SL-29	901.17
SL-31	910.8

- Drainage Area Outflow
- Subwatershed Outflow
- Major Subwatersheds
- Drainage Areas
- County Boundary
- Municipal Boundary

Wetland Management Classifications

- Manage A
- Manage B
- Manage C
- Water Quality Pond
- Lake/River

Source: Barr Engineering; 2015, Imagery: USDA; 2015

Tanglewood Dr
SL-26
Mound Ave
Brennans Pond Lake
SL-29
SL-25
SL-27
SL-24
96
SL-23
SL-28b
SL-28a
SL-22
SL-03
SL-12
SL-10c
SL-04
SL-21
SL-01
SL-14
SL-10a
SL-10b
SL-30
SL-31
Snail Lake
SL-01
SL-15
SL-11
SL-13
SL-09
SL-02
SL-16
52
SL-18
SL-05b
SL-05a
SL-17
SL-19
Snail Lake Blvd
SL-06
SL-08b
SL-20
SL-07

Figure 2.22-8

SNAIL LAKE SUBWATERSHEDS
DRAINAGE PATTERNS
AND WETLANDS
Ramsey-Washington Metro Watershed

N

Feet
0 1,000 2,000
1 Inch = 1,000 feet

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

100-Year Water Surface Elevation Model Nodes with Storage	
Drainage Area	**100-Year WSE**
GL-01	883.24
GL-01a	883.05
GL-02	887.67
GL-03	931.3
GL-05	881.99
GL-06a	882.5
GL-06b	883.24
GL-07	901.5
GL-08	915.54
GL-09	902.76
GL-10	908.05
GL-11	912.17
GL-12	922.42
GL-13	883.24
GL-13a	904.04
GL-14	883.22
GL-15	890.93
GL-16	925.13
GL-16a	941.77
GL-17	902.49
GL-18	937.86
GL-19	946.9
GL-20	950.96
GL-21	900.64
SL-08a	892.46

- Drainage Area Outflow
- Subwatershed Outflow
- Major Subwatersheds
- Drainage Areas
- County Boundary
- Municipal Boundary

Wetland Management Classifications

- Manage A
- Manage B
- Manage C
- Water Quality Pond
- Lake/River

Source: Barr Engineering; 2015, Imagery: USDA; 2015

Figure 2.19-4

GRASS LAKE SUBWATERSHED
DRAINAGE PATTERNS
AND WETLANDS
Ramsey-Washington Metro Watershed

Feet
0 2,000 4,000
1 inch = 2,000 feet

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

100-Year Water Surface Elevation Model Nodes with Storage			
Drainage Area	100-Year WSE	Drainage Area	100-Year WSE
Dschg18	950.12	LO_LL_1a	896.15
Dschg2	948.84	LO_LL_2a	895.13
Dschg21	944.3	LO_LL_2b	892.91
Dschg22	932.33	LO_LL_2c	892.76
Dschg23	929.83	LO_LL_3	892.52
Dschg27	927.77	LO_LL_4	892.15
Dschg29	927.45	LO_LL_5	891.91
Dschg3	923.11	LO_N_1	891.7
Dschg30	920.21	LO_S_1	891.53
Dschg34	919.91	LO_S_1a	891.14
Dschg35	915.34	LO_S_2a	890.89
Dschg36	914.15	LO_S_2b	954.7
Dschg50	913.27	LO_S_2c	890.6
Dschg52	907.7	LO_S_3a	890.6
LakeOwasso	906.03	LO_S_3b	889.95
LO_E_1a	904.79	LO_S_4	889.95
LO_E_1b	904.79	LO_S_5	889.81
LO_E_1c	904.75	LO_S_7	889.44
LO_E_1d	904.51	LO_W_1a	889.43
LO_E_1e	904.05	LO_W_1b	888.98
LO_E_1f	903.05	LO_W_1c	888.98
LO_E_1g	900.96	LO_W_1d	888.98
LO_E_1h	900.84	LO_W_2	888.98
LO_E_1i	899.16	LO_W_2a	888.98
LO_E_1j	898.87	LO_W_3	888.98
LO_E_1k	897.57	LO_W_4	881.86
LO_LL_1	896.82		

- Drainage Area Outflow
- Subwatershed Outflow
- Major Subwatersheds
- Drainage Areas
- County Boundary
- Municipal Boundary

Wetland Management Classifications

- Manage A
- Manage B
- Manage C
- Water Quality Pond
- Lake/River

Source: Barr Engineering; 2015, Imagery: USDA; 2015

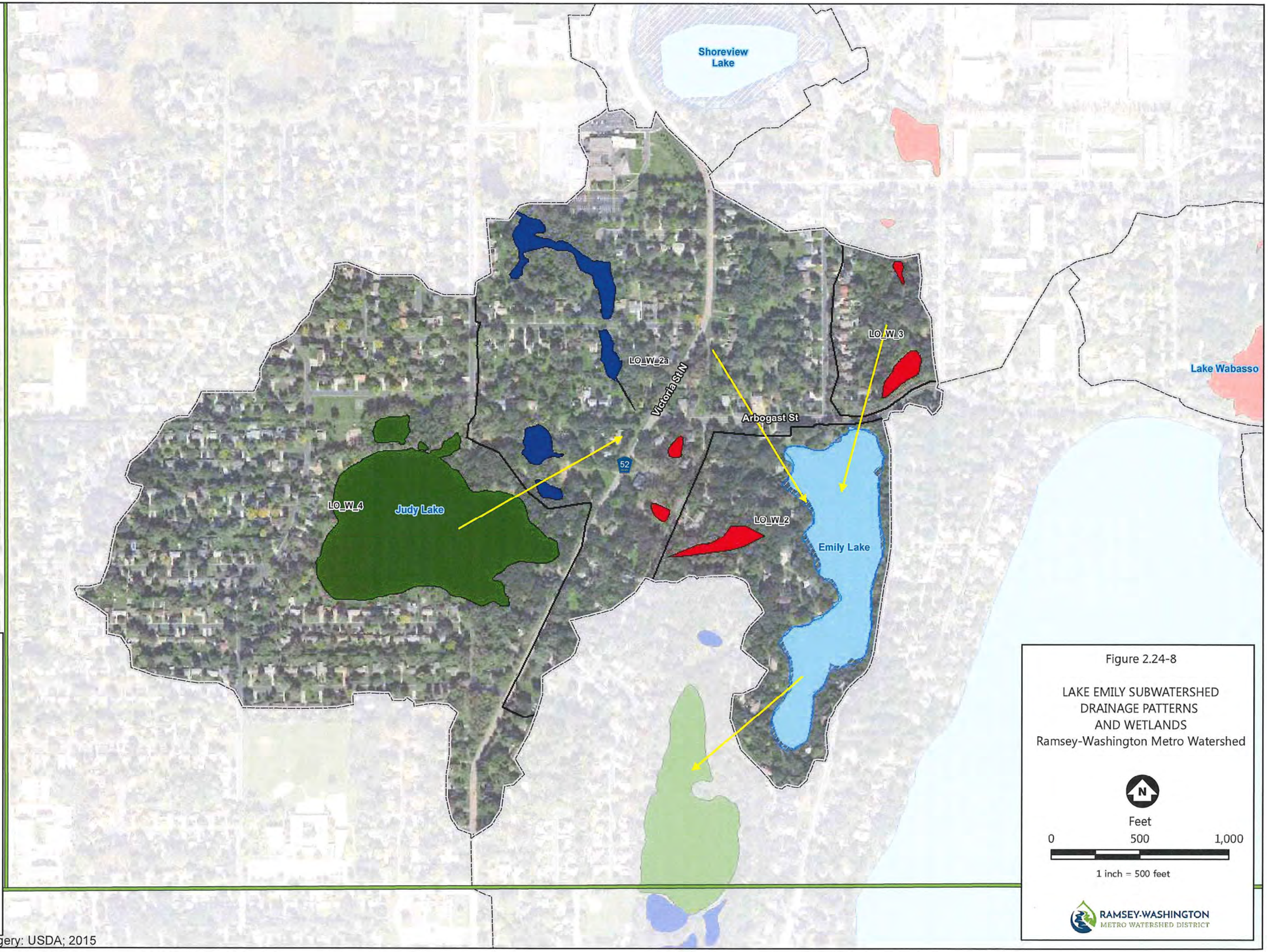
Figure 2.23-8

LAKE OWASSO SUBWATERSHED
DRAINAGE PATTERNS AND WETLANDS
Ramsey-Washington Metro Watershed

Feet
0 1,500 3,000
1 inch = 1,500 feet

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

100-Year Water Surface Elevation for Model Nodes with Storage	
Drainage Area	100-Year WSE
LO_W_2	919.91
LO_W_2a	929.83
LO_W_3	927.77
LO_W_4	944.3



- Drainage Area Outflow
- Subwatershed Outflow
- Major Subwatersheds
- Drainage Areas
- County Boundary
- Municipal Boundary

Wetland Management Classifications

- Manage A
- Manage B
- Manage C
- Water Quality Pond
- Lake/River

Source: Barr Engineering; 2015, Imagery: USDA; 2015

Figure 2.24-8

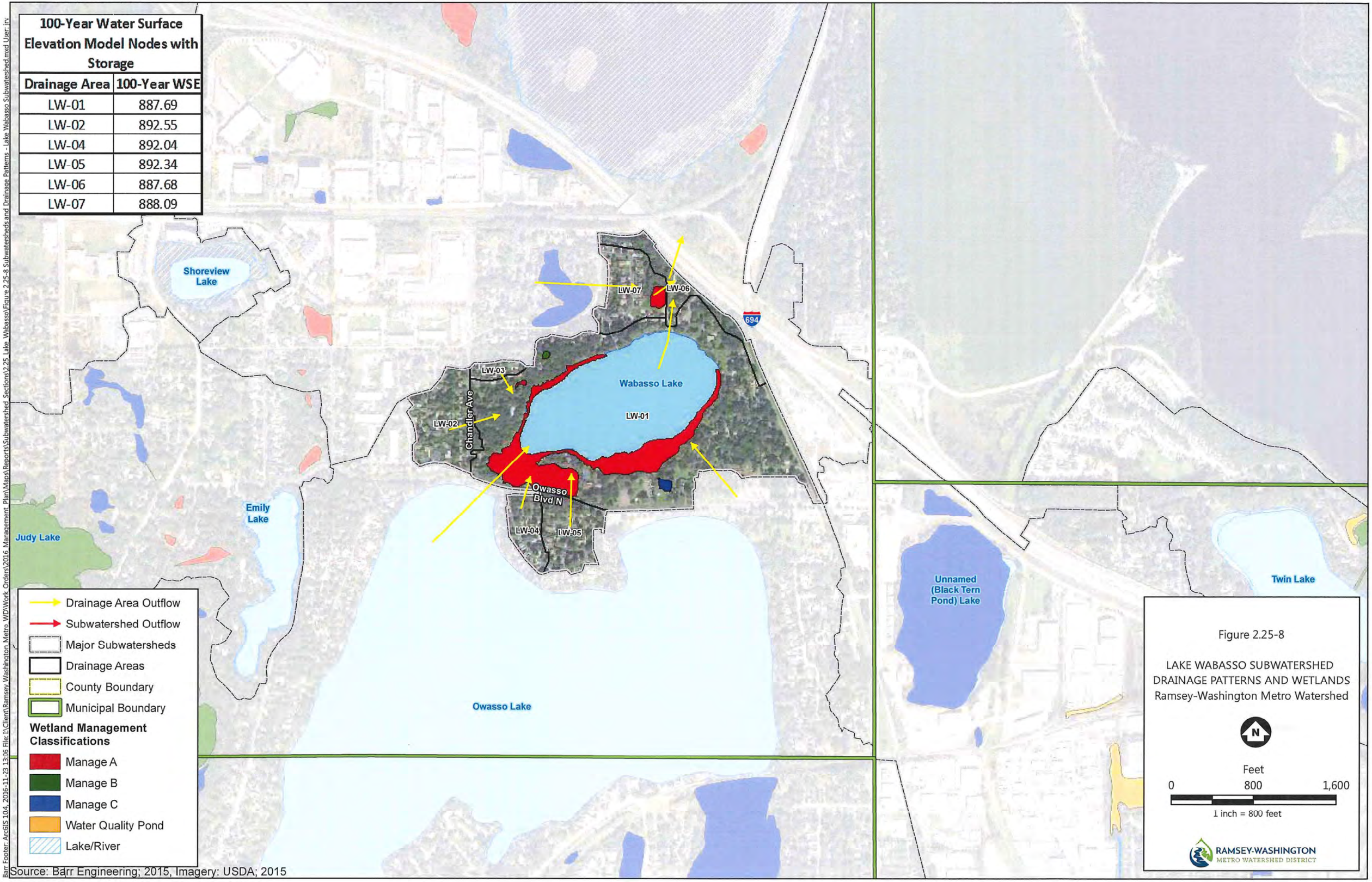
LAKE EMILY SUBWATERSHED
DRAINAGE PATTERNS
AND WETLANDS
Ramsey-Washington Metro Watershed

Feet
0 500 1,000
1 inch = 500 feet

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

Barr Footer: ArcGIS 10.4, 2016-11-28 10:25 File: I:\Client\Ramsey_Washington_Metro_WD\Work_Orders\2016_Management_Plan\Maps\Reports\Subwatersheds_Sections\2.24_Lake_Emily\Figure 2.24-8 Subwatersheds and Drainage Patterns - Lake Emily Subwatershed.mxd User: jrv

100-Year Water Surface Elevation Model Nodes with Storage	
Drainage Area	100-Year WSE
LW-01	887.69
LW-02	892.55
LW-04	892.04
LW-05	892.34
LW-06	887.68
LW-07	888.09



Source: Barr Engineering; 2015, Imagery: USDA; 2015

Figure 2.25-8

LAKE WABASSO SUBWATERSHED
DRAINAGE PATTERNS AND WETLANDS
Ramsey-Washington Metro Watershed

Feet
0 800 1,600
1 inch = 800 feet

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

APPENDIX E - RWMWD IMPLEMENTATION ACTIVITIES BY SUBWATERSHED

Table 2.5-3 Gervais Creek Subwatershed Implementation Activities

Activity ID No.	Gervais Creek Subwatershed Activity	Estimated Implementation Year	Estimated Cost (2017 Dollars)	Relevant Strategic Overview Action Items**	Priority Tier
GC-1	Continue to coordinate with DNR and Little Canada to improve habitat in Gervais Mill Park and maintain the urban fishing pond status.	**Continuous**	**$1,500 (average annual cost)**	**EC6**	**Tier 3**
GC-2*	Research options for control of Round Lake's (Little Canada) internal load of phosphorus and implement reduction measures if deemed necessary to maintain water quality.	**2020**	**$50,000**	**MO13**	**Tier 2**
GC-3	Prepare and implement a plan for increasing flood resiliency around Owasso Basin	**2018-2020**	**$500,000**	**WQ8, FL9, IE7, IE17, MO6, MO21**	**Tier 1**

*WRAPS strategy

Relevant Strategic Overview Action Items with "WQ**" pertain to the **"Achieve Quality Surface Water"** goal, with **"EC"** pertain to the **"Achieve Healthy Ecosystems"** goal, with **"FL"** pertain to the **"Manage Risk of Flooding"** goal, with **"GW"** pertain to the **"Support Sustainable Groundwater"** goal, and with **"IE"** pertaining to the **"Inform and Empower Communities**" goal and with **"MO"** pertain to the **"Manage Organization Effectively"** goal.

Table 2.19-2 Grass Lake Subwatershed Implementation Activities

Activity ID No.	Grass Lake Subwatershed Activity	Estimated Implementation Year	Estimated Cost (2017 Dollars)	Relevant Strategic Overview Action Items**	Priority Tier
GrL-1	Survey the connection between Grass Lake and Vadnais Lake, assess conditions and implement any needed improvements.	**2017**	**$20,000**	**FL1, FL7, FL9**	**Tier 1**

Relevant Strategic Overview Action Items with "WQ**" pertain to the **"Achieve Quality Surface Water"** goal, with **"EC"** pertain to the **"Achieve Healthy Ecosystems"** goal, with **"FL"** pertain to the **"Manage Risk of Flooding"** goal, with **"GW"** pertain to the **"Support Sustainable Groundwater"** goal, and with **"IE"** pertaining to the **"Inform and Empower Communities**" goal and with **"MO"** pertain to the **"Manage Organization Effectively"** goal.

Table 2.21-2 Shoreview Lake Subwatershed Implementation Activities

Activity ID No.	Shoreview Lake Subwatershed Activity	Estimated Implementation Year	Estimated Cost (2017 Dollars)	Relevant Strategic Overview Action Items**	Priority Tier
ShL-1*	Perform a feasibility study of retrofit opportunities throughout the Shoreview Lake Subwatershed to improve water quality	**2017**	**$30,000**	**WQ17, WQ19, IE7, IE17, MO6, MO21**	**Tier 1**
ShL-2*	Implement projects that are deemed feasible in the Shoreview Lake Subwatershed Feasibility Study	**2018-2026**	**$200,000**	**WQ2, WQ17, WQ18, WQ19, FL9, IE7, IE17, MO6, MO21**	**Tier 1**

*WRAPS strategy

Relevant Strategic Overview Action Items with "WQ**" pertain to the **"Achieve Quality Surface Water"** goal, with **"EC"** pertain to the **"Achieve Healthy Ecosystems"** goal, with **"FL"** pertain to the **"Manage Risk of Flooding"** goal, with **"GW"** pertain to the **"Support Sustainable Groundwater"** goal, and with **"IE"** pertaining to the **"Inform and Empower Communities**" goal and with **"MO"** pertain to the **"Manage Organization Effectively"** goal.

Table 2.22-4 Snail Lake Subwatershed Implementation Activities

Activity ID No.	Snail Lake Subwatershed Activity	Estimated Implementation Year	Estimated Cost (2017 Dollars)	Relevant Strategic Overview Action Items	Priority Tier
SL-1	No subwatershed-specific projects/programs are identified for this subwatershed; District-wide projects and activities will be implemented in this subwatershed.	Continuous	--	See DW items in Table 4-1	See DW items in Table 4-1

Table 2.23-4 Lake Owasso Subwatershed Implementation Activities

Activity ID No.	Lake Owasso Subwatershed Activity	Estimated Implementation Year	Estimated Cost (2017 Dollars)	Relevant Strategic Overview Action Items**	Priority Tier
LO-1*	Assess and conduct buffer and natural areas restoration along the Owasso Lakes Area	**2024-2026**	**$70,000**	**EC3, EC6**	**Tier 1**
LO-2	Create and implement an Emergency Response Plan for Owasso Lake.	**2017-2026**		**WQ19, FL5, FL9**	**Tier 2**
LO-3*	Perform a feasibility study of retrofit opportunities throughout the Lake Owasso Subwatershed to improve water quality, such as reducing the phosphorus load from tributary wetland systems (Westwood Village Pond, the Central Park Wetlands and Charlie Pond) and implementing a sedimentation pond at the City of Roseville's compost facility.	**2018**	**$30,000**	**WQ17, WQ19, FL8, IE7, IE17, MO6, MO21**	**Tier 1**
LO-4*	Implement water quality projects that are deemed feasible in the Lake Owasso Subwatershed Feasibility Study	**2019-2026**	**$750,000**	**WQ2, WQ17, WQ18, WQ19, FL8, FL9, IE7, IE17, MO6, MO21**	**Tier 1**
LO-5*	Research options for control of Lake Owasso's internal load of phosphorus and implement reduction measures if deemed necessary to maintain water quality.	**2020**	**$100,000**	**WQ8, MO13**	**Tier 2**
LO-6*	Evaluate the carp population in the Lake Owasso-Central Park Wetlands- Bennett Lake chain	**2017-2018**	**$150,000 (representative of assessment cost throughout the Owasso Chain of Lakes)**	**EC3, EC5**	**Tier 2**
LO-7*	Manage the carp population in the Lake Owasso-Central Park Wetlands-Bennett Lake chain if deemed necessary.	**2019-2026**	**$240,000 (representative of management cost throughout the Owasso Chain of Lakes)**	**WQ2, EC3, EC5**	**Tier 2**

Activity ID No.	Lake Owasso Subwatershed Activity	Estimated Implementation Year	Estimated Cost (2017 Dollars)	Relevant Strategic Overview Action Items**	Priority Tier
LO-8*	Use results of the District's macrophyte harvesting study to inform implementation of macrophyte management in Owasso Lake.	**2018**	**$100,000**	**WQ2, EC3, EC5**	**Tier 2**

*WRAPS strategy

Relevant Strategic Overview Action Items with "WQ**" pertain to the **"Achieve Quality Surface Water"** goal, with **"EC"** pertain to the **"Achieve Healthy Ecosystems"** goal, with **"FL"** pertain to the **"Manage Risk of Flooding"** goal, with **"GW"** pertain to the **"Support Sustainable Groundwater"** goal, and with **"IE"** pertaining to the **"Inform and Empower Communities**" goal and with **"MO"** pertain to the **"Manage Organization Effectively"** goal.

Table 2.25-4 Lake Wabasso Subwatershed Implementation Activities

Activity ID No.	Lake Wabasso Subwatershed Activity	Estimated Implementation Year	Estimated Cost (2017 Dollars)	Relevant Strategic Overview Action Items	Priority Tier
LW-1	No subwatershed-specific projects/programs are identified for this subwatershed; District-wide projects and activities will be implemented in this subwatershed.	Continuous	--	See DW items in Table 4-1	See DW items in Table 4-1

Table 2.24-4 Lake Emily Subwatershed Implementation Activities

Activity ID No.	Lake Emily Subwatershed Activity	Estimated Implementation Year	Estimated Cost (2017 Dollars)	Relevant Strategic Overview Action Items**	Priority Tier
LE-1*	Implement a shoreline management study and assist with lakeshore restoration to enhance lakeshore native habitat and stabilization	**2018**	**$25,000**	**EC3, EC9**	**Tier 2**
LE-2*	Perform a feasibility study of retrofit opportunities throughout the Lake Emily Subwatershed to improve water quality, including outflows from Lake Judy	**2016-2017**	**$30,000**	**WQ17, WQ19, IE7, IE17, MO6, MO21**	**Tier 1**
LE-3*	Implement projects that are deemed feasible in the Lake Emily Subwatershed Feasibility Study	**2019-2026**	**$300,000**	**WQ2, WQ17, WQ18, WQ19, IE7, IE17, MO6, MO21**	**Tier 1**
LE-4*	Research options for control of Lake Emily's internal load of phosphorus and implement reduction measures if deemed necessary to maintain water quality.	**2020**	**$50,000**	**WQ8, MO13**	**Tier 2**

*WRAPS strategy

Relevant Strategic Overview Action Items with "WQ**" pertain to the **"Achieve Quality Surface Water"** goal, with **"EC"** pertain to the **"Achieve Healthy Ecosystems"** goal, with **"FL"** pertain to the **"Manage Risk of Flooding"** goal, with **"GW"** pertain to the **"Support Sustainable Groundwater"** goal, and with **"IE"** pertaining to the **"Inform and Empower Communities**" goal and with **"MO"** pertain to the **"Manage Organization Effectively"** goal.

APPENDIX F – SHOREVIEW MS4 SWPPP

City of Shoreview, Minnesota

Permit Application and SWPPP

For the

GENERAL PERMIT
AUTHORIZATION TO DISCHARGE STORM WATER
ASSOCIATED WITH MUNICIPAL SEPARATE STORM SEWER SYSTEMS
UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION
SYSTEM/STATE DISPOSAL SYSTEM PERMIT PROGRAM

Permit No. MN R 040000

June 1, 2006

April 7, 2008

RE: Shoreview, Minnesota,
Revised Permit Application and SWPPP
NPDES/SDS Storm Water Phase II
Permit No. MN R 040000

Scott Fox
Senior Hydrogeologist
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Dear Mr. Fox:

Attached is a revised SWPPP based on your review comments provided in April and comments from the Metropolitan Council in June.

If you have any questions regarding our Revised Permit Application or SWPPP, please contact me at 651.490.4651.

Sincerely,

CITY OF SHOREVIEW

Mark Maloney, PE
Director of Public Works/City Engineer

Enclosure

Letter of Transmittal

TABLE OF CONTENTS

City of Shoreview, Minnesota

I. PERMIT APPLICATION

Minnesota Pollution Control Agency

General Stormwater Permit (MN R 040000) Application for Small Municipal Separate Storm Sewer Systems (MS4s)

RETURN THIS APPLICATION TO:

Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

NO FEE

Application deadline: **June 1, 2006**

PLEASE READ: **As you complete this form, read the instructions carefully. Use your keyboard's "Tab" key to move through the fields of this form. Select check-boxes and enter text as indicated. Save, and print.**

I. MS4 Information

A. Application Type

☐ **New applicant (this MS4 has no previous application for MS4 coverage on file at MPCA)**

☒ **Application for re-issuance of coverage (this MS4 applied in 2003)**

B. MS4 Owner General Contact (the community, municipality, agency or other party having ownership or operation control of the MS4)

City of Shoreview, Minnesota			
Community, municipality, agency or other party having ownership or operational control of the MS4			
4600 Victoria Street North			
Mailing Address			
Shoreview		MN	55126
City		*State*	*Zip Code*
Ramsey			
County			
41-6008808	8034049		
Federal Tax ID	*State Tax ID*		

C. General Contact (official, staff member, consultant or other) for all general correspondence about Permit compliance issues between the MPCA and your MS4

Maloney	Mark	Director of Public Works/City Engineer	
Last Name	*First Name*	*Title*	
4600 Victoria Street North			
Mailing Address			
Shoreview		MN	55126
City		*State*	*Zip Code*
651.490.4651		mmaloney@ci.shoreview.mn.us	
Telephone (include area code)		*E-mail Address*	

II. Certification of the Storm Water Pollution Prevention Program (SWPPP)

A. Have you developed a Storm Water Pollution Prevention Program for your MS4? ☒Yes

Municipalities must demonstrate how their Storm Water Pollution Prevention Program will be implemented and enforced over the term of the five-year Permit. SWPPPs must incorporate appropriate educational components, all required BMPs and the measurable goals associated with each. Storm Water Pollution Prevention Programs must address the specific requirements contained in Part V. G. of the Permit. SWPPPs must outline how the six minimum control measures will be addressed, the contact person, department in charge, timeline and measures that will be implemented to meet the schedules required by the Permit. Attach a BMP Summary Sheet to this application for ***each*** BMP in your SWPPP.

B. Does your SWPPP address all of the six Minimum Control Measures as outlined in the Permit? ☒Yes

The General Permit requires that you incorporate all six of the defined Minimum Control Measures in your Stormwater Pollution Prevention Program. You are required to implement mandatory BMPs which are directly associated to each of the Six Minimum Control Measures.

C. Have you attached the included BMP Summary Sheets, one for each of the Best Management Practices required by the Permit? ☒Yes

There are 34 required BMPs all of which require that the provided BMP Summary Sheet be filled out completely and included with your Storm Water Pollution Prevention Program. If any of these required sheets are missing, your application will not be considered complete and will be returned to you.

III. Reporting and Recordkeeping

I have read and understand Part VI *Evaluating, Recordkeeping, and Reporting* of the MS4 General Permit and certify that we intend to comply with the applicable requirements of those sections as well as the Permit as a whole. ☒Yes

B. Where will your SWPPP be available to the public for review?

Shoreview City Hall		**www.ci.shoreview.mn.us**
Name of Location		*If your SWPPP is available electronically, indicate location*
4600 Victoria Street North		
Street Address		
Shoreview	MN	55126
City	*State*	*ZIP Code*
Mark Maloney	651.490.4651	
Contact Name	*Contact Phone Number*	
8:00 am – 4:00 pm, M-F		
Hours of Availability		

IV. Limitations of Coverage

A. Part II Limitations on Coverage and Appendix C

I have read and understand Part II *Coverage Under This Permit* and Appendix C *Limitations on Coverage* of the MS4 General Permit and certify that we intend to comply with the applicable requirements of those sections as well as the Permit as a whole. ☒Yes

B. Outstanding Resource Value Waters (ORVWs)

Please refer to the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* to complete this section. An interactive map is available on the MPCA Web site that identifies Special Waters: http://pca-gis04.pca.state.mn.us

1. Prohibited Waters

Does the MS4 discharge into **Prohibited Waters** as defined in Minn. R. 7050.0180, subp. 3, 4, and 5? See Attachment Four of the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* for further information. ☐Yes ☒No

2. Restricted Discharge

Does the MS4 discharge into waters with a **Restricted Discharge** as defined in Minn. R. 7050.0180, subp. 6, 6a, and 6b? If yes, please list below and comply with Part IX, Appendix C, Item B. See Attachment Four of the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* for further information. ☐Yes ☒No

3. Prohibited or Restricted Waters

If you answered "yes" to either Question 1 or 2, have you included a map that outlines, at a minimum, the DNR minor sub-watersheds in your jurisdiction with ANY discharges to Prohibited or Restricted Waters? You are required by the Permit to provide this map along with your application. **[IX.B.2.b]** ☐Yes ☒No

Identify all discharges to Outstanding Resource Value Waters (ORVWs) from your MS4:

Name of Water Body	Type (lake, stream, river)

4. If you answered "yes" to either Question 1 or 2, who is the person responsible for ensuring compliance with this Permit condition?

Name: **NA** *Position:* _____ *Phone:* _____

C. Special Waters

1. Trout Waters

Does the MS4 discharge into **Trout Waters** as defined in Minn. R. 6264.0050 subp. 2 & 4? If yes, please list below and comply with Part IX, Appendix C, Item C. See Attachments Two and Three of the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* for further information. ☐**Yes** ☒**No**

2. Wetlands

Does the MS4 discharge into **Wetlands** as defined in Minn. R. 7050.0130, subp. F? ☒**Yes** ☐**No**

3. Environmental Review

Does the MS4 have a process to assure coordination with appropriate Agencies and to evaluate discharges that require applicable **Environmental Review** as required by State or federal laws? See Part IX of the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* for further information. ☒**Yes** ☐**No**

Who is the person responsible for ensuring compliance with this Permit condition?

Name: Jerry Auge *Position:* Assistant City Engineer *Phone:* 651.490.4652

4. Endangered or Threatened Species

Does the MS4 have a process to assure coordination with appropriate Agencies and to evaluate discharges whose direct, indirect, interrelated, interconnected, or independent impacts may jeopardize a listed **Endangered or Threatened Species** or adversely modify a designated critical habitat? See Part IX of the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* for further information. ☒**Yes** ☐**No**

Who is the person responsible for ensuring compliance with this Permit condition?

Name: Tom Wesolowski *Position:* Assistant City Engineer *Phone:* 651.490.4652

5. Historic Places and Archeological Sites

Does the MS4 have a process to assure coordination with appropriate Agencies and to evaluate discharges which may adversely affect properties listed or eligible for listing in the National Register of **Historic Places** or affecting known or discovered **archeological sites**? See Part IX of the *Guidance Manual for Small Municipal Separate Storm Sewer Systems (MS4s)* for further information. ☒**Yes** ☐**No**

Who is the person responsible for ensuring compliance with this Permit condition?

Name: Tom Wesolowski *Position:* Assistant City Engineer *Phone:* 651.490.4652

6. Drinking Water Sources

Does the MS4 have any discharges that may affect Source Water Protection as defined in part **IX.H** of the General Permit? ☒**Yes** ☐**No**

If "yes," does the MS4 have BMPs incorporated into the SWPPP to protect drinking water sources that the MS4 discharge may affect? ☒**Yes** **No**

V. Owner or Operator Certification

The person with overall, MS4 legal responsibility must sign the application. This person shall be duly authorized to sign the application and may be either a principal executive officer or ranking elected official. (see Minn. R. 7001.0060).

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. 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 (Minn. R. 7001.0070).

I also certify under penalty of law that I have read, understood, and accepted all terms and conditions of the National Pollutant Discharge Elimination System (NPDES) General Storm Water Permit for MS4s that authorizes storm water discharges identified in this application form.

I understand that as a Permittee, I am legally accountable under the Clean Water Act to ensure compliance with the terms and conditions of the NPDES General Storm Water Permit for MS4s.

I also understand that MPCA enforcement actions (pursuant to Minn. Stat. §115.07, 116.072, and Section 309 of the Clean Water Act) may be taken against me or the MS4 if the terms and conditions of the NPDES General Storm Water Permit for MS4s are not met.

C. General Contact (official, staff member, consultant or other) for all general correspondence about Permit compliance issues between the MPCA and your MS4

X

Authorized Signature		*Date*
Maloney	*Mark*	*Director of Public Works/City Engineer*
Last Name	*First Name*	*Title*

4600 Victoria Street North
Mailing Address

Shoreview	*MN*	*55126*
City	*State*	*ZIP Code*

651.490.4651	*mmaloney@ci.shoreview.mn.us*
Telephone (include area code)	*E-mail Address*

City of Shoreview, Minnesota

II. SUMMARY OF SURFACE WATER PROGRAM

II. SUMMARY OF SURFACE WATER PROGRAM

Background

The City of Shoreview lies north of the Twin Cities metropolitan area, equidistant from both Minneapolis and St. Paul. The City is located in north central Ramsey County. Adjacent cities include Mounds View and Arden Hills to the west; Blaine, Circle Pines and Lino Lakes to the north; North Oaks, Vadnais Heights, White Bear Township and Little Canada to the east; and Roseville to the south. The City covers approximately 8,100 acres (12.7 square miles) of land consisting of a mix of residential, light and heavy manufacturing, commercial, industrial, right-of-way, lakes/water, open space and park lands.

Receiving Waters

As stated in the City's Surface Water Management Plan (2005), the City is divided into two larger watersheds, Rice Creek and Grass Lake, along with a small portion located in the Vadnais Lake Area watershed. Storm water runoff from much of the City eventually reaches the Mississippi River.

Shoreview contains several waters (lakes and streams) that receive storm water runoff. The Grass Lake watershed encompasses approximately 3,100 acres, the Rice Creek watershed encompasses approximately 4,650 acres and the Vadnais Lake watershed encompasses approximately 350 acres. The list below identifies the waters in Shoreview where storm sewer system outfalls are located. Known outfalls to these waters are identified in the Outfall Map.

- Lake Owasso Lake
- Wabasso Snail Lake
- Turtle Lake
- Lake Emily
- Shoreview Lake
- Island Lake
- Lake Judy
- Grass Lake
- Martha Lake

BMPs for the Six Minimum Control Measures

The table which follows outlines BMPs that form the City's SWPPP.

2006 Unique BMP ID	2003 Unique BMP ID	Best Management Practices for Each Minimum Control Measure
MCM #1: Public Education & Outreach		
1a-1	1-01-R	City Storm Water Education Program
2a-1, 2b-1, 2c-1, 1e-1	1-02-R	Annual Public/City Council Meeting
1b-1, 1c-1, 1d-1	1-03	City Newsletter and Website
	1-04	Rice Creek Watershed District and Grass Lake WMO Education Programs
	1-05	City's Cable Access Television
MCM #2: Public Involvement and Participation		
2a-1, 2b-1, 2c-1, 1e-1	1-02-R	Annual Public/City Council Meeting
1c-2	2-01-R	Public Education and Outreach Program
	2-02	Storm Drain Stenciling
	2-03	Partner with County's Adopt-a-Highway Program
	2-04	Lake and Stream Clean-up and Monitoring
	2-05	City Clean-up Program
MCM #3: Illicit Discharge Detection and Elimination		
1c-3, 3d-1	3-01-R	Public Education & Outreach Program
3b-1	3-02-R	Regulatory Program to Prohibit Non-Storm Water Discharges into the MS4
3a-1	3-03-R	Storm System Outfall and BMP Map
3c-1, 3e-1	3-04-R	Illicit Discharge and Detection Program
3d-1, 6a-1	3-05	Maintenance Staff Meetings
3b-1	3-06	ISTS Inspection and Certification Program
	3-07	Used oil/household hazardous waste/pesticide program
	3-08	Phosphorus Fertilizer Ordinance
MCM #4: Construction Site Storm Water Controls		
1c-4	4-01-R	Public Education & Outreach Program
4a-1	4-02-R	Construction Erosion and Sediment Control Ordinance
4b-1	4-03	Rice Creek Watershed District Erosion Control Program
4d-1	4-04-R	Development Plan Review Process
4b-1, 4c-1, 4f-1	4-05-R	Construction Site Inspection and Street Sweeping Follow-up
4e-1	4-06-R	Complaint Response Program
MCM #5: Post Construction Storm Water Management for New Development and Redevelopment		
1c-5	5-01-R	Public Education & Outreach Program
5b-1	5-02-R	Post-Construction Runoff Control Ordinance
5c-1	5-03-R	BMP Maintenance Agreement Program
5b-1	5-04	RCWD and City Permit Program
5a-1, 5b-1	5-05-R	Reduction of Directly Connected Impervious Surfaces

MCM #6: Pollution Prevention/Good Housekeeping for Municipal Operations		
1c-6	6-01-R	Public Education & Outreach Program
3d-1, 6a-1	6-02-R	City Staff Training and Information Program
6b-2, 6b-3, 6b-4	6-03-R	Structural BMP and Outfall Inspection Program
6b-5	6-04-R	Storm Water System Maintenance Program
6b-6, 6b-7	6-05-R	Development of Storm System BMP Database
6a-2	6-06	Street Sweeping Program
6a-1	6-07	Spill Prevention and Control Training Program
6a-2	6-08	Road Salt Alternatives

III. SWPPP - BMP SUMMARY SHEETS

Minimum Control Measure 1: PUBLIC EDUCATION AND OUTREACH

Key to Unique BMP ID Numbers	Required BMP Title	Permit Reference
1a-1	Distribute Educational Materials	**V.G.1.a**
1b-1	Implement an Education Program	**V.G.1.b**
1c-1	Education Program: Public Education and Outreach	**V.G.1.c**
1c-2	Education Program: Public Participation	**V.G.1.c**
1c-3	Education Program: Illicit Discharge Detection and Elimination	**V.G.1.c**
1c-4	Education Program: Construction Site Run-off Control	**V.G.1.c**
1c-5	Education Program: Post-Construction Stormwater Management in New Development and Redevelopment	**V.G.1.c**
1c-6	Education Program: Pollution Prevention/Good Housekeeping for Municipal Operations	**V.G.1.c**
1d-1	Coordination of Education Program	**V.G.1.d**
1e-1	Annual Public Meeting	**V.G.1.e**

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota
Minimum Control Measure: 1-PUBLIC EDUCATION AND OUTREACH
Unique BMP Identification Number: 1a-1

***BMP Title:** Distribute Educational Materials

***BMP Description:**

The City will publish a series of articles in the ShoReview newsletter that is mailed to City residents and made available at City offices. The City will also continue to produce and maintain a website that will communicate water resource activities and projects at http://www.ci.shoreview.mn.us.

The City has put in a schedule to promote the use of the Household Hazardous Waste Program, Leaf Drop-Off at the County Site, sponsor and participate in Cleanup Day, which are scheduled twice a year in the spring and fall. The City also utilizes the ShoReview to provide information to residents as it pertains to preventing raking leaves into streets, relay information regarding the City's street sweeping operations and prohibiting the use of fertilizers that are phosphorous-exempt to promote good water quality within Shoreview.

The City's website also has an email notification system option that provides updates to residents when new information is added to the City's webpage.

***Measurable Goals:**

1. Maintain City web page for water resources information.
2. Update education materials, as needed, and make available at City offices.
3. Publish articles for each MCM (or combined article) in ShoReview newsletter.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually
2. Ongoing/Annually
3. Ongoing/Annually

Specific Components and Notes:

Audience or audiences: All City residents; community groups and visitors to Shoreview facilities.
Increased awareness: The flyers will educate the target audiences by giving them a good understanding of a variety of water quality topics and how citizens can make a difference.

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the ication due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1b-1

***BMP Title:** Implement an Education Program

***BMP Description:**

The City's education program consists of a wide range of activities as described in the BMP summary sheets in MCM 1 and 2, including newspaper articles, mailings, public meetings, resident participation programs and web-based information access. The City's surface water webpages have links to watershed organization websites where events and activities are posted.

The City has put in a schedule to promote the use of the Household Hazardous Waste Program, Leaf Drop-Off at the County Site, sponsor and participate in Cleanup Day, which are scheduled twice a year in the spring and fall. The City also utilizes the ShoReview to provide information to residents as it pertains to preventing raking leaves into streets, relay information regarding the City's street sweeping operations and prohibiting the use of fertilizers that are phosphorous-exempt to promote good water quality within Shoreview.

***Measurable Goals:**

1. Distribute storm water-related literature to developers and contractors.
2. Distribute literature to neighborhood groups, churches, schools, City staff and business owners.
3. Maintain a list of available information.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually
2. Ongoing/Annually
3. Ongoing/Annually

Specific Components and Notes:

The City may also host a public information meeting about storm water quality.

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-1

***BMP Title:** Education Program: Public Education and Outreach

***Audience(s) Involved:**

All City residents, business owners, City Council and committees, developers, contractors, watershed organizations and others.

***Educational Goals for Each Audience:**

Increased awareness: BMPs have been selected to increase awareness by making positive impressions on individuals that will help to change attitudes and behaviors towards storm water issues. The desired end result is improvements in the water quality of City lakes and water resources.

***Activities Used to Reach Educational Goals:**

1. Distribution of educational and informational flyers.
2. Maintain web site postings of storm water program information – including the City's Surface Water Management Plan as it is updated.
3. Broadcast storm water information on the local cable access channel.

***Activity Implementation Plan:**

1. Ongoing/Annually
2. Ongoing/Annually
3. Ongoing/Annually

***Performance Measures:**

1. Quantity of flyers distributed.
2. Web site activity related to storm water programs.
3. Program topics broadcast on cable.

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-2

***BMP Title:** Education Program: Public Participation

***Audience(s) Involved:**

Residents, developers, businesses, volunteers, youth groups, local clubs, visitors to the City.

***Educational Goals for Each Audience:**

Increased awareness: The program will make known the importance of storm water issues and how people can make an impact on a larger scale. Activities may include storm drain stenciling, picking up trash near the stenciled storm drains and by noting where maintenance is needed.

***Activities Used to Reach Educational Goals:**

1. Continuation of Adopt-a-Trail program.
2. Continuation of storm drain stenciling program.
3. Conduct City clean-up day events.

***Activity Implementation Plan:**

1. Ongoing/Annually.
2. Ongoing/Annually.
3. Semi-Annually - Spring and Fall.

***Performance Measures:**

1. Number of events and number of participants.
2. Number of events and number of participants.
3. Number of vehicles at each event.

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-3

***BMP Title:** Education Program: Illicit Discharge Detection and Elimination

***Audience(s) Involved:**

Residents, developers, businesses, volunteers, visitors to the City, City staff.

***Educational Goals for Each Audience:**

The program will make known the importance of storm water issues and how people can make an impact on a larger scale. The City will post information on the city's storm water page and in the ShoReview newsletter. The various articles solicit storm water related questions and citizen input on the city's SWPPP, and encourages residents to identify and report illicit discharges or other storm water related problems.

***Activities Used to Reach Educational Goals:**

1. Post at least one article on the City website relating to Minimum Control Measure #3.
2. Maintain a link to the Ramsey County Household Hazardous Waste program information.
3. Publish at least 1 article in the ShoReview newsletter relating to MCM #3.

***Activity Implementation Plan:**

1. Annually
2. Annually
3. Annually

***Performance Measures:**

1. Article posted.
2. Link maintained.
2. Article published.

***Responsible Party for this BMP:**

Name: Assistant City Engineer

Department: Public Works

Phone: 651.490.4652

E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-4

***BMP Title:** Education Program: Construction Site Run-off Control

***Audience(s) Involved:**

Residents, developers, contractors, businesses, volunteers, visitors to the City.

***Educational Goals for Each Audience:**

The program will make known the importance of storm water issues and how people can make an impact on a larger scale. Information on erosion control is posted on the city's website and can be accessed via links on the city's storm water pages. Links are also provided to the city's erosion control ordinance and erosion related information on the MPCA and watershed district websites. Information on erosion control is distributed with all grading permits and building permits. All new projects are reviewed for erosion control plans.

***Activities Used to Reach Educational Goals:**

1. Post at least one article on the City website relating to Minimum Control Measure #4.
2. Publish at least 1 article in the official City paper relating to MCM #4.
3. Distribute and make available standards guidance information to developers as initial contacts are made (materials may include MnDOT guide manual, MPCA guidance, RCWD guidance, City Standard Details, etc.).

***Activity Implementation Plan:**

1. Annually
2. Annually
3. Ongoing/Annually

***Performance Measures:**

1. Article posted.
2. Article published
3. Quantity of material/number of developers sent erosion control guidance materials.

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-5

***BMP Title:** Education Program: Post-Construction Stormwater Management in New Development and Redevelopment

***Audience(s) Involved:**

City council members, residents, developers, businesses, volunteers, visitors to the City.

***Educational Goals for Each Audience:**

The program will make known the importance of storm water issues and how people can make an impact on a larger scale. The City will continue to maintain and update flyers/informational materials and the City website relating to storm water management practices for development and redevelopment projects.

***Activities Used to Reach Educational Goals:**

1. Post at least one article on the City website relating to Minimum Control Measure #5.
2. Publish at least 1 article in the official City paper relating to MCM #5.
3. Distribute and make available treatment system standards and guidance documents to developers as initial contacts are made.
4. Meet with City council members to review the City's SWPPP and provide more detailed information on items as requested by the members.
5. Create a SWPPP information sheet that will be provided to new council members.

***Activity Implementation Plan:**

1. Annually
2. Annually
3. Ongoing/Annually
4. Meet with City council prior to January 1, 2009
5. Create informational sheet after meeting with the City council and provide as needed to new members.

***Performance Measures:**

1. Article posted.
2. Article published.
3. Quantity of material/number of developers sent water quality BMP guidance materials.
4. Conduct meeting with City council.
5. Create information sheet and distribute to new council members.

***Responsible Party for this BMP:**

Name: Assistant City Engineer

Department: Public Works

Phone: 651.490.4652

E-mail: jauge@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-6

***BMP Title:** Education Program: Pollution Prevention/Good Housekeeping for Municipal Operations

***Audience(s) Involved:**

Residents, developers, businesses, volunteers, visitors to the City, City staff.

***Educational Goals for Each Audience:**

The program will make known the importance of storm water issues and how people and city staff can make an impact on a larger scale. This information will also let residents know what the City is doing on a regular basis to actively improve water quality throughout the City. Information discussing the City's Pollution Prevention/Good Housekeeping Plan for the municipal operations will be posted on the city's website and be accessible through the city's storm water management page. A link is provided to the city's General Storm Water Permit for Industrial Activity of which the Pollution Prevention/Good Housekeeping Plan is an integral component.

***Activities Used to Reach Educational Goals:**

1. Post at least one article on the City website relating to Minimum Control Measure #5.
2. Publish at least 1 article in the official City paper relating to MCM #5.
3. Conduct annual internal staff training event on municipal operations and make information available to staff.

***Activity Implementation Plan:**

1. Annually
2. Annually
3. Annually

***Performance Measures:**

1. Article posted.
2. Article published.
3. Number of staff trained, topics/water resource material covered.

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1d-1

***BMP Title:** Coordination of Education Program

***BMP Description:**

The City will work with Ramsey County, the RCWD, GLWMO and the VLAWMO to distribute general information on non-point source pollution, water resource impacts and needs for and benefits of reduction. The City also currently has efforts ongoing with these agencies to promote and install a range of storm water practices in suitable areas. The most efficient method of coordinating these programs is by maintaining links to related programs on the various websites.

***Measurable Goals:**

1. Maintain a link to Ramsey County "Environment" web pages.
2. Provide web link/access to material available from MPCA.
3. Provide web link/access to material available from local Watershed Organizations.
4. Provide web link/access to other related educational information.

***Timeline/Implementation Schedule:**

1. Annually check access and update, as needed.
2. Annually check access and update, as needed.
3. Annually check access and update, as needed.
4. Annually check access and update, as needed.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer

Department: Public Works

Phone: 651.490.4652

E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1e-1

***BMP Title:** Annual Public Meeting

***BMP Description:**

The City will hold an annual public meeting at a City Council meeting between approximately February and May of each year to present progress to date on the City's SWPPP for the past year and required activities for the following year. The City will follow applicable public notice requirements and solicit public opinion about the adequacy of the SWPPP. The City will consider both written and oral public comments.

***Measurable Goals:**

1. Hold annual public meeting relating to NPDES SWPPP.
2. Reserve time in meeting agenda for public comment.
3. Have review written materials available prior to and at the public meeting.

***Timeline/Implementation Schedule:**

1. Annually
2. Annually
3. Prepare draft report prior to meeting.

Specific Components and Notes:

See also BMP 2a-1, 2b-1, 2c-1

***Responsible Party for this BMP:**

Name: Director of Public Works/City Engineer

Department: Public Works

Phone: 651.490.4651

E-mail: mmaloney@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet Instructions

Minimum Control Measure 2: PUBLIC PARTICIPATION/INVOLVEMENT

Key to Unique BMP ID Numbers	Required BMP Title	Permit Reference
2a-1	Comply with Public Notice Requirements	**V.G.2.a**
2b-1	Solicit Public Input and opinion on the Adequacy of the SWPPP	**V.G.2.b**
2c-1	Consider Public Input	**V.G.2.c**

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 2-PUBLIC PARTICIPATION/INVOLVEMENT

Unique BMP Identification Number: 2a-1

***BMP Title:** Comply with Public Notice Requirements

***BMP Description:**

The City will provide at least 30 days notice to residents through the local newspaper relating to the date, time and details of the annual public meeting. The meeting will be held in between February and May of each year to present progress to date on the City's SWPPP for the past year and required activities for the following year. The City will follow applicable public notice requirements and solicit public opinion about the adequacy of the SWPPP. The City will consider both written and oral public comments. Shoreview will also broadcast the annual informational meeting on community cable programming.

***Measurable Goals:**

1. Prepare and notice the public meeting in the official local paper.
2. Notice will specify that all residents have an opportunity for full and fair consideration.

***Timeline/Implementation Schedule:**

1. Notice at least 30 days prior to the scheduled meeting.
2. Annually with notice posted at least 30 days prior to meeting.

Specific Components and Notes:

See also BMP 1e-1, 2b-1, 2c-1

***Responsible Party for this BMP:**

Name: Director of Public Works/City Engineer

Department: Public Works

Phone: 651.490.4651

E-mail: mmaloney@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 2-PUBLIC PARTICIPATION/INVOLVEMENT

Unique BMP Identification Number: 2b-1

***BMP Title:** Solicit Public Input and opinion on the Adequacy of the SWPPP

***BMP Description:**

The City will hold an annual public meeting at a Council meeting between February and May of each year to present progress to date on the City's SWPPP for the past year and required activities for the following year. The City will follow applicable public notice requirements and solicit public opinion about the adequacy of the SWPPP. The City will consider both written and oral public comments. Shoreview will also broadcast the annual informational meeting on community cable programming.

***Measurable Goals:**

1. Provide an opportunity for public input in written or oral format.
2. Have draft annual report available at public meeting.
3. Make draft copy available for review one week prior to the public meeting.

***Timeline/Implementation Schedule:**

1. Annually, prior to the meeting, at the meeting or by data specified in the notice.
2. Annually
3. Annually

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Director of Public Works/City Engineer

Department: Public Works

Phone: 651.490.4651

E-mail: mmaloney@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 2-PUBLIC PARTICIPATION/INVOLVEMENT

Unique BMP Identification Number: 2c-1

***BMP Title:** Consider Public Input

***BMP Description:**

The City will hold an annual public meeting at a Council meeting between February and May of each year to present progress to date on the City's SWPPP for the past year and required activities for the following year. The City will follow applicable public notice requirements and solicit public opinion about the adequacy of the SWPPP. The City will consider both written and oral public comments. Shoreview will also broadcast the annual informational meeting on community cable programming.

***Measurable Goals:**

1. Summarize comments and analyze needs for adjustments to the SWPPP where appropriate.
2. Incorporate any significant changes identified by the input into the annual report and SWPPP revisions.

***Timeline/Implementation Schedule:**

1. Annually (prior to June 30).
2. Annually.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Director of Public Works/City Engineer

Department: Public Works

Phone: 651.490.4651

E-mail: mmaloney@ci.Shoreview.mn.us

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BMP Summary Sheet Instructions

Minimum Control Measure 3: ILLICIT DISCHARGE DETECTION AND ELIMINATION

Key to Unique BMP ID Numbers	Required BMP Title	Permit Reference
3a-1	Storm Sewer System Map	**V.G.3.a**
3b-1	Regulatory Control Program	**V.G.3.b**
3c-1	Illicit Discharge Detection and Elimination Plan	**V.G.3.c**
3d-1	Public and Employee Illicit Discharge Information Program	**V.G.3.d**
3e-1	Identification of Non Stormwater Discharges and Flows	**V.G.3.e**

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 3-ILLICIT DISCHARGE DETECTION AND ELIMINATION

Unique BMP Identification Number: 3a-1

***BMP Title:** Storm Sewer System Map

***BMP Description:**

The City has prepared a map that shows the location of portions of the City storm sewer system, treatment facility components and receiving water bodies. The map currently helps facilitate management of the overall illicit discharge detection and elimination program and the BMP maintenance program. The map is updated annually.

The map will identify: 1) ponds, streams, lakes and wetlands that are part of the City's storm system; 2) structural pollution control devices (grit chambers, separators, etc.); 3) all pipes and conveyances as a goal, but at a minimum, those pipes that are 24 inches in diameter and over; and 4) outfalls to receiving waters and other MS4s, structures that discharge directly to groundwater, overland discharge points and all other points that are outlets, but not diffuse flow areas.

***Measurable Goals:**

1. Review map details compared to listed items 1-4 above (from the MS4 Permit).
2. If additional information is needed, identify process and schedule for including the data on the map.
3. Incorporate new BMPs and storm system created by new and redevelopment activities.
4. Complete the MS4 map.

***Timeline/Implementation Schedule:**

1. December 31, 2006.
2. December 31, 2006.
3. Ongoing/Annually
4. June 30, 2008.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Director of Public Works/City Engineer
Department: Public Works
Phone: 651.490.4651
E-mail: mmaloney@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 3-ILLICIT DISCHARGE DETECTION AND ELIMINATION

Unique BMP Identification Number: 3b-1

***BMP Title:** Regulatory Control Program

***BMP Description:**

The City's regulatory mechanism to prohibit non-storm water discharges into the storm sewer system is contained in several sections of City code. The City currently has an ISTS code (Section 209.090) and has adopted the Minnesota Building Code that prohibits illicit connections and illegal dumping into the storm system. The City will continue to enforce these codes and review them to determine if changes or additions are needed to prohibit illicit discharges from other sources. State law covers the use of commercial fertilizer and lawn fertilizer applications. These ordinances and codes provide authority to inspect systems and facilities, prevent illicit connections and discharges, and allow for punitive measures.

The City will also continue to participate in the Ramsey County Household Hazardous Waste Program which collects: adhesives, aerosol spray products, automotive products, fluorescent lamps, furniture refinishing products, household cleaners, paint, stain, pool chemicals, pesticides, herbicides, insecticides. More information can be found at: http://www.co.ramsey.mn.us.

***Measurable Goals:**

1. Review ordinances to determine if adequately meeting the illicit discharge requirements.
2. Complete updates, as needed, through formal ordinance review and modification process.

***Timeline/Implementation Schedule:**

1. Annually.
2. As needed.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Director of Public Works/City Engineer
Department: Public Works
Phone: 651.490.4651
E-mail: mmaloney@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 3-ILLICIT DISCHARGE DETECTION AND ELIMINATION

Unique BMP Identification Number: 3c-1

***BMP Title:** Illicit Discharge Detection and Elimination Plan

***BMP Description:**

The City is not currently aware of any locations where this exists. The City has coordinated current activities with the complaint response program and related inspection and monitoring activities. This will be one of the methods by which the City monitors for illicit discharges into and from their system.

A range of potentially polluting activities occurs throughout the City (e.g., construction projects, hazardous materials handling, used oil and pesticide disposal, etc.) that can be identified and better addressed through this program. The storm system outfalls in the City inspecting these outfalls will be one step in tracking down illicit discharges or other potential water quality hazards that may impact the MS4 system.

***Measurable Goals:**

1. Respond to complaints or information relating to potential illicit discharges and illegal dumping.
2. Implement inspection program of the City storm system and development projects.
3. Complete employee training to identify and track illicit discharges as needed.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually
2. Ongoing/Annually
3. March 2009 – Develop illicit discharge detection and elimination training component for City staff

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 3-ILLICIT DISCHARGE DETECTION AND ELIMINATION

Unique BMP Identification Number: 3d-1

***BMP Title:** Public and Employee Illicit Discharge Information Program

***BMP Description:**

The City maintenance staff meets regularly and will discuss illicit discharges into the City's storm sewer system at least once per year. As these discharges occur and are identified, they are generally corrected and removed immediately when they are found connected to the City's system.

***Measurable Goals:**

1. Distribute information on illicit discharges in conjunction with BMP 1c-2.
2. Conduct annual staff training in conjunction with BMP 6a-1.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually
2. Annually

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 3-ILLICIT DISCHARGE DETECTION AND ELIMINATION

Unique BMP Identification Number: 3e-1

***BMP Title:** Identification of Non Stormwater Discharges and Flows

***BMP Description:**

The City has reviewed the following categories of **non-storm water discharges or flows** (i.e., illicit discharges) and has determined that none identified in the list are known to be significant contributors of pollutants to our system at this time.

Category	Significant Contributor?	
	Yes	No
Water line flushing		√
Landscape irrigation		√
Diverted stream flows		√
Rising ground waters		√
Uncontaminated ground water		√
Uncontaminated pumped ground water		√
Discharges from potable water sources		√
Foundation drains		√
Air conditioning condensation		√
Irrigation water		√
Springs		√
Water from crawl space pumps		√
Footing drains		√
Lawn watering		√
Individual residential car washing		√
Flows from riparian habitats and wetlands		√
Dechlorinated swimming pool discharges		√
And street wash water		√
Discharges or flows from fire fighting activities		√

***Measurable Goals:**

1. Review non-storm water discharge list annually to evaluate significance of each potential source.

***Timeline/Implementation Schedule:**

1. Annually

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer

Department: Public Works

Phone: 651.490.4652

E-mail: jauge@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet Instructions

Minimum Control Measure 4: CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Key to Unique BMP ID Numbers	Required BMP Title	Permit Reference
4a-1	Ordinance or other Regulatory Mechanism	**V.G.4.a**
4b-1	Construction Site Implementation of Erosion and Sediment Control BMPs	**V.G.4.b**
4c-1	Waste Controls for Construction Site Operators	**V.G.4.c**
4d-1	Procedure for Site Plan Review	**V.G.4.d**
4e-1	Establishment of Procedures for the Receipt and Consideration of Reports of Stormwater Noncompliance	**V.G.4.e**
4f-1	Establishment of Procedures for Site Inspections and Enforcement	**V.G.4.f**

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4a-1

***BMP Title:** Ordinance or other Regulatory Mechanism

***BMP Description:**

The City will develop an ordinance to regulate construction site stormwater runoff. The City will work with the appropriate WMOs to insure the ordinance is consistent with their regulations. The City will include the components recommended by the MPCA as follows:

1. Construction site plan submittal to include erosion and sediment controls during construction.
2. Site plan review and approval by the City prior to activity on the site.
3. Require record keeping of rainfall amounts and inspections by site operators.
4. Require design standards for temporary erosion and sediment controls during construction activities.
5. Regular inspections by site operators.
6. Require criteria for the site operator to conduct dewatering and/or basin draining at the site.
7. Require criteria for BMP maintenance.
8. Require waste controls for solid and hazardous wastes.
9. Require design standards for permanent storm water management controls following the completion of construction activities.
10. Require stable slopes and the establishment of perennial vegetative cover on all exposed soils upon the completion of any construction activity.

All components listed will be written into the ordinance as well as enforcement action that the City can take including verbal warnings, written warnings, stop-work orders, fines, forfeit of security bond money, and withholding of the certificate of occupancy.

***Measurable Goals:**

1. Review current City ordinances, other city ordinances, and other sources for potential programs that could be incorporated into the ordinance.
2. Complete background and draft ordinance structure.
3. Begin formal ordinance development process.
4. Complete process and have ordinance approved by City Council.

***Timeline/Implementation Schedule:**

1. Review of current City ordinances and other sources will begin April 2008.
2. Background and draft ordinance will be completed by January 2009.
3. Formal ordinance process and Council approval will be completed by March 2009.

Specific Components and Notes:

The City Planner will be involved in the process and provide examples, language, and assist in research.

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4b-1

***BMP Title:** Construction Site Implementation of Erosion and Sediment Control BMPs

***BMP Description:**

As part of the Rice Creek Watershed District (RCWD) permit program, the City will continue work with the District to ensure compliance with the RCWD requirements and to support the inspection and enforcement process by the District. In addition, the City will continue to promote the BMPs described in the Ramsey County Erosion and Sediment Control Handbook and compliance with the MPCA Construction NPDES Permit in all areas of the City.

Rice Creek Watershed District reviews all improvements located with its watershed district as it pertains to their permit requirements. The City, County and Rice Creek Watershed District inspect construction sites during the construction seasons for compliance with MPCA requirements. Rice Creek Watershed District gives the City results of permit review comments upon their findings. All failing inspection results are copied to the City for our property files. The City may also require site owners/contractor to sweep streets to remove accumulated sediment tracked from construction sites.

See also BMPs 4d-1 and 4f-1.

***Measurable Goals:**

1. Conduct plan review of proposed erosion control practices.
2. Require development agreements for private construction activities.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually
2. Ongoing/Annually

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4c-1

***BMP Title:** Waste Controls for Construction Site Operators

***BMP Description:**

The City has a current ordinance that addresses construction site waste controls and as described in BMP 3b-1, the City has adopted the Minnesota Building Code requirements for prohibitions on discharges or dumping of waste into the storm system. The ordinance is related to building code enforcement but also gives the City the authority to address issues relating to potential water quality hazards of construction site waste management.

The City may also require site owners/contractor to sweep streets to remove accumulated sediment tracked from construction sites.

***Measurable Goals:**

1. Based on inspections, record the number of non-compliant sites.
2. Record the number of sites where City clean-up is needed.
3. Review ordinance language for revisions specific to storm water runoff control.
4. If changes are needed, make formal changes in accordance with City procedures.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually (as part of construction site inspection program)
2. Ongoing/Annually.
3. By June 1, 2009
4. By June 1, 2010.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4d-1

***BMP Title:** Procedure for Site Plan Review

***BMP Description:**

The City currently reviews all land disturbing activities for compliance with the erosion and sediment control ordinance prior to issuing a building permit (City Code 203.041). If the project involves land disturbing activities, the project is reviewed by City staff for a range of issues including erosion control.

***Measurable Goals:**

1. Review development plans for sites for which include land disturbing activities.
2. Record the number of sites/projects reviewed annually.
3. Track the number and type of storm water management BMPs proposed.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually
2. Ongoing/Annually
3. Ongoing/Annually

Specific Components and Notes:

Tracking the type of BMP installed may include both erosion and sediment control BMPs and permanent water quality BMPs (e.g., ponds, rain gardens, structural devices). These data will be included in updates to the storm system map under BMP 3a-1.

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4e-1

***BMP Title:** Establishment of Procedures for the Receipt and Consideration of Reports of Stormwater Noncompliance

***BMP Description:**

The City will use their existing system of responding to complaints on storm water related concerns. The program and process will be noticed in the ShoReview newsletter and on the webpage. Residents of the City will be able to use the call-in line to report illicit discharges, report construction site erosion or sedimentation concerns and provide comments on the City's SWPPP.

***Measurable Goals:**

1. Maintain dedicated storm water call number on website.
2. Record the number of calls and the nature of the complaint/call.
3. Record the number of staff inspections and follow-up actions resulting from the call line.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually
2. Ongoing/Annually
3. Ongoing/Annually

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4f-1

***BMP Title:** Establishment of Procedures for Site Inspections and Enforcement

***BMP Description:**

The City currently inspects all construction sites to review compliance with code and permit requirements. Developers/applicants apply to the City for a building permit and City staff complete final project reviews and site inspections during construction. The City requires an escrow that is available to pay for turf and erosion control improvements, if the contractor or developer fails to comply. When needed, the inspector may order street sweeping to remove sediment from streets near the project. The inspector may also require removal of construction debris and other material that may cause adverse water quality impacts.

See also BMP 4b-1, 4c-1

***Measurable Goals:**

1. Record the number of sites inspected annually.
2. Record the number of non-compliant sites.
3. Record the number of sites where City clean-up is needed.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually
2. Ongoing/Annually
3. Ongoing/Annually

Specific Components and Notes:

See also BMP 4c-1.

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet Instructions

Minimum Control Measure 5: POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

Key to Unique BMP ID Numbers	Required BMP Title	Permit Reference
5a-1	Development and Implementation of Structural and/or Non-structural BMPs	**V.G.5.a**
5b-1	Regulatory Mechanism to Address Post Construction Runoff from New Development and Redevelopment	**V.G.5.b**
5c-1	Long-term Operation and Maintenance of BMPs	**V.G.5.c**

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 5-POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

Unique BMP Identification Number: 5a-1

***BMP Title:** Development and Implementation of Structural and/or Non-structural BMPs

***BMP Description:**

The City currently has several ordinances and standards that must be followed to address post construction runoff controls at sites where land disturbing activities are occurring. The City' current controls Ordinance No. 749 that specifies required design and management standards for storm water treatment ponds, impervious surface coverage requirements, chemical use and shoreland management. The City has amended the grading permit requirements to require verification of the installed practices meet the approved plans. Development agreements have been revised to specify maintenance requirements for private storm water systems.

The City requires water quality, rate control, and quantity requirements on all new development and re-development per our Surface Water Management Plan. For projects located in Rice Creek Watershed District, the District keeps track of the number of alternative BMPs installed within the City. Currently the City does not have a summarized accounting of the number of alternative systems within the City's permit program, but do have this information in our records. The City has recently changed its code to require alternative water treatment for sites adjacent to lakes, which is covered in the City code 209-26 which has specific requirements to assist in water quality near lakes. This includes vegetation buffers, removal of impervious surfaces and installation of rain gardens/native areas.

***Measurable Goals:**

1. Track the number and type of structural and non-structural BMPs installed annually (e.g., NURP ponds, infiltration basins, sump manholes, grit chambers, bioretention areas, etc.).
2. Incorporate new facilities in BMP database and map for City-installed alternative practices.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually
2. Ongoing/Annually

Specific Components and Notes:

See also BMPs 3a-1 and 4b-1.

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 5-POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

Unique BMP Identification Number: 5b-1

***BMP Title:** Regulatory Mechanism to Address Post Construction Runoff from New Development and Redevelopment

***BMP Description:**

The City currently has several ordinances and standards that must be followed to address post construction runoff controls at sites where land disturbing activities are occurring. The City' current controls Ordinance No. 749 that specifies required design and management standards for storm water treatment ponds, impervious surface coverage requirements, chemical use and shoreland management. Development agreements have been revised to specify maintenance requirements for private storm water systems.

The City requires water quality, rate control, and quantity requirements on all new development and re-development per our Surface Water Management Plan. The City has recently changed its code to require alternative water treatment for sites adjacent to lakes, which is covered in the City code 209-26 which has specific requirements to assist in water quality near lakes. This includes vegetation buffers, removal of impervious surfaces and installation of rain gardens/native areas.

***Measurable Goals:**

1. Review of development standards.
2. Revise standards and complete formal ordinance adoption in accordance with City procedures.
3. Review of standards following changes in NPDES permit program and/or TMDL studies or other significant program changes.

***Timeline/Implementation Schedule:**

1. Annually.
2. As needed to comply with watershed or state program changes.
3. As needed to comply with watershed or state program changes.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 5-POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

Unique BMP Identification Number: 5c-1

***BMP Title:** Long-term Operation and Maintenance of BMPs

***BMP Description:**

Shoreview will continue to implement the current program to require maintenance of new storm water ponds and other water quality BMPs within the City that are not owned or operated by the City. The City has a template maintenance agreement in its Surface Water Management Plan that can be used to establish specific maintenance requirements and schedules for a variety of BMPs. The City will look for opportunities to improve maintenance of private systems that were installed prior to establishment of the maintenance agreement program as resources allow.

The City charges residents and businesses a surface water utility fee to fund repair and replacement of the City's storm water conveyance system including BMPs.

***Measurable Goals:**

1. Require maintenance agreements on new private BMPs during the development approval process.
2. Record/track the number of new private systems where maintenance agreements have been completed.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually
2. Annually, starting in 2008.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet Instructions

Minimum Control Measure 6: POLLUTION PREVENTION/GOOD HOUSEKEEPING

Key to Unique BMP ID Numbers	Required BMP Title	Permit Reference
6a-1	Municipal Operations and Maintenance Program	V.G.6.a
6a-2	Street Sweeping**	
6b-2	Annual Inspection of All Structural Pollution Control Devices	V.G.6.b.2
6b-3	Inspection of a Minimum of 20 percent of the MS4 Outfalls, Sediment Basins and Ponds Each Year on a Rotating Basis	V.G.6.b.3
6b-4	Annual Inspection of All Exposed Stockpile, Storage and Material Handling Areas	V.G.6.b.4
6b-5	Inspection Follow-up Including the Determination of Whether Repair, Replacement, or Maintenance Measures are Necessary and the Implementation of the Corrective Measures	V.G.6.b.5
6b-6	Record Reporting and Retention of all Inspections and Responses to the Inspections	V.G.6.b.6
6b-7	Evaluation of Inspection Frequency	V.G.6.b.7

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6a-1

***BMP Title:** Municipal Operations and Maintenance Program

***BMP Description:**

The City maintenance staff meets regularly and will discuss illicit discharges into the City's storm sewer system at least once per year. As these discharges occur and are identified, they are generally corrected and removed immediately when they are found connected to the City's system.

The City will look to participate in a more formal pollution prevention workshop or training program for City grounds and landscaping staff, fleet and building maintenance staff, street maintenance staff and storm water system staff. The City will reach staff having responsibilities in the storm water program at least annually. The City will also provide information for new employees as needed. The City will work with RCWD, GLWMO and other agencies to develop or get access to a training program and research opportunities to and send staff to the MnDOT training and certification programs as City funding resources allow.

***Measurable Goals:**

1. Conduct a staff training event at least annually to discuss the topics relating to water resources programs.
2. Record number of staff attending the annual training event and meeting and the topics covered.

***Timeline/Implementation Schedule:**

1. Annually
2. Annually

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6a-2

***BMP Title:** Street Sweeping**

***BMP Description:**

The City will continue the current street sweeping program for vehicle safety, pedestrian safety, and water quality and environmental reasons. Street sweeping will be done as weather permits (late March to early April) through the first snowfall. The City also prioritizes sweeping to target key areas of the City.

As part of the street maintenance program, the City has evaluated the snow and ice control program with an emphasis on more effective use of salt. The Public Works Superintendent and Street Supervisor have attended programs including the Road Salt Symposium and seminars on the effects of chloride use on the environment.

***Measurable Goals:**

1. Sweep at least once each year (additional spring, summer or fall sweeping as weather and resources permits)
2. Estimate the number of miles swept annually.
3. Estimate the amount (volume or weight) of material collected.

***Timeline/Implementation Schedule:**

1. Annually
2. Ongoing/Annually
3. Ongoing/Annually

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-2

***BMP Title:** Annual Inspection of All Structural Pollution Control Devices

***BMP Description:**

The City currently operates a program of inspecting and maintaining structural BMPs including catch basins, storm water ponds and system outfalls. City staff inspects system components to look for sediment and debris buildup and proper functioning of the system and illicit discharges. The City is developing a more detailed database for the storm system that will be used to better track inspection activities and initiate maintenance work orders. The City will continue this program and look for opportunities to improve the tracking of inspection results and program efficiency. The inspection program will be coordinated with the BMP and Outfall mapping updates.

***Measurable Goals:**

1. Inspect 100% of the pollution control devices such as trap manholes, grit chambers, sumps, floatable skimmers, separators and other small settling or filtering devices each year.
2. Record and track follow-up actions needed, assign a priority level and a timeline for addressing the problem.
3. Record inspection date, weather conditions and results for each component inspected.
4. Record and track the dates of completing major maintenance activities.

***Timeline/Implementation Schedule:**

1. Annually
2. Ongoing/Annually
3. Ongoing/Annually
4. Ongoing/Annually

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-3

***BMP Title:** Inspection of a Minimum of 20 percent of the MS4 Outfalls, Sediment Basins and Ponds Each Year on a Rotating Basis

***BMP Description:**

The City currently operates a program of cleaning structural BMPs including catch basins, storm water ponds and system outfalls. City staff inspects system components to look for sediment and debris buildup and proper functioning of the system and illicit discharges. The City is developing a more detailed database for the storm system that will be used to better track inspection activities and initiate maintenance work orders. The City will continue this program and look for opportunities to improve the tracking of inspection results and program efficiency. The inspection program will be coordinated with the BMP and Outfall mapping updates.

***Measurable Goals:**

1. Inspect at least 20% of system outfalls, sediment basins and ponds each year.
2. Record and track follow-up actions needed, assign a priority level and a timeline for addressing the problem.
3. Record inspection date, weather conditions and results for each component inspected.
4. Record and track the dates of completing major maintenance activities.

***Timeline/Implementation Schedule:**

1. Annually
2. Ongoing/Annually
3. Ongoing/Annually
4. Ongoing/Annually

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-4

***BMP Title:** Annual Inspection of All Exposed Stockpile, Storage and Material Handling Areas

***BMP Description:**

The City currently operates material stockpiles and handling areas for excavated materials at the City Maintenance Facility. Sand and salt are stored in covered facilities. The City inspects this area at least annually and conducts maintenance as needed as part of the overall storm system maintenance program.

***Measurable Goals:**

1. Inspect material stockpile and handling areas each year.
2. Record and track follow-up actions needed, assign a priority level and a timeline for addressing problems.

***Timeline/Implementation Schedule:**

1. Annually
2. Ongoing/Annually

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-5

***BMP Title:** Inspection Follow-up Including the Determination of Whether Repair, Replacement, or Maintenance Measures are Necessary and the Implementation of the Corrective Measures

***BMP Description:**

The City will continue to update the inventory of structural runoff controls and continue current BMP maintenance and pond cleanout programs and record data in the developing database system to integrate the location of these controls with schedules for regular inspection and maintenance. The program will result in timely maintenance of the City's storm system components.

The City has created forms that are used for creating follow-up actions for major and minor maintenance activities.

Summary of significant repair or maintenance activities from BMPs 6b-2, 6b-3 and 6b-4.

***Measurable Goals:**

1. Inspect and maintain system components according to priority system established by the City.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer

Department: Public Works

Phone: 651.490.4652

E-mail: jauge@ci.Shoreview.mn.us

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BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-6

***BMP Title:** Record Reporting and Retention of All Inspections and Responses to the Inspections

***BMP Description:**

The City currently records system inspections in a database developed in-house. The City's goal is to continue to develop the database management system for the storm sewer system that is linked with the system map. This BMP is intended to start with the current database that can be expanded to include information on a range of BMPs (rainwater gardens, storm-ceptors, ponds, sump manholes, infiltration areas, etc.) located in and operated by the City. The database will helps the City in tracking the condition of system components, scheduling and tracking inspections under related BMPs in the City's MS4 permit, and in completion of the annual reporting requirements. Ultimately, the database will allow more efficient use of City resources to comply with NPDES program requirements and there in protecting and improving water resources in the City.

***Measurable Goals:**

1. Continue to track inspection program data in current system.
2. Develop/refine database system to accommodate all City storm system infrastructure.
3. Maintain and update the database with system inspection records.

***Timeline/Implementation Schedule:**

1. Ongoing
2. Develop initial database by December 2008.
3. Ongoing/Annual updates.

Specific Components and Notes:

Measurable Goal 2 refers to City system only. However, as the database system develops the City may further refine the system to include private BMPs throughout the City.

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Shoreview, Minnesota

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-7

***BMP Title:** Evaluation of Inspection Frequency

***BMP Description:**

The City currently operates a program of cleaning structural BMPs including catch basins, storm water ponds and system outfalls. City staff inspects system components to look for sediment and debris buildup and proper functioning of the system and illicit discharges. The inspection program will be coordinated with the BMP and Outfall mapping updates.

As the City develops a more comprehensive system database to better track system maintenance activities and findings, the system will assist in evaluating the frequency of maintenance for components of the City's system. As the system is populated with data, the City will be better able to evaluate the need for more or less frequent maintenance of BMPs, storm system and material storage and handling areas.

***Measurable Goals:**

1. Reevaluate inspection schedule and frequencies following annual reporting results.
2. Increase or decrease frequency if prior year conditions warranted more or less frequent cleaning or maintenance.

***Timeline/Implementation Schedule:**

1. Ongoing/Annually
2. Ongoing/Annually

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: jauge@ci.Shoreview.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Shoreview
Permit Condition: IV.6 – Drinking Water Sources
Unique BMP Identification Number: IV.6 – 1

BMP Title: Evaluating Drinking Water Sources for Infiltration Projects

BMP Description:

The City of Shoreview will evaluate drinking water sources when considering infiltration BMPs for future stormwater projects.

During the evaluation the City will:
1.Assemble existing information on the area of the proposed stormwater project including if it is in an approved wellhead protection area, what aquifer is used by drinking water supply wells, where the aquifer is vulnerable to land activities, what land uses exist or are proposed in the area, and what are the contaminants of concern in the stormwater.
2. After assembling the information the City will follow the Minnesota Department of Health Guidelines for evaluating storm water infiltration projects.
3. If the guidance information leads to infiltration not being appropriate in the area, then an alternate BMP will be considered.

Measurable Goals:

1. The City will establish a baseline of information that it can use for evaluating future infiltration projects. The information will be updated on an annual basis if necessary.
2. The City will prepare a map showing areas with potential vulnerable drinking water sources and will refer to the map for all infiltration projects.
3. The City will document the evaluation process for all infiltration projects in vulnerable drinking water source areas, will keep a record of the information compiled, and the decisions made on each separate project.

Timeline/Implementation Schedule:

1. The City will establish the baseline information by July 2008 and will update annually, if necessary.
2. The City will complete the map of vulnerable drinking water sources by July 2008.
3. The City will document infiltration project decisions each year in the Annual Report to the MPCA.

Specific Components and Notes:

The Minnesota Department of Health Guidance will be checked annually for changes to the process.
The City's vulnerable drinking water map will be update annually as required.

Responsible Party for this BMP:

Name: Assistant City Engineer
Department: Public Works
Phone: 651.490.4652
E-mail: twesolowski@ci.shoreview.mn.us

BMP Summary Sheet

MS4 Name: City of Shoreview
Permit Condition: IV.D Section 303(d) listings
Unique BMP Identification Number: IV.D – 1

BMP Title: Impaired Water Review Process

BMP Description:
The City of Shoreview will review all discharges from its MS4 system to impaired waters, as defined by the current USEPA approved 303(d) list.
In this review, the City of Shoreview will identify impaired waters that could be impacted by the MS4's stormwater discharge. Storm sewer maps and field surveys will be used to identify all potential stormwater discharges to impaired waters. Once the discharges have been identified the watersheds that contribute to those discharges will be delineated. The delineated watershed will then be evaluated on the basis of hydrology, land use, and other characteristics that may impact the impaired water through the stormwater discharges.
Based on the review listed above the City will determine if changes to the stormwater system or BMPs are needed to minimize the impact discharges to the impaired waters. If modifications are deemed necessary, the City will modify our SWPPP and submit those modifications to the MPCA with the current year's annual report. Factors included as part of the review long-term and short-term cost and timing. All facts and information used in determining if changes to the SWPPP are necessary will documented and kept with the MS4 permit. A summary will be prepared and any SWPPP revisions that were made will be identified.

Measurable Goals:
The City will establish a baseline of information – evaluate what we have already done that will help with this BMP.
The City will document all impaired waters with the MS4 and any impaired water outside of the MS4 that may be impacted by stormwater discharge from the City of Shoreview.
The City will prepare a map that includes all impaired waters that may be impacted, MS4 discharge points that may contribute to impairment, and the delineated watersheds that impact the impaired waters.
The City will complete a written summary of conclusions reached through the investigation, including the decision making process used to determine what SWPPP revisions may be needed.
The City will determine a schedule and timeline to incorporate changes into the SWPPP.

Timeline/Implementation Schedule:
The baseline of information will be established by July 2008.
Impaired waters impacted by MS4 discharges will be identified by September 2008.
Watersheds contributing to runoff to impaired waters will be delineated by October 2008.
Evaluation of hydrology, land uses, and other factors will be completed by February 2009.
The impaired waters review and any changes made to the SWPPP will be included in the 2008 annual report completed in 2009.

Specific Components and Notes:
This process will be reassessed annually over the course of the permit cycle. As new 303(d) lists with additional impaired waters are published, the City will review changes to the list and determine if discharges are impacting the newly listed waters.
When an USEPA approved TMDL is finalized, the City of Shoreview intends to fully comply with all limits and requirements set forth in the TMDL in accordance with the schedules(s) outlined in the TMDL and the MS4 permit.

Responsible Party for this BMP:

Name:	Assistant City Engineer
Department:	Public Works
Phone:	651.490.4652
E-mail:	twesolowski@ci.shoreview.mn.us

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 Shoreview *County: Ramsey
(city, county, municipality, government agency or other entity)

*Mailing address: 4600 Victoria Street North

*City: Shoreview *State: MN *Zip code: 55126

*Phone (including area code): 651-490-4651 *E-mail: mmaloney@shoreviewmn.gov

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

*Last name: Wesolowski *First name: Tom
(department head, MS4 coordinator, consultant, etc.)

*Title: City Engineer

*Mailing address: 4600 Victoria Street North

*City: Shoreview *State: MN *Zip code: 55126

*Phone (including area code): 651-490-4652 *E-mail: twesolowski@shoreviewmn.gov

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

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

Title:

Mailing address:

City: State: Zip code:

Phone (including area code): E-mail:

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: Mark Maloney
(This document has been electronically signed)

Title: Public Works Director Date (mm/dd/yyyy): 9/30/2013

Mailing address: 4600 Victoria Street North

City: Shoreview State: MN Zip code: 55126

Phone (including area code): 651-490-4651 E-mail: mmaloney@shoreviewmn.gov

Note: *The application will not be processed without certification.*

Stormwater Pollution Prevention Program Document

I. Partnerships: (Part II.D.1)

A. List the **regulated small MS4(s)** with which you have established a partnership in order to satisfy one or more requirements of this Permit. Indicate which Minimum Control Measure (MCM) requirements or other program components that each partnership helps to accomplish (List all that apply). Check the box below if you currently have no established partnerships with other regulated MS4s. If you have more than five partnerships, hit the tab key after the last line to generate a new row.

☐ No partnerships with regulated small MS4s

Name and description of partnership	MCM/Other permit requirements involved
Rice Creek Watershed District *Provides permitting, erosion and sediment control inspections, and shared education and outreach via website, newsletter, or public events. Would share illicit discharge information if necessary.	MCMs 1, 3, 4, 5
Ramsey Washington Watershed District (new in 2013) *Provides permitting, erosion and sediment control inspections, and shared education and outreach to residents via website, newsletter, or public events. Would share illicit discharge information if necessary.	MCMs 1, 3, 4, 5

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.*

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:

   Municipal Code Section 209: Environmental Standards

   209.060 Stormwater Management (A) Illicit Discharge Detection and Elimination (Pages 20 through 24) in document below

Direct link:

http://www.shoreviewmn.gov/home/showdocument?id=16

209.060 Stormwater Management (A) Illicit Discharge Detection and Elimination (Pages 20 through 24) in document

☐ 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:

Municipal Code Section 209: Environmental Standards

Section 209.040 Soils, Slopes, Grading, and Erosion and Sediment Control (Pages 7 through 13).

Direct link:

The City has an ordinance that requires a grading permit which specify basic standards for erosion control on construction or landscaping projects/ sites. We also utilize Development Agreements with new or redevelopment projects which move though the Planning Commission and/or City Council approval process. Development Agreements specify that an erosion control agreement and cash escrows shall be in place before construction begins, and the builder or developer agree to inspections and any required maintenance.

http://www.shoreviewmn.gov/home/showdocument?id=16 Section 209.040 Soils, Slopes, Grading, and Erosion and Sediment Control (Pages 7 through 13.

☐ Check here if attaching an electronic copy of your regulatory mechanism, with the following file naming convention: *MS4NameHere_CSWreg.*

B. Is your regulatory mechanism at least as stringent as the MPCA general permit to Discharge Stormwater Associated with Construction Activity (as of the effective date of the MS4 Permit)? ☐Yes ☒ No

If you answered **yes** to the above question, proceed to C.

If you answered **no** to either of the above permit requirements listed in A. or B., describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

The City will comprehensively review existing regulatory mechanisms in place and revise where necessary to ensure that the Construction site standards will be at least as stringent as the MPCA General Permit requirements for MCM 4 from the NPDES Construction Stormwater (CSW) General Permit. We anticipate this review in spring of 2014 with ordinance revisions to follow.

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:

For items 1 through 8 above the City has existing regulatory mechanisms in place which specify many of the permit language requirements of the Minimum Control Measure 4 (Construction Site Stormwater Runoff Control) or similar language with the same intent.

However with the updated Construction Stormwater General Permit language, the City will comprehensively review these existing regulatory mechanisms and revise where necessary to ensure that the Construction site standards will be at least as stringent as the MPCA General Permit requirements for MCM 4 from the NPDES Construction Stormwater General Permit.

We anticipate this review in spring of 2014 with ordinance revisions to follow. For example, in Section C.2 above, our regulatory mechanisms do not include specifications for preserving a 50 foot natural buffer when a surface water is located within 50 feet of the project's distrubed area. The City may research mechanisms from other municpalities to adequately implement this new requirement of the Construction permit, which we would seek during the review process in spring of 2014.

For Section C.7. above, the City has final stabilization requirements which are more stringent than the MPCA Construction Permit. The MPCA language specifies 70 percent cover, while the City specifies 80 percent. The City also retains escrows until all temporarty erosion protection measures have been removed. The City has succeeded in achieving the 80 percent final stabilization and will likely maintain the more stringent standard. (Construction Permit language 7. Final Stabilization: Bullets 3 and 4.(Page 10 of 14 wq-strm4-59q Guidance Document.)

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:

Direct link:

☐ 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 ☐ Yes ☒ No

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).

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:

Talk to our attorney to discuss how this would be achieved on private property within 12 months of permit coverage. Once a development is completed and the erosion control escrows are returned we do not inspect or enforce structural BMPs on private property. The Watershed Districts may have long-term maintenance agreements but the City does not at this time.

B.2.b. For redevelopment projects we require "no net increase" from pre-project conditions. We will re-visit our rules to possibly include the "a net reduction" language when the Surface Water Management Plan is revised, in conjunction with new Watershed plan updates.

4.a, 4.b, 4.c, 4.d, 4.e, 4.f: We currently do not mitigate for discharges of TSS and/or TP post-construction. The City will review potential mitigation mechanisms or standards being utilized by other entities, and revise our standards where necessary to ensure that any stormwater discharges of TSS and/or TP are addressed through mitigation. These standards will be at least as stringent as the MPCA General Permit requirements.. We anticipate this review in spring of 2014 with the review of regulatory mechanisms, and ensure that any updated requirements are included when the City's Surface Water Management Plan is revised. The mitigation provisions would also be reviewed in conjunction with new Watershed plan updates.

5.a. Talk to our attorney to discuss updating development agreement or other contract/permit language that would meet the requirement to allow future inspections, maintenance, and to assess costs to private properties.

5.b. Talk to our attorney to discuss updating development agreement or other contract/permit language that would meet the requirement to allow the City's right to ensure future maintenance when those responsibilities are transferred to a new party or owner.

5.c. We currently do not have the resources to track or require new stormwater BMPs through any sort of mitigation provisions. These new permit requirements would entail setting up long-term agreements with private property owners and then having the resources to perform inspections, track changes or required maintenance, and following through with property owners to get compliance.

This is a new requirement and City would need to budget for additional staff time and/or aquire outside contracts for the inspections, tracking, and program management.

III. Enforcement Response Procedures (ERPs): (Part II.D.3)

A. Do you have existing ERPs that satisfy the requirements of the Permit (Part III.B.)? ☒ Yes ☐ No

1. If **yes**, attach them to this form as an electronic document, with the following file naming convention: *MS4NameHere_ERPs.*
2. If **no**, describe the tasks and corresponding schedules that will be taken to assure that, with twelve (12) months of the date permit coverage is extended, these permit requirements are met:

B. Describe your ERPs:

The City contracts out with Ramsey Conservation District to perform erosion control inspections for large construction projects. Ramsey Conservation District uses standard inspection procedures. City staff inspect smaller projects with building or grading permits which have an erosion control escrow and signed agreement. The inspection form is attached, as well as our enforcement response mechanism in City Code.

(attach Inspection report)

If contractors or developers are not in compliance, a warning is issued and a timeframe to correct the situation is given. If there is still not compliance, we would utilize City Code Section 210 Nusiance Code to abate the issue and use the erosion control escrow to pay for the corrections. The City has liquidated escrows to bring sites into compliance.

Section 210.020 Abatement direct link: Procedure.http://www.shoreviewmn.gov/home/showdocument?id=18 (Pages 3 to 5).

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

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

The City has collected some data for structural BMPs and outfalls, but the data has not been compiled. The City has GPSed many features of the stormwater system and annually adds new features as they are constructed or upgraded.

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:

The 2014 City budget includes funding a GIS staff person whose primary work program will be dedicated to stormwater program requirements (B.1., B.2., B.3.)

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:

We will create a map and include all ponds within 12 months of permit coverage. The 2014 City budget includes funding a GIS staff person whose primary work program will be dedicated to stormwater program requirements.

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**:

   Shoreview is predominantly residential so our focus is on residential issues such as cleaning up leaves and grass clippings, stabilizing shorelines, and minimizing impacts during landscaping or construction. We consider these issues high priority. We have multiple ways of educating residents which include an ongoing educational newsletter articles to every household 6x a year, the Environmental Quality Committee led programs such as a Speaker Series and Green Community Award programs which highlight best management practices on private properties for stormwater, tabling at the Slice of Shoreview annually, and providing handouts at City Hall. We also have several water related webpages on our main City website for residents to find additional information on water quality problems and solutions.

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**
Green Community Award Program - Individual properties recognized for outstanding best management practices in water quality – Celebratory event made available live, recorded for cable access to educate and inspire other residents and businesses.	Annual Recognition Ceremony with City Council and Mayor in September
Environmental Quality Committee Speaker Series – One speaker a month from January to April	At least one presentation on water quality or quantity issues per year
Ongoing City newsletter	Publish multiple articles a year on what residents can do to help water quality of lakes and wetlands, also groundwater conservation tips
Handouts during 2 City cleanup day events	1200 printed fliers given out on average – featuring info on raking up leaves/grass clippings and keeping out of curb
City website -Surface Water Quality pages	Information and links to our SWPPP and SWMP documents, as well as resources for homeowners on watershed districts, raingardens, native plants, and technical assistance for projects. Keep updated information available.

BMP categories to be implemented	**Measurable goals and timeframes**
Illicit discharge recognition and reporting article in City newsletter	Published in spring newsletter and updated on City website for 2014
Social media	Publish water quality related information at least twice a year

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

   Environmental Officer

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:

   Publish notice of public hearing in newspaper with sufficient time before the Annual report SWPPP progress to the City Council every summer.

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**
Publish notice of annual report in newspaper	Publish 30 days before public meeting date
Hold Public Hearing/Annual Meeting	Conduct annual report presentation and hold public hearing for City Council meeting.
Availability of SWPPP document	Provide a link on the City's website to the SWPPP and a hard copy available at City Hall for viewing.

BMP categories to be implemented	**Measurable goals and timeframes**
Publish notice on City's Facebook page at the same time as newspaper	Track "likes" or comments on the post, track attendance at the hearing.
Program Evaluation	During yearly Annual Report, consider which materials are most effective for our program and audiences. Consider a way to gather citizen feedback related to all aspects of our SWPPP.

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:

   Environmental Officer

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 adopted an Illicit Discharge Detection and Elimination ordinance in March of 2012. We also created a

brochure/handout for employees in the field to detect and report any suscpicious discharges into the City's system once the ordinancewas approved by the City Council.

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:

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**
Training brochure	Make sure new employees in the field receive to learn how to detect and report any suscpicious discharges into the City's system.
Annual inspection and maintenance of outfalls	Check for any illicit discharges each spring and during normal duties while in the field. Document any illicit discharges.
Ordinance	Review and revise ordinance yearly to ensure that it continues to meet the needs of the City and legal requirements

BMP categories to be implemented	**Measurable goals and timeframes**
Public outreach	Publish article in City newsletter within 12 months explaining illicit discharge and how to report a suspicious discharge.

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:

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

   Environmental Officer

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:

   When an area of 1,000 squre feet or 10 cubic yards of soil is being disturbed, a grading permit is required. City staff review construction site erosion control plans before a project begins, and work with contractors to ensure appropriate use and maintance of all BMPs on site. We partner with the Ramsey Conservation District to perform some of our construction site inspections. All site inspection checklists are scanned and retained electronically

   If contractors or developers are not in compliance, a warning is issued and a timeframe to correct the situation is given. If there is still not compliance, we would utilize City Code Section 210 Nusiance Code to abate the issue and use the erosion control escrow to pay for the corrections. The City has liquidated escrows to bring sites into compliance.

2. Does your program address the following BMPs for construction stormwater erosion and sediment control as required in the Permit (Part III.D.4.b.):
   a. Have you established written procedures for site plan reviews that you conduct prior to the start of construction activity? ☒ Yes ☐ No
   b. Does the site plan review procedure include notification to owners and operators proposing construction activity that they need to apply for and obtain coverage under the MPCA's general permit to *Discharge Stormwater Associated with Construction Activity No. MN R100001*? ☒ Yes ☐ No
   c. Does your program include written procedures for receipt and consideration of reports of noncompliance or other stormwater related information on construction activity submitted by the public to the permittee? ☒ Yes ☐ No
   d. Have you included written procedures for the following aspects of site inspections to determine compliance with your regulatory mechanism(s):
      1) Does your program include procedures for identifying priority sites for inspection? ☐ Yes ☒ No
      2) Does your program identify a frequency at which you will conduct construction site inspections? ☒ Yes ☐ No
      3) Does your program identify the names of individual(s) or position titles of those responsible for conducting construction site inspections? ☒ Yes ☐ No
      4) Does your program include a checklist or other written means to document construction site inspections when determining compliance? ☒ Yes ☐ No
   e. Does your program document and retain construction project name, location, total acreage to be disturbed, and owner/operator information? ☒ Yes ☐ No
   f. Does your program document stormwater-related comments and/or supporting information used to determine project approval or denial? ☒ Yes ☐ No
   g. Does your program retain construction site inspection checklists or other written materials used to document site inspections? ☒ Yes ☐ No

   If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met.

   2.d. 1. We can identify a way to priority sites for inspection such as those on lakes or those with problem contractors. We handle things this way already, but it is not formalized. This will be completed when we renew the contract with Ramsey Conservation District for inspections, which usually takes place in January of each calendar year.

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
Inspections	Conduct inspections of all permitted sites bi-weekly or after significant rainfall.
Ordinance	The City Code contains an ordinance on erosion and sediment control measures.
Education	Provide checklist/log to all builders with an erosion control agreement and escrow at time of permit issuance. Also provide erosion and sediment control BMP fact sheet to contractors unfamiliar with stormwater regulations with permit documents.
Permit routing system	Process all grading permit applications within 7 days of receipt.

BMP categories to be implemented	Measurable goals and timeframes
Prioritize inspections	Create prioritization guideline to get to high priority inspection sites first – those near sensitive receiving waters or those managed by problem contractors. This guideline will be completed when we renew the contract with Ramsey Conservation District for inspections, which usually takes place in January of each calendar year. We plan to implement immediately.

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

   Environmental Officer

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:

   Currently we do not have a post-construction stormwater management ordinance. Once a development is completed and the escrows are returned, we do not have resources to enforce maintenance of installed BMPs. Watershed Districts may have maintenance agreements with the property owners, but the City does not.

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.a through d: We will develop procedures for documenting all legal mechanisms regarding long-term maintenance of BMPs within 12 months of permit coverage. Any mitigation necessary to meet stormwater standards would be documented and archieved properly with all responsible parties involved, as well as any payments received. These documents would be reviewed by the City Attorney. We will seek examples of long term maintenance agreements from our two Watershed Districts to have similar language for sites under an acre or for those which do not trigger a Watershed District maintenance agreement.

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
Inspections during construction	Continue bi-weekly inspections of all permitted sites during growing season. Builders receive written reports with items to correct.
Permit review	Review erosion control measures and stormwater BMPs/calculations pre-construction for each permit submitted

BMP categories to be implemented	Measurable goals and timeframes
Update ordinance and/or development agreements to meet new permit requirements	Within 12 months of extension of permit coverage, revise ordinance and/or development agreements to meet permit requirements. Ensure that TSS and/or TP volumes are documented with any mitigation projects that the City authorizes.
Evaluate MIDS (Minimal Impact Design Standards)	Look into MIDS Community Assistance Package when available and see if this approach would work in Shoreview

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 our structural BMPs on an annual basis and inspects all outfalls, sediment basins, and ponds each year. The City inspects stockpiles, storage and materal handling areas at the maintenance center for potential discharges and necessary maintenance. The City has taken a leadership role in reducing chlorides entering our water resources by training and certifying all operators,equipment calibration, and application of pre-treatment chemicals. The City sweeps the streets several times annually, and pervious pavements are vaccummed once a month during the growing season. The City owns a mechanical brush and a regenerative air sweeper.

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:

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
Street Sweeping	Complete entire City 4-5 times a year. Progress is tracked daily and retained electronically.
Inspect Maintenance Center/Salt Shed	In spring check if underground storage tank should be emptied. Annually ensure all materials are covered.
Road Salt Training	All personnel responsible for snow/ice removal will be trained and certified in the proper handling and application of road salt chemicals. Training will be offered every other year.
Illicit discharge detection	All field staff are given a brochure to identify potential illicit discharges and notified of who to report the concern, brochure updated annually and given to new staff when necessary. Training will be offered every other year.

BMP categories to be implemented	Measurable goals and timeframes
Optimize street sweeping priorities	Identify high priority areas and timeframes to sweep
Create Public Works "Housekeeping 101" handout	Keep copies available online and at City Hall to explain our operations regarding pollution prevention. Create by mid-2014.

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:

5b.2) The Department of Health does not yet have a Source Water Assessment Area designated.We are implementing our approved wellhead protection plan.

6. Currently the City does not have procedures or a schedule for testing all ponds within the City for TSS and/or TP. We anticipate guidance and possible partnerships or funding in the future to do so. To develop our own procedure for testing ponds we would aquire (or build upon data already collected for the pond inventory) such as the current depth compared to the original as-built information. The City could then consider maintenance to restore the pond to it's original intended purpose, depending on the costs and benefits. We expect to learn from other municipalities and orginzations such as the Metro Stormwater Coalition to meet MPCA these permit requirements within 12 months of coverage, knowing that implementation could be in future years from 2014 to 2018.

9. The daily sweeping operations are logged and retained electronically, however the quantities of materials are not tracked. The City will seek guidance on the best method of estimating quantites and incorporate it into our records in 2014..

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

Utilities Supervisor

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

City Council:
Sandy Martin, *Mayor*
Blake Huffman
Terry Quigley
Ady Wickstrom
Ben Withhart

Shoreview

City of Shoreview
4600 Victoria Street North
Shoreview, MN 55126
651-490-4600 phone
651-490-4699 fax
www.shoreviewmn.gov

Inspection Report

This project was issued a permit by the City of Shoreview requiring erosion and sediment control measures be installed and maintained to prevent adverse impacts to adjacent property, stormwater facilities, and water resources.

This report documents the results from an inspection at 5277 Hodgson Road conducted on 7/31/13. Items noted below as non-compliant are to be corrected within the time frames allotted to prevent enforcement action.

Comments: Maintain stock piles and exposed soils.

Perimeter Control ☒Compliant ☐Non-Compliant ☐Under Review ☐NA
Comment:

Inlet Protection ☐Compliant ☐Non-Compliant ☐Under Review ☒NA
Comment:

Stabilized Construction Entrance ☒Compliant ☐Non-Compliant ☐Under Review ☐NA
Comment:

Vehicle Tracking ☒Compliant ☐Non-Compliant ☐Under Review ☐NA
Comment:

Exposed Soil Stabilization ☐Compliant ☐Non-Compliant ☒Under Review ☐NA
Comment: Cover all exposed soils not being worked within 14 days.

Designated Concrete Washout Area ☐Compliant ☐Non-Compliant ☐Under Review ☒NA
Comment:

Dewatering Activities ☐Compliant ☐Non-Compliant ☐Under Review ☒NA
Comment:

Ditch/Swale Stabilization ☐Compliant ☐Non-Compliant ☐Under Review ☒NA
Comment:

Energy Dissipation ☐Compliant ☐Non-Compliant ☐Under Review ☒NA
Comment:

Maintenance of BMPs ☐Compliant ☐Non-Compliant ☐Under Review ☒NA

Comment:

Stock Piles ☐Compliant ☐Non-Compliant ☒Under Review ☐NA
Comment: Cover all exposed soils not being worked within 14 days.

Other: ☐Compliant ☐Non-Compliant ☐Under Review ☒NA
Comment:

If you have questions, please call 651-266-7274.
Inspector: Samantha Kreibich

Developer's Erosion Control/Maintenance Log

	Type of Inspection		Date of Inspection				Type of Inspection			Areas Inspected							
Developer's Inspector	Routine weekly	24 hrs. after rain	Month	Day	Year	Rainfall (record all events > 0.5 in)	Time	AM	PM	Erosion/Sediment Control - BMPs	Silt Fences	Sedimentation basins	Drainage ditches and other surface waters	Construction site exits	Infiltration areas	Pollution Prevention Measures	**Property Address** **Findings and Corrective Actions**
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The developer is responsible for inspecting Erosion and Sediment Control BMPs on a weekly basis and after every rainfall greater than ½ inch. Record the results of the maintenance inspection and corrective action (repair and maintenance to BMPs) using this form.