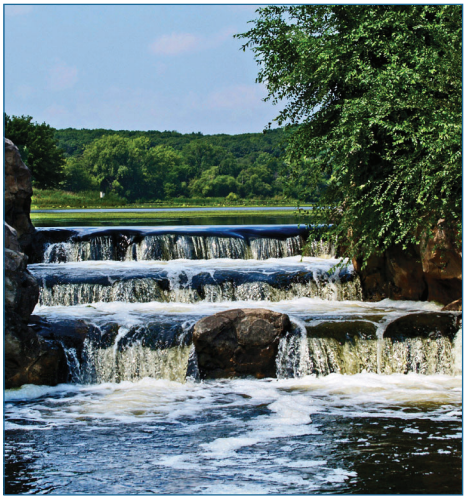
9 MILE CREEK WATERSHED DISTRICT

Water Management Plan

October 2017

Amended April 2018, April 2019, September 2023



Prepared in accordance with the Metropolitan Surface Water Management Act and Watershed Law
Minnesota Statutes, Chapters 103B and 103D

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List of Abbreviations and Acronyms

AIS	Aquatic Invasive Species
AUAR	Alternative Urban Area-wide Review
BMP	Best Management Practices
BWSR	Minnesota Board of Water and Soil Resources
CAC	Citizens Advisory Committee
CAMP	Citizen Assisted Monitoring Program
CIP	Capital Improvement Program
CWA	Clean Water Act
CWF	Clean Water Fund
District	Nine Mile Creek Watershed District
DWSMA	Drinking Water Supply Management Area
EAW	Environmental Assessment Worksheet
EIS	Environmental Impact Statements
EQB	Environmental Quality Board
ESC	Erosion and Sediment Control
FEMA	Federal Emergency Management Agency
HBI	Hilsenhoff Biotic Index
IBI	Index of Biotic Integrity
IC	Impervious Cover
ICI	Invertebrate Community Index
LGU	Local Government Unit
MC	Metropolitan Council
MCES	Metropolitan Council Environmental Services
MDIF	Metropolitan Development and Investment Framework
MDH	Minnesota Department of Health
MDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MLCCS	Minnesota Land Cover Classification System
MOU	Memorandum of Understanding
MPCA	Minnesota Pollution Control Agency
MRAP	Minnesota River Assessment Project
MRCC	Midwestern Regional Climate Center
MRIP	Minnesota River Implementation Project
MS4	Municipal Separate Storm Sewer System
MSL	Mean Sea Level

MSP	Minneapolis-St. Paul International Airport
MUSA	Metropolitan Urban Service Area
NFIP	National Flood Insurance Program
NEMO	Nonpoint Education for Municipal Officials
NHIS	Natural Heritage Information System
NHNRP	Natural Heritage and Nongame Research Program
NMCWD	Nine Mile Creek Watershed District
NPDES	National Pollution Discharge Elimination System
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRI	Natural Resources Inventory
NURP	Nationwide Urban Runoff Program
NWI	National Wetland Inventory
OHWL	Ordinary High Water Level
ORVW	Outstanding Resource Value Waters
PAH	Polycyclic Aromatic Hydrocarbon
Plan	Nine Mile Creek Watershed District Water Management Plan
PWI	Public Waters Inventory
QHEI	Qualitative Habitat Evaluation Index
RSEA	Regionally Significant Ecological Area
SHPO	State Historic Preservation Office
SRVs	Soil Reference Values
SSTS	Subsurface Sewage Treatment System
SSURGO	Soil Survey Geographic dataset
SWCD	Soil and Water Conservation District
SWPPP	Stormwater Pollution Prevention Plan
TH	Trunk Highway
TAC	Technical Advisory Committee
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TP-40	Technical Paper 40
TP-49	Technical Paper 49
TSI	Carlson's Trophic State Index
TSI_{SD}	Trophic State Index, Secchi disc basis
TSS	Total Suspended Solids
USC	United States Code
UAA	Use Attainability Analyses

USACE	U.S. Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USDA	United States Department of Agriculture
USGS	United States Geologic Survey
VIC	Voluntary Investigation and Cleanup Program
WBI	Wetlands Biotic Index
WCA	Wetlands Conservation Act
WERF	Water Environment Research Foundation
WHPP	Wellhead protection plan
WMO	Watershed Management Organization
WOMP	Watershed Outlet Monitoring Program
WRAPS	Watershed Restoration and Protection Strategy

Glossary

Aerobic: describes life or process that requires the presence of molecular oxygen (see anoxic).

Algae: simple plants found in water and elsewhere, having no roots, flowers, or seeds; frequently microscopic and may grow in simple colonies, singular: *alga*

Anaerobic: describes processes that occur in the absence of molecular oxygen.

Anoxic: describes no oxygen in the water. Often occurs near the bottom of eutrophic lakes in summer and under the ice in winter.

Aquifer: saturated permeable geologic unit(s) that can transmit significant quantities of water under ordinary hydraulic gradients.

Artesian: an aquifer in which the water is under sufficient pressure to cause it to rise above the zone of saturation at that place if opportunity were afforded to do so.

Atlas 14: the primary source of information regarding rainfall frequency estimates in the Midwest region. Published by the National Oceanic and Atmospheric Administration in 2013, Atlas 14 provides estimates of precipitation depth (i.e., total rainfall, in inches) and intensity (i.e., depth of rainfall over a specified period) for durations from 5 minutes up to 60 days. Atlas 14 supersedes publications Technical Paper 40 (TP-40) and Technical Paper 49 (TP-49) issued by the National Weather Bureau (now the National Weather Service) in 1961 and 1964.

Bathymetric map: a map showing the bottom contours and depth of a lake. Can be used to calculate lake volume.

Bedrock aquifer: one or more saturated geologic units composed of sedimentary, metamorphic, or igneous rock that can transmit significant quantities of water under ordinary hydraulic gradients.

Bed load: the part of the stream's sediment load that is rolling and sliding along because it is too heavy to be carried by suspension.

Benthic: describes stream and lake bottoms.

Benthic aquatic invertebrates: insects and simple animals that live near stream and lake bottoms.

Blooms: sudden abundant growth of algae, usually consisting of one or a few species, which has the effect of greatly reducing transparency.

Braided stream: a stream with complex, anastomosing multiple channels rather than a single larger channel.

Buffer: Buffers are upland, vegetated areas located adjacent to water resources that reduce adverse impacts from adjacent development and activities.

Chlorophyll *a*: green pigment in plants essential to photosynthesis.

Climate change: a change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards.

Conductance: conductivity, the indirect measure of electrolytes in water; the reciprocal of resistance; an electromotive force of 1 volt between two points is 1 mho (reciprocal of ohm) or 1 siemens(S); specific conductance, usually the electron flow between two cm^2-electrodes, set 1 cm apart.

Deleterious: having a harmful effect.

Diel: relating to a 24-hour period or daily cycle.

Dimictic: describes lakes with two mixing periods, typically in spring and fall.

Discharge: the volume of stream flow passing a point during some period of time; often expressed as cfs or cubic feet/second.

Ecology: scientific study of relationships among animals, plants, other organisms, and their environments.

Ecoregion: an environmental area characterized by a specific land use, soil types, land surface form, and potential natural vegetation.

Ecosystem: a system of interrelated organisms and their physical-chemical environment.

Epilimnion: upper, warm layer of a lake during summer thermal stratification.

Erosion: wearing away of the lands or structures by running water, glaciers, winds, and waves.

Erosion control: the practice of preventing or controlling soil erosion from wind or water.

Euphotic zone: upper region of lake where photosynthesis occurs because of adequate amounts of light and nourishment.

Eutrophic: "well-nourished"; describes a lake with high nutrient levels that can support a dense growth of algae and other organisms, the decay of which can deplete oxygen from the shallow waters.

Eutrophication: the process of physical, chemical, and biological changes associated with nutrient, organic matter, and silt enrichment and sediment of a lake or reservoir. If the process is accelerated by human influences, it is termed cultural eutrophication.

Export coefficient: an estimate of the expected annual amount of a nutrient transported from its source to a water body. Expressed in terms of mass per area per unit of time.

External loading: nutrients or pollutants arriving at a body of water via eternal routes, for example, influent streams.

Flood elevation: the highest water elevation of a waterbody reached during a precipitation or runoff event of a specific recurrence interval.

Flood profile: a set of elevations established along a stream or riparian to a lake that results from the storage of surface water runoff.

Floodplain: an area defined to be used for the storage of surface water runoff.

Freeboard: a factor of safety used in flood management, usually expressed as a height (in feet) between a flood elevation and the lowest entry elevation of a structure.

Geology: the science that studies the origin, history, and structure of the earth, as recorded in the rocks; together with the forces and processes now operating to modify rocks.

Glacial drift: poorly sorted, permeable sediment which was deposited by glaciers.

Groundwater: water found beneath the soil surface and saturating the strata at which it is located; often connected to lakes.

Groundwater sensitivity: a qualitative or semiquantitative measure of the vulnerability of an aquifer to contamination.

Hydrology: the applied science concerned with the waters of the earth in all its states; their occurrences, distribution, and circulation through the unending hydrologic cycle of: precipitation; consequent runoff, stream flow, infiltration, and storage; eventual evaporation; and reprecipitation.

Hydrologic cycle: process of water falling to the earth as rain or snow, flowing across or under the ground into rivers and to the ocean, and evaporating back into the air.

Hypolimnion: lower, cooler layer of a lake during summer thermal stratification.

Infiltration: the entrance of water into the soil or other porous material through the interstices or pores of a soil or other porous medium.

Internal loading: nutrients or pollutants recycled to a body of water from its sediments.

Internal nutrient cycling: transformation of nutrients such as nitrogen or phosphorus from biological to inorganic forms through decomposition, occurring within the lake itself.

Isothermal: the same temperature throughout.

Lake management: a process that involves study, assessment of problems, and decision-making affecting the maintenance of lakes as thriving ecosystems.

Land use: type of development and use of a land area; urban and agriculture are examples of land uses.

Land cover: undeveloped area of landscape with a distinct type of vegetation. Forests and wetlands are land covers.

Limnetic: open area of a lake, from the edge of the littoral zone to the center of the lake. Also known as pelagic.

Limnology: scientific study of fresh water, especially the history, geology, biology, physics, and chemistry of lakes.

Littoral: portion of a waterbody extending from the shoreline lakeward to the greatest depth occupied by rooted plants.

Loading rate: See export coefficient.

Macrophyte: "large plant"; rooted, seed-producing plants in lakes.

Mesotrophic: describes a lake of moderate photosynthetic productivity.

Metalimnion: thermocline; boundary layer of rapid temperature change between epilimnion and hypolimnion or a thermally-stratified lake.

No net loss: no reduction in the area and value of a wetland from existing conditions.

Nonpoint source pollution: pollution originating at a variety of nonlocalized sources, such as street runoff, septic systems, atmospheric deposition, or groundwater.

Nutrient: element or chemical essential to life, including carbon, oxygen, nitrogen, and phosphorus.

Nutrient budget: measurement of amount of nutrients (usually phosphorus and nitrogen) coming into a lake or stream, flowing out, and staying in the water and bottom sediments.

Oligotrophic: "poorly nourished"; describes a lake of low photosynthetic productivity.

Permeability: a measure of the ability of rock or soils to transmit water analogous to hydraulic conductivity.

Porosity: the void space in a rock or soil between fractures or grains.

pH: measure of the concentration of hydrogen ions of a substance. Specifically it is the negative logarithm of the molar concentration of hydrogen ions. It ranges from 1 = very acid (high concentration) to 14 = very alkaline (low concentration) of hydrogen ions. 7 is neutral, neither acid or alkaline.

Phosphorus load: the amount of phosphorus entering a waterbody in a given period of time, usually expressed as a mass load per time period (e.g., pounds per year).

Photosynthesis: biological process by which algae, higher plants, and some bacteria create organic matter from inorganic nutrients using energy captured from light by some pigment, e.g., chlorophyll.

Point source: well-defined source of pollutants, such as a pipe from a municipal wastewater treatment plant or industry.

Pollution: addition, by people or by their activities, of a substance or energy to the environment which causes undesirable effects.

Precipitation: the total measurable supply of water from all forms of falling moisture, including dew, rain, mist, snow, hail, and sleet; usually expressed as depth of liquid water on a horizontal surface in a day, month, or year, and designated as daily, monthly, or annual precipitation.

Recharge: the process whereby an aquifer receives water.

Secchi disc: a white disc about 20 cm in diameter, lowered into water to measure transparency on the basis of visibility.

Shoreline stabilization: restoring and protecting banks of lakes and streams against scour and erosion by using vegetative plantings, soil bioengineering, and structural systems.

Stream order: the position a section of a stream occupies in relation to the tributaries contributing to it; the higher the order the more tributaries it has.

Superstorm: a powerful and destructive storm that affects an unusually large area.

TDS: total dissolved solids; filterable residue; usually expressed as g/liter or mg/liter following evaporation of a measured sample of filtered water.

Thalweg, talweg: German for "the valley path"; the longitudinal deepest channel in a stream bed.

Thermocline: a density gradient or pycnocline owed to changing temperatures; the planar thermocline is the imaginary plane at the depth where the rate of temperature change is the greatest in a vertical temperature profile.

Topography: the physical features of a district or region, such as are represented on maps, taken collectively; especially, the relief and contour of the land.

Trophogenic zone: a region in a body of water where synthesis of organic compounds is predominant; usually refers to the photosynthetic region.

Use Attainability Analysis (UAA): a scientific study to assess a waterbody's physical, chemical, and biological conditions relative to the desired beneficial uses that can reasonably be achieved and maintained for a given waterbody and identify management recommendations. A UAA considers observed water quality, estimated water quality under fully developed conditions, and recommends management strategies to achieve water quality goals.

Wellhead protection: the process of mitigating the potential for contamination of a well or well field by instituting controls on land use in the area where the well receives its groundwater.

Wetland buffer: Buffers are upland, vegetated areas located adjacent to wetlands.

Zooplankton: the fraction of the plankton community composed of animals; the individual is a zooplankter.

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1.0 Executive Summary

This Nine Mile Creek Watershed District (NMCWD or District) Water Management Plan (Plan) sets the vision, guidelines, and proposed tasks for managing surface water within the boundaries of the NMCWD. This Executive Summary provides highlights of the Plan, including introductory information, history, mission statement, goals, and key policies and actions that will be implemented to achieve the District's desired outcomes.

1.1 Background and Purpose

1.1.1 Background

The NMCWD was established on September 30, 1959 in response to a citizen's petition to the State of Minnesota to address water resource management issues. Like all watershed districts in Minnesota, the NMCWD is a special purpose unit of local government that manages water resources on a watershed basis (a watershed is an area of land that drains to a given lake, river, stream or wetland). Watershed district boundaries generally follow natural watershed divides, rather than political boundaries.

The NMCWD consists of the land that drains to Nine Mile Creek in the south-central region of Hennepin County. The District encompasses approximately 50 square miles and includes portions of the cities of Bloomington, Eden Prairie, Edina, Hopkins, Minnetonka, and Richfield (see Figure 1-1).

Watershed districts are governed by a local Board of Managers who are appointed by the boards of the counties with land in the watershed district. In the NMCWD, the Board of Managers has five members appointed by the Hennepin County Board. The appointments are for staggered 3-year terms.

The NMCWD Board of Managers holds regular monthly meetings that are open to the public and are held at Discovery Point, the District's headquarters and educational facility, located at 12800 Gerard Drive in Eden Prairie, Minnesota. At the time of publication of this plan, the regular meetings are held on the third Wednesday of the month, with additional special meetings scheduled as necessary.

The NMCWD employs a full-time Administrator, an Education and Outreach Program Manager, and an Education and Outreach Specialist. Other services, including engineering, legal, accounting, and administrative assistance are provided by part-time consultants. The NMCWD has a website (9-Mile Creek Watershed District [Ref. 1]), which includes NMCWD permitting information, manager and consultant information, agendas and minutes from meetings, education and outreach programming information, and other pertinent information.

The NMCWD has established and supports two advisory committees: one is a Technical Advisory Committee (TAC) composed primarily of staff from state agencies and cities within the watershed who advise the District and offer review comments and advice; the other is a Citizens Advisory Committee

(CAC). The CAC assists in developing programs and activities that help improve and protect the water resources of the NMCWD.

The NMCWD operates under the guidance of both the Watershed Act (Minnesota Statues chapter 103D) and the Metropolitan Surface Water Management Act (Minnesota Statutes sections 103B.201-.253). Minnesota Statutes chapters 103B and 103D require watershed districts to prepare water management plans. In addition to the plan requirements in statute, the NMCWD must also follow the detailed plan requirements of Minnesota Rules 8410. This water management plan (Plan) is the fifth NMCWD Plan approved by the Minnesota Board of Water and Soil Resources (BWSR), or its predecessor. Previous plans were published in 1961, 1973, 1996, and 2007.

1.2 Watershed District Purposes

1.2.1 General Watershed District Purposes

The general purposes of a watershed district are to conserve natural resources through land use planning, flood control, and other conservation projects to protect the public health and welfare and for the wise use of the natural resources (Minnesota Statutes section 103D.201).

Watershed districts can be involved with a number of issues, including protection or enhancement of water quality, prevention and alleviation of flood damage, prevention and alleviation of soil erosion and sedimentation, regulation of streams, lakes and water courses for domestic, recreational and public use, and protection and regulation of groundwater uses. Minnesota Statutes section 103B.201 establishes the purposes of watershed management organization water management programs in the metropolitan area as:

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

1.2.2 NMCWD Past Successes

1.2.2.1 Flood Protection

For its first several decades, the NMCWD focused primarily on flood protection. The District established a floodplain management ordinance in 1961, well before the state adopted the Floodplain Management Act

of 1969, which encouraged cities to adopt, enforce, and administer floodplain ordinances similar to the measure established by the District. Following passage of the Floodplain Management Act, each of the cities within the District adopted floodplain ordinances. These District and municipal regulations, in combination with several important District-led flood improvement projects, proved successful in that no significant widespread flooding has occurred in the District even during the major flooding events that occurred in 1977, 1987, and 1993. The basic water management projects completed by the District to provide flood protection and management in anticipation of ultimate watershed land use development are shown on Figure 1-2 and summarized below:

- More than 45 years ago, the NMCWD undertook flood protection and wetland and habitat preservation by implementing the **Marsh Lake Basic Water Management Project.** Located east of France Avenue in the vicinity of 94th Street in the City of Bloomington, the marsh was the last point to detain and store floodwaters before they entered the steep channel now stabilized and restored by the Lower Minnesota Valley Restoration Project. This first major project was completed in 1970. In addition to its function as a stormwater detention basin, the area was designated as a wildlife refuge to ensure that wildlife habitat was protected from development. Since its inception, the District has supported, promoted, and adhered to a policy of multi-benefit projects involving its water resources, wherever possible.
- The **Mount Normandale Lake Basic Water Management Project** created an artificial 135-acre lake in 1978. The lake stores floodwater during high-intensity rainstorm events, regulating the extreme fluctuations, or bounce in the flow rate of the creek. Reduced peak flowrates in downstream portions of the creek results in reduced flood risk and reduced potential for erosion and sedimentation.
- The **Bredesen-Mud Lake Project**, completed in 1985, converted a portion of a large, approximately 125-acre shallow marsh area in central Edina to an open water wetland to provide flood storage and included constructing trails and bridges throughout the wetland area. While the primary purpose was to provide flood storage along the North Fork of Nine Mile Creek, additional benefits included stream stabilization, improved water quality, enhancement of wildlife habitat, and pedestrian access throughout Bredesen Park.
- The **Anderson and Bush Lakes Project**, portions of which were completed in 1978 and 2000, stabilized water levels in the lakes through construction of an outlet from Anderson Lakes and installation of a pumped outlet from Bush Lake. The project also included shoreline stabilization at Bush Lake. In addition to flood control and water quality benefits, the project created and enhanced recreation, aesthetic nature uses, and wildlife habitat.
- The **Hopkins Culvert Improvements Basic Water Management Project** was completed in 1993. These improvements substantially improved the flow of the North Fork of Nine Mile Creek through the City of Hopkins. The changes significantly reduced local flooding of many properties and streets within the city. By lowering the flood elevation, previously flooded property became

available for new and expanded commercial uses. Flooding had endangered both people and property during storm events.

- The **Smetana Lake Basic Water Management Project** was completed in 2002. That project created additional flood storage for the South Fork of Nine Mile Creek. Besides this flood protection, the aesthetic and recreational uses of the lake were improved, as was the creek's water quality below Smetana Lake.

In 2002-2005, the District developed a detailed hydrologic and hydraulic model of the entire Nine Mile Creek watershed and calibrated the model using stream flow monitoring data collected by the NMCWD and Metropolitan Council from three locations along Nine Mile Creek. The model was developed to verify and update flood elevations along the creek based on more up-to-date information and a more sophisticated modeling method. In 2015, the District updated the model and established revised flood elevations based on NOAA's Atlas 14 precipitation frequency estimates. Since development, the hydrologic and hydraulic model has served as a valuable tool for the District, watershed cities, and other governmental entities in establishing local and regional flood elevations and evaluating potential impacts of proposed infrastructure changes.

1.2.2.2 NMCWD Regulatory Program

The NMCWD rules have been an essential tool in preventing and/or minimizing flooding and water quality problems. In 1973, the District adopted rules and began reviewing proposed developments and other projects in the watershed through its permit program, in an effort to ensure that land use and development would not degrade water quality or increase flood risk. The NMCWD rules have always addressed the water quantity impacts of stormwater (e.g. flooding, rate control). At first, the NMCWD rules only indirectly addressed the water quality impacts of stormwater, but since 1997 they have directly addressed water quality impacts (upon implementation of the 1996 NMCWD Plan). In 2008, the District substantially revised its rules, including the following changes:

- Increased focus on retention of stormwater onsite to reduce discharge rates and volumes;
- Enhanced protection of wetlands within the watershed through high replacement ratios and buffer requirements;
- Requirements for compensatory storage in the floodplain;
- Application of erosion and sediment control regulations to single family home construction and reconstruction projects.

A limited number of specific adjustments were made to the rules in 2012 and 2015 to streamline and improve functionality.

1.2.2.3 Water Quality

The NMCWD has been concerned about water quality since its formation. The NMCWD and other authorities have been monitoring the water quality of streams in the watershed since 1968. The District has monitored lakes periodically since 1970, and began a more comprehensive monitoring program in

1997. Since completion of its third generation Water Management Plan in 1996, the NMCWD has concentrated on conducting water quality studies and implementing water quality improvement projects. Between 1997 and 2010, the NMCWD conducted 15 diagnostic-feasibility studies (termed *Use Attainability Analyses,* or *UAAs*) for 21 lakes within the NMCWD (references listed in Section 9.0). Several important basic water management projects completed by the District to improve the water quality of lakes and streams within the watershed are shown on Figure 1-2 and are summarized below:

- The **Lower Valley Restoration Project**, finished in 1991, was one of the earlier District projects that focused on water quality. The project, located in Bloomington, restored and stabilized the streambank of the lower valley of Nine Mile Creek through its final steep descent to the mouth of the creek at the Minnesota River. By stabilizing the streambank, erosion was significantly reduced, as documented by the nonpoint source pollution monitoring program for the creek.
- In 2006, the NMCWD completed the **Minnetonka Lakes Water Quality Improvement Project**, which included construction or upgrade of ten stormwater ponds and four infiltration/filtration basins to provide water quality treatment of watershed runoff. The Minnetonka Lakes Water Quality Improvement Project implemented recommendations presented in the Glen Lake, Lone Lake, Minnetoga Lake and Shady Oak Lake Use Attainability Analyses, in addition to improvements in the Lake Holiday, Wing Lake, and Lake Rose watershed.
- Since the adoption of its Water Management Plan in 2007, the NMCWD has completed the **Eden Prairie Lakes Water Quality Improvement Project**, which implemented recommendations within the City of Eden Prairie that were presented in the Birch Island Lake, Bryant Lake, and Anderson Lakes Use Attainability Analyses. The project, completed from 2008-2013, included installation of a stormwater reclamation system to re-establish Birch Island Lake water levels, construction and upgrade of several stormwater treatment ponds, a wetland restoration upstream of Bryant Lake, and an alum treatment of Bryant Lake. Water quality in Bryant Lake has improved as a result of these management activities, with summer average water clarity consistently meeting the Minnesota Pollution Control Agency (MPCA) criteria since project completion. The Eden Prairie Lakes Water Quality Improvement project also included curlyleaf pondweed management (lake draw-down and herbicide treatments) in Northwest and Southwest Anderson Lakes and an alum treatment in Southwest Anderson Lake. The project has resulted in improved water quality in both Northwest and Southwest Anderson Lakes and improved aquatic plant communities, especially in Southwest Anderson Lake.
- From 2009-2014, the NMCWD conducted the **Southeast Anderson Lake Water Quality Improvement Project**, which consisted of curlyleaf pondweed management (herbicide treatments) in Southeast Anderson Lake to improve water quality and improve the health of the native plant community. This management activity was recommended in the Anderson Lakes Use Attainability Analysis (UAA) and conducted by the District in response to a petition by the City of

Bloomington. The Anderson Lakes UAA also recommends an alum treatment of Southeast Anderson Lake, which has not yet been undertaken by the District.

- The NMCWD completed the **Hopkins Streambank Stabilization and Restoration Project** in 2012-2014, which included stabilization of Nine Mile Creek from Excelsior Boulevard to Trunk Highway (TH) 169 and re-meandering of the creek in the wetland area upstream of TH 169. The project, which was recommended in the Nine Mile Creek Use Attainability Analysis, has resulted in reduced erosion and improved habitat in the creek, as evidenced by more abundant fish populations in recent years, in comparison to pre-project observations.

The District received a petition from the City of Edina in 2009 for streambank stabilization along the North Fork of Nine Mile Creek from TH 169 to the Bloomington border. The **Edina Streambank Restoration Project**, also recommended as part of the Nine Mile Creek Use Attainability Analysis, includes restoration of approximately 16,000 feet of Nine Mile Creek from TH 169 to West 77th Street, realignment of approximately 3,400 feet of Nine Mile Creek from Brook Drive to the SOO Line Railroad, and realignment of approximately 650 feet of Nine Mile Creek from the SOSO Line Railroad to West 70th Street in Edina. The project, which will result in reduced erosion and improved habitat along the North Fork of Nine Mile Creek, is underway and anticipated to be completed in 2017-2018.

The District received a petition from the City of Bloomington in 2008 for implementation of the water quality improvement recommendations presented in the Normandale Lake Use Attainability Analysis (2005). Normandale Lake was created in the late-1970s by constructing a dam along Nine Mile Creek in northwestern Bloomington to provide regional flood storage. The shallow lake (wetland), located within the popular Lake Normandale Park, receives phosphorus and sediment loading from a large tributary watershed (approximately 20,000 acres), resulting in reduced water clarity and frequent nuisance algal blooms. Additional analysis and discussions with the city and Army Corp of Engineers regarding watershed and in-lake management options are underway. It is anticipated that an improvement project will commence in 2018-2019.

1.2.2.4 Education and Outreach

One of the District's strengths has been building a successful education program over the past decade. Education and outreach staff has led the development of numerous programs to reach audiences such as District residents, K12 students, elected and appointed officials, and professionals. The District has been recognized by both the Minnesota Association of Watershed Districts and the Freshwater Society for several education programs, including:

- Fighting Salt Pollution with Education
- Rain Barrel Art Program
- Summer Education Series

Another significant accomplishment since adoption of its 2007 Plan is construction of **Discovery Point**, which serves as the District headquarters and educational facility. In 2011, the NMCWD received a donation of a building and over five acres of land in a residential area in Eden Prairie. Reconstruction of the building into an office, meeting, and educational facility was completed in 2014. The Discovery Point site property features innovative stormwater management techniques through demonstration projects that reduce site runoff and improve water quality. The stormwater management features include porous pavers, raingardens, and a cistern to capture roof runoff. With over five acres of wooded land overlooking a wetland and adjacent to City of Eden Prairie trails, Discovery Point provides education and outreach opportunities to showcase and research good land management and natural resource conservation practices. Additional site restoration to manage invasive species (particularly Buckthorn) and improve habitat is ongoing.

1.3 NMCWD Goals, Policies, and Actions

The NMCWD has established goals, policies, and actions in this Plan to guide day-to-day operations of the District and long-range planning efforts (see Section 5.0). The goals help fulfill the purposes of the District. The District policies and actions guide present and future management decisions. The goals, policies, and actions of this Plan are organized in the following ten major topic areas:

Section 5.1	Stormwater Management
Section 5.2	Surface Water Management
Section 5.3	Open Spaces and Recreational Uses
Section 5.4	Wetland Management
Section 5.5	Groundwater Management
Section 5.6	Land Use Management
Section 5.7	Flood Management
Section 5.8	Climate Change Adaptation
Section 5.9	Education and Outreach
Section 5.10	Organizational Management

1.3.1 Goals

The NMCWD Plan establishes the following goals for the District:

1. **Stormwater Management-** Stormwater will be managed to maintain or reduce impacts to downstream waterbodies.
2. **Surface Water Management-** The surface water quality of the lakes and streams of the District will be protected and enhanced.
3. **Open Spaces and Recreational Uses-** Recreational uses of District water resources will be improved, or at least maintained.

4. **Wetland Management-** The acreage, functions, and values of wetlands within the Nine Mile Creek watershed will be maintained and enhanced.
5. **Groundwater Management**- Groundwater quality and quantity will be protected and conserved for appropriate and sustainable beneficial uses.
6. **Land Use Management**- Water resources will be protected and enhanced by integrating water resources management with land use planning.
7. **Flood Management**- Human life and permanent structures will be protected from damage due to flooding.
8. **Climate Change Adaptation**- Adverse impacts of climate change on the watershed and its water resources will be minimized.
9. **Education and Outreach**- District water resources will be protected and enhanced through effective education and outreach programs.
10. **Organizational Management**- The organization will be managed in an efficient, effective, and responsible manner.

To achieve these goals, the District has identified policies and actions that guide present and future management decisions. Many of the policies and actions included in this Plan require collaboration with Federal, State, local governments and citizens to be effective.

1.3.2 Issue Identification and Actions

Identification of significant issues facing the NMCWD was an important task in the development of this Plan. Input on identification and prioritization of issues was solicited from the NMCWD Board of Managers, cities, counties, state agencies, residents, and District staff. The key issues are discussed in detail in Section 4.0, including identification of priority issues and opportunities. This information was used to identify actions and inform priorities to achieve District goals.

The NMCWD identified approximately 200 action items to address the issues and goals. The action items are organized according to goal topic in Section 5.0 of this Plan. Many of the action items included in this iteration of the Plan are a continuation of existing District practices to address ongoing District responsibilities (e.g., implement stormwater volume, quality and rate-control criteria in the NMCWD's rules). Other action items are new, reflecting emerging issues and changing priorities within the NMCWD. New or expanded action items of note in this Plan update include the following:

Stormwater Management (Table 5-1)

- Working with local governments in identifying high-priority areas, planning, and development of regional stormwater management facilities to enhance treatment and provide flexibility for stormwater management compliance as redevelopment occurs (Objective 1, Policy 5, Action A).
- Working with cities and other public or private partners to evaluate opportunities for and implement stormwater reuse projects (Objective 1, Policy 7, Actions A and B).

Surface Water Management (Table 5-2)

- Collecting, interpreting and reporting water quality and ecological indicator data annually, including additional targeted monitoring to help measure success of District management activities (Objective 1, Policy 1, Action B and Policy 3, Action A).
- Conducting periodic inventories and assessments of aquatic invasive species in District waterbodies and working with agencies and local stakeholders to manage invasive species (Objective 2, Policy 4, Actions A, B, and C).
- Conducting additional or updating prior Use Attainability Analyses for District lakes and working with agencies and stakeholders to establish subwatershed-based implementation programs (Objective 3, Policy 1, Actions A, B, and C).
- Implementing recommendations from past and/or updated Use Attainability Analyses (UAAs), Total Maximum Daily Loads (TMDLs), and Watershed Restoration and Protection Strategies (WRAPS) (Objective 3, Policy 3, Action A).

Open Spaces and Recreational Uses (Table 5-3)

- Working with cities and developers to provide access to water resources through the development/redevelopment process or in conjunction with NMCWD water management projects, while protecting and conserving natural areas (Objective 1, Policy 1, Action A).

Wetland Management (Table 5-4)

- Identifying and implementing wetland restoration and protection opportunities to address high-quality wetland areas, sensitive habitats, and sensitive, rare or endangered animal or plant species (Objective 2, Policy 1, Actions C, D, E).

Groundwater Management (Table 5-5)

- Studying the interaction of groundwater and surface water resources in the Nine Mile Creek watershed to better understand the impacts of groundwater on lake, wetland and stream hydrology and to identify areas with high aquifer recharge potential (Objective 1, Policy 1, Action C).
- Collaborating with other entities to:
    - Research infiltration impacts on groundwater and develop a consistent approach to protecting areas sensitive to groundwater contamination (Objective 1, Policy 2, Action A).
    - Develop a regional groundwater management plan (Objective 2, Policy 1, Action B).
- Promoting groundwater conservation through:
    - Requiring cities to adopt and implement a groundwater conservation policy and encouraging cities to develop groundwater sustainability goals (Objective 2, Policy 4, Actions A and C).

Land Use Management (Table 5-6)

- Participating in local and regional land use planning efforts to identify opportunities to achieve District goals, objectives and policies and provide information and analysis regarding opportunities for improved water resources management and protection (Objective 1, Policy 1, Actions A and B).

Flood Management (Table 5-7)

- Requiring local stormwater management plans to maintain critical 100-year flood storage volume (Objective 2, Policy 1, Action A).
- Assisting cities in addressing increased flood potential identified using Atlas 14 precipitation frequency estimates (Objective 2, Policy 2, Actions A, B, C, and D), including:
    - Identifying and prioritizing flooding problems.
    - Identifying improvement alternatives to address regional flooding problems.
    - Implementing infrastructure improvements to address regional flooding problems.
    - Working with cities to incorporate flood risk information into local land use controls.

Climate Change Adaptation (Table 5-8)

- Promoting climate change adaptation to minimize property damage and impacts to natural and water resources within the Nine Mile Creek watershed through:
    - Evaluating impacts and developing a District climate change adaptation strategy to identify natural and water resource vulnerabilities to climate change and potential adaptation strategies (Objective 1, Policy 1, Action A).
    - Working with local governments and stakeholders to educate and assist in development and implementation of city-specific climate change adaptation strategies (Objective 1, Policy 1, Actions B and C).

Education and Outreach (Table 5-9)

- Reviewing and prioritizing educational programming annually for alignment with District goals and policies (Objective 1, Policy 1, Action A).
- Fostering open communication and stakeholder participation by expanding use of the District's website to provide timely information on District policies, programs, and projects and its regular meetings (Objective 5, Policy 1, Action A).

Organizational Management (Table 5-10)

- Biennially reviewing the District's implementation program relative to past accomplishments, available resources, current opportunities, emerging issues, and progress toward District goals (Objective 2, Policy 1, Action A and Policy 3, Action A).
- Continuing to collect relevant monitoring and performance data to measure program and project successes and inform future decisions (Objective 2, Policies 4, Action A).

1.4 NMCWD Plan Implementation

The programs, projects, and other actions the District will implement in the next 10 years are summarized in Section 6.0. The implementation plan programs and activities are organized under the following headings:

- Regulatory Controls and Permitting Program
- Data Collection, Assessment and Management
- Education and Outreach
- Project and Capital Improvements
- Administration

The District's operations and programs are summarized in Table 6-1 along with the anticipated costs and schedule. The District's anticipated capital improvement projects for the next 10 years are summarized in Table 6-2. Section 6.1 provides details on how the tables of projects provide important information for the Board of Managers' use in developing annual budgets over the life of this plan, but do not represent proposed budgets.

While the District assumes overall responsibility for implementing its programs and activities, and the plan is self-executing with exception of very limited contributions from watershed cities and other partners, many of the specific programs, projects, and activities described in this Plan will benefit from engagement and partnership with watershed cities, Hennepin County, and others. That broader engagement and partnership is a critical premise for the successful implementation of this Plan.

Given that the watershed is almost entirely developed, and in many areas watershed cities are putting considerable resources and time into redevelopment revitalization strategies, a critical new element to NMCWD's approach to project implementation will be the integration of water-resource management improvements into such redevelopment efforts. Early in the process of implementing this Plan, the District will engage planning and community development staffs and boards in the watershed cities to plant seeds for the development of such collaborative approaches. Cities and others also may approach the District with ideas. The nature and extent of the District's involvement in any particular project will depend on several factors, and may evolve over time. The District will use the following prioritization framework when considering how to engage in a partnership for any particular project:

Top priority – work that will:

- Advance NMCWD's progress toward completion of a Use Attainability Analysis.
- Advance NMCWD's progress toward implementation of a completed UAA.
- Contribute to the completion of a study, data collection or assessment scope of work already identified as a NMCWD priority.
- Contribute to minimizing the risk of and mitigating potential damage from regional flooding.
- Contribute to a Total Maximum Daily Load or Watershed Restoration and Protection Strategy study or implementation of a TMDL- or WRAPS-derived project in the watershed.

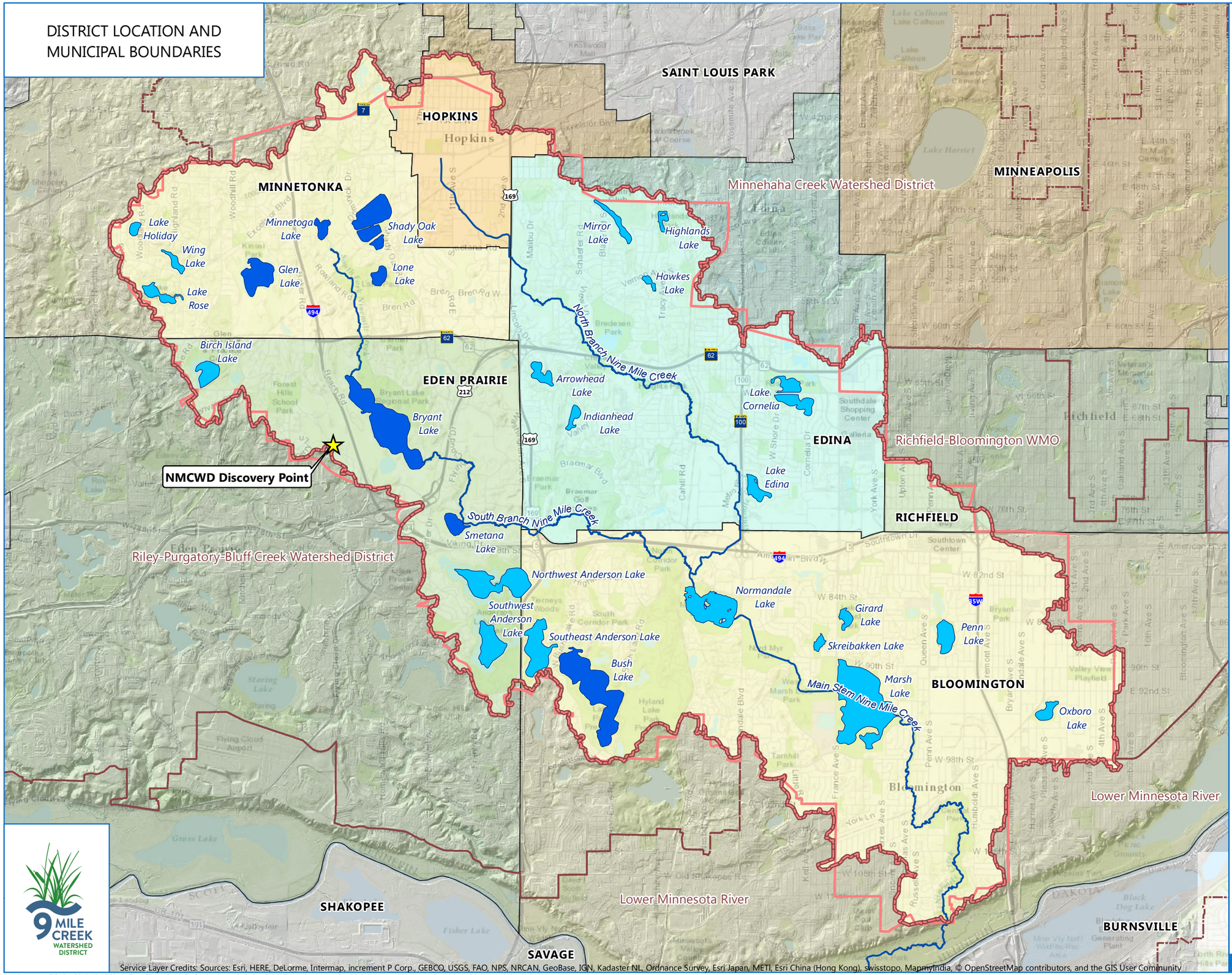
Second priority – work that will:

- Enhance or improve previously completed watershed projects.

Third priority – work that will:

- Advance NMCWD's interests in a project related to water resources management in the watershed.
- Address local flooding issues.

DISTRICT LOCATION AND MUNICIPAL BOUNDARIES



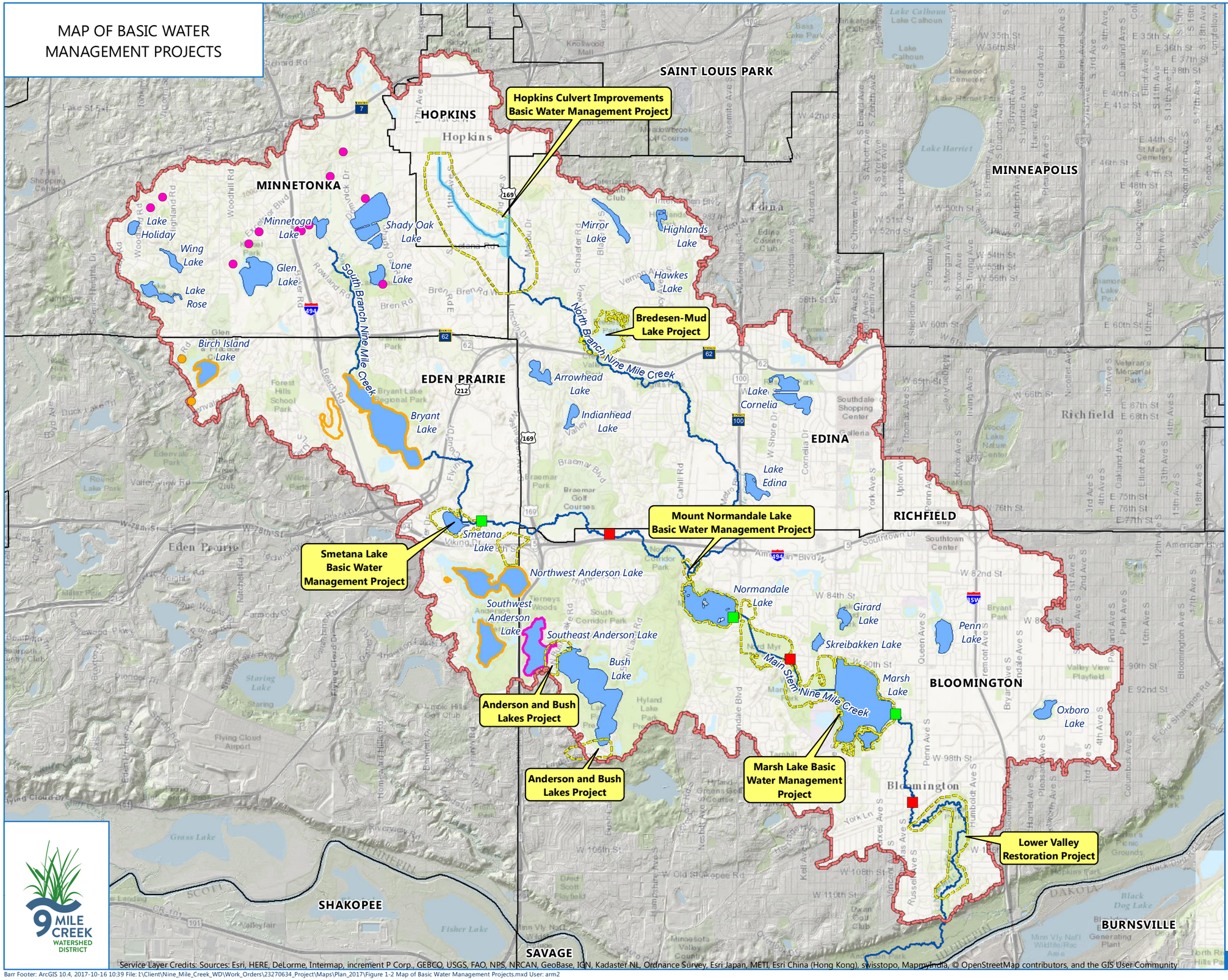
9 MILE CREEK WATERSHED DISTRICT

Barr Footer: ArcGIS 10.4, 2017-10-16 09:11 File: I:\Client\Nine_Mile_Creek_WD\Work_Orders\23270634_Project\Maps\Plan_2017\Figure 1-1 District Location and Municipal Boundaries.mxd User: arm2

DISTRICT LOCATION AND MUNICIPAL BOUNDARIES

Figure 1-1

MAP OF BASIC WATER MANAGEMENT PROJECTS



9 MILE CREEK WATERSHED DISTRICT

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

MAP OF BASIC WATER MANAGEMENT PROJECTS

Figure 1-2

Barr Footer: ArcGIS 10.4, 2017-10-16 10:39 File: I:\Client\Nine_Mile_Creek_WD\Work_Orders\23270634_Project\Maps\Plan_2017\Figure 1-2 Map of Basic Water Management Projects.mxd User: arm2

2.0 Land and Water Resource Inventory

This section of the Nine Mile Creek Watershed District (NMCWD or District) Water Management Plan (Plan) summarizes the land and water resources located within the District. It contains information on climate and precipitation, topography, surface water resources, geology and groundwater resources, soils, land use, water recreation, fish and wildlife habitat, natural communities and rare plants, animals, and natural features, as well as pollutant sources. This important information describes the condition of the watershed as of 2017 and it affects decisions about infrastructure, development, and ecological preservation.

2.1 Climate and Precipitation

The climate of the Minneapolis-St. Paul area is a humid continental climate, characterized by moderate precipitation (normally sufficient for crops); wide daily temperature variations; large seasonal variations in temperature; warm humid summers; and cold winters with moderate snowfall. Figure 2-1 summarizes monthly average precipitation data for the Minneapolis-St. Paul International Airport (MSP) station based on the most recent 30-year "climate normal" period (1981-2010). Average total annual precipitation at the MSP station is 30.6 inches (1981-2010). Snowfall averages 54.4 inches annually at the MSP station (1981-2010). The NMCWD also collects precipitation data at three continuous gaging stations, located in Bloomington, Hopkins, and Eden Prairie. This information, which has been collected since 1964, is used to record and assess local rainfall patterns within the watershed and calibrate District hydrologic models.

The amount, rate, and type of precipitation are important in determining flood levels and stormwater runoff rates, all of which impact water resources. In urbanized watersheds, shorter duration events tend to play a larger role in predicting high water levels on basins. Shorter duration events are generally used by hydrologists to study local issues (sizing catch basins, storm sewer pipes, etc.). Longer duration events are generally used by hydrologists to study regional issues, such as predicting high water levels for regional basins and basins that have no outlets (landlocked), or have small outlets relative to their watershed size.

Average weather imposes little strain on the typical drainage system. Extremes of precipitation and snowmelt are important for design of stormwater management and flood control systems. Extremes of snowmelt most often affect major rivers, the design of large stormwater storage areas, and landlocked basins. Extremes of rainfall most often affect the design of conveyance facilities. The National Oceanic and Atmospheric Administration (NOAA) has data on extreme precipitation events that can be used to aid in the design of stormwater management and flood control systems.

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

- For climate information about Hennepin County: Climate Info: Hennepin Cty [Ref. 2].
- For climate information about the Twin Cities metropolitan area: Climate Info: Twin Cities Metro [Ref. 3].

- Local data available from the Midwestern Regional Climate Center (MRCC): Climate Info: Local data MRCC [Ref. 4].
- For a wide range of climate information: Climate Info: NOAA [Ref. 5].
- For other Minnesota climate information: Climate Info: MDNR [Ref. 6].

2.1.1 Precipitation-Frequency Data (Atlas 14)

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

Snowmelt and rainstorms that occur with snowmelt are significant in this region. The volumes of runoff generated, although they occur over a long period, can have significant impacts where the contributing drainage area to a lake or pond is large and the outlet is small. Runoff estimates from spring snowmelt are not provided in Atlas 14. The Soil Conservation Service's (now the Natural Resources Conservation Service, or NRCS) National Engineering Handbook, Hydrology, Section 4, presents maps of regional runoff volume. Table 2-1 (below) lists selected rainfall and snowmelt runoff events used for design purposes by the NMCWD.

Table 2-1 Selected Rainfall and Snowmelt Runoff Design Events

Type	Event Frequency[1]	Event Duration	Depth (inches)
Rainfall	2-year	24 hour	2.9
	5-year	24 hour	3.6
	10-year	24 hour	4.3
	25-year	24 hour	5.4
	50-year	24 hour	6.4
	100-year	24 hour	7.5
	10-year	10 day	6.8
	100-year	10 day	10.3
Snowmelt[2]	10-year	10 day	4.7
	25-year	10 day	5.7
	50-year	10 day	6.4
	100-year	10 day	7.2

Source: NOAA Atlas 14 – Volume 8 (data from centroid of District).
Hydrology Guide for Minnesota (USDA Soil Conservation Service – NRCS)

[1] The period during which, on average, a single precipitation event of a given depth and duration would occur.

[2] Snowmelt runoff depth reported as liquid water.

2.1.2 Climate Trends

Even with wide variations in climate conditions, climatologists have identified four significant climate trends in Minnesota (MDNR, 2017):

- Increasing temperatures, with winter temperatures warming the fastest.
- Decline in severity and frequency of extreme cold weather
- Increasing annual precipitation
- Increasing frequency and size of extreme rainfall events

According to NOAA's 2013 assessment of climate trends for the Midwest (NOAA, 2013), annual and summer precipitation amounts in the Midwest are trending upward, as is the frequency of high intensity storms. Higher intensity precipitation events typically produce more runoff than lower intensity events with similar total precipitation amounts; higher rainfall intensities are more likely to overwhelm the

capacity of the land surface to infiltrate and attenuate runoff. Precipitation records in the Twin Cities area show that the average annual precipitation has increased (Minnesota Climatology Working Group, 2016).

2.2 Topography

The topography of the District varies from relatively flat land in much of Bloomington and along the North Fork of the creek through Edina and Hopkins, to very hilly land along the west boundary of the District in Bloomington, the southwest corner of Edina, and most of Eden Prairie and Minnetonka. The remainder of the District is moderately rolling topography. Based on United States Geological Survey (USGS) Quadrangle maps, there is an elevation difference of approximately 430 feet between the creek's outlet into the Minnesota River, at Elevation 700 feet above mean sea level (MSL) and the highest point, located in the northwest corner of the District. Despite this difference in elevation, about 90 percent of the land within the District ranges from 800 to 950 feet above MSL.

Detailed topography of the District is available through the Minnesota Department of Natural Resources' 2011 LiDAR data (MDNR, 2011). Figure 2-2 shows surface elevation based on the LiDAR data.

Local topography determines the direction of overland stormwater runoff, leading to the determination of watershed divides (see Section 2.3). The urbanization of the watershed over time has altered the natural topography of the watershed. With these alterations, drainage patterns have become more defined. Many of the wetland areas that existed prior to urbanization have been eliminated or altered, especially in the older developed areas. The presence of steep slopes within the watershed is of interest as these areas have limited options for land development and a higher potential for erosion.

2.3 Surface Water Resources

The drainage system throughout the District is primarily defined by Nine Mile Creek, but is also characterized by many wetlands, lakes, and conveyance systems which all eventually drain to the Minnesota River. For management purposes, the District has broken down the watershed geographically into 20 major subwatersheds. A subwatershed represents an area of land that drains directly to a common waterbody (or series of connected waterbodies). Figure 2-3 shows the major subwatersheds in the District. The major subwatersheds identified on Figure 2-3 are further broken down into minor subwatersheds (not shown) for specific management purposes (e.g., establishing 100-year flood levels, estimating pollutant loading). Information regarding minor subwatersheds is available upon request.

2.3.1 Lakes and Streams

There are numerous lakes and ponds, and many miles of streams within the NMCWD. The District considers all of these waterbodies valuable resources and manages these resources in a manner that will attain and preserve their highest and best intended beneficial uses. Additional consideration is given to those District waterbodies with public swimming access (i.e., Bryant Lake, Bush Lake, and Shady Oak Lake). District management activities include water level and water quality monitoring, studies, and projects (see also Section 6.3). Detailed information about major District waterbodies is available from the District website at 9-Mile Creek Watershed District [Ref. 1].

Many of the waterbodies within the District also fall under the regulatory jurisdiction of other agencies (see Section 1.0) with their own classification systems and management roles.

Public Waters (Minnesota Department of Natural Resources)

Minnesota Department of Natural Resources (MDNR) designates certain water resources as public waters to indicate those lakes, wetlands, and watercourses over which the MDNR has regulatory jurisdiction. The MDNR public waters within the Nine Mile Creek watershed are shown on Figure 2-4. By statute, the definition of public waters includes both "public waters" and "public waters wetlands." The NMCWD works closely with the MDNR on matters pertaining to permitting or management of public waters.

Public waters are all waterbasins and watercourses that meet the criteria set forth in Minnesota Statutes section 103G.005, subdivision 15 that are identified on public water inventory maps and lists authorized by Minnesota Statutes section 103G.201. Public waters wetlands include all type 3, type 4, and type 5 wetlands, as defined in U.S. Fish and Wildlife Service Circular No. 39, 1971 edition, that are 10 acres or more in size in unincorporated areas or 2.5 acres or more in size in incorporated areas (see Minnesota Statutes section 103G.005, subdivisions 15a and 17b.)

The MDNR uses county-scale maps to show the general location of the public waters and public waters wetlands under its regulatory jurisdiction. These maps are commonly known as public waters inventory (PWI) maps. PWI maps also show public waters watercourses and ditches. The regulatory boundary of these waters and wetlands is called the ordinary high water level (OHWL). A MDNR permit is required for work within designated public waters. PWI maps are available on a county-by-county basis. Additionally, county-by-county lists of these waters are available in tabular form. The MDNR also maintains a web-based mapping tool for viewing PWI maps. The PWI maps and lists are available on the MDNR's website: PWI Maps: MDNR. {Ref. 7].

Lake and Stream Water Quality Goals

One of the primary goals of the District is to "ensure the water quality of the lakes and streams of the District is protected and enhanced" (see Section 5.2). In 1996, the District established lake water quality management goals based on designated uses for a waterbody (i.e., full-contact recreational activities such as swimming; non-full body contact recreational activities such as boating, canoeing, or water skiing; fishing and aesthetic viewing; runoff management). Through its 2007 Plan, the District managed lakes to achieve the District's water quality goals. In the time since the District established designated uses for District waterbodies, the MPCA has adopted eutrophication water quality standards for Minnesota lakes and streams. The MPCA established water quality goals and determined appropriate uses of the lakes and streams, as outlined in the guidance document *Guidance Manual for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: 305(b) Report and 303(d) List* (MPCA, 2014). Standards for lakes vary by MPCA ecoregion and whether the MPCA classifies a lake as "shallow" or "deep." The MPCA defines "shallow" lakes as having a maximum depth of 15 feet or less or having at least 80% of the lake area shallow enough to support aquatic plants (referred to as "littoral area").

In this Plan, the District adopts the MPCA water quality standards applicable to lakes and streams within the District as the District's water quality goals. These water quality goals are presented in Table 2-2. Some

lakes within the District exhibit water quality better than the applicable eutrophication standards. In these cases, the District seeks to maintain or improve the existing water quality. This concept is generally known as "non-degradation" or "anti-degradation."

Table 2-2 NMCWD Water Quality Goals

Water Quality Parameter	Water Quality Standard by MPCA Waterbody Type [1]		
	Shallow Lakes[2]	Deep Lakes	Stream
Total Phosphorus (summer average, µg/L)	60	40	100
Chlorophyll *a* (summer average, µg/L)	20	14	18
Secchi Disc Transparency (summer average, m)	1.4	1.0	NA
Total Suspended Solids (mg/L)	NA	NA	30
Daily Dissolved Oxygen Flux (mg/L)	NA	NA	3.5
Biological Oxygen Demand (5 day) (mg/L)	NA	NA	2
Escherichia coli (# per 100 mL)	126 [3]	126 [3]	126 [3]
Chloride (mg/L)	230	230	230

[1] NMCWD goals are based on MPCA standards included in MN Rules 7050. Revisions to MN Rules 7050 will supersede NMCWD standards. Note that MN Rule 7050.0220 includes standards for additional parameters that are enforced by the MPCA.
[2] Shallow lakes have a maximum depth less than 15 feet or littoral area greater than 80% of the total lake surface area.
[3] 126 organisms per 100 mL as a geometric mean of not less than five samples within any month, nor shall more than 10% of all samples within a month exceed 1,260 organisms per 100 mL.

The MPCA also established water quality standards for parameters in addition to those presented in Table 2-2; these standards are published in Minnesota Rules 7050 and are applicable to NMCWD lakes, ponds, and streams. Standards for several parameters included in Minnesota Rules 7050 vary according to the MPCA-determined designated use of the waterbody (e.g., drinking water, industrial use).

In addition to the water quality goals presented in Table 2-2, the District plans to establish holistic lake health targets for District-managed lakes. The holistic lake health targets will consider a wide range of factors affecting lake health, with an increased emphasis on the role of ecological factors in overall lake health and the interrelated nature of these factors (see Section 4.3.2 and Section 6.3.2).

Impaired Waters

Waterbodies not meeting standards established by the MPCA may be included on the MPCA's 303(d) impaired waters list (see Section 4.3.2). As of the writing of this Plan, Nine Mile Creek and five lakes

(Bryant, Cornelia (north), Edina, Rose, and Wing) in the District watershed are included on the MPCA's 2016 draft impaired waters 303(d) list. Locations of impaired waters are shown on Figure 2-5. Table 2-3 summarizes the impaired waters within the District. See Section 4.3.2 for more detailed information about water quality issues and impaired waterbodies.

Current impaired waters listings are available from the MCPA website: Impaired Waters Listings: MPCA [Ref. 8].

Table 2-3 Summary of MPCA Impaired Waters within the District

Waterbody	Affected Designated Use	Pollutant or Stressor	Year Listed	TMDL Study Target Start	TMDL Study Target Completion	TMDL Study Approved
Nine Mile Creek	Aquatic Life	Chloride[1]	2004	--	--	2010
	Aquatic Life	Fish Bioassessments	2004	2014	2019	--
Bryant Lake[2]	Aquatic Recreation	Nutrients/ Eutrophication Biological Indicators	2008	2014	2019	
	Aquatic Consumption	Mercury in Fish Tissue	2002	--	--	2008
Bush Lake[2]	Aquatic Consumption	Mercury in Fish Tissue	1998	--	--	2008
Lake Cornelia (North)	Aquatic Recreation	Nutrients/ Eutrophication Biological Indicators	2008	2014	2019	--
Lake Edina	Aquatic Recreation	Nutrients/ Eutrophication Biological Indicators	2008	2014	2019	--
Rose Lake	Aquatic Recreation	Nutrients/ Eutrophication Biological Indicators	2010	2014	2019	--
Smetana Lake[2]	Aquatic Consumption	Mercury in Fish Tissue	2008	--	--	2008
Wing Lake	Aquatic Recreation	Nutrients/ Eutrophication Biological Indicators	2010	2014	2019	--

Note: Data based on proposed 2016 MPCA Impaired Waters 303(d) List.

[1] Addressed by the Nine Mile Creek Watershed Chloride Total Maximum Daily Load Report.

[2] Impaired for aquatic consumption due to mercury in fish tissue; addressed by the *Minnesota Statewide Mercury TMDL* report (2007).

District Water Quality Monitoring

Annually, the District conducts water quality monitoring programs that assess the conditions of both lakes and streams. The locations of lake and stream water quality monitoring sites are shown on Figure 2-6. Hydrologic monitoring stations are also shown.

1. **Lakes.** The District samples its lakes on a rotating basis, typically sampling 4 or 5 lakes per year. A summary report on the results of the preceding year is prepared annually.

   The lake water quality reports concentrate upon the three principal water quality indicators: total phosphorus, chlorophyll *a*, and Secchi disc transparency. Phosphorus is a biologically active element whose concentration often determines the productivity (i.e., algae and/or weed growth) of a lake. Chlorophyll *a* is the photosynthetic pigment of phytoplanktonic algae present in a lake, and a general indicator of algal density. Secchi disc transparency is a measure of water clarity and is measured as the depth to which one can see a standard 20-centimeter-diameter white (or black and white-patterned) disc lowered into the water. More detailed information about lake water quality and lake management strategies is included in Section 4.3.2. The most recent water quality data available for District lakes are available from the District website at: 9-Mile Creek Watershed District Water Quality Data Ref. 44].

   Beginning in 1997, lakes within the NMCWD were monitored more intensively in support of Use Attainability Analyses (UAAs) that diagnose water quality problems and their causes and recommend feasible alternative remedial measures. Over the period from 1997 to 2011, the District analyzed 21 lakes and their watersheds through the UAA process, beginning with headwaters lakes and generally proceeding downstream. UAAs have been completed for:

   - Shady Oak Lake
   - Glen Lake
   - Lone Lake
   - Minnetoga Lake
   - Birch Island Lake
   - Bush Lake
   - Bryant Lake
   - Smetana Lake
   - Penn Lake
   - Southeast, Southwest, and Northwest Anderson Lakes
   - Normandale Lake
   - Mirror Lake
   - Lake Cornelia (North and South)
   - Indianhead and Arrowhead Lakes
   - Holiday, Wing, and Rose Lakes

The District has also performed (or cooperated to perform) more detailed water quality monitoring related to total maximum daily load (TMDL) studies to address impaired waters (see Section 4.3.2).

In addition to monitoring lake water chemistry, the District performs macrophyte (aquatic plant) surveys to assess the presence (frequency) and density of vegetation in each lake. Macrophyte surveys are performed in the same year as water chemistry monitoring, and typically include a survey performed in June and August. Information gathered from the macrophyte surveys can be used to assess the biologic integrity or condition of a lake through a multi-metric approach called an index of biological integrity (see Section 4.3).

2. **Streams.** The District also monitors Nine Mile Creek water quality each year at three watershed outlet monitoring program (WOMP) stations (see Figure 2-6). This monitoring includes assessment of chemical water quality and biological conditions. Chemical parameters monitored include a subset of the MPCA Class 2b. water quality standards (Minnesota Rules 7050) and include: chloride, total suspended solids (TSS), total phosphorus (TP), and nitrates. Continuous flow gaging is also performed as part of the annual stream water quality monitoring program. Flow gaging is conducted by continuously recording water levels in a stream, then using a site-specific mathematical relationship between water depth and stream flow (called a rating curve) to estimate the flow rate for the recorded water depths. Benthic macroinvertebrate and fish samples have also been collected from eight stream monitoring sites each year to assess stream water quality in terms of its biological diversity and health (see Figure 2-6). The biological monitoring has been performed to identify changes in stream water quality that may be caused by nonpoint source pollution. This information complements the chemical water quality sampling to provide a more complete understanding of overall stream health.

The District performs quantitative trend analysis on collected water quality data to identify waterbodies with degrading, stable, or improving water quality and uses this information to prioritize management actions (see Section 6.3.2).

Other agencies monitor lake and stream water quality within the District. The Metropolitan Council Environmental Services (MCES) monitors several District lakes through its Citizen Assisted Monitoring Program (CAMP). MCES also monitors the outlet of Nine Mile Creek for chemical and biological water quality and flow. Additional water quality information collected by MCES is available at: Water Quality Info: MCES [Ref. 9].

In addition to this District data collection, as part of the Minnesota River Assessment Program (MRAP), the Metropolitan Waste Control Commission studied the Creek from 1989-1992 and established a continuous monitoring station near the mouth of the Creek. Observations appear in the report of the Metropolitan Waste Control Commission to the MRAP, including extensive flow gaging information. The Metropolitan Waste Commission's (i.e., now Metropolitan Council Environmental Services, MCES) creek monitoring station at 106th Street in Bloomington continues to operate now as part of the MCES Watershed Outlet Monitoring Program (WOMP), and the District has supplemented this monitoring effort by establishing

three additional WOMP-type stations at upstream locations, including 98th Street (Main Stem, Bloomington), West 72nd Street (North Fork, Edina), and West 78th Street (South Fork, Bloomington).

2.3.2 Wetlands

The wetlands in the District are an important community and ecological asset. These resources provide significant wildlife habitat and refuge, while also supplying aesthetic, recreational, and water quality treatment benefits. Prior to development, much of the land within the NMCWD was wetland. Many wetland areas were drained or filled as the cities developed (prior to the establishment of regulations protecting wetlands). Presently, wetlands within the District are protected by the Wetland Conservation Act (WCA, see Section 6.2.2) and District Rules (see Section 6.2.2). The District serves as the Local Government Unit (LGU) responsible for administration of the WCA rules for portions of Edina, Eden Prairie, Hopkins, and Richfield within the District (except for on Minnesota Department of Transportation projects, see Section 6.2.2). Bloomington and Minnetonka serve as the LGUs for administering the WCA rules within those cities. More information about WCA guidance is provided at the BWSR website: WCA guidance info: BWSR [Ref. 10].

Historically, the U.S. Fish and Wildlife Service (USFWS) has been responsible for mapping wetlands across the country, including those in Minnesota. More recently, the MDNR has maintained and periodically updated the wetlands database within Minnesota. The most recent update to the National Wetland Inventory (NWI) for the Nine Mile Creek watershed was published in 2013. Figure 2-7 shows the location of all NWI wetlands within the NMCWD. Figure 2-4 shows waterbodies classified as public waters wetlands by the MDNR.

2.3.3 Hydrologic System Characteristics

Local Stormwater Systems

Each city maintains maps showing the extent of stormwater management facilities (e.g., pipes, ponds, outfalls), which are incorporated herein by reference and available from each city. The District requires that the maps be included in each city's local plan.

The cities within the NMCWD are responsible for maintaining stormwater systems (see also Section 7.1). Each city maintains maps showing the extent of municipal stormwater management facilities (e.g., pipes, ponds, outfalls), which are incorporated herein by reference and can be obtained at each of the municipal offices. Municipal stormwater management system information shall be incorporated in local plans (see Section 7.1).

Public Ditches

Public drainage systems (also referred to as public ditches or county ditches) are established under Chapter 103E of Minnesota Statutes. The original principal function of public ditches was to provide drainage for agricultural lands; most remaining ditches in Hennepin County now serve as urban drainage systems. Figure 2-4 identifies the public ditches within the NMCWD. The current condition of these ditches is described in this section.

Ditch 1

Ditch 1 is the main stem of the Creek from West 84th Street through Normandale Lake and Marsh Lake. Downstream of the Normandale Lake outlet structure, this is a well-defined channel that has required periodic maintenance. The maintenance has primarily been the removal of aquatic bog that has dislodged itself from the wetland complex riparian to the creek channel.

Ditch 41

Ditch 41 is located in southeast Hopkins and northwest Edina. Even though this section of the North Fork of Nine Mile Creek is primarily located in the City of Edina, the accumulation of sediment along the channel bottom has historically resulted in a "pooling" of base flows within the Creek upstream of TH 169 in Hopkins. Past clean-outs of the channel have improved the conveyance of stream base flows in the area.

Ditch 34

Ditch 34 provides the outlet conveyance from Birch Island Lake and handles the drainage from an area of primarily industrial and multi-residential land-use. This ditch is normally dry with flows typically only after intense rainstorm events. The District will work with the City of Eden Prairie to ensure that the required conveyance capacity of this ditch is maintained.

100-Year Floodplain and Profiles

The District has developed a District-wide hydrologic and hydraulic model incorporating city modeling, where available. The District uses this model to estimate 100-year flood elevations and peak discharges of existing and proposed stormwater management facilities, as well as estimate flood profile information that corresponds to the peak discharges of channelized flow passing through the watershed. Following the publication of Atlas 14 precipitation data (see Section 2.1.1), the District updated the hydrologic and hydraulic model to establish 100-year flood elevations and peak flow rates corresponding to the Atlas 14 data. The District adopted the revised 100-year flood levels and peak flow rates in 2016. The extent of the floodplain adjacent to Nine Mile Creek corresponding to the Atlas 14 100-year flood levels is shown on Figure 2-8. Figure 2-9 shows the corresponding 100-year flood profile for Nine Mile Creek and additional areas necessary to manage the floodplain as development progresses.

In accordance with the National Flood Insurance Program (NFIP), floodplain studies by other governmental agencies have been completed for Hennepin County, including the cities within the District. Each of these studies was based on existing development conditions. The Federal Emergency Management Agency (FEMA) adopted updated 100-year floodplain extents and 100-year flood elevations for Hennepin County in 2016 [Note that the 2016 Hennepin County FEMA maps are based on TP-40 precipitation data, and not Atlas 14 data, see Section 2.1.1]. Current FEMA floodplain maps are available from each municipality and online from the FEMA: Floodplain Maps: FEMA [Ref. 11].

District 100-year flood elevations and extents may differ from FEMA-adopted flood elevations and extents due to the use of different precipitation inputs and development conditions. As of 2017, the FEMA-adopted flood elevations and extents within the Nine Mile Creek watershed are based on TP-40 precipitation frequency estimates, whereas the NMCWD flood management elevations are based on updated Atlas 14 precipitation frequency estimates. Compliance with District Rules is evaluated relative to District-established 100-year flood elevations and corresponding floodplains.

Floodplain extent and elevations for hydrologic systems within each municipality may be obtained from the municipal offices and shall be incorporated in local plans (see Section 7.1).

Identified Flooding Issues

The District has not identified any known flood-prone areas outside of the established flood profile. As part of their local water management planning, cities are required to assess and report local flood-prone areas. The Hopkins Culvert Improvements Basic Water Management Project rectified a widely known local flooding problem (see Section 1.2.2).

Water Quality Modeling

In 2005, the District completed water quality models of the entire District using P8 (Program for Predicting Polluting Particle Passage through Pits, Puddles and Ponds). P8 is a model for predicting the generation and transport of stormwater runoff pollutants in urban watersheds. The P8 models are used to estimate watershed runoff and pollutant loading to lakes and Nine Mile Creek and evaluate the effectiveness of potential stormwater management practices as part of Use Attainability Analyses and other water quality studies.

2.3.4 Shoreland Ordinances

Minnesota has statewide shoreland management standards that apply to all public waters greater than 10 acres in municipalities and rivers with a drainage area greater than two square miles. The MDNR encourages cities to adopt their own shoreland management ordinances, and has published a sample shoreland ordinance for cities to use as a template. The sample ordinance regulates development and other land alterations in shoreland areas, and places special requirements on shoreland alterations, including vegetation alterations, grading, filling, and stormwater management. The sample ordinance includes stormwater management requirements such as:

- Limitations on the percentage of impervious area for each zoning designation.
- Preferred use of existing natural drainage ways, wetlands, and vegetated land for stormwater management.
- Stormwater management designs that use surface drainage, vegetation, and infiltration rather than buried pipes and constructed materials/facilities when existing features are not sufficient to adequately manage stormwater.

- Filtering or settling of suspended solids and skimming of surface debris prior to discharge for newly constructed stormwater outfalls to public waters.

The cities of Bloomington, Edina, Eden Prairie and Minnetonka have adopted shoreland management regulations (e.g., city code and/or ordinances) consistent with MDNR standards.

2.3.5 Water Appropriations

The MDNR requires users withdrawing more than 10,000 gallons of surface water or groundwater per day or 1 million gallons per year to obtain a water appropriations permit. Additional information about water appropriation permits, including water use information reported by location or permit information, is available from the MDNR website: Water Appropriation Permits: MDNR [Ref. 12].

2.4 Geology and Groundwater Resources

2.4.1 Geology

The geology of the NMCWD includes a layer of unconsolidated Quaternary deposits (glacial drift) underlain by multiple layers of bedrock. The glacial drift varies in thickness from less than 50 feet in some areas to over 400 feet in areas of Bloomington, but is between 100- and 250-feet thick throughout most of the district. The glacial drift is underlain primarily by the Prairie du Chien group (dolomite) in the southeastern part of the District and the St. Peter Sandstone unit in the northwestern part of the District. The southeastern half of the District is bisected by two buried erosional valleys below the City of Bloomington. These areas have the thickest overburden and are underlain by Jordan Sandstone and the St. Lawrence and Franconia formations.

More detailed information about the surficial and bedrock geology in the District is available in the Geologic Atlas of Hennepin County (Minnesota Geological Survey, 1989), available at: Geologic Atlas: MN Geological Survey [Ref. 13].

2.4.2 Groundwater

Many of the residents within the District obtain their drinking water from groundwater. The groundwater system in the District is comprised of the glacial drift water table (i.e., surficial aquifers) and the underlying bedrock aquifers that are partially in an artesian condition, meaning that water in the bedrock is maintained under pressure by confining upper layers.

2.4.2.1 Surficial (Quaternary) Aquifers

Surficial aquifers are water-bearing layers of sediment, usually sand and gravel, which lie close to the ground surface. Many private domestic wells in the watershed draw water from these aquifers. Since the surficial aquifers are more susceptible to pollution, they are generally not used for municipal or public supply wells. In some locations in the NMCWD, the aquifer could provide sufficient water yield for some non-potable industrial uses. The depth of the water table varies across the watershed, but is on the order of tens of feet.

Recharge to the surficial aquifers is primarily through the downward percolation of local precipitation. The ponds, lakes, and wetlands scattered throughout the watershed recharge the groundwater. Some of these waterbodies are landlocked and their only outlet is to the groundwater; some landlocked lakes may be perched above the regional level of the shallow groundwater in the watershed. Some surficial aquifers may also be recharged during periods of high stream stage; this is estimated to occur in the lower valley of Nine Mile Creek. Surficial aquifers may discharge to local lakes, Nine Mile Creek, or to the underlying bedrock. The nature of surface water and groundwater interactions for specific waterbodies must be evaluated on a case-by-case basis.

The general contours of the glacial drift groundwater are shown on Figure 2-10, which also depicts the locations of lake level monitoring and precipitation gaging stations. This map was developed using data from the District's groundwater monitoring program.

2.4.2.2 Bedrock Aquifers

There are four major bedrock aquifers below the District (in order of increasing depth): (1) St. Peter Sandstone, (2) Prairie du Chien-Jordan, (3) Wonewoc Sandstone (formerly Ironton-Galesville Sandstone), and (4) Mt. Simon-Hinckley Sandstone. The Prairie du Chien-Jordan aquifer is high-yielding, more easily tapped than deeper aquifers, has very good water quality, and is continuous throughout most of the area. This is the most heavily used aquifer in Hennepin County, with yields above 2,000 gallons per minute throughout much of the District.

The groundwater level in the Prairie du Chien-Jordan aquifer varies from about 750 feet to 850 feet above mean sea level within the NMCWD, as shown in the Hennepin County Geologic Atlas (MGS, 1989). The aquifer is recharged in areas where thin permeable drift overlies the limestone layers. Some recharge of this aquifer occurs locally from percolation through the overlying glacial deposits or St. Peter sandstone. However, hydrogeologic characteristics suggest this recharge would be a minimal contribution to the aquifer flow. Regional recharge of the Prairie du Chien-Jordan aquifer occurs to the south of the Minneapolis-St. Paul metropolitan area. Groundwater movement in the aquifer is generally from west to east toward the Mississippi River.

The pressure levels in the Prairie du Chien-Jordan aquifer indicate that, in the absence of a confining layer, a groundwater flow from the glacial drift to the Prairie du Chien-Jordan aquifer exists. The MDNR closely reviews permits for groundwater withdrawals from the Prairie du Chien-Jordan aquifer to ensure that the withdrawals will not cause drawdown effects on nearby water resources of regional significance.

2.4.3 Wellhead Protection Areas

The regional aquifer with the highest water quality is the Mt. Simon-Hinckley aquifer. It is more expensive to use than the Prairie du Chien-Jordan because of its greater depth. Yields from the Mt. Simon-Hinckley aquifer exceed 1,500 gallons per minute throughout the NMCWD. Minnesota statutes limit appropriations from the Mt. Simon-Hinckley aquifer to potable water uses, where there are no feasible or practical alternatives, and where a water conservation plan is incorporated with the appropriations permit. The groundwater level of the Mt. Simon-Hinckley ranges from about 600 to 650 feet above mean sea level

within the NMCWD. Recharge of the Mt. Simon-Hinckley takes place far northwest of the county, where the bedrock is closer to the surface, and occurs by percolation through the overlying drift and bedrock. The pattern of flow in the Mt. Simon-Hinckley aquifer differs greatly from the pattern in the overlying Prairie du Chien-Jordan aquifer. Groundwater movement in the aquifer below the District is generally to the northeast towards a cone of depression located just north of the District and formed by major pumping centers such as public water utilities and private industrial users (groundwater levels below 600 feet above mean sea level). In general, the Mt. Simon-Hinckley aquifer has little or no hydraulic connection with the surficial groundwater system or major streams.

The Minnesota Department of Health (MDH) is responsible for the protection of groundwater quality and aims to prevent contaminants from entering the recharge zones of public water supply wells through its wellhead protection program (see Section 3.4.4). This task has become complicated by the increased use of infiltration as a means to improve surface water quality and promote sustainable groundwater supplies. As part of the MDH wellhead protection program, each of the communities within the NMCWD that obtains its municipal water supply from groundwater has an MDH-approved wellhead protection plan (WHPP). Information included in a city's WHPP, including delineation of wellhead protection areas, may be obtained from each municipality.

MDH guidance for implementing infiltration projects within areas serving municipal groundwater supplies is available from the MPCA's website: MDH guidance: MPCA website [Ref. 14].

2.5 Soil Data

The distribution of soil types in the District is the direct result of glaciations. The surficial soils of the area predominately consist of till and outwash deposits from Late Wisconsinan glaciations, as well as more recent postglacial organic, lacustrine, and alluvial deposits. The currently topography and surficial geology of the area are mostly due to the last of these glacial advances, which consisted of the Des Moines Lobe and Grantsburg Sublobe advances. The Grantsburg Sublobe of the Des Moines Lobe crossed through the area and reached its furthest extent in Grantsburg, WI approximately 16,000 years ago. Near surface till deposits of the Grantsburg Sublobe, and the Des Moines Lobe appear brown due to oxidation, however, in deeper reaches the till deposits have a distinctive grey coloring. The moraine areas are typified by hummocky topography, which consists of rolling hills and depressions usually filled with lakes and marshes.

Underlying the Des Moines Lobe and Grantsburg Sublobe deposits are a series of deposits from older glaciations, including deposits from the Superior Lobe. Although the more recent Des Moines Lobe and Grantsburg Sublobe deposits account for the majority of the surficial soils in the area, there are a few outcrops of Superior Lobe deposits at the surface in the NMCWD. Till deposits from Superior Lobe are more reddish brown to brown in color, and have a different lithology than deposits from the Des Moines Lobe and Grantsburg Sublobe. During the advances of the Des Moines Lobe and Grantsburg Sublobe, some mixing of their till deposits with the underlying Superior Lobe deposits occurred to varying degrees.

During the periods when the glaciers receded, there were numerous areas where blocks of ice were left in place while adjacent ice melted or was carried away. Later, after the deposition of materials had ended,

the ice blocks melted, leaving depressions in the landscape. Many of these depressions filled with water, resulting in the lakes and potholes that prevail throughout the District.

Soil boring information in the area indicates that the subsurface soils are intermixed and do not exhibit spatial continuity. Many soil borings indicate layers of sand embedded with till layers, which indicate that the area had been subjected to outwash or ice-contact depositional environments typical of stagnating or retreating glaciers.

Soils information for the District can be found in the Soil Survey of Hennepin County, Minnesota published by the Natural Resources Conservation Service (NRCS) and available online: Soil Information: Henn Cty: NRCS [Ref. 15].

The NRCS regularly updates soils data and makes this data available online: Soils data updates: NRCS [Ref. 16].

2.5.1 Hydrologic Soil Group and Infiltration

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

The NRCS has established four general hydrologic soil groups based on infiltration rate:

- 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

Soils may also be classified as types A/D, B/D, and C/D, with the first letter describing the soil infiltration rate in drained conditions and the "D" identifying very low infiltration rates under saturated, or undrained, conditions. Combined with land use, the hydrologic soil grouping symbols (A-D) may be used to estimate the amount of runoff that will occur over a given area for a particular rainfall amount. The most current soils data for the NMCWD watershed are based on the Soil Survey Geographic dataset (SSURGO) from the NRCS and are presented on Figure 2-11.

Fifty-three percent of the District is classified as "Not Rated/Not Available" in the SSURGO dataset, including large portions of the eastern half of the District. This classification is typically assigned to areas where development has altered the existing soil or data were unavailable prior to development; hydrologic soil groups or infiltration rates are typically not determined after development. Type C soils occupy 16 percent of the total watershed area with some additional areas of Type A soils (13 percent of the total area) in the northwest part of the watershed. Type A/D, B/D, and C/D soils occupy a total of 12 percent of the watershed and are most common adjacent to Nine Mile Creek.

Overall, infiltration rates within the district are moderately low, owing to the prevalence of type C and D soils. However, the hydrologic soil groups map (Figure 2-11) provide only general guidance about the infiltration capacity of the soils throughout the watershed. Soils should be inspected on a site-by-site basis as projects are considered.

2.6 Land Use and Public Utility Services

The entire NMCWD is within the Metropolitan Urban Service Area (MUSA) and is completely urbanized. Each of the cities within the District maintains zoning ordinances, or other regulatory controls, and comprehensive plans that include general maps of existing land uses and anticipated land uses. City zoning maps and comprehensive planning maps are incorporated by reference and can be obtained through each municipality at the respective municipal offices.

The Metropolitan Council also publishes land use data including anticipated future land use. The Metropolitan Council 2010 land use and estimated 2030 land use data are shown on Figure 2-12 and Figure 2-13, respectively. The primary land use within the District is single family residential land use, which occupies approximately 40 percent of the District. Park, recreational, or preserve land use also occupies a significant portion of the watershed (16 percent). Undeveloped areas (including areas that cannot be developed, such as wetlands) occupy less than 5 percent of the District. Redevelopment will be a major issue facing the District during the lifespan of this Plan.

2.7 Water-Based Recreation Areas and Land Ownership

Figure 2-14 shows the location and land ownership for publicly owned water-based recreation areas. Shady Oak Lake Park is a municipal beach operated by the cities of Hopkins and Minnetonka. Bryant Lake Regional Park is owned and operated by Three Rivers Park District, as is Hyland Lake Regional Park. Hyland Regional Park extends into the Riley Purgatory Bluff Creek Watershed District. Bush Lake Park is owned and operated by the City of Bloomington. Additional information is available from each city and the Three Rivers Park District at: Three Rivers Park [Ref. 17].

Figure 2-14 also identifies waterbodies within the Nine Mile Creek watershed that are part of the MnDNR's Fishing in the Neighborhood (FiN) program. Through this urban fishing program, the MnDNR works with cities and other partners to provide family-friendly shoreline fishing opportunities. The FiN program stocks fish, assesses fish populations, installs fishing piers and shore fishing structures, restores shoreline habitat and sponsors aquatic education to create quality fishing opportunities.

2.8 Fish and Wildlife Habitat

The District's lake management system considers the importance of fishery communities in District lakes and streams, including ecological and management classifications designated by the Metropolitan Council, the MPCA, the MDNR, and cities (if applicable). The MDNR manages the fishery in several lakes within the District. Management activities include performing fish surveys, fish stocking, and operating its Fishing in the Neighborhood (FiN) program. Centennial Lake and Lake Cornelia are part of the FiN program, which is intended to increase fishing opportunities, public awareness, and environmental

stewardship. Lake-specific information about fish stocking and fish surveys is available from the MDNR's "LakeFinder" website: Lakefinder: MDNR {Ref. 18]. Development and urbanization place increasing pressure on habitat areas. To protect habitat areas in the Twin Cities metropolitan area, the MDNR established "metro conservation corridors" as part of a strategy for accelerating and enhancing habitat protection by targeting specific areas. A significant area adjacent to Nine Mile Creek is included among the metro conservation corridors. Mapping and additional information about conservation corridors are available from the MDNR website at: Conservation Corridors: MDNR [Ref. 19].

In 2003, the MDNR conducted a landscape-scale assessment of the seven-county metro area to identify ecologically significant terrestrial and wetland areas, termed "regionally significant ecological areas" (RSEA). The assessment was updated in 2008. The purpose of the assessment was to provide tools to identify areas for conservation or protection and to inform regional scale land use decisions. In the Nine Mile Creek watershed, Glen Lake, Bush Lake, and the Anderson Lakes have RSEA of high rank in the vicinity, while Nine Mile Creek has RSEA of high rank in close proximity. More information about RSEA is available from the MDNR at: RSEA assessment: MDNR [Ref. 45].

2.8.1 Aquatic Invasive Species

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

The MDNR established the Invasive Species Program in 1991 to prevent the spread of invasive species and manage invasive aquatic plants and wild animals (Minnesota Statutes chapter 84D). As part of its Invasive Species Program, the MDNR maintains a list of waters infested with specific AIS (MDNR Designation of Infested Waters, 2015 as amended). The MDNR list includes the following NMCWD waterbodies as infested with Eurasian watermilfoil:

- Arrowhead Lake
- Bryant Lake
- Bush Lake

The MDNR's list of AIS infested waterbodies does not include all known AIS occurrences within the District.

Common carp is also present in the District. Common carp are typically spread between lakes by the accidental inclusion and later release of live bait, but can also migrate through natural or built channels as adults. Carp feeding techniques disrupt shallow-rooted plants, which can reduce water clarity and can potentially release phosphorus bound in sediments, leading to increased algal blooms and decline in native aquatic plants.

In 2015, zebra mussels were reported in Bryant Lake. Zebra mussels can cause problems for lakeshore residents and recreationists by clogging water intakes and attaching to motors and possibly clogging cooling water areas. Zebra mussels can also attach to native mussels, killing them.

More information about aquatic and terrestrial invasive species is available from the MDNR at: Invasive Species: MDNR [Ref. 20].

2.9 Land Cover, Natural Communities, Rare Features, and Scenic Areas

The Minnesota Land Cover Classification System (MLCCS) is a tool developed by the MDNR that categorizes urban and built-up areas in terms of land cover rather than land use. The vegetation-oriented classification system provides site-level information on natural and cultural land cover types using a standardized methodology. More information about the MLCCS is available at: MN Land Cover Classification System: (MDNR) [Ref. 21].

Through its Natural Heritage and Nongame Research Program (NHNRP), the MDNR collects, manages, and interprets information about rare natural features, native plants and plant communities, and nongame animals, including endangered, threatened, and special concern species. As part of the NHNRP, the MDNR maintains the Natural Heritage Information System (NHIS) as a statewide database of these resources. The MDNR limits publication of spatial attributes and locations of these items to protect rare features or species from damage or collection. General information about the NHIS is available at: Natural Heritage Info System: MDNR [Ref. 22].

The MDNR publishes a Rare Species Guide which provides information on biology, habitat use, and conservation measures. Rare species information is available at: Rare Species Guide: MDNR. [Ref. 23].

Natural vegetation in the District has been greatly altered over time by agricultural development and, more recently, urbanization. In addition to removal of the forested areas, numerous wetlands have been drained or filled for development. The MDNR's Minnesota County Biological Survey for Hennepin County (1998) identifies pre-settlement vegetation and areas of significant biodiversity. Prior to settlement, oak openings and barrens covered most of the watershed with areas of wet prairie, marshes, and sloughs scattered throughout. Significant areas of cattail marsh remain adjacent to the main stem of Nine Mile Creek in and around Marsh Lake Park. Areas of pre-settlement vegetation also remain at Anderson Lakes Park Reserve and near the outlet of Nine Mile Creek. Data from the Minnesota County Biological Survey is presented on Figure 2-15.

Natural resources inventory (NRI) studies identifying plant species have been completed by all cities within the District. NRI studies are available from Hennepin County at: Natural Resources inventory: plant species: Henn Cty [Ref. 24].

2.10 Pollutant Sources

The sources of water pollution in the District are many and varied. There are many permitted sites, hazardous waste generators, and contaminated sites within the District. The MPCA maintains a database of these sites, which includes permitted sites (air, industrial stormwater, construction stormwater, wastewater discharge), hazardous waste generating sites, leak sites, petroleum brownfields, tank sites, unpermitted dump sites, and sites enrolled in the Voluntary Investigation and Cleanup (VIC) program. This information is available online through the MPCA's What's In My Neighborhood program, and is presented on Figure 2-16. The location of these potentially contaminated or hazardous waste sites should be considered as sites are redeveloped and BMPs are implemented. The presence of soil contamination at many of these sites, if not removed, may limit or prevent infiltration as a stormwater management option.

In contrast to sites with known hazards, non-point source pollution cannot be traced to a single source or pipe. Instead, pollutants are carried from land to water in stormwater or snowmelt runoff, in seepage through the soil, and in atmospheric transport. Discharge from stormwater pipes is considered a non-point source discharge as the pollutants coming from the pipe are generated across the watershed contributing to the pipe, not at a single location. Point sources frequently discharge continuously throughout the year, while non-point sources discharge in response to precipitation or snowmelt events. For most waterbodies, non-point source runoff, especially stormwater runoff, is the major contributor of pollutants. Table 2-4 summarizes the principal pollutants found in stormwater runoff and provides example sources and possible impacts of each pollutant.

Pathogens are harmful organisms such as bacteria, viruses, and protozoa that can be transported in stormwater runoff. The disease-producing organisms originate from sources such as animal waste and failing subsurface sewage treatment systems (SSTS), and can pose a public health threat when present in contact waters.

Some subsurface sewage treatment systems (SSTS) likely remain in areas of the District. Non-functioning SSTS may be a non-point source of pollutants and. achieve inadequate treatment of sewage. In addition to the public health risks of untreated or inadequately treated sewage (e.g., contamination of wells), sewage contains the nutrient phosphorus. Excess phosphorus discharged to waterbodies can cause excessive algae and aquatic plant growth leading to degradation in water quality. The MPCA implements an SSTS regulatory program to manage the environmental and public health impacts of SSTS (see Section 3.4.3).

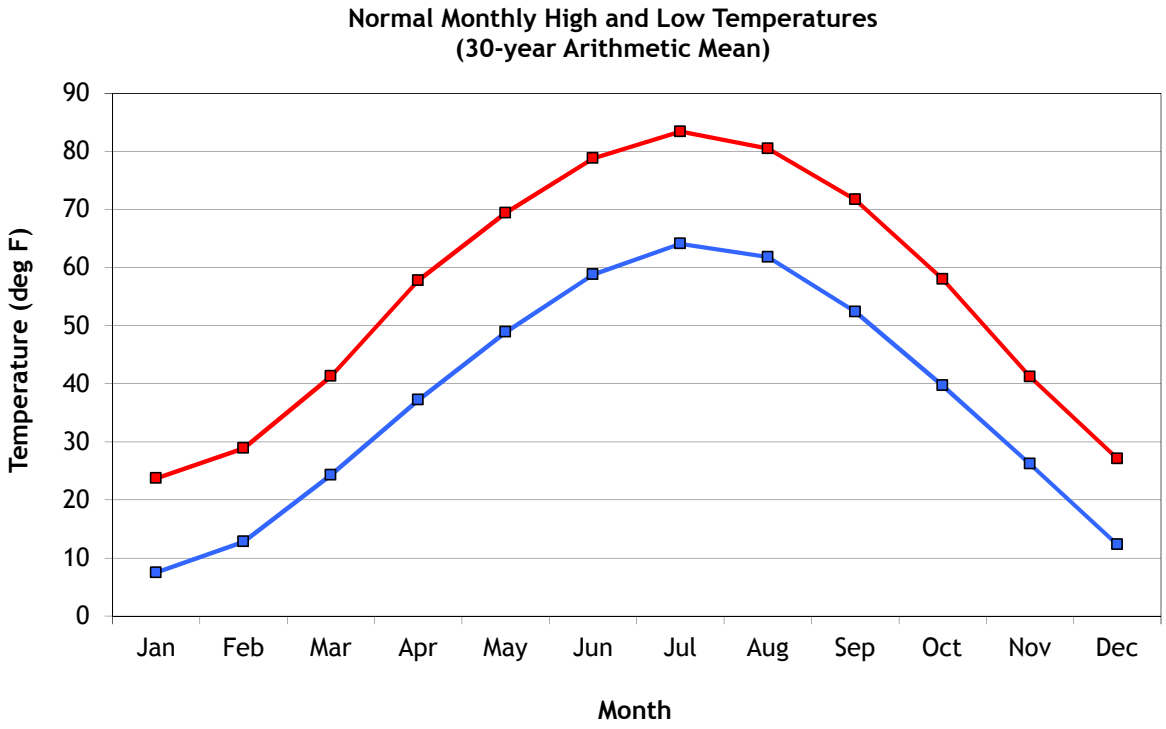
Excessive phosphorus concentrations in lakes or ponds can lead to harmful algal blooms, which are blue-green (cyanobacterial) algal blooms containing toxins or other noxious chemicals that can pose harmful health risks to humans and animals. Blue-green algal blooms, which can look like pea soup or green paint, typically occur in lakes with high nutrient concentrations. While not all blue-green algal blooms are toxic, there is no visual way to predict toxicity; therefore people should avoid contact with the water and should prevent animals from contact with the water, when possible.

More information about potential pollutant sources is available from the MPCA website: Potential pollutant sources "Whats-in-my neighborhood": MPCA [Ref. 25].

Table 2-4 Pollutants Commonly Found in Stormwater Runoff

Stormwater Pollutant	Examples of Sources	Related Impacts
Nutrients: Nitrogen, Phosphorus	Decomposing grass clippings, leaves and other organics, animal waste, fertilizers, failing septic systems, atmospheric deposition	Algal growth, reduced clarity, other problems associated with eutrophication (oxygen deficit, release of nutrients and metals from sediments)
Sediments: Suspended and Deposited	Construction sites, other disturbed and/or non-vegetated lands, eroding streambanks and shorelines, road sanding	Increased turbidity, reduced clarity, lower dissolved oxygen, deposition of sediments, smothering of aquatic habitat including spawning sites, sediment and benthic toxicity
Organic Materials	Leaves, grass clippings	Oxygen deficit in receiving waterbody, fish kill, release of nutrients.
Pathogens: Bacteria, Viruses	Domestic and wild animal waste, failing septic systems	Human health risks via drinking water supplies, contaminated swimming beaches
Hydrocarbons: Oil and Grease, PAHs (Naphthalenes, Pyrenes)	Tar-based pavement sealant, industrial processes; automobile wear, emissions & fluid leaks; waste oil	Toxicity of water column and sediment, bioaccumulation in aquatic species and through food chain
Metals: Lead, Copper, Cadmium, Zinc, Mercury, Chromium, Aluminum, others	Industrial processes, normal wear of auto brake linings and tires, automobile emissions & fluid leaks, metal roofs	Toxicity of water column and sediment, bioaccumulation in aquatic species and through the food chain, fish kill
Pesticides: PCBs, Synthetic Chemicals	Pesticides (herbicides, insecticides, fungicides, rodenticides, etc.), industrial processes	Toxicity of water column and sediment, bioaccumulation in aquatic species and through the food chain, fish kill
Chlorides	Road salting and uncovered salt storage	Toxicity of water column and sediment
Polycyclic Aromatic Hydrocarbons (PAH's)	Tar based pavement sealant	Carcinogenic to humans
Trash and Debris	Litter washed through storm drain networks	Degradation of the beauty of surface waters, threat to wildlife

Based on *Minnesota Urban Small Sites BMP Manual* (Metropolitan Council, 2001).



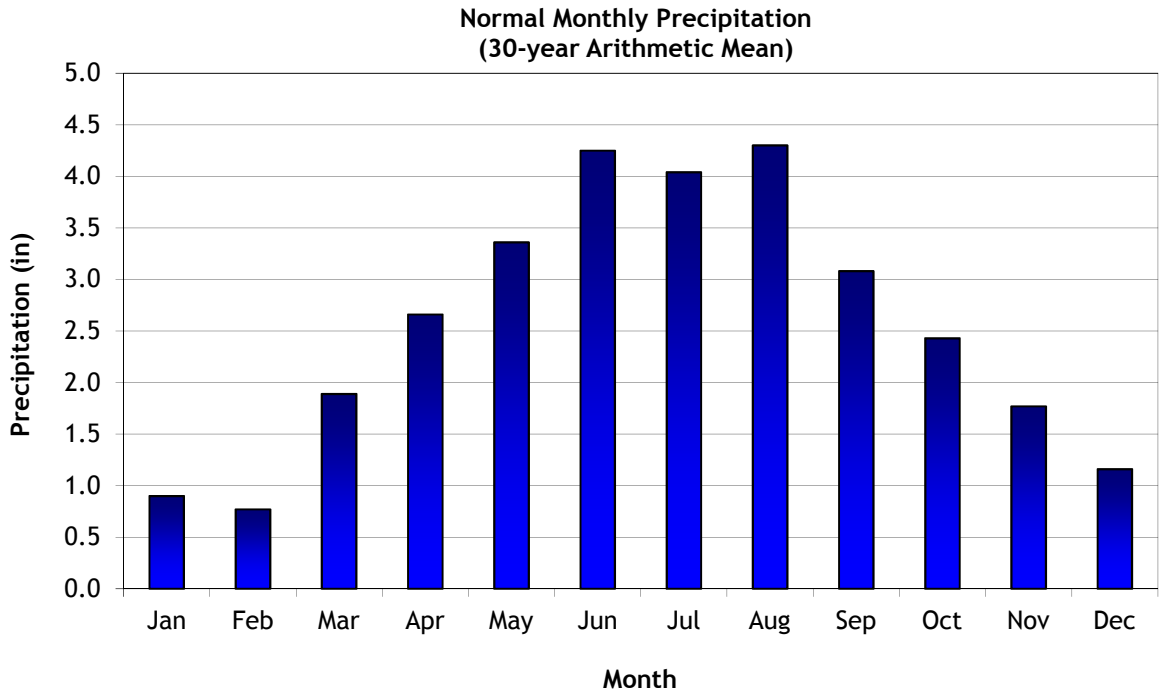


Figure 2-1
Monthly Climate Averages for Minneapolis-St. Paul International Airport (1981-2010)

TOPOGRAPHY

SAINT LOUIS PARK
HOPKINS
MINNETONKA
MINNEAPOLIS
EDEN PRAIRIE
EDINA
RICHFIELD
BLOOMINGTON
SHAKOPEE
SAVAGE
BURNSVILLE

Lake Holiday
Wing Lake
Lake Rose
Minnetoga Lake
Glen Lake
Shady Oak Lake
Lone Lake
Birch Island Lake
Bryant Lake
Mirror Lake
Highlands Lake
Hawkes Lake
Arrowhead Lake
Indianhead Lake
Lake Cornelia
Lake Edina
North Branch Nine Mile Creek
South Branch Nine Mile Creek
Smetana Lake
Northwest Anderson Lake
Southwest Anderson Lake
Southeast Anderson Lake
Bush Lake
Normandale Lake
Girard Lake
Skreibakken Lake
Penn Lake
Marsh Lake
Main Stem Nine Mile Creek
Oxboro Lake

Nine Mile Creek
Lakes
District Hydrologic Boundary
Municipal Boundaries

Surface Elevation (feet)

- 688 - 700
- 700 - 750
- 750 - 800
- 800 - 850
- 850 - 900
- 900 - 950
- 950 - 1,000
- 1,000 - 1,050
- 1,050 - 1,100
- 1,100 - 1,150

N

0 1 2
Miles

9 MILE CREEK WATERSHED DISTRICT

TOPOGRAPHY

Figure 2-2

DRAINAGE DIVIDES AND MAJOR SUBWATERSHEDS

SAINT LOUIS PARK
HOPKINS
MINNETONKA
MINNEAPOLIS
EDEN PRAIRIE
EDINA
RICHFIELD
BLOOMINGTON
SHAKOPEE
SAVAGE
BURNSVILLE

Minnetoga Lake
Shady Oak Lake
Glen Lake
Holiday Lake
Wing Lake
Holiday/Wing/Rose Lakes
Rose Lake
Birch Island Lake
Minnetoga Lake
Glen Lake
Lone Lake
North Branch Nine Mile Creek
Bryant Lake
Mirror Lake
Highlands Lake
Hawkes Lake
Arrowhead Lake
Indian Head Lake
Indianhead Lake
Lake Cornelia
Lake Edina
Smetana Lake
Normandale Lake
Northwest Anderson Lake
Anderson Lake (Upper, Middle)
Anderson Lake (Lower)
Southwest Anderson Lake
Southeast Anderson Lake
Bush Lake
Girard Lake
Penn Lake
Skreibakken Lake
Marsh Lake
Oxboro Lake
Main Stem Nine Mile Creek

Nine Mile Creek
Lakes
Major Subwatersheds
Major Landlocked Subwatersheds
District Hydrologic Boundary
District Legal Boundary
Municipal Boundaries

Flow Direction
Gravity Outlet
Pumped Outlet

N

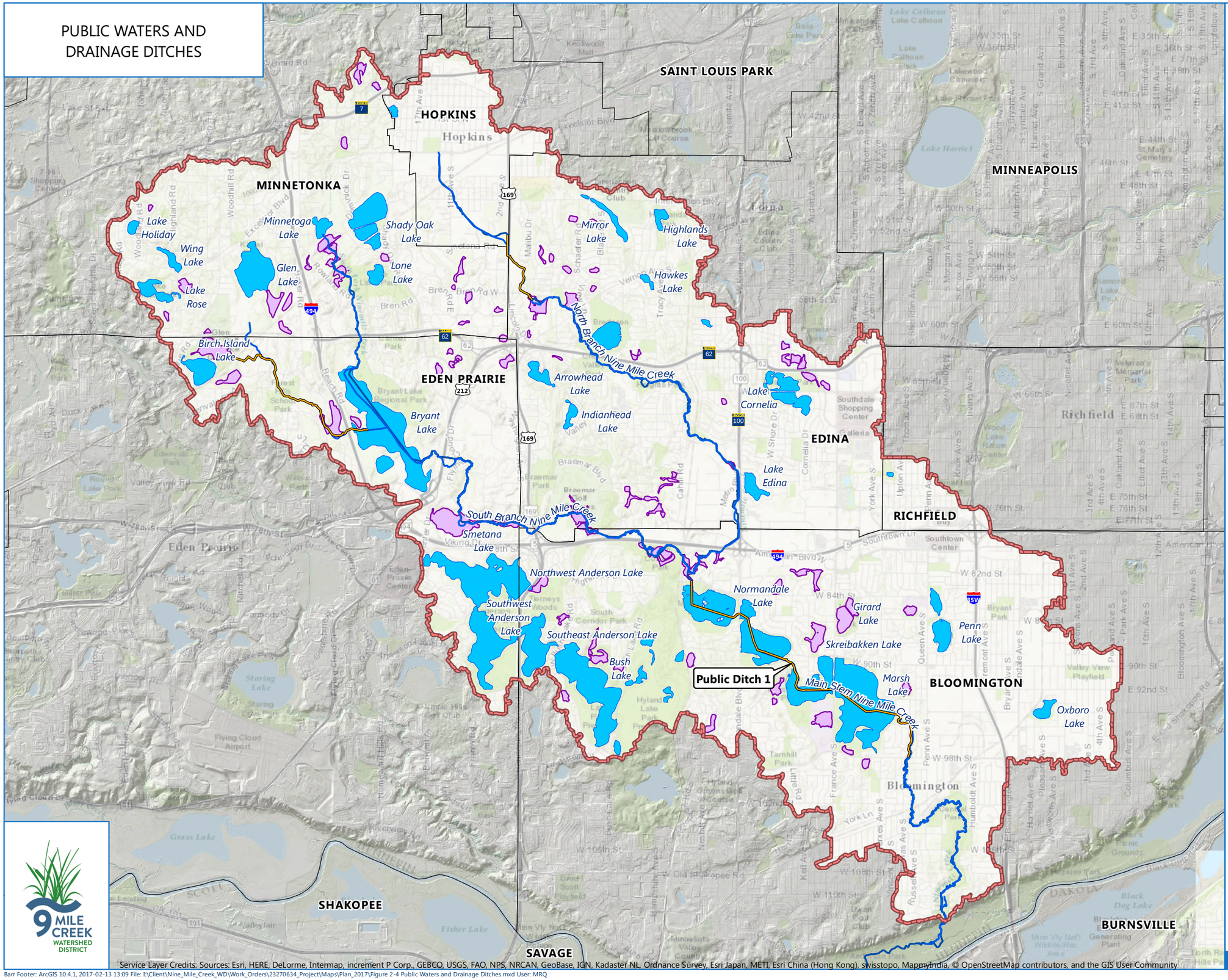
0 1 2
Miles

9 MILE CREEK WATERSHED DISTRICT

DRAINAGE DIVIDES AND MAJOR SUBWATERSHEDS

Figure 2-3

PUBLIC WATERS AND DRAINAGE DITCHES



Public Ditches
Nine Mile Creek
District Hydrologic Boundary
Municipal Boundaries

MDNR Public Waters Classification

Public Water Inventory Watercourses
Public Water Inventory Wetlands
Public Water Inventory Basins

N

0 1 2
Miles

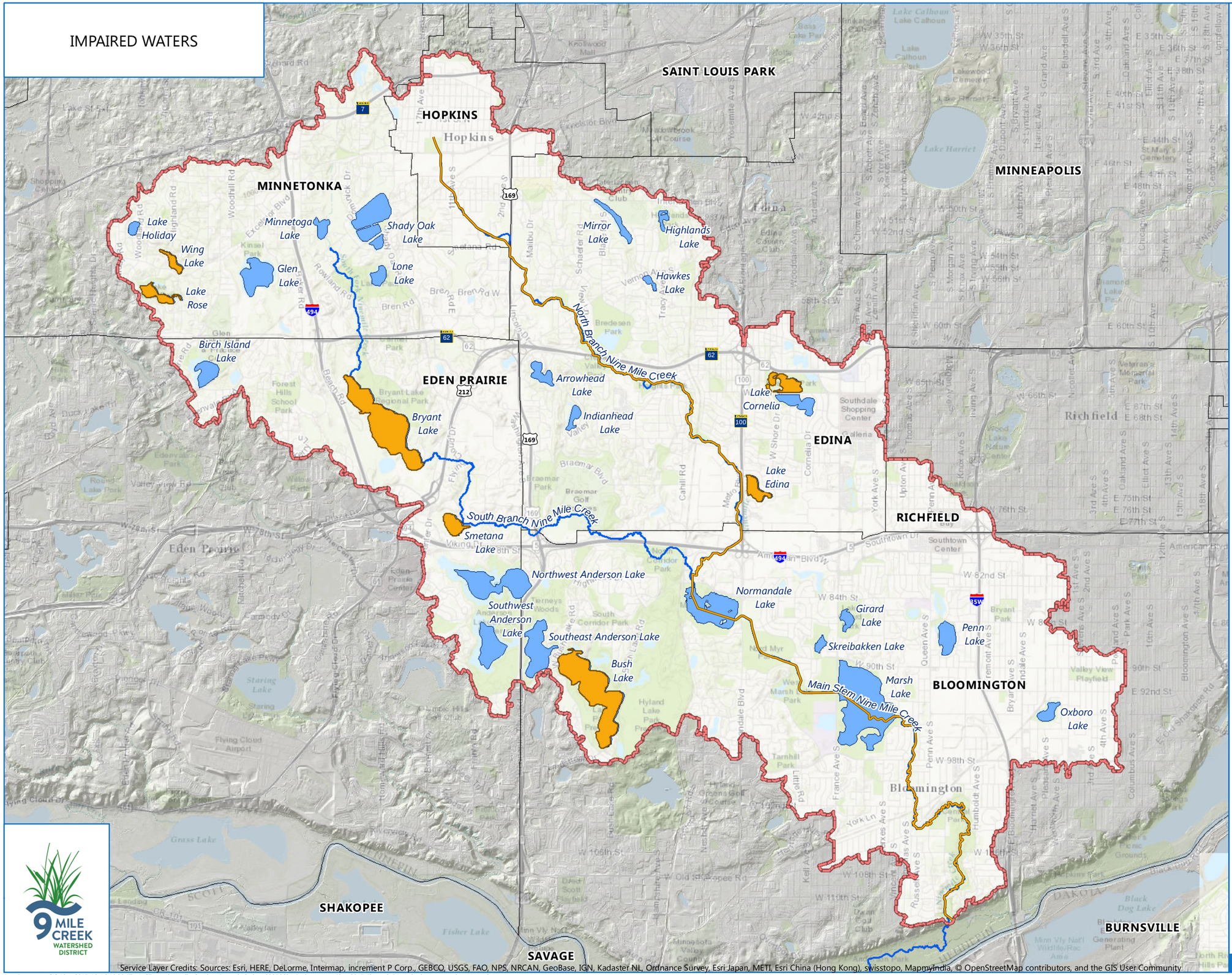
9 MILE CREEK WATERSHED DISTRICT

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

PUBLIC WATERS AND DRAINAGE DITCHES

Figure 2-4

IMPAIRED WATERS



Nine Mile Creek
Impaired Stream
Impaired Lakes
Lakes
District Hydrologic Boundary
Municipal Boundaries

N

0 1 2
Miles

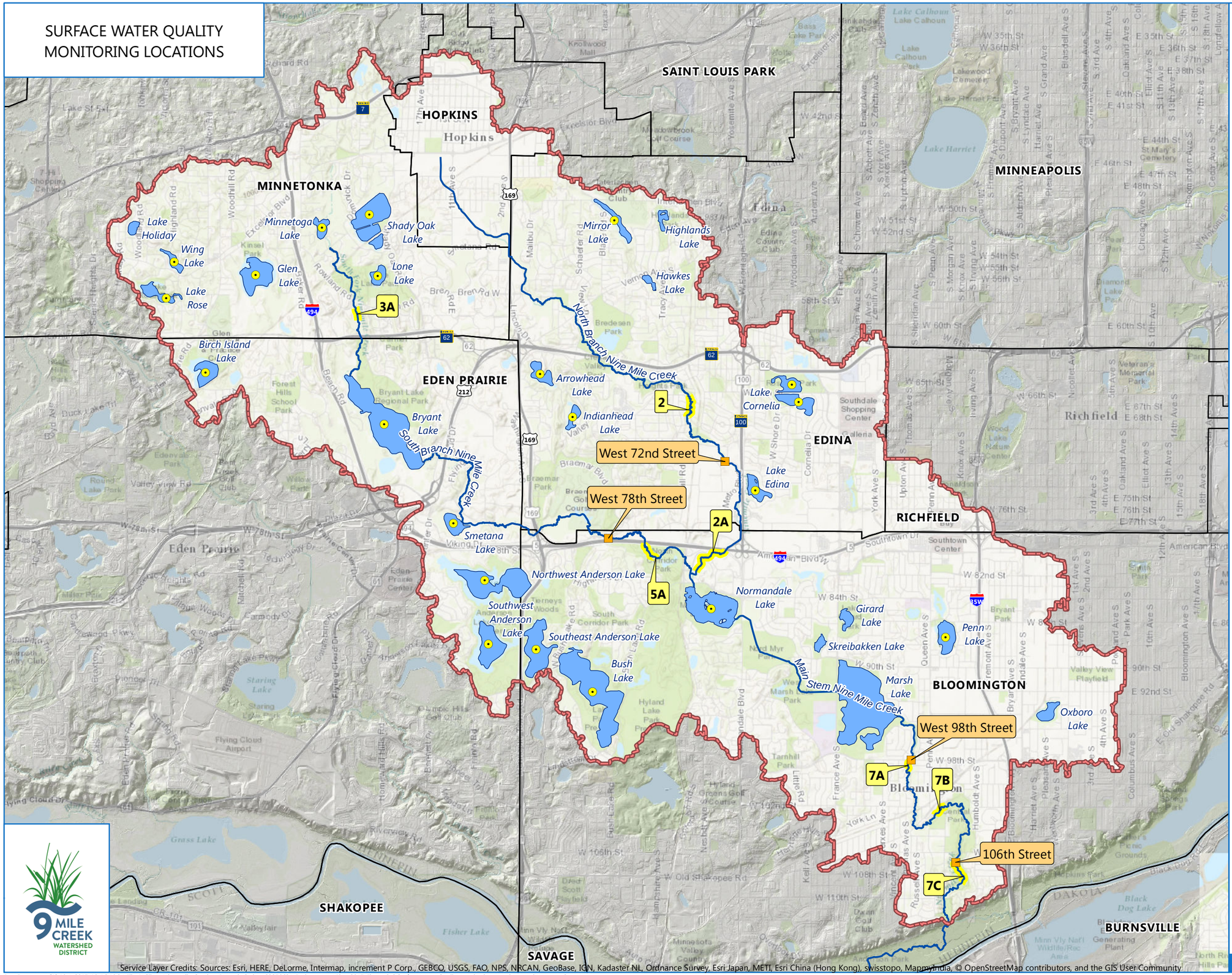
9 MILE CREEK WATERSHED DISTRICT

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

IMPAIRED WATERS

Figure 2-5

SURFACE WATER QUALITY MONITORING LOCATIONS



- Lake Water Quality Monitoring Locations
- Watershed Outlet Monitoring Program (WOMP) Stations
- Ecological Use Classification Reach Locations and Reach Numbers
- Nine Mile Creek
- Lakes
- District Hydrologic Boundary
- Municipal Boundaries

N

0 1 2

Miles

9 MILE CREEK WATERSHED DISTRICT

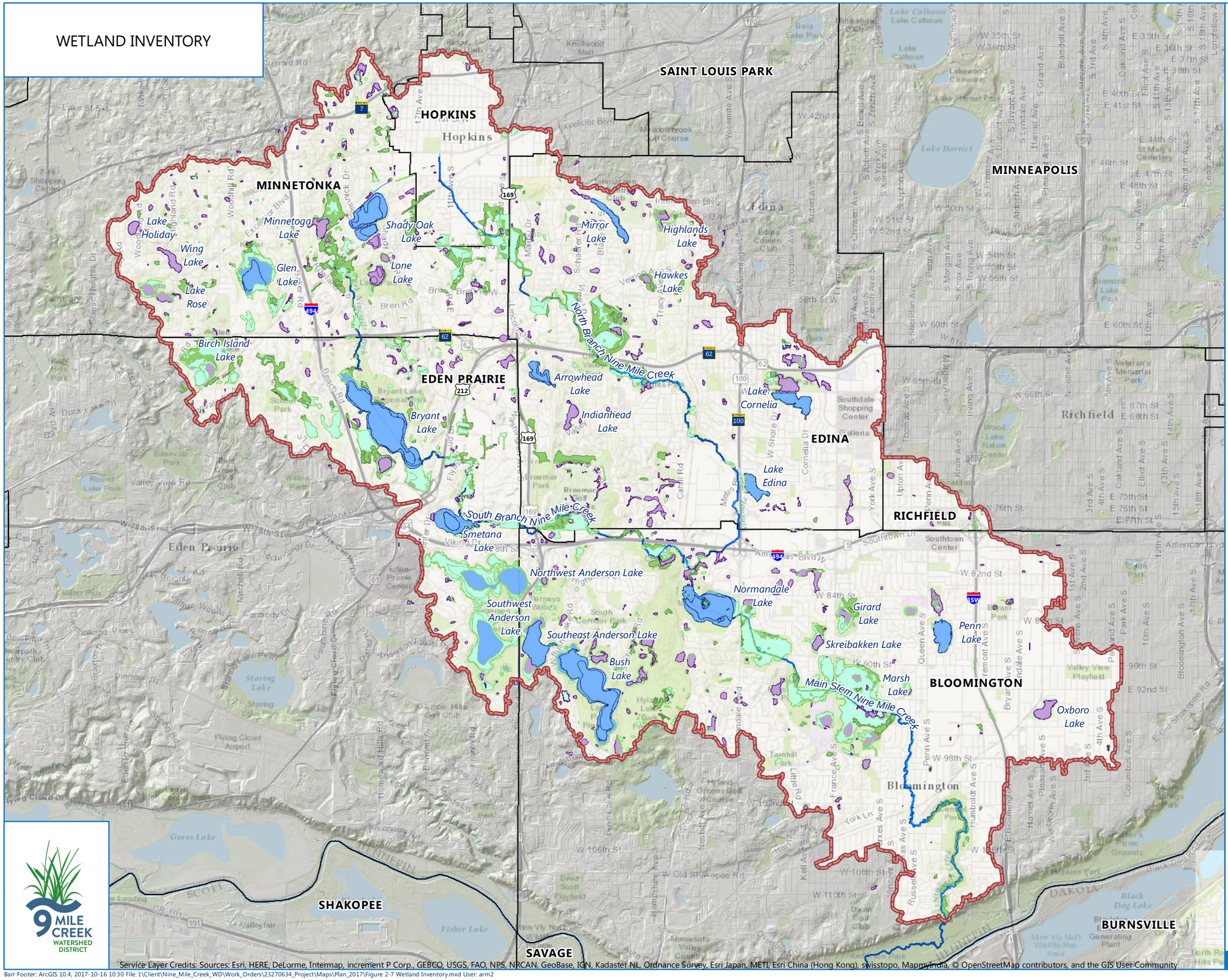
SURFACE WATER QUALITY MONITORING LOCATIONS

Figure 2-6

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Barr Footer: ArcGIS 10.4, 2017-10-16 10:24 File: I:\Client\Nine_Mile_Creek_WD\Work_Orders\23270634_Project\Maps\Plan_2017\Figure 2-6 Surface Water Quality Monitoring Locations.mxd User: arm2

WETLAND INVENTORY



9 MILE CREEK WATERSHED DISTRICT

WETLAND INVENTORY

Figure 2-7

Barr Footer: ArcGIS 10.4, 2017-10-16 10:30 File: I:\Client\Nine_Mile_Creek_WD\Work_Orders\23270634_Project\Maps\Plan_2017\Figure 2-7 Wetland Inventory.mxd User: arm2

NINE MILE CREEK
100-YEAR FLOODPLAIN

SAINT LOUIS PARK
HOPKINS
MINNETONKA
MINNEAPOLIS
EDEN PRAIRIE
EDINA
RICHFIELD
BLOOMINGTON
SHAKOPEE
SAVAGE
BURNSVILLE

Lake Holiday
Wing Lake
Lake Rose
Minnetoga Lake
Glen Lake
Shady Oak Lake
Lone Lake
Birch Island Lake
Bryant Lake
Mirror Lake
Highlands Lake
Hawkes Lake
Arrowhead Lake
Indianhead Lake
Lake Cornelia
Lake Edina
North Branch Nine Mile Creek
South Branch Nine Mile Creek
Smetana Lake
Northwest Anderson Lake
Southwest Anderson Lake
Southeast Anderson Lake
Bush Lake
Normandale Lake
Girard Lake
Skreibakken Lake
Penn Lake
Marsh Lake
Main Stem Nine Mile Creek
Oxboro Lake

Nine Mile Creek
Nine Mile Creek 100-Year Floodplain
Lakes
District Hydrologic Boundary
Municipal Boundaries

0 1 2
Miles

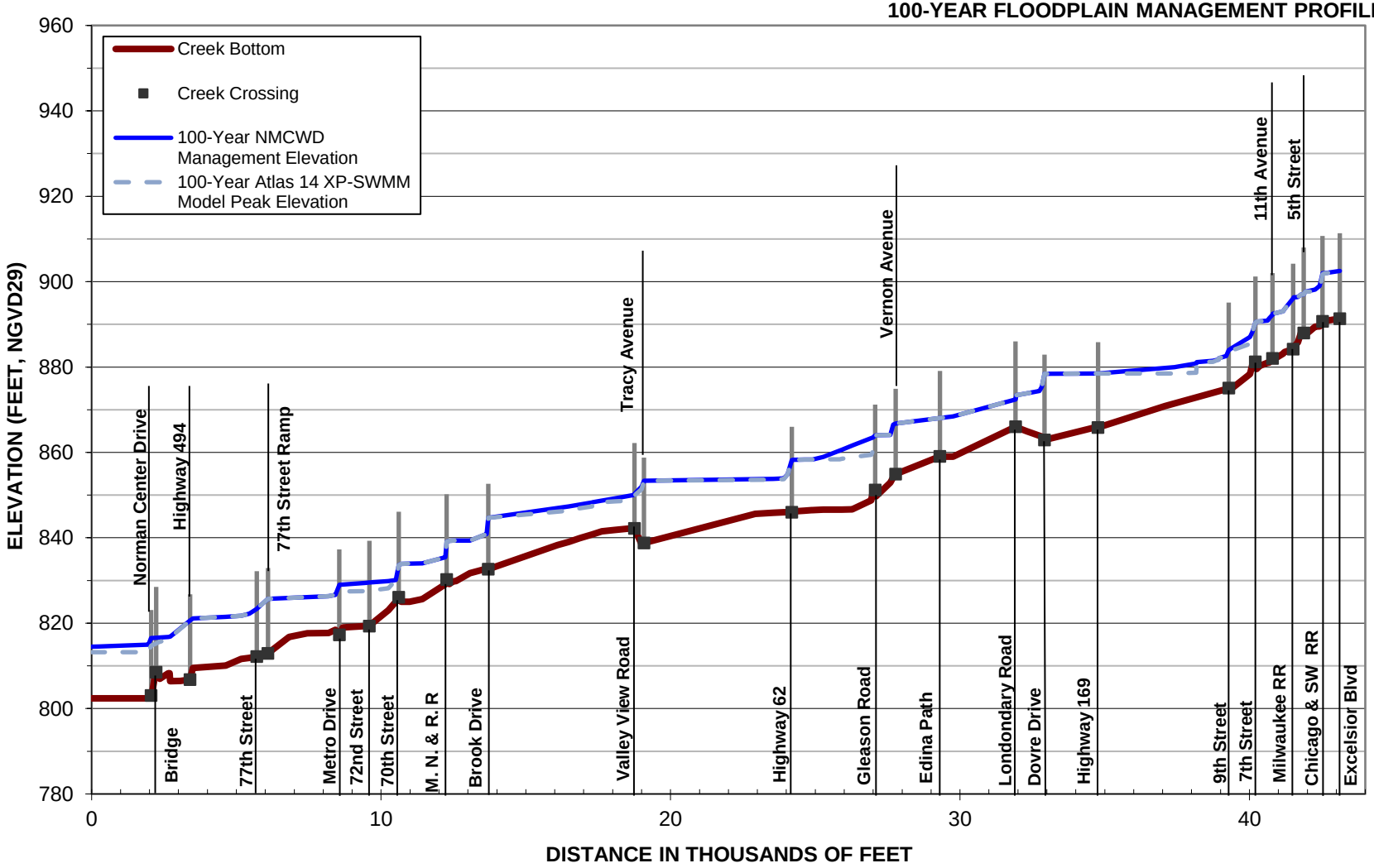
NINE MILE CREEK
100-YEAR FLOODPLAIN

Figure 2-8

9 MILE CREEK WATERSHED DISTRICT

Figure 2-9 (Page 1)

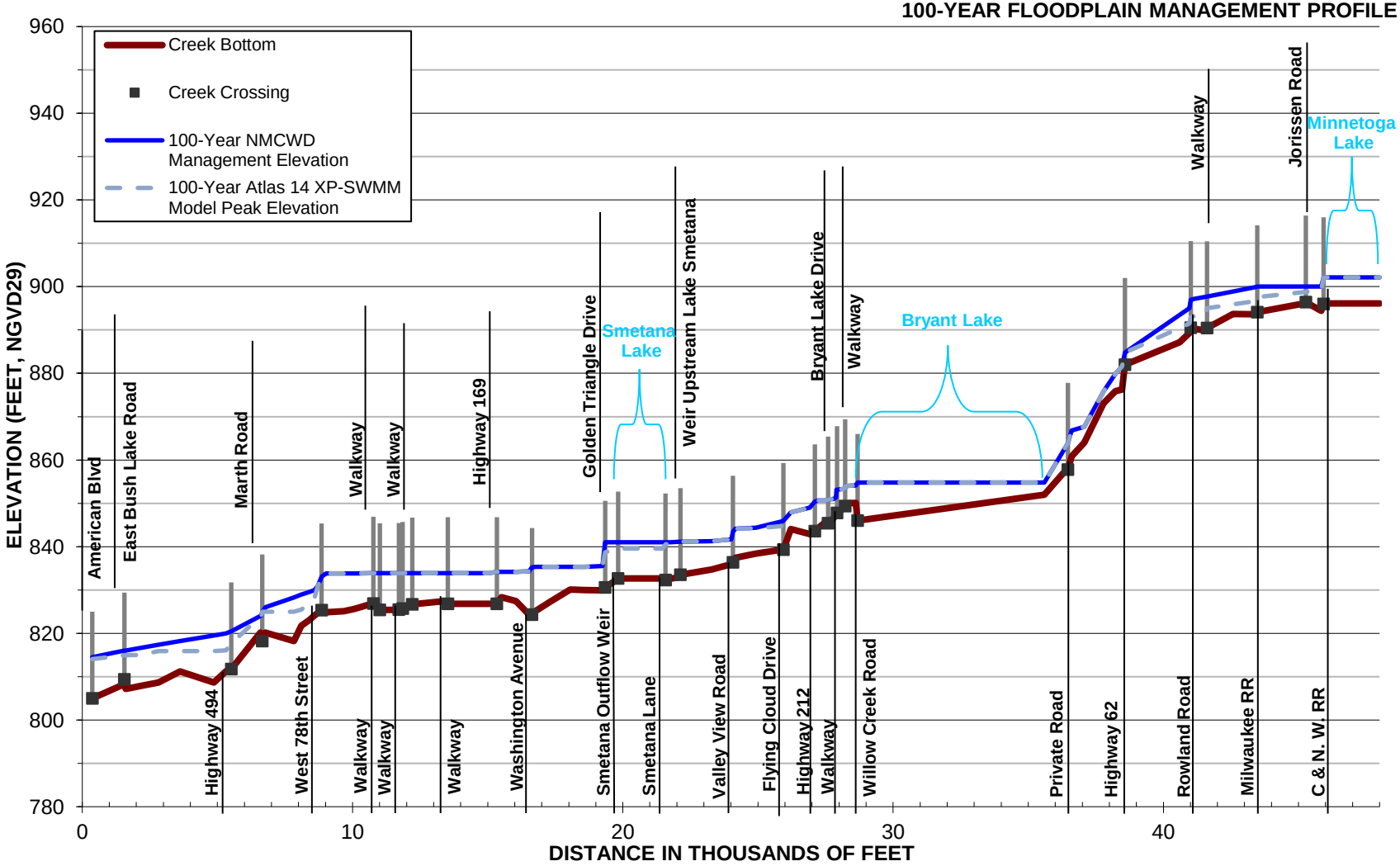
NORTH FORK OF
NINE MILE CREEK
100-YEAR FLOODPLAIN MANAGEMENT PROFILE



REVISED MAY 14, 2015

Figure 2-9 (Page 2)

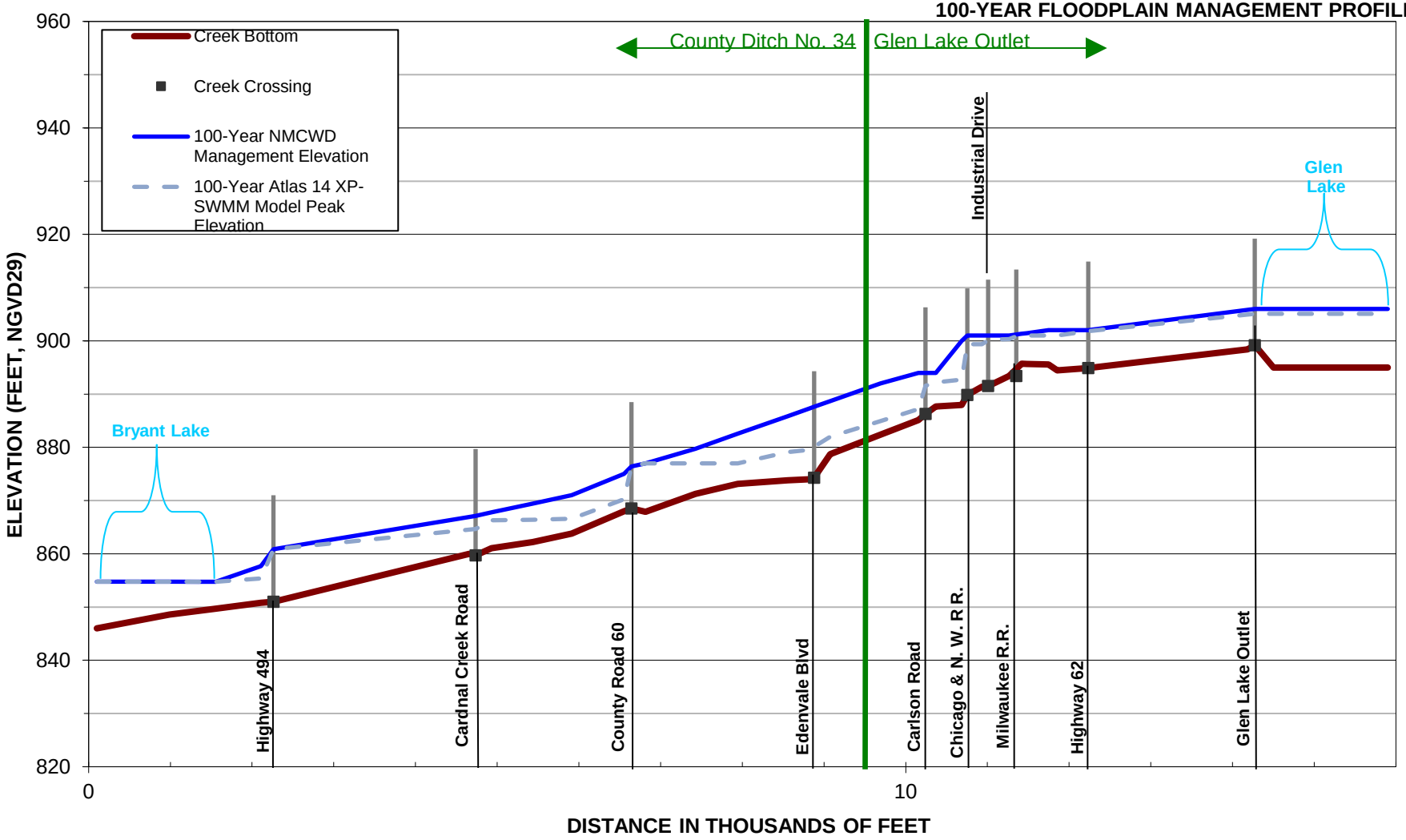
SOUTH FORK OF
NINE MILE CREEK
100-YEAR FLOODPLAIN MANAGEMENT PROFILE



REVISED MAY 14, 2015

Figure 2-9 (Page 3)

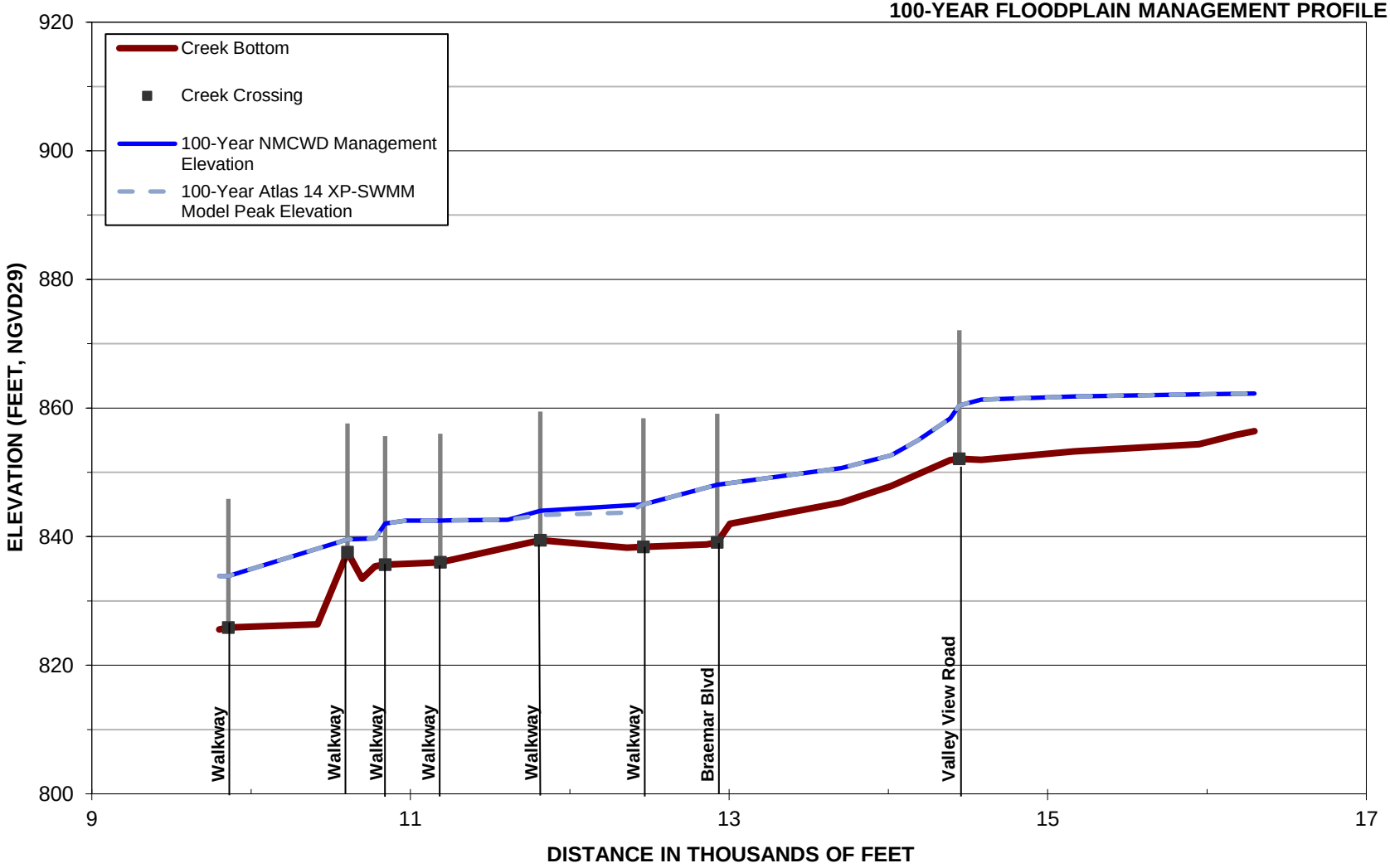
COUNTY DITCH 34 AND GLEN LAKE OUTLET
NINE MILE CREEK
100-YEAR FLOODPLAIN MANAGEMENT PROFILE



REVISED MAY 14, 2015

Figure 2-9 (Page 4)

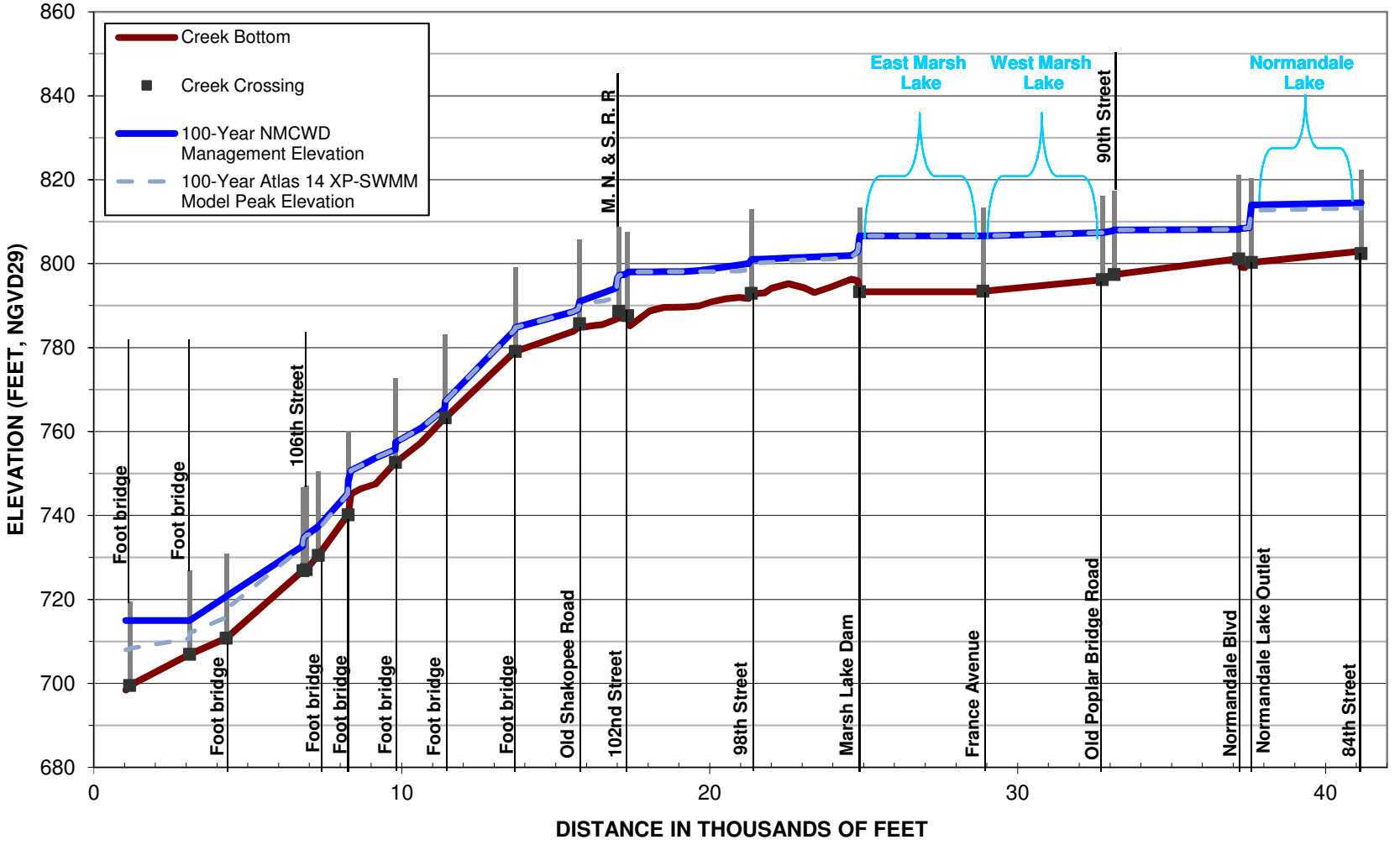
BRAEMAR BRANCH OF
NINE MILE CREEK
100-YEAR FLOODPLAIN MANAGEMENT PROFILE



REVISED MAY 14, 2015

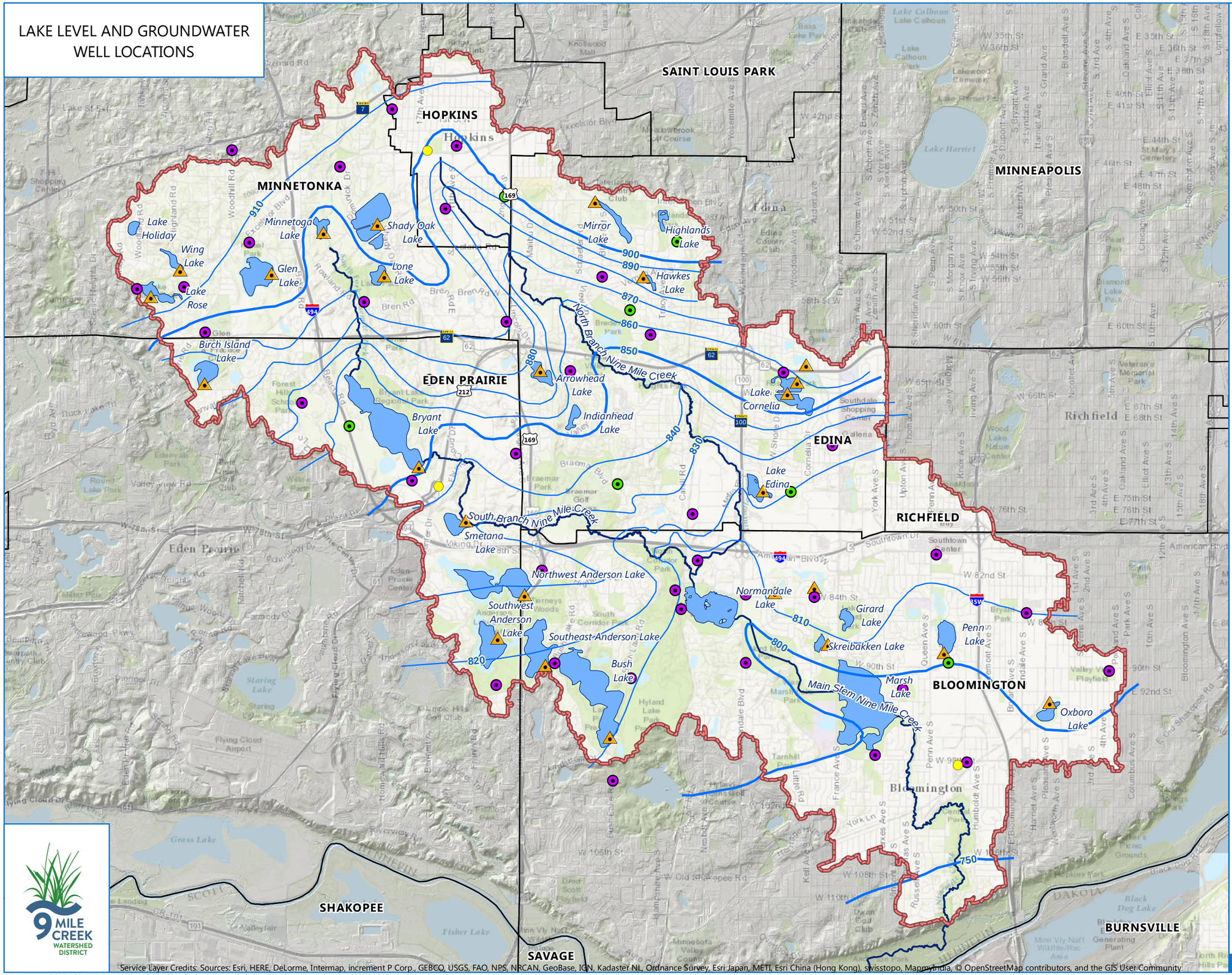
Figure 2-9 (Page 5)

MAIN STEM OF
NINE MILE CREEK
100-YEAR FLOODPLAIN MANAGEMENT PROFILE



REVISED MAY 14, 2015

LAKE LEVEL AND GROUNDWATER WELL LOCATIONS



- Precipitation Gage
- Level Monitoring Location
- Inactive Groundwater Observation Wells
- Active Groundwater Observation Wells
- Nine Mile Creek
- Lakes
- District Hydrologic Boundary
- Municipal Boundaries

Groundwater Elevation Contours

- 50 Feet Interval
- 10 Feet Interval

N

0 1 2

Miles

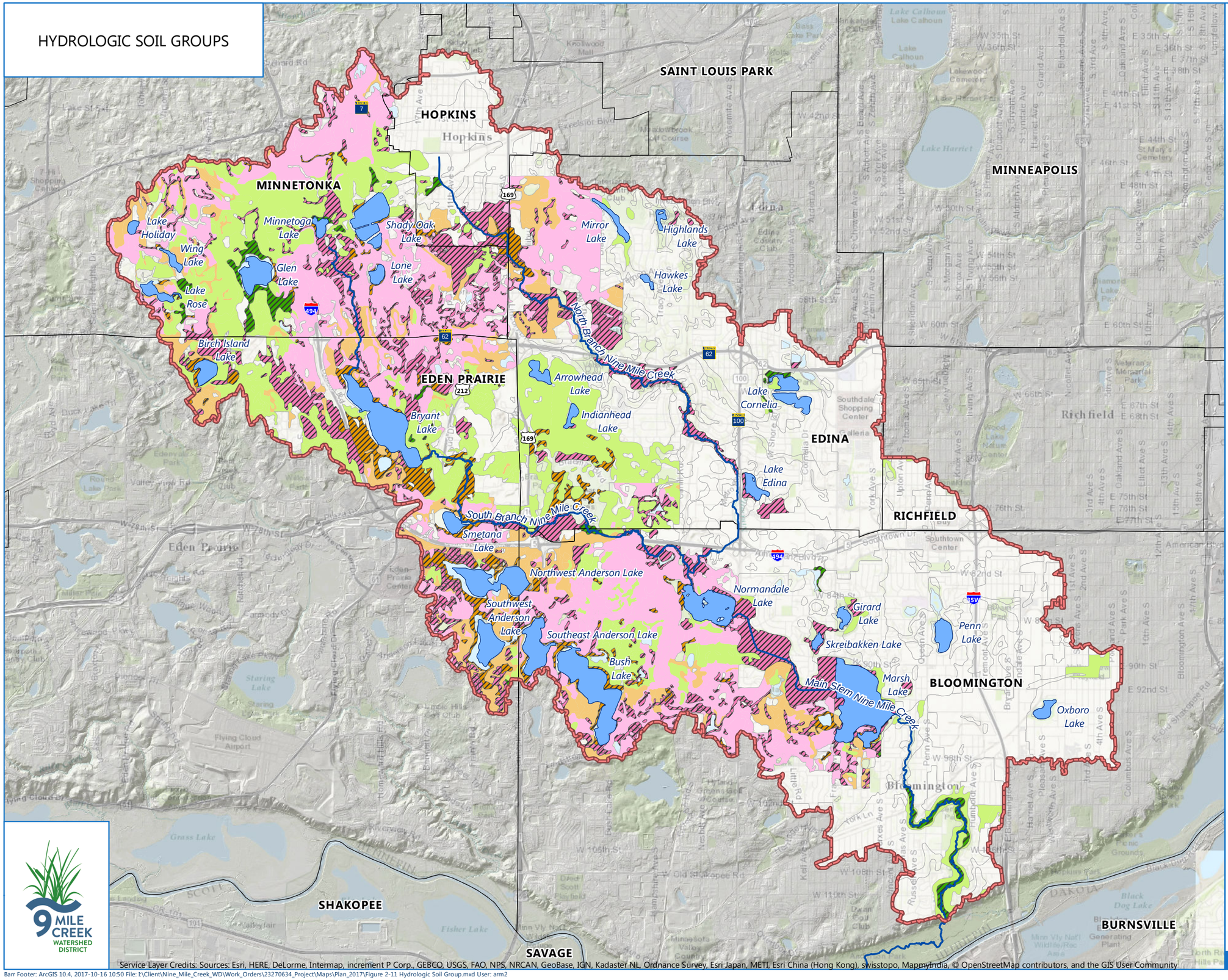
9 MILE CREEK WATERSHED DISTRICT

LAKE LEVEL AND GROUNDWATER WELL LOCATIONS

Figure 2-10

Barr Footer: ArcGIS 10.4, 2017-10-16 10:45 File: I:\Client\Nine_Mile_Creek_WD\Work_Orders\23270634_Project\Maps\Plan_2017\Figure 2-10 Lake Level and Groundwater Well Locations.mxd User: arm2

HYDROLOGIC SOIL GROUPS



Nine Mile Creek

Lakes

District Hydrologic Boundary

Municipal Boundaries

Hydrologic Soil Group (Source: NRCS, 2016)

- Urban/No Data
- A - Low runoff potential, high infiltration rate
- A/D*
- B - Moderate infiltration rate
- B/D*
- C - Slow infiltration rate
- C/D*
- D - High runoff potential, very slow infiltration rate

* Dual hydrologic groups A/D, B/D, and C/D are given for certain wet soils that can be adequately drained. The first letter applies to the drained condition, the second to the undrained condition.

N

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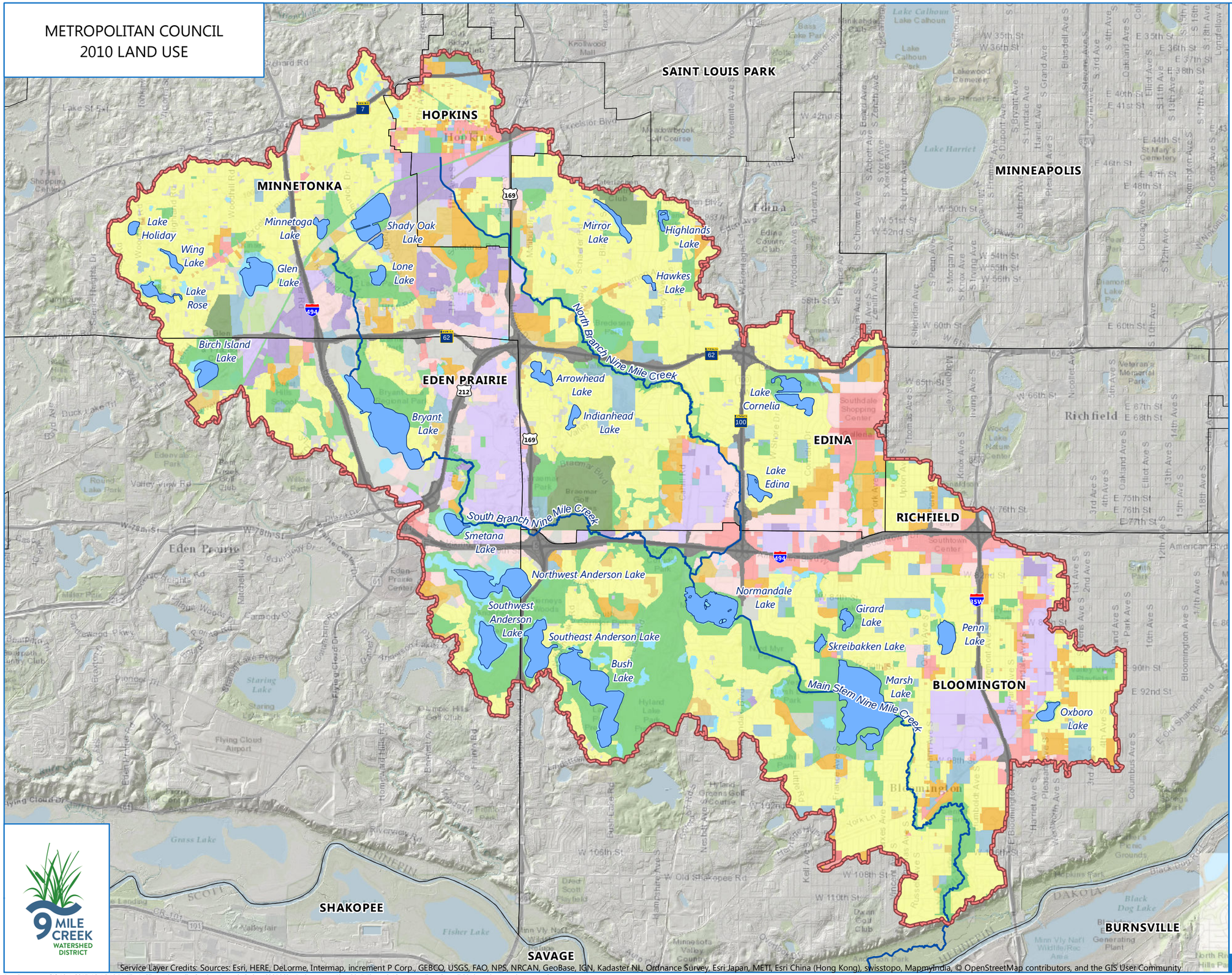
Miles

9 MILE CREEK WATERSHED DISTRICT

HYDROLOGIC SOIL GROUPS

Figure 2-11

METROPOLITAN COUNCIL
2010 LAND USE



- Nine Mile Creek
- Lakes
- District Hydrologic Boundary
- Municipal Boundaries

Metropolitan Council 2010 Land Use

- Farmstead
- Single Family Detached
- Manufactured Housing Park
- Single Family Attached
- Multifamily
- Office
- Retail and Other Commercial
- Mixed Use Residential
- Mixed Use Industrial
- Mixed Use Commercial and Other
- Industrial and Utility
- Institutional
- Park, Recreational or Preserve
- Golf Course
- Major Highway
- Railway
- Agricultural
- Undeveloped
- Water

N

0 1 2

Miles

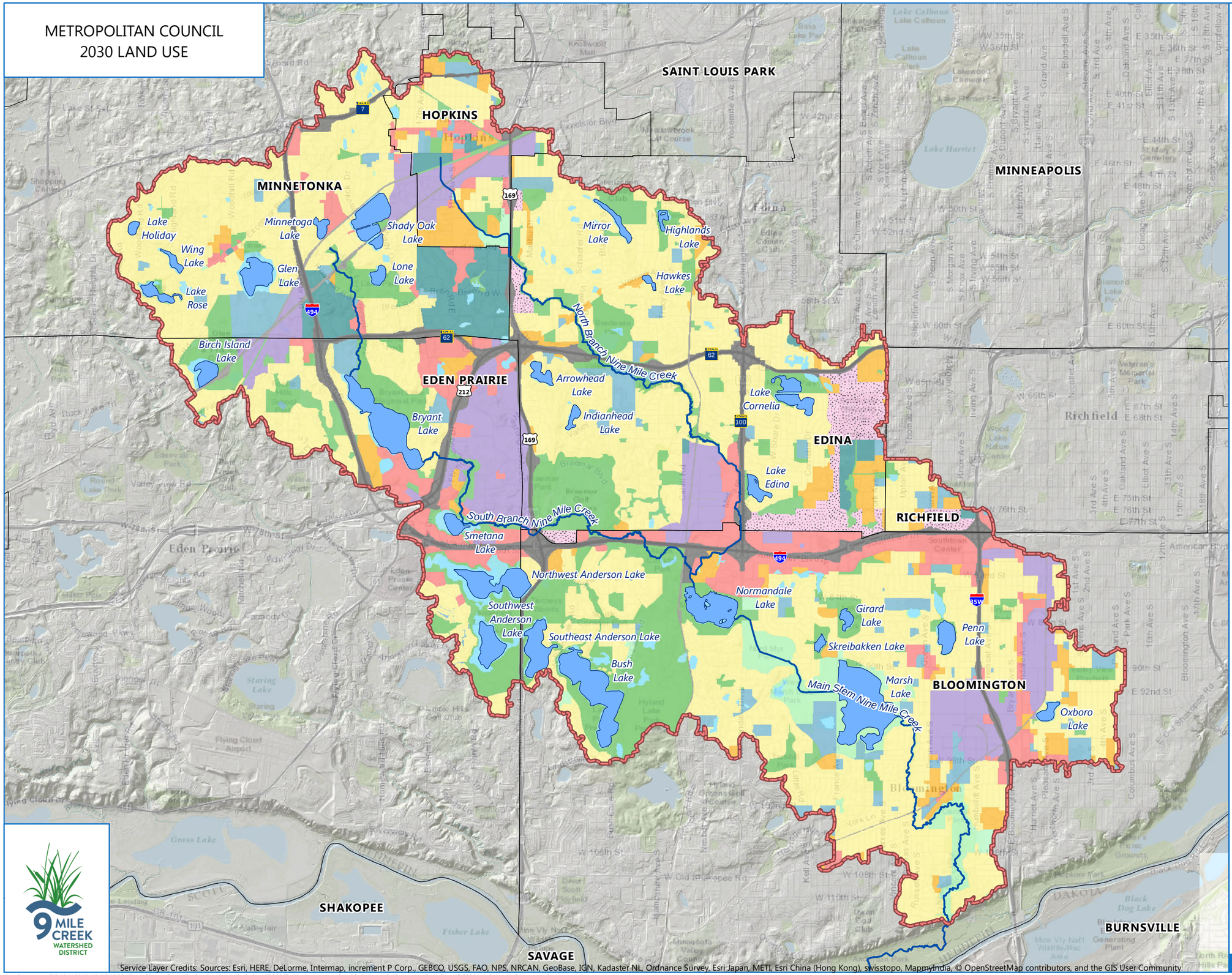
9 MILE CREEK WATERSHED DISTRICT

METROPOLITAN COUNCIL
2010 LAND USE

Figure 2-12

Barr Footer: ArcGIS 10.4, 2017-10-16 10:51 File: I:\Client\Nine_Mile_Creek_WD\Work_Orders\23270634_Project\Maps\Plan_2017\Figure 2-12 Metropolitan Council 2010 Land Use.mxd User: arm2

METROPOLITAN COUNCIL
2030 LAND USE



- Nine Mile Creek
- Lakes
- District Hydrologic Boundary
- Municipal Boundaries

Metropolitan Council 2030 Land Use

- Single Family Residential
- Multifamily Residential
- Commercial
- Industrial
- Institutional
- Mixed Use
- Multi-Optional Development
- Park and Recreation
- Open Space or Restrictive Use
- Rights-of-Way (i.e., Roads)
- Railway (inc. LRT)
- Open Water

N

0 1 2

Miles

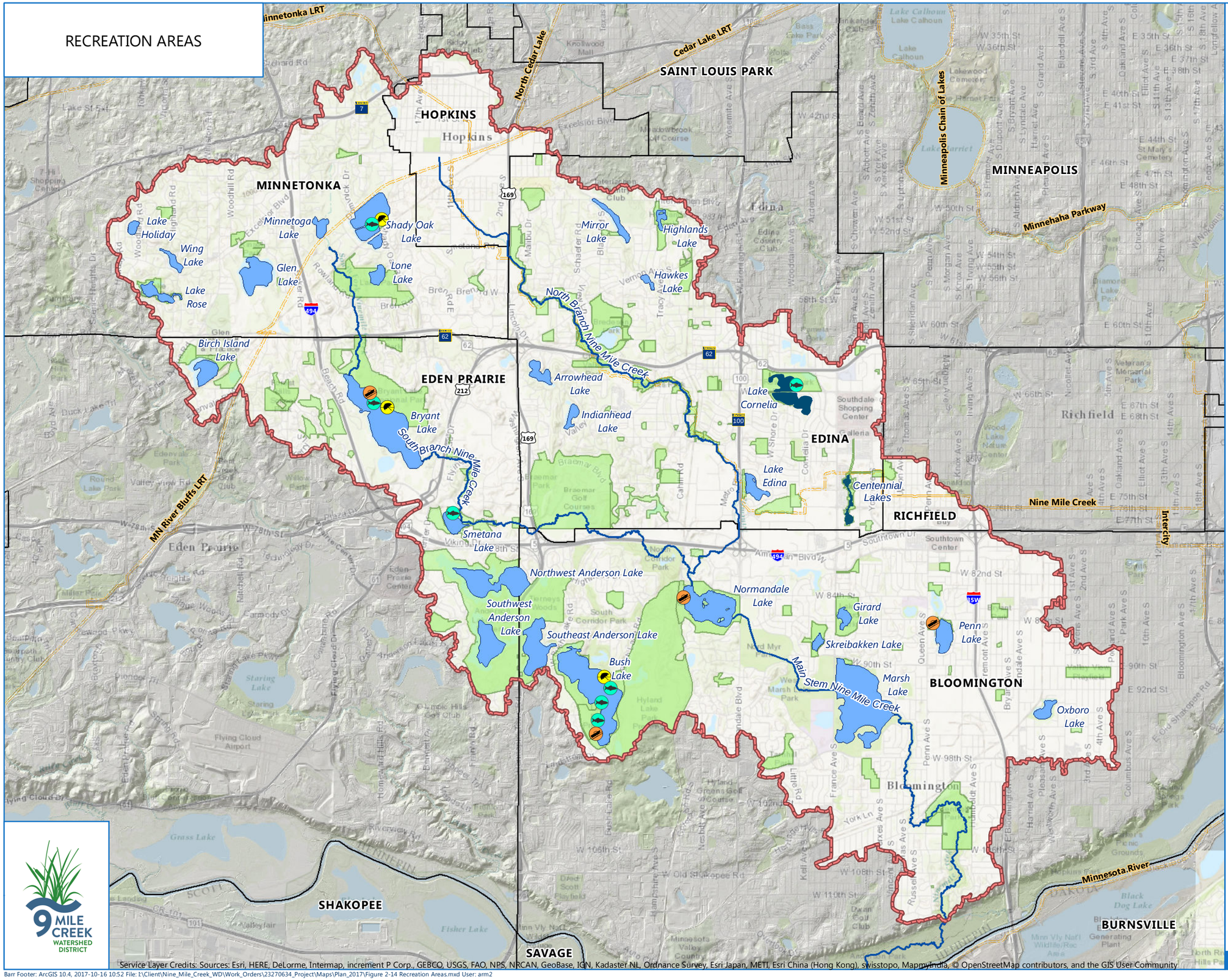
9 MILE CREEK WATERSHED DISTRICT

METROPOLITAN COUNCIL
2030 LAND USE

Figure 2-13

Barr Footer: ArcGIS 10.4, 2017-10-16 10:53 File: I:\Client\Nine_Mile_Creek_WD\Work_Orders\23270634_Project\Maps\Plan_2017\Figure 2-13 Metropolitan Council 2030 Land Use.mxd User: arm2

RECREATION AREAS



9 MILE CREEK WATERSHED DISTRICT

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RECREATION AREAS

Figure 2-14

SITES OF BIODIVERSITY SIGNIFICANCE

SAINT LOUIS PARK
HOPKINS
MINNETONKA
MINNEAPOLIS
EDEN PRAIRIE
EDINA
RICHFIELD
BLOOMINGTON
SHAKOPEE
SAVAGE
BURNSVILLE

Lake Holiday
Wing Lake
Lake Rose
Minnetoga Lake
Glen Lake
Shady Oak Lake
Lone Lake
Birch Island Lake
Bryant Lake
Arrowhead Lake
Indianhead Lake
Mirror Lake
Highlands Lake
Hawkes Lake
Lake Cornelia
Lake Edina
North Branch Nine Mile Creek
South Branch Nine Mile Creek
Smetana Lake
Northwest Anderson Lake
Southwest Anderson Lake
Southeast Anderson Lake
Bush Lake
Normandale Lake
Girard Lake
Skreibakken Lake
Penn Lake
Marsh Lake
Main Stem Nine Mile Creek
Oxboro Lake

Sites of Biodiversity Significance (Source: Minnesota Biological Survey, 2017)[1]

- High Biodiversity Significance
- Moderate Biodiversity Significance
- Below Biodiversity Significance
- Nine Mile Creek
- Lakes
- District Hydrologic Boundary
- Municipal Boundaries

[1]High Biodiversity Significance
Sites contain very good quality occurrences of the rarest species, high-quality examples of rare native plant communities, and/or important functional landscapes.

Moderate Biodiversity Significance
Sites contain occurrences of rare species, moderately disturbed native plant communities, and/or landscapes that have strong potential for recovery of native plant communities and characteristic ecological processes.

Below Biodiversity Significance
Sites lack occurrences of rare species and natural features or do not meet MBS standards for outstanding, high, or moderate rank. These sites may include areas of conservation value at the local level, such as habitat for native plants and animals, corridors for animal movement, buffers surrounding higher-quality natural areas, areas with high potential for restoration of native habitat, or open space.

N

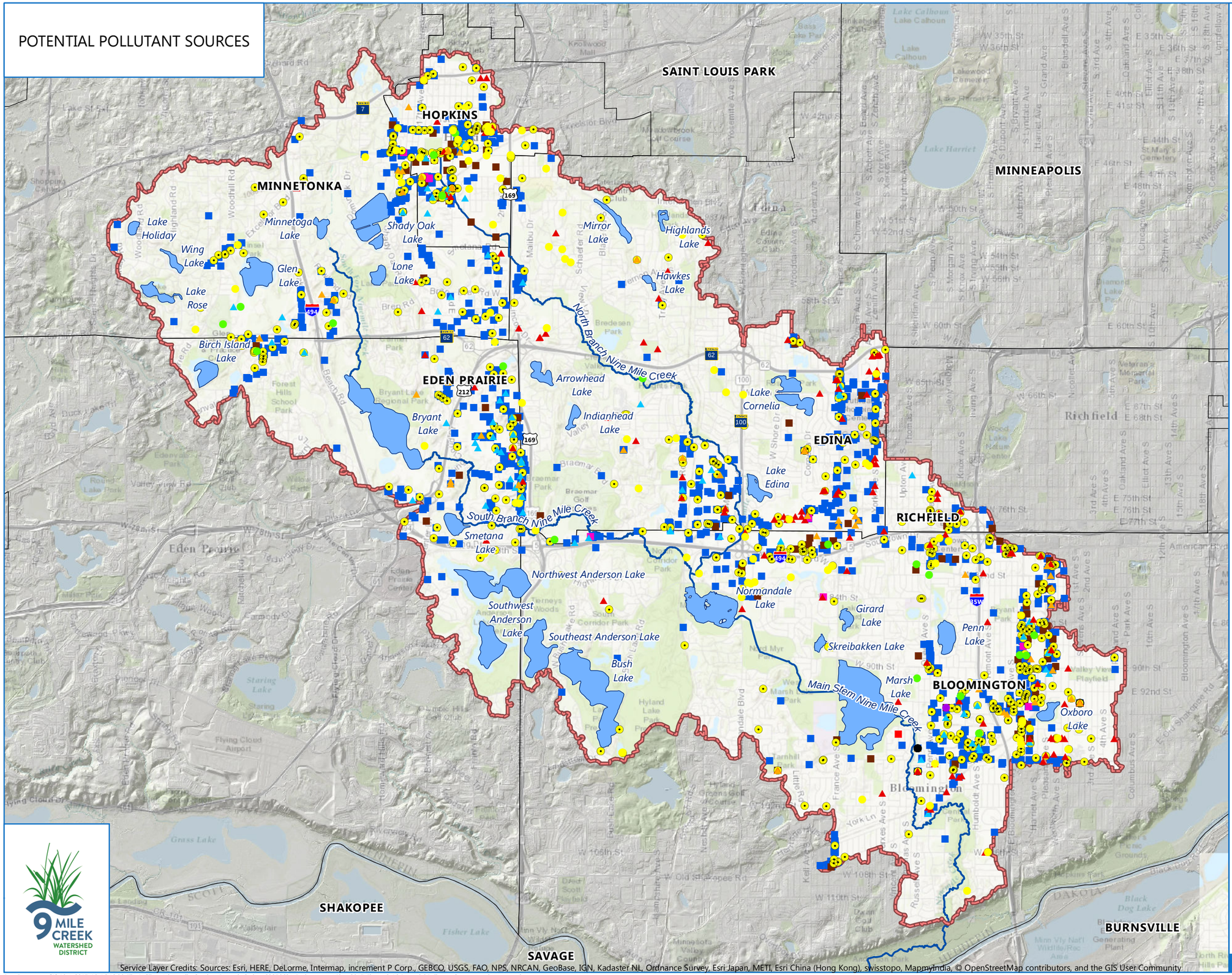
0 1 2
Miles

9 MILE CREEK WATERSHED DISTRICT

SITES OF BIODIVERSITY SIGNIFICANCE

Figure 2-15

POTENTIAL POLLUTANT SOURCES



9 MILE CREEK WATERSHED DISTRICT

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

POTENTIAL POLLUTANT SOURCES

Figure 2-16

3.0 Roles and Responsibilities

This section summarizes the roles and responsibilities of the District, the cities and counties within its borders, and regional and state agencies with jurisdiction over its resources. Additional detail regarding the processes and programs the District uses to perform its roles and responsibilities is included in Section 6.0 (Implementation Program).

3.1 District Roles and Responsibilities

The NMCWD fulfills many water resource management roles in its efforts to satisfy the purposes and functions assigned to watershed management organizations (see Section 1.2.1). Some of these roles are required to satisfy rule or statute (e.g., annual reporting), while other roles are assumed by the District as a means to achieve its vision and goals. In carrying out these roles and responsibilities, the District collaborates with its cities, community groups, and others.

Major roles and responsibilities of the District generally include the following:

- Implementation of the District's rules and permitting program
- Wetland and natural resource protection and management
- Projects and studies
- Maintenance of District facilities
- Monitoring
- Reporting and evaluation
- Assistance to local governmental units
- Collaboration with other state and regional agencies and organizations
- WRAPS and TMDL Implementation
- Education

These roles are performed in support of the District programs described in greater detail in Section 6.0. Enhancement of recreational opportunities (including improving/increasing public access) is not a primary goal of the District. However, the District consults with other stakeholders to consider recreational benefits when designing projects targeting the District's primary goals (e.g., flood protection, improving water quality).

NMCWD Rules and Permit Program

In accordance with Minnesota Statutes section 103D.341, the District has adopted rules, last revised in 2015, to ensure that land-disturbing activities that trigger the rules do not degrade water quality, exacerbate flooding, or otherwise negatively affect water resources. The District implements its rules through its permitting program. A District permit is required for projects meeting specific criteria related to the nature and extent of land-disturbing activity and such activity's location relative to floodplains, wetlands, or public waters.

Wetland and Natural Resource Management

The NMCWD is the Local Government Unit (LGU) responsible for administering the Wetland Conservation Act (WCA) for the cities of Eden Prairie, Edina, Hopkins, and Richfield. Under its authority as LGU and utilizing authority under watershed law, the District has taken on the responsibility of managing the wetlands within the watershed, including the permitting of projects with potential wetland impacts. The cities of Minnetonka and Bloomington act as the WCA LGU for their jurisdictions, as does the Minnesota Department of Transportation (MnDOT) for state transportation projects and the Minnesota State College and University System for projects within the Normandale Community College campus.

Projects and Capital Improvements

The District is responsible for performing studies and implementing its capital improvement program (CIP) in order to achieve its goals. The District performs studies to obtain the knowledge needed to implement effective solutions. Through previous studies (e.g., hydrologic modeling of Nine Mile Creek) and other planning efforts, the District has identified projects for the protection or enhancement of water resources to be implemented over the life of this Plan. These projects are included in the District's implementation program summarized in Section 6.0.

Maintenance of Stormwater Facilities and Water Resources Improvements

The District is generally responsible for inspection and maintenance of District-implemented projects. In some cases, though, the District enters agreements with other entities – principally the watershed cities – to maintain facilities and improvements constructed by the District. Such arrangements provide for the necessary costs of maintenance, and the District anticipates that it will continue to collaborate with watershed cities on cost-effective stormwater facility-management strategies on a case-by-case basis.

The District is the drainage authority responsible for public ditches within the watershed (see Section 2.3.3). The District would like to abandon the public ditches in the watershed. This may not be reasonably feasible, though: The areas of the watershed that benefitted from ditches when they were first created have undergone dramatic changes as the watershed has urbanized. With the number of subdivisions of land and changes in ownership, it likely would be logistically challenging and cost-prohibitive to identify all of the landowners who would have to be part of an abandonment proceeding. More realistic, likely, is continued collaboration with watershed cities and Hennepin County to ensure that water resources projects are pursued mindful of the legal ditch status of some stretches of Nine Mile Creek and Ditch 34 (Cardinal Creek), and that the ditches are maintained in a way that ensures they continue to function as urban drainage ways. Within the watershed, Hennepin County, the MnDOT and all cities are subject to the MPCA's National Pollution Discharge Elimination System Municipal Separate Storm Sewer System permit program. Such entities are referred to as "MS4s." (MPCA has not designated the District as a mandatory MS4 permittee.) Each MS4 must fulfill prescribed stormwater management and reporting responsibilities as required by the state MS4 general permit. To minimize duplication and increase efficiency, the District collaborates with MS4s in the watershed – especially the cities – to help them implement their NPDES responsibilities.

Monitoring

The District will continue to monitor water quantity and water quality of waterbodies within the District focusing on those waterbodies identified as impaired (see Section 2.3.1). The District coordinates its monitoring efforts with other programs, where possible, to avoid duplication of effort. Water quantity monitoring efforts include flow monitoring in creeks and water level monitoring in several lakes. Water quality monitoring may include detailed water chemistry monitoring performed at regular intervals, aquatic plant monitoring of lakes, and fish and invertebrate monitoring in streams. Monitoring programs are described in greater detail in Section 6.3.1.

Reporting and Evaluation

The NMCWD is responsible for evaluating progress towards achieving its goals and reporting annually to the Board of Water and Soil Resources, per Minnesota Rules 8410.0150. Within the first 120 days of the calendar year, the District must submit to BWSR an activity report for the previous calendar year. The District must submit an audit report for the previous fiscal year within 180 days of the end of the District's fiscal year. The required contents of the annual activity report are specified in Minnesota Rules 8410. Generally, the District's annual report includes:

- An assessment of the previous year's annual work plan that indicates whether planned activities were completed, including the expenditures of each activity with respect to the approved budget (unless included in the audit report).
- A work plan and budget for the current year specifying which activities will be undertaken.
- At a minimum of every 2 years, an evaluation of progress on goals and the implementation actions, including the capital improvement program, to determine if amendments to the implementation actions are necessary.

The District has identified specific actions toward achieving its goals and objectives as identified in Table 5-1 through Table 5-10 of Section 5.0. These actions serve as the basis for the District's implementation program. At a minimum of every 2 years, the District will evaluate its progress on each of the actions identified in Section 5.0 and its capital improvement program to determine if amendments to the implementation program are necessary.

The District will communicate with cities on an ongoing basis to ensure cohesive and coordinated implementation of the goals, policies, and actions in this plan and city local water management plans. The NMCWD will work with watershed cities to review (at least every 2 years) city implementation of local water management plans as part of the NMCWD's evaluation of its own progress (fulfilling the requirements in Minn. R. 8410.0105, subp. 1C, and 8410.0150).

The District will continue to maintain its website. The website will contain the location, time, agenda, and minutes for organization meetings; contact information for the organization staff; the current water management plan; annual activity reports; rules; a list of the NMCWD board members; and a list of

employees including postal and electronic mailing addresses and telephone numbers. The website will be kept current. The NMCWD website is located at: 9-Mile Creek Watershed District [Ref. 1].

Assistance to Local Units of Government

The NMCWD expects cities to address water resource management issues that are more local in nature. However, the District may provide assistance in solving local issues when requested by the cities. The District will work closely with the cities to continue to provide support in the areas of water quality, natural resources, and wetlands management. The District also coordinates with cities to accommodate municipal benefits beyond the charge of the NMCWD (e.g., recreational benefits) into District projects. The NMCWD reviews local water management plans for consistency with this Plan and approves the local plans. More information about local water management plan requirements is presented in Section 7.1.

Collaboration with Other Agencies and Organizations

The District will continue to assist and/or collaborate with other agencies and organizations in addressing issues of mutual interest. Cooperators may include cities, counties, adjacent watershed management organizations, and state agencies. As part of its water management role, the District shares a large amount of data, including water quality monitoring, water quality modeling, and hydrologic (e.g., flood level) data with local units of government, state agencies, and others. The District also administers a general permit from the MDNR and reviews water appropriations permits submitted to the MDNR within the District.

WRAPS and TMDL Implementation

The NMCWD has a general responsibility to improve the water quality of its waterbodies as well as stormwater runoff reaching the Minnesota River from the watershed. Several District waterbodies are included in the MPCA's impaired waters 303(d) list (see Section 2.3.1). To address impaired waters and protect designated uses, the MPCA uses processes known as a total maximum daily load (TMDL) analysis and/or a watershed restoration and protection strategy (WRAPS). Both TMDL and WRAPS studies may result in implementation plans containing specific programs or projects to improve and/or protect the water quality of assessed waterbodies. The District will continue to participate in future WRAPS and TMDL studies and may assume a lead role in carrying out the resulting TMDL implementation plans, if appropriate.

3.2 City Responsibilities

The NMCWD's intention is to work cooperatively with its cities and to limit imposition of requirements on local units of government as much as possible while still accomplishing the District's purposes and implementing the Plan. Local (city) water management responsibilities, including requirements for local water management plans, are described in Section 1.0.

This Plan includes only a few requirements for the cities within the NMCWD imposed by the District, but it provides many opportunities for collaboration and partnership. While the cities in the Nine Mile Creek watershed address some of the same activities governed by the NMCWD rules in the course of exercising their primary authority over land use, cities can alleviate any burden of imposing water resources

protection requirements by deferring exercise of regulatory authority to NMCWD, as discussed in more detail in Section 6.2.

3.3 County Responsibilities

Counties have a wide variety of duties, including property assessment, record-keeping, road maintenance (including street sweeping, and snow/ice control), administration of election and judicial functions, social services, corrections, child protection, library services, hospitals and rest homes, public health services, planning and zoning, economic development, parks and recreation, water quality, and solid waste management and recycling (including yard waste and compost sites). As of February 12, 2014, Hennepin County assumed all duties and authorities of the Soil and Water Conservation District (SWCD).Hennepin County's responsibilities directly related to NMCWD include:

- Appointing the NMCWD Board of Managers – Hennepin County appoints five managers to staggered terms.
- Administering the NMCWD tax levy.
- Groundwater management, including preparing and adopting groundwater plans (currently Hennepin County is without an adopted groundwater plan).
- Adopting and implementing the county's MS4 stormwater pollution prevention plan (SWPPP).

3.4 Other Agency Responsibilities

Various other units of state and regional government are involved in regulating water resource related activities and have jurisdiction overlapping that of the NMCWD. The roles of these agencies are described in this section and summarized in Table 3-1.

3.4.1 Minnesota Department of Natural Resources (MDNR)

The MDNR Ecological and Water Resources Division manages water resources through a variety of programs related to lakes, rivers and streams, watersheds, wetlands, groundwater, and climate. The MDNR administers the Public Waters Work Permit Program, the Water Use (Appropriations) Permit Program, and the Dam Safety Permit Program. MDNR Fisheries administers the Aquatic Plant Management Program and other fishery related permits. The MDNR is involved in enforcement of the WCA and is responsible for identifying, protecting, and managing calcareous fens. The MDNR also has model shoreland ordinances that cities and counties can adopt.

Public Waters

The MDNR's Public Waters Work Permit Program (Minnesota Statutes chapter 103G) requires an MDNR permit for any work below the Ordinary High Water Level (OHWL) or any work that will alter or diminish the course, current, or cross-section of any public water, including lakes, wetlands, and streams. For lakes and wetlands, the MDNR's jurisdiction extends to designated U.S. Fish and Wildlife Service Circular #39 Types 3, 4, and 5 wetlands which are 10 acres or more in size in unincorporated areas or 2.5 acres or more in size in incorporated areas. The program prohibits most filling of public waters and public waters

wetlands for the purpose of creating upland areas. The Public Waters Work Permit Program was amended in 2000 to minimize overlapping jurisdiction with the WCA. Under certain conditions, work can be performed below the OHWL without a Public Waters Work Permit. Examples include docks, watercraft lifts, beach sand blankets, ice ridge removal/grading, riprap, and shoreline restoration. The MDNR public waters in the NMCWD are shown on Figure 2-4.

Water Appropriations and Transport

The MDNR regulates surface water and groundwater usage rate and volume as part of its charge to conserve and use the waters of the state. For example, suppliers of domestic water to more than 25 people or applicants proposing a use that exceeds 10,000 gallons per day or 1,000,000 gallons per year from surface water or groundwater sources must obtain a Water Appropriation Permit from the MDNR. Appropriation Permits from the MDNR are not required for domestic uses serving less than 25 persons for general residential purposes. An additional permit is required to appropriate or transport water from waters designated as infested with invasive species, regardless of the volume appropriated or transported.

Groundwater

In addition to regulating appropriations from groundwater, the MDNR is also responsible for mapping sensitive groundwater areas, conducting groundwater investigations, addressing well-interference problems, and maintaining the observation well network.

Dam Safety

The MDNR administers the state's Dam Safety Program (MN Rules 6115.0300 – 6115.0520), which applies to all impoundments that pose a potential threat to public safety or property. Dams 6 feet or lower in height and dams that impound 15 acre-feet or less of water 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. The dam safety rules require that the downstream impacts of a dam failure be analyzed under high-flow conditions (i.e., greater than a 100-year flood).

Other Regulations

In addition to permit programs, the MDNR oversees the Floodplain Management Program, the Public Waters Inventory Program, the Shoreland Management Program, the Flood Damage Reduction Grant Program, the Wild and Scenic Rivers Program, various surface and groundwater monitoring programs, and the Climatology Program.

Questions concerning the MDNR's role in water resource management should be directed to the MDNR Ecological and Water Resources Division, Metro Region, 1200 Warner Road, St. Paul, MN 55106 (651-259-5774). More information is available at the MDNR website: MDNR website [Ref. 26].

3.4.2 Minnesota Board of Water and Soil Resources (BWSR)

BWSR oversees the state's watershed management organizations (joint powers, county, and watershed district organizations) and Soil and Water Conservation Districts (SWCDs), and administers the rules for the WCA and metropolitan area watershed management. BWSR also administers the Clean Water Fund

(CWF) grant program, funded by the Clean Water Land and Legacy amendment passed in 2008. The purpose of the CWF is to protect, enhance, and restore water quality in lakes, rivers, and streams and to protect groundwater and drinking water sources from degradation. Applicants eligible for CWF grants include counties, watershed districts, watershed management organizations, soil and water conservation districts, and cities working under a current BWSR-approved and locally adopted local water management plan.

BWSR administers the state's buffer law (Minnesota Statutes section 103F.48). The NMCWD has deferred enforcement of the buffer law to the BWSR due to the administrative burden, lack of funding assistance offered, and the District's preference toward a role of technical assistance provider, rather than an enforcement role.

Questions concerning BWSR's role in water resource management should be directed to the Minnesota Board of Water and Soil Resources, 520 Lafayette Road North, St. Paul, MN 55107 (651-296-3767). More information is available at the BWSR website: BWSR website [Ref. 27].

3.4.3 Minnesota Pollution Control Agency (MPCA)

The MPCA administers the State Discharge System/National Pollutant Discharge Elimination System (NPDES) Permit program (for point source discharges of wastewater), the NPDES General Stormwater Permit for Construction Activity, the NPDES General Industrial Stormwater Permit Program, the NPDES stormwater permit program, and subsurface sewage treatment system regulations (7080 Rules). The MPCA also reports the state's "impaired waters" to the U.S. Environmental Protection Agency. Spills should be reported directly to the MPCA, including spills that may cause pollution, such as spills of toxic, flammable, corrosive, or dangerous industrial chemicals, or spills of environmentally damaging materials.

The MPCA administers and enforces laws relating to pollution of the state's waters, including groundwater. The MPCA monitors ambient groundwater quality and administers subsurface sewage treatment system (SSTS) design and maintenance standards. The MPCA is responsible for administering the programs regulating construction and reconstruction of SSTS. The MPCA requires an inspection program for SSTS that meets MPCA standards. Minnesota Rules 7080 govern administration and enforcement of new and existing SSTS. The Tanks and Spills Section of the MPCA regulates the use, registration, and site cleanup of underground and above-ground storage tanks.

The MPCA resumed selective administration of Section 401 of the Clean Water Act Water Quality Certification program in 2007. The program is primarily administered by the U.S. Army Corps of Engineers (USACE). Section 401 Certification is required to obtain a federal permit for any activity that will result in a discharge to navigable waters of the United States. Formal applications for 401 Certification must be sent to the MPCA.

Construction Stormwater Permitting

The NPDES General Stormwater Permit for Construction Activity (construction stormwater permit), which went into effect in 2003, regulates discharges of stormwater affected by construction activity to waters of the state. The MPCA updated the construction stormwater permit in 2013. Proposers of projects equal to

or larger than one acre (or projects smaller than 1 acre that are a part of a larger common plan of development or sale that is 1 acre or more) must obtain coverage under the general permit. A key permit requirement is the development and implementation of a stormwater pollution prevention plan (SWPPP) with appropriate best management practices (BMPs). The SWPPP must be a combination of narrative and plan sheets that address foreseeable conditions, include a description of the construction activity, and address design requirements including temporary and permanent BMPs to control the discharge of stormwater, sediment, and/or other potential pollutants from the site. The project's plans and specifications must incorporate the SWPPP before applying for NPDES permit coverage. The permittee must also ensure final stabilization of the site, which includes final stabilization of individual building lots.

The SWPPP must address the following construction activity requirements (from Section IV of the construction stormwater permit):

- Temporary and permanent erosion prevention practices
- Sediment control practices
- Dewatering and basin draining
- Inspections and maintenance
- Pollution prevention management measures
- Final stabilization

A significant change in the 2013 update of the construction stormwater permit is the inclusion of a volume control requirement. For projects that replace vegetation or other pervious surfaces with 1 or more acres of cumulative impervious surface, the permittee must retain on-site a volume of stormwater equal to 1 inch of runoff over the new impervious surface. In situations where infiltration is prohibited, the construction stormwater permit requires stormwater treatment using wet ponds, filtration, regional ponding, or other equivalent methods.

Municipal Separate Storm Sewer System (MS4) Permitting

The federal Clean Water Act (CWA) established the National Pollutant Discharge Elimination System (NPDES) to regulate point sources of pollution, with the MPCA as the delegated permitting authority. This program was later expanded to include both point and non-point sources of pollution, including the regulation of stormwater runoff, and created a two-phase comprehensive national program to address stormwater runoff. Phase I of the program was implemented in 1990 and covered two general categories of stormwater discharge including 11 categories of industrial activities (including construction) and Municipal Separate Storm Sewer Systems (MS4s) serving populations of 100,000 or more (e.g., St. Paul). A few years later, Phase II of the program was implemented. Phase II was a broader program that included smaller construction sites, municipally owned or operated industrial activities, and many more municipalities (MS4s).

In 2013, the MPCA reissued the MS4 General Permit, which replaced the Phase II permit. The permit focus shifts from permit program development to increasing emphasis on measured progress and beginning some of the implementation measures. Some of the requirements of the reissued MS4 permit include:

- More stringent construction related erosion control
- Post-construction controls to reduce volume, total phosphorus, and total suspended solids
- Documented enforcement response procedures
- Submittal of additional information on all stormwater ponds and outfalls
- Inventories of municipal facilities that could contribute pollutants to stormwater discharges

All of the cities within the NMCWD are required to maintain an MS4 permit from the MPCA. As part of the permit program, each member city must annually submit an MS4 report to the MPCA. The numerous and expanded requirements of the MPCA's MS4 permit present opportunities for the NMCWD to cooperate with member cities to prevent redundancy in implementing or reporting on activities related to water quality.

More information about the MPCA's stormwater program can be found at the MPCA's website: MPCA Stormwater Program [Ref. 28].

Impaired waters, Total Maximum Daily Loads (TMDLs) and Watershed Restoration and Protection Strategy (WRAPS)

In administering the CWA in Minnesota, the MCPA also maintains a list of impaired waters (see Section 2.3.1). The CWA requires the development of a total maximum daily load (TMDL) study for impaired waterbodies. A TMDL is a threshold calculation of the amount of a pollutant that a waterbody can receive and still meet water quality standards. A TMDL establishes the pollutant loading capacity within a waterbody and develops an allocation scheme amongst the various contributors, which include point sources, non-point sources, and natural background levels, as well as a margin of safety. As a part of the allocation scheme a waste load allocation is developed to determine allowable pollutant loadings from individual point sources (including loads from storm sewer networks). A load allocation establishes allowable pollutant loadings from non-point sources and natural background levels in a waterbody.

A watershed restoration and protection strategy (WRAPS) is similar to a TMDL and may examine other waterbodies in the watershed in addition to impaired waterbodies. Both TMDLs and WRAPSs may result in implementation plans to address water quality issues of the affected waterbodies.

Guidance for Dredged Materials

The MPCA considers material excavated below the OHW level of waterbasins, watercourses, public waters, or public waters wetlands (as defined by Minnesota Statutes section 103G.005) to be dredged material. Dredged material is defined as waste and regulated by the MPCA. The MPCA provides guidance for the management of dredged material on its website: MPCA guidance for management of dredged material [Ref. 29].

In 2012, the MPCA developed specific guidelines for the removal of sediment from stormwater ponds. Guidance for the removal of sediment from municipal stormwater ponds differs from guidance for other dredged materials in three primary ways:

1. Permits are not required when performing routine maintenance on stormwater conveyance and collection systems.

2. The MPCA does not need to be notified of sediment removal activities. The MPCA recommends that cities keep records and documentation of sediment removal projects.

3. Best management practices were revised to include guidance from cities that have experience performing sediment removal projects.

Disposal options for sediment dredged from municipal stormwater ponds vary according to the level of contamination present in the excavated material. The document provides guidance for collecting samples and testing sediment, and calculating chemical concentrations relative to soil reference values (SRVs). The number of samples to be collected depends on the surface area of the pond. More detailed information regarding the disposal of sediment from stormwater ponds is available from the MPCA website: Guidance for disposal of sediment: MPCA [Ref. 30].

Questions concerning MPCA's role in water resource management should be directed to the Minnesota Pollution Control Agency, 520 Lafayette Road, St. Paul, MN 55155-4194 (651-296-6300). More information is available at the MPCA website: MPCA website [Ref. 31].

3.4.4 Minnesota Department of Health (MDH)

The MDH is the official state agency responsible for addressing all public health matters, including drinking water protection. The MDH administers the Well Management Program, the Wellhead Protection Program, and the Safe Drinking Water Act rules. The MDH also issues fish consumption advisories. The MDH is responsible for ensuring safe drinking water sources and limiting public exposure to contaminants. Through implementation of the federal Safe Drinking Water Act, the MDH conducts the Public Water Supply Program, which allows the MDH to monitor groundwater quality and train water supply system operators. The 1996 amendments to the federal Safe Drinking Water Act require the MDH to prepare source water assessments for all of Minnesota's public water systems and to make these assessments available to the public.

Through its Well Management Program, the MDH administers and enforces the Minnesota Water Well Code, which regulates activities such as well abandonment and installation of new wells. The MDH also administers the Wellhead Protection Program, which is aimed at preventing contaminants from entering public water supply wells.

The Wellhead Protection Program rules (Minnesota Rules 4720.5100 to 4720.5590) went into effect in 1997. These rules require all public water suppliers that obtain their water from wells to prepare, enact, and enforce wellhead protection plans (WHPPs). The MDH prepared a prioritized ranking of all such

suppliers in Minnesota. Regardless of the ranking, Minnesota Rules 4720 required all public water suppliers to have initiated wellhead protection measures for the inner wellhead management zone prior to June 1, 2003. If a city with an existing WHPP drills a new well and connects it to the distribution system, the WHPP must be amended.

Wellhead protection plans include: delineation of groundwater "capture" areas (wellhead protection areas), delineation of drinking water supply management areas (DWSMA), an assessment of the water supply's susceptibility to contamination from activities on the land surface, management programs such as identification and sealing of abandoned wells, and education/public awareness programs. As part of its role in wellhead protection, the MDH developed the guidance document "Evaluating Proposed Stormwater Infiltration Projects in Drinking Water Supply Management Areas" (MDH, 2016, as amended).

Questions concerning the MDH's role in water resource management should be directed to the Minnesota Department of Health, P.O. Box 64975, St. Paul, MN (651-201-5000). See the Minnesota Department of Health website for more information about these programs: MDH role in Water Resource Management: MDH [Ref. 32].

3.4.5 Minnesota Department of Agriculture (MDA)

The MDA is the lead agency for all aspects of pesticide and fertilizer environmental and regulatory functions as directed in the Groundwater Protection Act (Minnesota Statutes chapter 103H). These include but are not limited to the following:

- Serving as lead agency for groundwater contamination from pesticide and fertilizer nonpoint source pollution.
- Conducting monitoring and assessment of agricultural chemicals (pesticides and nitrates) in ground and surface waters.
- Overseeing agricultural chemical remediation sites and incident response.
- Regulating use, storage, handling and disposal of pesticides and fertilizer.

The MDA is statutorily responsible for the management of pesticides and fertilizer other than manure to protect water resources. The MDA implements a wide range of protection and regulatory activities to ensure that pesticides and fertilizer are stored, handled, applied and disposed of in a manner that will protect human health, water resources and the environment. The MDA works with the University of Minnesota to develop pesticide and fertilizer Best Management Practices (BMPs) to protect water resources, and with farmers, crop advisors, farm organizations, other agencies and many other groups to educate, promote, demonstrate and evaluate BMPs, to test and license applicators, and to enforce rules and statutes. The MDA has broad regulatory authority for pesticides and has authority to regulate the use of fertilizer to protect groundwater.

3.4.6 Minnesota Environmental Quality Board (EQB)

The EQB administers the state's environmental review program, including Environmental Assessment Worksheets (EAW), Environmental Impact Statements (EIS), and Alternative Urban Area-wide Reviews (AUAR). EAWs and EISs prepared for projects within NMCWD or that could affect the NMCWD's resources must be submitted to the NMCWD for review and comment. With respect to water resources, the EQB is responsible for developing the state water plan, a state water monitoring plan, biennial water policy and priorities reports, and biennial reports on trends in water quality and availability and research needs. Questions concerning the EQB's role in water resource management should be directed to the Minnesota Environmental Quality Board, 520 Lafayette Road North, St. Paul, MN 55155 (651-296-9027). More information is available at the EQB website: MN Environmental Quality Board (EQB) website [Ref. 33].

3.4.7 Minnesota Department of Transportation (MnDOT)

The MnDOT is responsible for major maintenance and reconstruction of stormwater infrastructure associated with state highways. In the NMCWD, these locations include Interstate 494, Interstate 35W, US Highway 212, and Highway 62.

Questions concerning MnDOT's role in water resource management should be directed to the Minnesota Department of Transportation, 395 John Ireland Boulevard, St. Paul, MN 55101-1638 (651-296-3000). More information is available at the MnDOT website MN Department of Transportation (MnDOT) website [Ref. 34].

3.4.8 Minnesota State Historic Preservation Office (SHPO)

Following the National Historic Preservation Act of 1966, Minnesota's SHPO was established by state statute in 1969. The director of the Minnesota Historical Society serves as State Historic Preservation Officer. The mission of the SHPO is to preserve and promote Minnesota history by identifying, evaluating, registering, and protect Minnesota's historic and archaeological properties and assisting government agencies in carrying out their historic preservation responsibilities. The SHPO maintains the National Register of Historic Places (NRHP) for the state. This includes several listed or eligible to be listed places within the NMCWD (e.g., Glen Lake Children's Camp). To ensure the protection of places eligible for listing or listed in the NRHP, SHPO review is required for all state and federally funded projects, and all USACE projects.

Questions concerning SHPO's role in historical resource management should be directed to the Minnesota State Historic Preservation Office, 345 Kellogg Boulevard West, St. Paul, MN 55102-1903 (651-259-3450). More information is available at the SHPO website MN State Historic Preservation Offices (SHPO) website [Ref. 35].

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

The USACE administers several regulatory permit programs, including Section 10 of the Rivers and Harbors Act permit program, the Section 404 permit program, and Section 401 Certifications. The USACE updated Section 10 of the Rivers and Harbors Act Permit and the Section 404 Permit in March 2012 to streamline the requirements of the Clean Water Act (CWA). The updated permits provide expedited

review of projects that have minimal impact on the aquatic environment. These projects may include linear transportation projects, bank stabilization activities, residential development, commercial and industrial development, aids to navigation, and some maintenance activities. Permit programs are described briefly in this section.

Through Section 10 of the Rivers and Harbors Act, the USACE is responsible for administering this program, which regulates the placement of structures and/or work in, or affecting, navigable waters of the United States.

The Federal Clean Water Act requires that anyone who wants to discharge dredged or fill material into U.S. waters, including wetlands, must first obtain a Section 404 Permit from the USACE. Examples of activities that require a Section 404 Permit include: construction of boat ramps, placement of riprap for erosion protection, placing fill in a wetland, building a wetland, construction of dams or dikes, stream channelization, and stream diversion. When Section 404 Permit applications are submitted to the USACE, the applications are typically posted for the U.S. Fish and Wildlife Service, the U.S. Forest Service, the U.S. Environmental Protection Agency (USEPA), and other federal agencies to review and provide comments. The USACE evaluates permit requests for the potential impact to various functions and values of the wetland.

Section 401 Certification is required to obtain a federal permit for any activity that will result in a discharge to navigable waters of the United States. The program is primarily administered by the USACE along with the MPCA. A Section 401 Water Quality Certification may be granted if the applicant demonstrates that the proposed activity "will not violate Minnesota's water quality standards or result in adverse long-term or short-term impacts on water quality." Greater protection is given to a category of waters designated by the MDNR as Outstanding Resource Value Waters (ORVW). These waters include such groups as scientific and natural areas, wild, scenic and recreational river segments, and calcareous fens.

Questions concerning the USACE's role in water resource management should be directed to the U.S. Army Corps of Engineers, St. Paul District, 180 East 5th Street, St. Paul, MN 55101-1678 (651-290-1678). More information is available at the USACE website: USACE website [Ref. 36].

3.4.10 The Metropolitan Council

The Metropolitan Council provides regional planning and wastewater services (collection and treatment) for the seven county metropolitan area. The Metropolitan Council provides review and comment on water management plans, local water management plans, and local comprehensive (land use) plans; conducts lake monitoring (including the Citizen Assisted Monitoring Program); and conducts river and stream monitoring.

Questions concerning the Metropolitan Council's role in water resource management should be directed to the Metropolitan Council, 390 Robert Street North, St. Paul, MN 55101 (651-602-1000). More information is available from the Metropolitan Council's website: Metropolitan Council website [Ref. 37].

Table 3-1 Summary of Regulatory Authorities within the NMCWD

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 Review	Broad environmental assessment required for certain proposed developments and other activities.

Table 3-1 Summary of Regulatory Authorities within the NMCWD

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.
	NPDES General Stormwater Permit for small Municipal Separate Storm Sewer Systems (MS4s)	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 permittees 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 Stormwater 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.

4.0 Issue Identification

This section of the Plan summarizes some of the key issues facing the Nine Mile Creek Watershed District. Issue identification was an important task in development of this Plan, including identification and prioritization of issues by the NMCWD Board of Managers, Technical Advisory Committee (TAC) members, and the public. The key issues identified through this process are among the following topic areas: (1) water quantity and flood control; (2) stormwater management; (3) lake management; (4) stream management; (5) open spaces and recreational uses; (6) wetland management; (7) aquatic invasive species; (8) groundwater; (9) land use management; (10) education and outreach; and (11) organizational management. The issues are discussed in the respective topical subsections below.

4.1 Water Quantity and Flood Control

4.1.1 Background

Flood control was the key issue in the formation of the Nine Mile Creek Watershed District in 1959. The protection of human life and structures at risk of damage from flooding was the first priority of the District and continues to be a primary objective.

The NMCWD developed a flood control plan in 1960 and established a 100-year frequency flood envelope (i.e., floodplain) along the creek in 1961. Since then, the District has completed several major flood control projects (see Figure 1-2) with the objective of detaining flood flows within the floodplain and reducing flowrates. The NMCWD also historically addressed flood control by assuming ultimate development conditions when originally establishing the floodplain. By doing this, sufficient flood volume capacity was provided as development occurred within the watershed. In addition, stormwater rate control requirements were implemented to mitigate the impacts of increased impervious surfaces on the overall water management system.

In 2006, for the purposes of updating the Federal Emergency Management Agency (FEMA) Flood Insurance study of the Nine Mile Creek floodplain, the District developed a hydrologic and hydraulic model using XP-SWMM software. The detailed model was used to generate revised 100-year frequency floodplain maps and revised floodplain profiles. In 2013-2015, the NMCWD updated their hydrologic and hydraulic model to reflect the increased precipitation frequency estimates for the region based on NOAA's 2013 Atlas 14 publication. A revised 100-year floodplain map and floodplain profiles were adopted by the NMCWD in January 2016.

The emphasis of the NMCWD's Atlas 14 modeling analysis was on the Nine Mile Creek system, including inline lakes and storage areas. While model updates were made throughout the entire watershed to account for increased stormwater runoff, a rigorous evaluation of flood risk in ponds, wetlands, lakes and low areas not immediately adjacent to the creek system remains to be completed.

4.1.2 Flood Control Challenges

Flooding is a concern for the Nine Mile Creek Watershed District and local cities due to the threat to public safety and potential for significant property damages and economic losses. Flooding can cause other damages that are harder to quantify, including the following:

- Flooding of roads so they are impassable to emergency vehicles and residents
- Reduced redevelopment potential
- Shoreline erosion
- Increased pollutants in stormwater discharges
- Destruction of riparian habitats and vegetation such as grass, shrubs, trees, etc.
- Unavailability of recreational facilities for use by the public (e.g., inundation of shoreline) and/or restricted recreational use of waterbodies
- More strain on budgets and personnel for repairing flood-damaged facilities and controlling public use of facilities during flooding events
- Alterations to the mix and diversity of wildlife species as a result of inundation of habitats

Updated NOAA Atlas 14 precipitation frequency depths result in increased flood risk throughout the Nine Mile Creek watershed. The Atlas 14 hydrologic and hydraulic modeling analysis and revised 100-year floodplain mapping and profiles identified several locations along Nine Mile Creek and its tributaries where increased flood elevations may impact structures. There are several known regional flooding problems upstream of the creek system, such as the Pentagon Park/Border Basin area within Edina and Bloomington and the Penn Avenue/American Boulevard area within Bloomington. Identification of additional localized flooding issues is anticipated as flood risk in areas upstream of the creek system is evaluated in more detail.

Beyond Atlas 14, climatologists indicate that large rainfall events are occurring more frequently and climate change predictions indicate large rainfall events will become more extreme in the future in this region. These changing rainfall patterns will pose additional flood risk for local cities, businesses and residents within the Nine Mile Creek watershed.

4.1.3 Priority Issues/Opportunities

During the development of this Plan, the Board of Managers, local cities, and other stakeholders identified flood control as a top concern, including the following specific priority issues/opportunities:

- Assisting local cities in prioritizing and addressing increased flood potential resulting from Atlas 14 precipitation frequency depths.
- Promoting stormwater volume reduction policies, programs, and implementation projects to reduce flood potential and minimize flood impacts to water resources within the watershed.

- Developing a climate change adaptation strategy to understand and address potential flood risks.

4.2 Stormwater Management

The quality of surface waters within the Nine Mile Creek watershed is greatly influenced by stormwater runoff. The quality and quantity of stormwater runoff, from rainfall and snowmelt, are dependent on the hydrology and the physical conditions of the watershed. Hydrology is dependent on weather, topography, soils, land use/land cover, and other factors. Changes to any of these factors will affect the quality and quantity of stormwater runoff. While some of the factors are difficult to control, changes to land use/land cover can be regulated and managed. To achieve the NMCWD goals for maintaining and improving water quality, and managing water quantity, stormwater runoff must be carefully and closely managed.

4.2.1 Background

The contributing watershed to Nine Mile Creek has changed over time from a natural condition to agricultural land use, and finally to urban land use. The most significant change associated with urbanization, with regard to the downstream waterbodies, is an increase in stormwater runoff. With urbanization, the amount of impervious surface and the associated rate and volume of runoff increases. This results in more frequent bankfull flows in the creek, causing deepening and widening of the channel and increased erosion. Increased runoff also transports additional pollutants to downstream waterbodies. Wetlands can be especially susceptible to inputs from stormwater runoff, as increased runoff modifies the hydrologic regime and ecological balance, impacting water quality, wildlife habitat, and vegetation, among other functions and values.

Stormwater best management practices (BMPs) are often constructed in the upstream watershed to slow the rate of stormwater discharge to the downstream waterbodies to a more natural flow and to remove pollutants. Infiltration of stormwater runoff is the most effective means of limiting the impacts of urbanization, as these practices reduce the total volume of runoff to the downstream receiving waterbodies.

For most waterbodies in the Nine Mile Creek watershed, stormwater runoff is a major contributor of pollutants. As urbanization increases and other land use changes occur within the watershed, nutrient and sediment inputs (i.e., loading) from stormwater runoff can far exceed the natural inputs to waterbodies. In addition to nutrients and sediment, stormwater runoff may contain pollutants such as chlorides, oil, grease, chemicals (including hydrocarbons), metals, litter, and pathogens, which can severely reduce water quality.

Land use changes resulting in increased imperviousness (e.g., urbanization) or land disturbance (e.g., urbanization, construction, or agricultural practices) result in increased amounts of nutrients (phosphorus and nitrogen) carried in stormwater runoff. For lakes, ponds, and wetlands within the watershed, phosphorous is typically the pollutant of primary concern. While nitrogen can be a contaminate of concern in some waterbodies in Minnesota, data collected from Nine Mile Creek indicates that nitrogen levels within the stream are generally well below the state standard and have not been identified as a significant concern. In addition to watershed (stormwater runoff) sources, other sources of phosphorus

include atmospheric deposition, and internal loading (e.g., release from anoxic sediments, algae die-off, aquatic plant die-back, and fish-disturbed sediments).

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

Chlorides are another pollutant of particular concern for waterbodies within the Nine Mile Creek watershed. The primary source of chlorides in stormwater runoff is road salt, applied to roadways, parking lots and sidewalks throughout the winter months to prevent or remove ice build-up. The salt, often in the form of sodium chloride, dissolves in melted snow and is conveyed to downstream waterbodies along with snowmelt runoff. Chlorides are especially difficult to remove once dissolved in water and remain persistent in the environment. High chloride concentrations can be harmful to aquatic life in downstream waterbodies, affecting the osmosis process.

Sedimentation can also have detrimental effects on aquatic organisms in streams, lakes, and wetlands. It is especially problematic in streams where eroded sediments from the watershed can bury the stream bottom and suffocate benthic organisms. Associated with this sediment is often a biochemical oxygen demand that reduces the dissolved oxygen content of stream and lake waters. In lakes, sedimentation problems usually manifest themselves in the form of sediment deltas at the mouths of inflowing discharge points. This deposition may destroy near-shore areas that are important fish spawning and rearing grounds. Sediment accumulation can also plug culverts and other stormwater conveyances, increasing flood risks.

4.2.2 Balancing Stormwater Management Priorities

Stormwater management infrastructure plays a critical societal role, providing local drainage and flood protection. Storm sewer systems are typically designed using "level of service" criteria; drainage systems are designed to remove runoff and prevent significant interference with normal daily transportation, commerce, and access that might be impacted from a rainstorm. Under the designated "level of service" criteria, intersections are not inundated to an extent that adversely impacts driving conditions, right-of-way is undamaged, and public infrastructure operates normally. The modern standard of practice is that systems be designed for a 10-year level of service, which means that there is a 10-percent probability in any year that the system will be overtaxed and unable to meet these criteria.

Stormwater infrastructure is also typically designed to provide a designated "level of protection", to prevent property damage and assure a reasonable degree of public safety following a rainstorm or flooding event. For example, runoff might bypass storm sewer catch basins and collect in low-lying areas and intersections, but would not cause flood damage to structures. Ponded water might temporarily interfere with traffic or access, but public infrastructure should operate normally and public safety should

not be threatened. The "100-year" runoff event, which means there is a 1-percent probability of occurring in any given year, is often recommended as a level of protection guideline.

Providing stormwater management and conveyance, while also protecting downstream waterbodies, can be a challenge, especially given the developed nature of the Nine Mile Creek watershed. Much of the stormwater infrastructure within the watershed was installed prior to the focus on downstream water quality protection, when efficiently draining the landscape was the primary consideration. As a result, stormwater from many areas within the watershed is conveyed directly to the downstream waterbody without treatment. Accordingly, many wetlands within the watershed serve as regional stormwater treatment basins. Protection of these downstream waterbodies often requires retrofitting stormwater best management practices or implementation of lake, wetland, or stream restoration projects. Areas within the watershed that developed in the 1990s and early-2000s typically rely on constructed stormwater ponds to provide treatment prior to conveyance of runoff to downstream waterbodies. Many of these ponds serve as both flood control and water quality infrastructure. Since the District's rule revisions in 2008, rate control, water quality and volume retention best management practices (BMPs) have typically been implemented on-site, where feasible, versus relying on regional systems.

Looking forward, striking a balance between achieving local drainage and flood protection goals and protection of downstream water resources will increasingly be a challenge. As cities and property owners seek to reduce local flood risks, improvement options will likely include increased conveyance capacity, which can have detrimental effects to downstream water resources.

4.2.3 Priority Issues/Opportunities

During the development of this Plan, the NMCWD, local cities, and other stakeholders identified stormwater management as a significant concern, including the following specific priority issues/opportunities:

- Conducting targeted monitoring to measure and track sources of pollutants to downstream waterbodies.
- Reducing stormwater volume and phosphorus loading to downstream waterbodies through educating and implementing best management practices and programs.
- Reducing chlorides in stormwater runoff through education and implementation assistance to local cities and other stakeholders.
- Promoting stormwater reuse to reduce stormwater volume through education and implementation efforts.

4.3 Lake Management

The lakes in the District are an important community asset. These resources supply recreational and aesthetic benefits, enhance property values, serve as sources for groundwater recharge, and provide nutrient removal, wildlife habitat and fishery resources. The high quality of the watershed's lakes makes it

an attractive place for people to live. Preserving the quality of the lakes within the Nine Mile Creek watershed is critical to the existence of a high quality of life among the citizens residing in the watershed and in the larger metropolitan region.

4.3.1 Water Levels

Fluctuations in water levels can be a significant concern for property owners adjacent to waterbodies. While high-water levels (flooding) are more commonly identified as a problem, low-water levels are also of concern to many watershed residents and public officials. The District's lake level monitoring program began in 1960 and was comprised of the three Anderson Lakes and Bush Lake. The program was expanded in 1963 to include monthly monitoring of 26 lakes within the watershed. Lake level management information is summarized in Table 4-1.

Table 4-1 Lake Level Management

Lake	100-Year Flood Elevation (MSL)	Ordinary High Water Elevation[2]	Historical High Water Elevation[2]		Historical Low Water Elevation[2]	
			Elevation	Date	Elevation	Date
Anderson NW	841	839	841.8	07/24/87	834.7	06/25/77
SE	841	839	841.8	07/24/87	833.5	12/08/64
SW	841	839	841.8	07/24/87	835.1	12/08/64
Arrowhead	n/a	875.8	878.6	7/24/87	871.4	2/18/81
Birch Island	n/a	n/a	891.2	03/24/69	877.3	02/13/91
Bryant	855	852.6	854.8	07/24/87	849.3	01/14/77
Bush	835	833.2	836.9*	6/11/99*	826.0	08/08/64
Cornelia	865 (N) 865 (S)	859**	864.1	7/24/87	858.1	10/27/03 12/8/67
Edina	827	822**	825.4	7/24/87	817.8	2/09/82
Glen	906	904.4	905.0	08/06/65	898.4	04/08/97
Lone	901	n/a	901.1	04/04/66	895.4	02/06/90
Minnetoga	903	896.4	899.1	07/24/87	894.1	02/06/90
Mirror	912	907.5	912.1	07/24/87	901.8	01/14/77
Normandale	815	808	815.8	7/24/87	B	B
Oxboro	817	812	813.3	7/24/87	797.9	1/15/91
Penn (Lower)	817	n/a	816.6	07/24/87	803.2	01/31/89
Rose	n/a	925.9	928.4	4/4/66	919.6	1/08/90

Lake	100-Year Flood Elevation (MSL)	Ordinary High Water Elevation[2]	Historical High Water Elevation[2]		Historical Low Water Elevation[2]	
			Elevation	Date	Elevation	Date
Shady Oak	906	903.4	904.4	04/04/66	897.8	01/29/90
Smetana	841	835.2	840.6	07/24/87	830.2	11/08/76
Wing	n/a	940.3	941.5	7/24/87	933.5	1/31/89

[1]100-year flood elevations, rounded up to the nearest digit, are based on Atlas 14 precipitation frequency estimates.

[2]Data from the MDNR, unless otherwise noted.

*Data from the City of Bloomington

**Data from the City of Edina

n/a- indicates Atlas 14 100-year flood elevation not available at the time of plan preparation.

Water level fluctuations can be beneficial for wetlands and shallow lakes. Low water levels promote regeneration and increased diversity of aquatic plant communities, aquatic organisms, and improved fish and wildlife habitat (BWSR, 2014). Intentional drawdown of water levels in wetlands and shallow lakes is a common management practice to manage or control undesired or invasive aquatic plant species, stimulate the growth of desired emergent aquatic plant species, and/or strengthen submergent aquatic vegetation. The drawdown process, which simulates chemical and biological fluctuations that can occur naturally in some waterbodies, can improve wildlife habitat for many species, including waterfowl and shorebirds.

4.3.2 Water Quality

The lakes within the Nine Mile Creek watershed vary in size and characteristics, ranging from deep to shallow, land-locked to impoundments along the creek. The NMCWD has considered the water quality of these lakes a primary concern since the 1990s and has made significant efforts to evaluate and improve conditions. In 1991, the District inventoried and analyzed lake water quality data collected for many of its lakes from 1970 to 1991. In its report *Lake Water Quality Data Inventory and Historic Trend Analysis*, no statistically significant trends in lake water quality were detected over the 22-year time period. More recent data supports the previous assessment, and the complete data set demonstrates that watershed management efforts are generally maintaining lake water quality in accordance with Policy 55 of the *Management Guide* of the Metropolitan Council (MC), which states:.

> *Water quality in the Metropolitan Area lakes and streams should be maintained at least at 1980-81 levels.*

However, this does not necessarily mean that current lake water quality conditions fully support intended beneficial uses of the lakes, and some lakes within the District are included in the MPCA's 303(d) Impaired Waters List (see Section 2.3.1). For this reason, the District completed a series of Use Attainability Analyses (UAAs) for Nine Mile Creek and 21 lakes and their watersheds beginning in 1996. The UAAs followed a

step-wise, outcome-based evaluation and planning process. This process involves following the seven basic steps intended to achieve or maintain water quality conditions that support beneficial uses such as swimming, fishing, aesthetic viewing, and wildlife habitat:

1. Determine current and historic water quality conditions.
2. Set water quality goals that support intended uses.
3. Assess attainment or nonattainment of goals for current watershed land-use conditions.
4. Estimate annual runoff water and pollutant inputs to waterbodies.
5. Calibrate a computer simulation model to predict observed lake- or stream-water quality conditions from annual runoff inputs.
6. Using the calibrated lake-or stream-model, assess water quality goal attainment for current and ultimate watershed land-use conditions and range of climatic conditions.
7. If necessary, recommend feasible alternative remedial measures (i.e., best management practices (BMPs)) to achieve desired water quality.

UAAs are intended to be "Total Maximum Daily Load (TMDL) Equivalent" studies, and implementation of their recommendations should result in removal of the subject waterbodies from the MPCA's *Sec. 303(d.) Impaired Waters* list. Table 4-2 summarizes the timeline and results of the UAAs completed to date. Additional information on the completed UAAs is available on the NMCWD's website.

With this Plan, the District is continuing to promote holistic lake management, with an expanded emphasis on the role of numerous ecological factors in overall lake health, and the interrelated nature of these factors. The District's holistic lake management approach is described in greater detail in Section 6.3 and generally includes factors such as:

- Chemical water quality
- Aquatic communities (e.g., macrophytes, fish, phytoplankton)
- Water quantity
- Wildlife
- Recreation

Water Quality Standards and Impaired Waters

The federal Clean Water Act (CWA) requires states to adopt water quality standards to protect the nation's waters. Section 303(d) of the CWA requires each state to identify and establish priority rankings for waters that do not meet the water quality standards. The list of impaired waters, or sometimes called the 303(d) list, is maintained by the MPCA and updated by the state every 2 years. Several waterbodies within the District are listed on the 2016 MPCA impaired waters 303(d) list for a variety of impairments.

For impaired waterbodies, the CWA requires an assessment that addresses the causes and sources of the impairment. This process is known as a total maximum daily load (TMDL) analysis. A TMDL is a threshold

calculation of the amount of a pollutant that a waterbody can receive and still meet water quality standards. A TMDL establishes the pollutant loading capacity within a waterbody and develops an allocation scheme amongst the various contributors, which include point sources, nonpoint sources and natural background, as well as a margin of safety. As a part of the allocation scheme, a waste load allocation is developed to determine allowable pollutant loadings from individual point sources (including loads from storm sewer networks in MS4 communities), and a load allocation establishes allowable pollutant loadings from nonpoint sources and natural background levels in a waterbody.

Lakes and streams within the District that are included on the MPCA's 2016 draft impaired waters 303(d) list are presented in Table 2-3. Current impaired waters listings are available from the MCPA website: Impaired Waters Listings: MPCA [Ref. 8].

Table 4-2 Summary of Use Attainability Analyses Management Strategies and Assessment of Attainment of State Lake Eutrophication Standards

Summary of Use Attainability Analyses Management Strategies and Assessment of Attainment of State Lake Eutrophication Standards			
Lake	UAA Completion Date	UAA Management Strategies	Does 10-Year Average Summer Water Quality Meet MPCA State Eutrophication Standards?[1]
Northwest Anderson	January 2005	Control curly-leaf pondweed via drawdown (completed); improve the water quality and stormwater detention efficiency of a runoff detention pond (NS-AL-12) east of Prairie Lakes Drive (completed); whole-lake alum treatment to control internal phosphorus loading from sediment.	*Yes*
Southeast Anderson	January 2005	Control curly-leaf pondweed via herbicide treatment with endothall (completed); whole-lake alum treatment to control internal phosphorus loading from sediment; improve the control structure between Southeast and Southwest Anderson lakes.	Yes[2]- TP, Secchi No[2]- Chlor-a
Southwest Anderson	January 2005	Control curly-leaf pondweed via drawdown (completed); whole-lake alum treatment to control internal phosphorus loading from sediment (completed).	Yes
Arrowhead	July 2006	Control curly-leaf pondweed and Eurasian watermilfoil via herbicide treatment; continue aquatic plant surveys to monitor changes in aquatic invasive and native plant species (ongoing periodic monitoring); collect additional water quality data to assess lake water quality, but turn off aerators and refrain from chemical treatment of the lake during data collection (when monitoring data were collected for UAA, aerators were running and the lake had received a chemical treatment to control curly-leaf pondweed)	Yes[2]- TP, Secchi No[2]- Chlor-a
Birch Island	June 2000	Construct new stormwater treatment/detention pond (Pond BIL4-1) (completed); improve an existing runoff detention pond (BIL8) (completed); construct a pipe bypass system to convey groundwater and surface water runoff north of CSAH 62 directly to Birch Island Lake to restore the lake's historic hydrology (completed); continue aquatic plant surveys to monitor the growth of purple loosestrife, an aquatic invasive species (ongoing periodic monitoring).	Yes[2]- Chlor-a, Secchi No[2]- TP
Bryant	October 2003	Restore wetland (BL-11) located west of I-494 (completed); whole-lake alum treatment to control internal phosphorus loading from sediment (completed); optional management recommendations – herbicide treatment to control curly-leaf pondweed and Eurasian watermilfoil, aquatic invasive species.	Yes[3]
Bush	April 2002	More stringent goals to provide greater protection of Bush Lake; herbicide treatment of curly-leaf pondweed and Eurasian watermilfoil (aquatic invasive species).	Yes

Summary of Use Attainability Analyses Management Strategies and Assessment of Attainment of State Lake Eutrophication Standards			
Lake	UAA Completion Date	UAA Management Strategies	Does 10-Year Average Summer Water Quality Meet MPCA State Eutrophication Standards?[1]
Cornelia (North Basin)	January 2010	Continue aquatic plant surveys to monitor the growth of purple loosestrife and curly-leaf pondweed (aquatic invasive species) (ongoing periodic monitoring); evaluate the fishery to better understand carp activity and management options such as elimination of reinfestation, suppressment of recruitment, and removal of adult carp; whole-lake alum treatment to control internal phosphorus loading from sediment; consider adding new stormwater runoff treatment/detention Pond NC-62a to treat stormwater runoff from the North Cornelia direct watershed; consider adding iron-enhanced sand filtration basin and/or alum treatment plant to treat inflow from NC-3 (Swimming Pool Pond).	No
Cornelia (South Basin)	January 2010	Continue aquatic plant surveys to monitor the growth of purple loosestrife and curly-leaf pondweed (aquatic invasive species); evaluate the fishery to better understand carp activity and management options such as elimination of reinfestation, suppression of recruitment, and removal of adult carp;	No
Edina	Not Yet Completed	--	No
Glen	June 2000	Add two new stormwater runoff treatment/detention ponds (692-3 and RP1) (completed); upgrade pond 629-1 from the City of Minnetonka Surface Water Management Plan in order to meet MPCA and Nationwide Urban Runoff Program (NURP) criteria for a regional runoff detention/treatment pond (completed); manage purple loosestrife by releasing *Galerucella beetles* onto the plants or hand removing the plants.	Yes
Holiday	April 2010	Control curly-leaf pondweed via herbicide treatment with endotholl; whole-lake alum treatment to control internal phosphorus loading from sediment; monitor sediment deltas surrounding storm sewer outlets into the lake and manage as the need arises.	No
Indianhead	July 2006	Treat the lake with copper sulfate to attain a temporary improvement in water quality; continue aquatic plant surveys (ongoing periodic monitoring); collect additional water quality data to assess lake water quality, but turn off aerators and refrain from chemical treatment of the lake during data collection (when monitoring data were collected for UAA, aerators were running and the lake had received two copper sulfate treatments).	Yes[2]- TP, Secchi No[2]- Chlor-a
Lone	July 2000	Add one new stormwater runoff treatment/detention pond (582-3) (infiltration basin installed in 582-3); manage purple loosestrife by releasing *Galerucella beetles* onto the plants or hand removing the plants.	Yes

Summary of Use Attainability Analyses Management Strategies and Assessment of Attainment of State Lake Eutrophication Standards			
Lake	UAA Completion Date	UAA Management Strategies	Does 10-Year Average Summer Water Quality Meet MPCA State Eutrophication Standards?[1]
Minnetoga	June 2000	Add three new stormwater treatment ponds (572, 567-2, and 567-3 (the final design did not include construction of 567-2) (completed); upgrade pond 556 from the City of Minnetonka Surface Water Management Plan (to meet Minnesota Pollution Control/Nationwide Urban Runoff Program criteria for a regional runoff detention pond) (completed); manage purple loosestrife by releasing *Galerucella beetles* onto the plants or hand removing the plants.	Yes
Mirror	January 2004	Add water quality treatment volume to existing pond ML-3; construct a new water quality treatment pond in subwatershed ML-16; alum application to the entire surface of Mirror Lake to reduce internal phosphorus from sediment; manage curly-leaf pondweed with whole-lake endotholl treatments to reduce the plant's impact on water quality; manage purple loosestrife by releasing *Galerucella beetles* onto the plants or hand removing the plants.	No
Normandale	October 2005	Improve Bryant (completed) and Smetana lakes' water quality to reduce phosphorus loading to Normandale Lake; add two water quality treatment ponds – one pond would be located along the North Fork of Nine Mile Creek in Hopkins while the other would be located along the South Fork of Nine Mile Creek just upstream of East Bush Lake Road; consider constructing an alum treatment facility, located at the confluence of the North Fork and South Fork of Nine Mile Creek, with the capacity to treat 15 cubic feet per second stream flow.	Yes[2]- Chlor-a, Secchi No[2]- TP
Penn (Lower)	December 2003	Construct treatment ponds to treat additional runoff waters from future 35W expansion; continue annual goose removal program; manage purple loosestrife by releasing *Galerucella beetles* onto the plants; other water quality improvement measures were considered, but were not recommended because implementation would not change the lake's trophic status (hypereutrophic).	No
Rose	April 2010	Whole-lake alum treatment to control internal phosphorus loading from sediment; continue aquatic plant surveys to monitor changes in curly-leaf pondweed (ongoing periodic monitoring).	No
Shady Oak	May 2000	No further BMPs, besides those prescribed by the Minnetonka Water Resources Management Plan, are required to meet the District's water quality goals. However elevating the outlet from pond 531 could improve the water quality in the lake (completed). Manage purple loosestrife by releasing *Galerucella* beetles onto the plants; continue aquatic plant surveys and strive to prevent the introduction of Eurasian watermilfoil.	Yes

Summary of Use Attainability Analyses Management Strategies and Assessment of Attainment of State Lake Eutrophication Standards			
Lake	UAA Completion Date	UAA Management Strategies	Does 10-Year Average Summer Water Quality Meet MPCA State Eutrophication Standards?[1]
Smetana	**May 2003**	**Implementation of Bryant Lake UAA recommendations will also improve Smetana Lake's water quality; add three new stormwater treatment ponds (SL-5A, SL-5B, and SL-1); manage purple loosestrife by releasing *Galerucella beetles* onto the plants; control curly-leaf pondweed via herbicide treatment with endothall.**	**Yes[2]- Chlor-a, Secchi No[2]- TP**
Wing	**April 2010**	**Control curly-leaf pondweed via herbicide treatment with endotholl; whole-lake alum treatment to control internal phosphorus loading from sediment; monitor sediment deltas surrounding storm sewer outlets into the lake and manage as the need arises.**	**No**

[1] 10-Year average summer (June-September) total phosphorus, corrected chlorophyll a, and Secchi disc values shown in Table 5-2 were compared with MPCA standards detailed in Minnesota Administrative Rules Chapter 7050.0222, Subp. 4 and Subp. 4a to determine whether 10-year average summer water quality has met the MPCA water quality standards for lakes. The MPCA assessment guidance manual (available at MPCA assessment guidance manual: (MPCA) [Ref. 38] details the assessment process to determine whether or not summer average lake water quality has met MPCA water quality standards. An excerpt from page 35 follows:

> "Lakes where TP and at least one of the response variables (corrected chl-*a* or Secchi) exceed the standards are considered impaired. For lakes with excellent data quality (2+ years of data) and where all parameters are better than the standards, an assessment of full support is made. Lakes with good quality data (1 year data plus Secchi trends) may be considered for full support assessment as well. In this case the assessment thresholds have been adjusted by 20 percent (made more stringent) and lakes with good quality data that meet these thresholds will be considered fully supporting. This modification of the thresholds provides a margin of safety to assure that lakes with lesser amounts of data are supporting the beneficial use.

[2] For lakes that do not meet minimum data requirements and use support cannot be determined, a determination of insufficient data will be made. In some instances, a lake may have good or excellent quality data but only one of the thresholds is exceeded (e.g., TP or corrected chl-*a* or Secchi), while the other two are in compliance with the standards. In this instance, the MPCA will be considered to have insufficient data to determine impairment."

[3] While Bryant Lake remained on the MPCA's draft 2016 Impaired Waters list, the most recent 10-year average summer total phosphorus, chlorophyll a, and Secchi disc values indicate the lake is achieving the state's eutrophication standards. MPCA staff have indicated that Bryant Lake will likely not be included on the 2018 Impaired Waters list.

Indices of Biological Integrity

An index of biological integrity (IBI) is a multi-metric approach that depicts the overall biological integrity or condition of a system. As of 2016, the MPCA and MDNR are in the process of developing additional IBIs to assess whether lakes may be impaired for aquatic life, including:

- **Lake Plant Eutrophication Index of Biological Integrity (Plant IBI)** – The Plant IBI is intended to measure the response of a lake plant community to eutrophication. The Plant IBI includes two metrics to assess the viability of aquatic life use: 1) taxa richness and 2) floristic quality index. Taxa richness is the estimated number of taxa in a lake. Floristic quality index (FQI) distinguishes those plant communities that may have similar taxa richness but differ in taxa composition. Since lake plant species differ in their tolerance to eutrophication stress. The MPCA and MDNR will use the Plant IBI to determine if individual lakes are meeting the CWA standards with respect to aquatic life and potentially identify lakes that are impaired (i.e., not supporting aquatic life use based on the stress received from anthropogenic eutrophication).
- **Fish-based Index of Biological Integrity (Fish IBI)** – the MDNR developed four fish-based IBI tools for lakes 100 – 10,000 acres in size and within most areas of the state. The Fish IBI tools include between 8 and 15 metrics, with metric scoring individualized for each tool. Metrics are of three types: species richness, community assemblage, and trophic composition. Thresholds for impaired and exceptional resources have been determined. As of the writing of this Plan, only the impairment thresholds are used in the assessment process. Identifying lakes with exceptionally high IBI scores is used in prioritization efforts. MPCA and MDNR will use the Fish IBI to identify lakes that are impaired for aquatic life and draft stressor identification reports to identify the source of the impairment.

As of the writing of this Plan, the MPCA has not assessed District lakes relative to the Plant IBI or Fish IBI. It is possible that District lakes may be included in the MPCA's impaired waters 303(d) list in the future based on the results of Plant IBI and Fish IBI assessments.

Water Quality Goals

In its 1996 *Water Management Plan*, the NMCWD adopted its own lake management goals based on designated use classifications and the levels of water quality required to support the intended beneficial uses. Total phosphorus, chlorophyll *a*, and Secchi disc transparency measurements were used to assess lake trophic status (i.e., fertility level) according to the Carlson Trophic State Index (TSI) value methodology. In 2008, the State of Minnesota adopted Lake Eutrophication standards that include ecoregion-based criteria for shallow and deep lakes. The eutrophication standards include criteria for total phosphorus, chlorophyll-a, and Secchi disc transparency. In 2014, the State of Minnesota adopted eutrophication water quality standards for streams. With this Plan, the District has modified its water quality goals to be consistent with the State of Minnesota lake and stream eutrophication standards. The District's lake and stream water quality standards are described in Section 2.3. Overall lake and stream management goals are described in greater detail in Section 6.3.

Algal Blooms

Algae (phytoplankton) are small aquatic plants that derive energy from sunlight and dissolved nutrients found in lake water. Green algae are considered beneficial in that they form the base of a lake's food web, providing food for several types of animals, including zooplankton, which are in turn eaten by fish. Over-abundance of green algae can hinder lake health, altering the structure of the zooplankton community and causing poor water clarity, which can negatively impact fish predation and recreation conditions. Although algal blooms can be a nuisance, the green algae are generally not harmful.

Filamentous algae are a form of green algae that can create recreational nuisance conditions in lakes and streams. The filamentous algae (also called periphyton) form dense mats of hair-like strands on the lake bottom or on submerged plants. The algae produce oxygen that becomes entrapped in the mat of strands and give the mat buoyancy that causes it to rise to the surface where it can cover large areas of the lake. The filamentous algae problem is often persistent throughout the growing season because nutrient conditions favor the presence of the algae and they can reproduce rapidly by plant fragments, spores, and cell division.

Management of filamentous algae is similar to the algae that float in the water column (planktonic algae). The most effective management option for both filamentous algae and planktonic algae is nutrient reduction to create a nutrient condition that is unfavorable for algal growth. However, some species of filamentous algae exist under relatively low nutrient concentrations. When nuisance mats of algae are present, removal of the mats by harvesting or chemical treatment may provide a short-term control option. However, because filamentous algae can grow very rapidly, the benefit of a chemical treatment or harvesting may only last a few days or a few weeks.

Blue-green algal blooms, often described as looking like pea soup or spilled green paint, can be harmful. Blue-green algae, which are not actually algae but types of bacteria called cyanobacteria, can produce algal toxins that can pose a health threat for pets and people when concentrations become high enough. Blue green algae thrive in warm, shallow, nutrient-rich lakes; blooms typically occur during summer and early fall, when water temperatures are higher than 75°F. Because it is not possible to determine if blue green algae are toxic by observation, humans and animals should avoid contact with water with blue-green algae. Laboratory texting is required to determine if algal toxins are present. Information about harmful algal blooms is available from the MPCA at the following link: https://www.pca.state.mn.us/water/blue-green-algae-and-harmful-algal-blooms [Ref. 46].

4.3.3 Priority Issues/Opportunities

During the development of this Plan, the Board of Managers, local cities, and other stakeholders identified lake management as a top concern, including the following specific priority issues/opportunities:

- Improving water quality to meet the MPCA's water quality standards for all lakes within the Nine Mile Creek watershed.
- Continuing and expanding lake monitoring program to measure success of NMCWD projects.

- Applying a subwatershed approach to evaluating and addressing lake water quality problems, with a strategy of implementing improvements in the upstream portions of the watershed first and moving toward the downstream portions.

4.4 Stream Management

The streams in the District are an important community asset. These resources supply recreational and aesthetic benefits, enhance property values, convey stormwater runoff downstream, and provide wildlife habitat and fishery resources. The high quality of the watershed's streams makes it an attractive place for people to live near. Preserving the quality of the streams within the Nine Mile Creek watershed is critical to the existence of a high quality of life among the citizens residing in the watershed and in the larger metropolitan region.

4.4.1 Background

Nine Mile Creek has a total watershed area of approximately 50 square miles. Approximately 15 square miles of the watershed is tributary to lakes, ponds, or wetlands that are landlocked. The watershed ranges from relatively flat topography in the upper and middle portions of the watershed, to the steep lower valley which descends to the Minnesota River at the downstream portion of the watershed. Nine Mile Creek originates as two branches: a north branch (North Fork), and a south branch (South Fork).

The South Fork begins at Minnetoga Lake in Minnetonka, flows south through Bryant and Smetana Lakes in Eden Prairie before continuing east toward Normandale Lake in Bloomington. A secondary branch, Ditch 34, originates at Birch Island Lake, combines with the Glen Lake outlet in the Eden Prairie Industrial Park area and flows into Bryant Lake on the west side of the lake.

The North Fork begins in Hopkins near Excelsior Boulevard (County Road 3) and west of 11th Avenue. It flows Southerly through Hopkins and Edina, joining with the South Fork upstream of Normandale Lake.

From Normandale Lake, the creek flows through both Nord Myr Marsh and Marsh Lake. The outflow from Marsh Lake is controlled by the Marsh Lake dam. From here, the creek flows through Bloomington residential areas, with yards abutting the creek for much of its length. After crossing Old Shakopee Road, the creek steepens as it descends into its lower valley. The land use in the lower valley is park/open space, owned by the City of Bloomington.

Historical aerial photos of the NMCWD were reviewed for years 1937 and 1940 to gain a better understanding of the history of the creek and associated watershed, particularly with regard to land use. The NMCWD was primarily agricultural until the 1950s, when urbanization rapidly occurred. The creek was straightened prior to 1935 to provide better drainage for farming in the area that is now Normandale Lake, Nord Myr Marsh, and Marsh Lake Park. This portion of the creek was Ditch No. 1. Portions of the North Fork and South Fork were also straightened, particularly along the North Fork near TH 100 and in Bredesen Park area.

The change in land use from agricultural to urban has likely improved much of the riparian vegetation, as grazing and farming practices ceased. Vegetated buffers now exist in many areas that were previously grazed. Because vegetation is a very strong influence on stream stability, the overall condition of the stream may have improved as a result of this land use change, however, the frequency and duration of flood flows has increased with urbanization, offsetting the benefits of improved vegetation.

4.4.2 Past Stream Monitoring and Management

The Nine Mile Creek Watershed District has evaluated Nine Mile Creek annually since 1968 to identify problems and/or substantial changes in flow, water quality, or the stream's biological community. Prior to completion of its 1996 Plan, the District conducted an annual stream water quality monitoring program with sampling station locations located at or near municipal boundaries. Much of that monitoring was conducted during fair weather when flows were relatively low, not during periods of elevated flows when stream water quality is likely to be degraded by runoff-borne pollutants. Beginning in 1997, the District's stream water quality monitoring program was revised to collect data that are more diagnostic of stream health, including measurements of physical, chemical, and biological parameters. The District's stream monitoring program was further expanded in 2003 in response to Nine Mile Creek being listed on the MPCA's Section 303(d) Impaired Waters list because of excessive turbidity and chloride concentrations and biotic impairments, based on data collected downstream of 106th Street in Bloomington by the Metropolitan Council. The current NMCWD stream water quality monitoring program includes:

- Annual monitoring of the fish community during summer to determine compliance with the MPCA biological standard
- Annual macroinvertebrate monitoring during October to determine 'biotic index' values and to detect change in stream water quality.
- Annual habitat monitoring during summer to assess stream substrate, stream bank erosion, and sediment accumulation including depth of fine sediment, and the embeddedness of coarse substrate such as gravel, rubble, cobble, and boulders (i.e., the extent to which large particles are surrounded by small particles such as silt or sand).
- March through October monthly measurements of water quality parameters essential for the support of fish and aquatic life in the stream.
- Runoff-related stream water quality monitoring, including operation of continuous flow gaging and storm runoff-activated automatic sampling stations on the North- and South-Forks and Main Stem of Nine Mile Creek.

In addition to its monitoring program, the District has completed several special studies to either identify problems or to determine solutions to previously identified problems. Stream water quality problems identified by the District's annual evaluation and/or special studies are detailed in the following sections.

4.4.3 Chlorides

The NMCWD's annual stream evaluation has identified excess chlorides as a problem within the Creek. Specific conductance values throughout the stream system have annually exceeded the MPCA state water quality chronic standard of 230 milligrams per liter in the spring and periodically other times of the year. The high values indicate the presence of excess chlorides in the stream. In 2004, the MPCA determined that Nine Mile Creek did not meet the chloride standard for streams and listed Nine Mile Creek as impaired on the MPCA's 303(d) list of impaired waters of the State.

Road salt has been determined to contribute the majority of the anthropogenic (caused by man) chloride in Nine Mile Creek. Chloride comprises approximately three-fifths of the chemical composition (or mass) in sodium chloride based road salts. Salt application on the vast amount of impervious surfaces throughout the watershed can contribute to excess chloride levels directly via snowmelt and rainfall runoff delivery as well as increased runoff of water to Nine Mile Creek.

A Total Maximum Daily Load (TMDL) study was completed in 2010 to identify management measures to reduce chloride levels in Nine Mile Creek. The study, approved by the USEPA in 2010, determined that commercial and private applications of salt represent the single largest source of chloride, with 37 percent of the estimated load to Nine Mile Creek (MPCA, 2010). The cities of Edina, Bloomington and Hennepin County combine for another 40 percent of the total load, based on approximated salt application rates from 2007-2009. The cities of Eden Prairie, Hopkins, Minnetonka, and Richfield contribute approximately 14 percent of the total load and MnDOT is estimated to contribute approximately 6 percent of the total load. It is estimated that the background or irreducible load currently represents 3 percent of the total chloride load. For Nine Mile Creek, the chloride load capacity is 2,476 tons of chloride per year to meet the water quality standards during the snowmelt/spring runoff season. To attain this chloride load capacity, a 63% reduction in the existing watershed chloride load estimated for Nine Mile Creek would be required. This reduction can be achieved through management of road salt inputs from both road authorities and commercial and private applicators.

For the TMDL implementation, the NMCWD initially took the role of providing guidance for implementing projects to achieve the chloride reduction. However, other MS4s are expected to fulfill their existing responsibilities in stormwater management to achieve the TMDL goals. Specifically, the NMCWD would:

- Look for opportunities to implement voluntary projects to reduce chloride loading wherever possible, taking advantage of cost-share or grant programs for training and other improvements.
- Provide education and outreach regarding impacts of salt use on waterbodies and methods to reduce salt application.
- Continue to implement Stormwater Pollution Prevention Plans (SWPPPs) and to improve public works maintenance practices and training wherever possible.
- Continue to implement volume reduction BMPs on all watershed projects to comply with NMCWD standards.

The MS4s continue to work toward attainment of the TMDL target chloride reductions.

4.4.4 Biological Impairment – Fish

Fish data collected from Nine Mile Creek were assessed to determine compliance with the MPCA biological standard for the period of 2003 through 2015. The most downstream sample location of the Main Stem of the Creek, ECU -7C (downstream of 106th Street) has met the MPCA standard annually during 2003 through 2015. All other locations have met the standard during some years and have failed to meet the standard during other years. However, during 2006 and 2012, all Nine Mile Creek locations met the MPCA biological standard for fish. During the 2003-2015 monitoring period:

- The North Fork location, ECU-2 (east of Cahill Road and north of Brook Drive), met the standard 54 percent of the time.
- The most downstream North Fork location, ECU-2A (downstream of Interstate 494 and immediately upstream of 81st Street in Bloomington), met the standard 62 percent of the time.
- The most downstream South Fork location, ECU-5A (in Corridor Park immediately downstream from Interstate 494 in Bloomington and west of East Bush Lake Road), met the standard 31 percent of the time.
- The most upstream Main Stem location, ECU-7A (downstream of Marsh Lake at 98th Street in Bloomington), and the middle Main Stem location, ECU-7B (downstream of Old Shakopee Road at 103rd Street in Bloomington), each met the standard 54 percent of the time.

In 2003, Nine Mile Creek was placed on the MPCA list of impaired waters for impaired biota due to low fish Index of Biological Integrity (IBI) scores. Biological impairment for fish in the Minnesota River Basin, including Nine Mile Creek, was defined as failing to meet the Minnesota River Assessment Project (MRAP) IBI impairment threshold score of 30 or greater out of a possible score of 60. Only streams with a watershed area of at least 5 square miles were obligated to meet the IBI impairment threshold.

In 2009, a Biological Stressor Identification study was completed to determine the causes of the Nine Mile Creek biological impairment for fish. The study concluded:

- The probable cause of impairment on the South Fork of Nine Mile Creek is inadequate dissolved oxygen. Although the impairment can be caused by numerous stressors, the data suggests that inadequate dissolved oxygen is the most prominent of the stressors, followed by excess sediment and inadequate baseflow.
- The probable causes of impairment on the North Fork of Nine Mile Creek are inadequate dissolved oxygen and excess sediment.
- The probable causes of impairment on the Main Stem of Nine Mile Creek are inadequate dissolved oxygen and excess sediment.

The 2009 data indicate low dissolved oxygen levels were related to reduced flow resulting from reduced precipitation, a natural effect. Stream flow and continuous dissolved oxygen data, collected at continuous flow gaging stations located at 78th Street on the South Fork and at Metro Boulevard on the North Fork indicate minimum dissolved oxygen concentrations generally varied with flow. Flow increases were accompanied by higher minimum dissolved oxygen concentrations while flow decreases were accompanied by lower minimum dissolved oxygen concentrations. The data provide evidence that minimum dissolved oxygen concentrations causing stress to the fish community were due to low flow conditions within the Creek caused by reduced precipitation.

Data from the Main Stem of Nine Mile Creek at 98th Street indicate the relationship between flow and dissolved oxygen concentrations were less evident than the relationships observed on both the South and North Forks. The uncertainty in the source of the low dissolved oxygen concentrations at the 98th Street location is due to the influence of Marsh Lake on downstream waters. Oxygen levels within Marsh Lake fluctuate due to biological activity within the marsh – plant photosynthesis raises oxygen levels and plant senescence lowers oxygen levels. Hence, water exiting the marsh may have either lower or higher oxygen levels than downstream locations, depending upon biological processes occurring within the marsh. The data indicate low dissolved oxygen levels in the stream at 98th Street are due to two natural effects – low flows and natural biological processes within Marsh Lake.

Continuous dissolved oxygen data from 2009 and habitat data from 2003 through 2006 were evaluated to determine whether diel effects were a secondary cause of low oxygen concentrations in the Creek. Respiration by plants and/or algae can deplete a stream of oxygen during the night when there is no photosynthesis to add oxygen to the stream.

Diel effects were consistently observed in 2009 on the South Fork, North Fork, and Main Stem locations. Daily dissolved oxygen levels, on average, ranged from:

- A low of 0.5 to a high of 11.1 mg/L on the South Fork at 78th Street;
- A low of 2.5 to a high of 7.2 mg/L on the North Fork at Metro Boulevard; and
- A low of 3.3 to a high of 7.3 mg/L on the Main Stem at 98th Street.

Minimum oxygen levels occurred during the night when photosynthesis and associated oxygen production stops; maximum levels occurred during the day when oxygen production increases due to photosynthesis. The 2009 data provide evidence that diel effects in the Creek cause low dissolved oxygen levels that stress the stream's fishery. The primary cause of the Creek's biological impairment for fish is inadequate dissolved oxygen due to natural causes rather than anthropogenic. For this reason, the NMCWD requested that the MPCA delist the stream from the MPCA's 303(d) list of impaired waters of the State.

The stream's biological impairment for fish is primarily due to natural causes, which cannot be changed by management measures. However, continued watershed management for sediment, flow, and chlorides, as

well as management and further study of riparian habitat, would be valuable. Data collected during the biological stressor identification study suggest that these efforts would improve biotic integrity.

4.4.5 Stream Bank Erosion/Stream Instability

In 1997 and again in 2003, the NMCWD completed a physical assessment of Nine Mile Creek using the classification system developed by D.L Rosgen in "A Classification of Natural Rivers" (Rosgen, 1994). Comparing 1997 and 2003 results identified areas of the stream that have degraded due to stream bank erosion. Assessment results are discussed in detail in the 2007 Plan. A brief summary follows:

- **North Fork between CSAH 62 and 70th Street** – Bank erosion was evident where the channel abuts residential properties with turf lawn to the streambank. Here, the banks were prone to slumping into the creek.
- **South Fork north of CSAH 62** – During the 1997 through 2003 period, scouring lowered the profile of the channel by as much as one foot. Left unchecked, this erosion will migrate upstream and will likely become larger and more problematic.
- **South Fork south of Interstate 494 and west of East Bush Lake Road** – The streambed had aggraded between 1997 and 2003 causing the channel to widen. If the bed aggradation and channel widening continue, the stream type could change to a less desirable channel type from a hydraulic and ecological perspective.
- **Main Stem downstream of Marsh Lake, south of West 98th Street and west of Penn Avenue** – Stream banks continued to actively erode in this reach, especially where turf lawns abut the channel. Several factors contribute to this erosion: (1) lack of vegetative root mass due to turf lawn areas and shade from trees; (2) several large storm sewers discharge to the stream in this vicinity, increasing the frequency of bankfull flow conditions; and (3) the streamflow may be "sediment starved" as it leaves Marsh Lake, and thus have a greater tendency to erode its banks and bed. Several homeowners have added rock riprap to the streambanks along their property, but this only accelerates erosion of the unprotected areas.

The Nine Mile Creek Watershed District has completed two stream stabilization projects: the Lower Valley Stabilization and Restoration Project and a stream restoration project in the headwaters reaches of the North Fork of Nine Mile Creek in Hopkins. The District will be undertaking a stream restoration project along the North Fork of the Creek in Edina. The South Fork reaches and Main Stem downstream of Marsh Lake have not yet been stabilized and continue to be problematic.

4.4.6 Priority Issues/Opportunities

During the development of this Plan, the Board of Managers, local cities, and other stakeholders identified the water quality of Nine Mile Creek as a significant concern, including the following specific priority issues/opportunities:

- Improving the water quality in Nine Mile Creek, including increasing dissolved oxygen concentrations.
- Improving the stability of Nine Mile Creek and reducing erosion.
- Reducing chloride concentrations in Nine Mile Creek.

4.5 Open Spaces and Recreational Uses

Improving and maintaining the quality of water resources within the Nine Mile Creek watershed is one of the main concerns of the District. Water quality is closely linked to the surrounding environment and land uses. Protecting and enhancing open spaces and natural areas near water resources can aid in improving the water quality of the lakes and streams within the District. Increased public access to these resources and providing places that offer a variety of water resource-related experiences can enhance the public's understanding of the importance of water and natural resources to our communities' vitality and health.

4.5.1 Priority Issues/Opportunities

During the development of this Plan, the Board of Managers, residents and other stakeholders identified open space and access to water resources as an important issue, including the following specific priority issues/opportunities:

- Providing education to cities and the public regarding the impacts of land use management and redevelopment on District water resources.
- Protecting and promoting preservation of open spaces.
- Promoting public access to District water resources.

4.6 Wetland Management

Diverse wetland systems are critical components of a healthy hydrologic system that positively affect soil systems, groundwater and surface water quality and quantity, wildlife, fisheries, aesthetics, and recreation. The benefits of wetlands can be compromised by hydrologic alterations, exotic and invasive species, and erosion and sedimentation. The effectiveness of wetland communities for wildlife habitat, and for human appreciation, is greatly increased when they are physically or functionally connected with other native communities.

Wetlands are a key element of the hydrologic system that can provide hydrologic and water quality benefits, including:

- Maintaining stream base flow
- Recharging groundwater
- Providing flood storage and attenuating peak flows
- Providing erosion protection
- Physically filtering particulates (and pollutants attached to particulates) from runoff
- Biologically removing nutrients from runoff in some wetlands and at certain times of the year

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

Wetlands provide valuable habitat for many types of wildlife including waterfowl, songbirds, raptors, mammals, fish, and many species of amphibians. Even though it is difficult to determine the value of wetlands for wildlife due to the specialized requirements of each species, it is possible to determine wildlife, fisheries, and amphibian habitat values in a general sense. Maintaining and improving wildlife viability requires that water resources and land management activities consider the life cycles of various animals.

4.6.1 Wetland Buffers

Buffers are upland, vegetated areas located adjacent to wetlands. Many of the hydrologic, water quality, and habitat benefits achieved by wetlands are directly attributable to or dependent on the presence of buffers. Vegetation and organic debris shield the soil from the impact of rain and bind soil particles with root materials, reducing erosion. Vegetation obstructs the flow of runoff, thereby decreasing water velocities, allowing infiltration, and a reduction in the erosion potential of stormwater runoff. As a physical barrier, vegetation also filters sediment and other insoluble pollutants from runoff. Vegetation scatters sunlight and provides shade, reducing water temperature in the summer, limiting nuisance algae growth, and reducing the release of nutrients from the sediment. Buffers also have habitat benefits; providing food and shelter for native wildlife, fish, and amphibians and needed separation and interspersion areas for animals, to reduce competition and maintain populations.

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

4.6.2 Priority Issues/Opportunities

During the development of this Plan, the Board of Managers, local cities, and other stakeholders identified wetland protection as a concern, including the following specific priority issues/opportunities:

- Inventorying and assessing wetlands within the Nine Mile Creek watershed for function and value.
- Preserving the quality of existing wetlands and protecting high quality wetlands.
- Seeking opportunities to restore degraded wetlands.
- Improving wetland health by promoting diversity and abundance of native aquatic species and improving habitat.

4.7 Aquatic Invasive Species (AIS)

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

The presence of non-native species and invasive species can impair the ecological, aesthetic, and recreational functions of aquatic, wetland and shoreland areas. Not all non-native species are invasive; "invasive" refers to those non-native species that are able to out-compete, displace, and even eliminate native species (i.e., some "non-native" species to the region are able to coexist with native species).

As part of its Invasive Species Program, the MDNR maintains a list of waters infested with specific AIS (MDNR Designation of Infested Waters, 2016 as amended). The MDNR list includes several NMCWD waterbodies as infested with Eurasian watermilfoil, including:

- Arrowhead Lake
- Bryant Lake
- Bush Lake

The MDNR's list identifies that zebra mussels have been observed in Bryant Lake. Zebra mussels are typically spread as adult mussels attached to boats or aquatic plants, or as larvae carried in bait buckets, bilges, or any other water moved from an infested lake or river. They can cause problems by clogging water intakes to motors, causing cuts and scrapes to swimmers and lake users, and attaching to native

mussels, killing them. In large populations, zebra mussel feeding impacts the food chain by reducing food for larval native fish, among other impacts.

The MDNR's list of AIS infested waterbodies may not include all known AIS occurrences within the NMCWD. The MDNR infested waters list does not include curlyleaf pondweed, which has been identified in several NMCWD waterbodies.

Curlyleaf pondweed is of special concern due to its source of internal phosphorus loading. This submersed aquatic plant grows vigorously during early spring, outcompeting native species for nutrients. After curlyleaf pondweed dies out in early to mid-summer, plant decay releases nutrients and consumes oxygen, exacerbating internal sediment release of phosphorus. This process often result in algal blooms during the peak of the recreational use season (mid-summer), which further inhibit native macrophytes by reducing water clarity and blocking sunlight necessary for growth.

Invasive aquatic animals present in the NMCWD waters include common carp, which can degrade water quality, especially in shallow lakes and wetlands. Carp feeding techniques disrupt shallow-rooted plants, reducing water clarity and release phosphorus bound in lake bottom sediment, leading to increased algal blooms and a resultant decline in native aquatic plants. Common carp are typically spread between lakes by the accidental inclusion and later release of live bait, but can also migrate through natural or built channels as adults.

Based on their potential environmental impact and the difficulty of eradication once a waterbody is infested, NMCWD is interested in preventing the spread of AIS and supporting management of AIS that are already present in NMCWD waterbodies.

4.7.1 Priority Issues/Opportunities

During the development of this Plan, the Board of Managers, local cities, and other stakeholders identified aquatic invasive species as a concern, including the following specific priority issues/opportunities:

- Conducting periodic monitoring of District water resources to identify and inventory aquatic invasive species.
- Educating the public on aquatic invasive species, in conjunction with the cities, Hennepin County, state agencies, and other local partners.
- Establishing a targeted aquatic invasive species management strategy.
- Promote native habitat restoration.

4.8 Groundwater Management

The NMCWD recognizes the importance of protecting the quality and quantity of groundwater, because the majority of the municipal drinking water supply and surface water resources are dependent on groundwater. Although the role of regulation to protect groundwater generally falls upon the MDNR and the MDH, the NMCWD plans to work in partnership with the county and watershed cities to ensure the

implementation of groundwater protection programs, though NMCWD itself does not intend to regulate groundwater. The District recognizes that there is an interrelationship between surface water and groundwater resources, and surface water must be managed with a concern for proper management of groundwater resources.

Groundwater is a finite resource with inputs and outputs that need to be managed to ensure a sustainable supply. The input is generally rainwater and snowmelt that seeps into the ground (recharge). The outputs can be through pumping for human use and those that naturally discharge (recharge) to the lakes, wetlands, and streams. While rainfall and snowmelt are variable factors that cannot be controlled, the amount of rainfall or snowmelt that becomes recharge is affected by land use. Urbanization generally results in larger impervious areas and more compacted soils that decrease opportunities for infiltration and recharge. In addition, population increases result in increases in groundwater appropriations to meet municipal demands.

Long-term well data collected by the MDNR, United States Geological Survey (USGS), and others identify declines in groundwater levels across the state. In response to mounting concern about groundwater supply, the MDNR has published a draft strategic plan identifying strategies and actions intended to achieve sustainable use of groundwater resources (MDNR, 2013), along with establishing three pilot Groundwater Management Areas (GWMAs).

Surface water resources and groundwater resources are often interdependent. Precipitation and snowmelt that infiltrate the ground surface may ultimately discharge to streams, lakes, and wetlands. Groundwater levels that are higher than the water level of adjacent surface waters create a gradient (or head differential) driving groundwater flow toward the surface water. When groundwater levels are lower than adjacent surface water elevations, the gradient is reversed and surface water recharges groundwater. The rate of inflow and outflow from surface waters to groundwater is a function of the difference in water level as well as soil and bedrock characteristics. The temporal and spatial variability of each of these factors make it extremely difficult to quantify the exchange of water between surface waters and the groundwater.

The interaction of groundwater and surface water can have negative consequences on either resource. Contaminated groundwater discharging to surface waters will likely have a direct impact on surface water quality and/or habitat. Declines in groundwater levels result in decreased baseflow to streams, which in turn result in decreased water quality and ecosystem function. Decreased baseflow is especially problematic for streams supporting fish populations (e.g., trout streams), as decreased baseflow normally results in higher stream temperatures. Lower lakes levels may limit recreational use, reduce habitat areas, and result in increased growth of aquatic plants including invasive species (via an increased littoral zone).

Maintaining clean, safe groundwater supplies is critical to human and environmental health and to the economic and social vitality of communities. Possible sources of groundwater contamination include commercial and industrial waste disposal, landfills, leaking underground storage tanks, subsurface sewage treatment systems (SSTS), mining operations, accidental spills, feedlots, and fertilizer/pesticide

applications. In addition, there is growing concern regarding potential for groundwater contamination from stormwater infiltration practices. While infiltration is often a preferred method of stormwater treatment, it can have negative consequences in areas with vulnerable groundwater resources. To ensure that its regulatory program continues to effectively balance protection of groundwater and the benefits of infiltration, NMCWD will revise its Stormwater Management Rule to ensure it requires systems that fit the specific conditions presented at a particular property. The rule revision will be informed by the current NPDES General Construction Stormwater permit (2013) and MIDS guidance (2013, as amended), as well as the MDH's *Evaluating Proposed Stormwater Infiltration Projects in Vulnerable Wellhead Protection Areas* (2007).

4.8.1 Priority Issues/Opportunities

During the development of this Plan, the Board of Managers, local cities, and other stakeholders identified groundwater protection as a concern, including the following specific priority issues/opportunities:

- Understanding and evaluating groundwater recharge potential throughout the watershed.
- Understanding the interaction between groundwater and surface water in the watershed, including the potential for groundwater contamination from stormwater infiltration practices and the vulnerability of surface water resources within the watershed to fluctuating groundwater levels.
- Promoting sustainable use and conservation of groundwater.
- Protecting groundwater from surface water contamination.

4.9 Climate Change Adaptation

Climate change occurring in the upper Midwest poses a challenge for water resources management. Changes in precipitation trends include increased precipitation amounts and more frequent higher intensity storms leading to increased stormwater runoff (see Section 2.1). Increased stormwater runoff places additional strain on existing stormwater systems and can increase flood risk.

Capital improvement projects implemented by the District, cities, and developers have long design lives that must consider current as well as possible future climate scenarios. Implementing projects and programs capable of performing under a range of possible conditions is strategy referred to as "adaptive management."

In addition to responding to climate change, measures are required to limit or prevent further climate change. Two key tools to preventing further climate change that are relevant to water resources management include conservation and education.

4.9.1 Priority Issues/Opportunities

During the development of this Plan, the Board of Managers, local cities, and other stakeholders identified climate change adaptation as an important issue, including the following specific priority issues/opportunities:

- Studying the impact of climate change on flooding and identifying the areas of greatest flood risk.
- Reviewing District policies with consideration for climate change.
- Developing an adaptation strategy for climate change.
- Incorporating climate change adaptation into planning and land management.
- Evaluating the impacts of climate change on groundwater, surface water, and the interaction between groundwater and surface water.
- Assessing the impact of climate change on wetlands and changes in the species they support.

4.10 Land Use Management

Land use management plays a fundamental role in the management and protection of surface water resources. Responsibility for comprehensive land use planning and zoning falls upon the cities. As significant redevelopment continues to occur within the Nine Mile Creek watershed, there is a need for striking balance between promoting redevelopment and protecting surface water resources.

Historically, the District has promoted protection of water resources in conjunction with land use management primarily through establishment of goals, policies, and standards that get implemented through local surface water management plans and through adoption of District rules and administration of the District's regulatory program. As significant redevelopment occurs within the watershed, the District will work collaboratively with cities, private landowners and developers, and other government agencies in the redevelopment planning process to identify and implement water resource improvement opportunities.

4.10.1 Priority Issues/Opportunities

During the development of this Plan, the Board of Managers, local cities, and other stakeholders identified land use management as an important issue, including the following specific priority issues/opportunities:

- Collaborating with local cities in the planning/redevelopment process to identify and implement water resource improvements, including opportunities to improve drainage and manage local flood risk, while increasing stormwater filtration and promoting groundwater recharge.
- Working closely with local cities in subwatershed-based planning to address water quantity (flooding) and water quality issues.

- Increasing infiltration of stormwater through implementation of the District's regulatory program and identifying opportunities for regional infiltration and/or volume control.
- Providing technical assistance to local cities to understand the impacts of development and redevelopment on downstream water resources.
- Promoting ecologically healthy landscapes through education, program and project implementation, and partnering opportunities.

4.11 Education and Outreach

Public education and outreach plays an important role in the management of water resources within the Nine Mile Creek watershed. It is through public education and outreach that the District will increase the public's understanding of water resource management and issues in the watershed, and foster long-term public commitment to protecting these resources. The District conducts its education and public outreach duties through a variety of means. Education programming includes interactive learning opportunities at the District's office site (Discovery Point), training opportunities for the professional and public sectors, and educational workshops, including an annual summer education series. Outreach activities include sponsorship of clean-up events, exhibiting at local events, providing volunteer opportunities, and leveraging citizen volunteers for education and outreach activities. The District also offers a cost share grant program for efforts that protect and improve water and natural resources within the watershed. In addition to promoting implementation of best management practices, the cost share program results in engaged and educated residents and provides demonstration sites for promoting best management practices.

Communication is a critical component of the District's education and outreach program. The NMCWD maintains a website with information regarding the Districts programs, including announcements on education and outreach opportunities, District meeting minutes, contact information, and reports and studies. The NMCWD website also contains links to other reference and educational material. The District also proactively communicates with its audiences through targeted invitations, email distribution and periodic publications in local newspapers.

4.11.1 Priority Issues/Opportunities

During the development of this Plan, the Board of Managers, local cities, and other stakeholders identified education and outreach as an important issue, including the following specific priority issues/opportunities:

- Expanding the education and outreach program, including programming at Nine Mile Creek Discovery Point, and ensuring adequate staff capacity to maintain programming.
- Maintaining and expanding development of partnerships with other organizations (public and private) for effective and efficient educational programming.

- Linking educational programming to District goals through prioritization and tracking of measurable outcomes.
- Increasing public participation.
- Increasing public communication and expanding communication network.

4.12 Organizational Management

Clear roles and responsibilities, administrative processes, and funding sources are necessary for the District to accomplish its vision. Minnesota Statutes chapters 103B and 103D provide watershed districts with the authority to: construct improvements, levy taxes, adopt rules to regulate water resources, acquire property, and incur debts, liabilities, and obligations. The jurisdiction of the District overlaps that of cities, counties, and the state. Thus, coordination with other units of government is critical to achieving District goals. As a taxing authority, effective and efficient operation of the Watershed District's work is essential to ensure public support. This section describes several areas of District organizational management.

4.12.1 Maintenance of Stormwater Systems and Projects

Local cities and other MS4 permit holders are generally responsible for maintaining their stormwater management systems. These systems are managed in accordance with maintenance plans detailed in each city's Stormwater Pollution Prevention Program (SWPPP) and local water management plan. Proper maintenance of the stormwater system will ensure that the stormwater system provides the necessary flood control and water quality treatment.

Other entities responsible for maintaining the stormwater systems within the NMCWD:

- MnDOT is responsible for maintenance and reconstruction of stormwater infrastructure associated with state highways. In the Nine Mile Creek watershed, these locations include Interstate 494, US Highway 169, Highway 212, Highway 100, and Highway 62.
- Hennepin County is responsible for maintaining only the "mainline" culvert crossings in its county state aid highways (CSAHs). Cities may maintain these mainline culvert crossings by agreement with the county. Cities are responsible for maintaining storm sewer infrastructure in the county roads.
- Owners of private stormwater facilities are responsible for maintaining their facilities in proper condition, consistent with the original performance design standards, maintenance specifics included in a declaration recorded on property to fulfill a condition of a District permit, and any maintenance agreements with member cities.

Effective maintenance of cities' MS4 systems is of great interest to NMCWD and NMCWD will provide assistance as useful and feasible, but NMCWD will not oversee or audit cities' MS4 compliance.

Maintenance responsibilities for NMCWD capital improvement projects are typically defined for each project in the cooperative agreement between the NMCWD and the local municipality. While as a baseline

matter NMCWD is responsible for maintenance of facilities and improvements it constructs, often cities assume responsibility for routine maintenance in the cooperative agreement forged between NMCWD and the city for a project, given cities often have resources necessary for such maintenance (e.g., heavy equipment, trucks, crews) and own the property on which improvements are constructed. A cooperative agreement for a project will customarily outline a cost-sharing structure – especially for major maintenance and repairs. NMCWD will work with local cities to resolve issues related to NMCWD project maintenance or replacement as they arise.

4.12.2 Management of County Ditches

NMCWD is the drainage authority for three public ditches within its jurisdiction (see also Figure 2-4):

- Ditch 1
- Ditch 34
- Ditch 41

NMCWD, in collaboration with cities, manages public ditches to maintain their function as urban drainage systems. As deemed necessary and appropriate, NMCWD will seek to abandon authority of these ditches, and associated responsibilities under Minnesota Statutes chapter 103E.

4.12.3 Funding

Historically, the District has implemented capital improvement projects primarily through the Basic Water Management Project authority (Minnesota Statutes chapter 103D) provided in the Watershed Law and in response to petitions from local cities within the watershed. In recent years, the NMCWD has expanded its implementation avenues to fund capital projects through levy authorities in Minnesota Statutes (Chapter 103B). With a focus on working closely with local cities and others to develop plans and designs that integrate water quality improvements, flood control, and resource restoration and protection into public and private redevelopment projects, the 103B funding offers the District additional flexibility for implementing capital projects. Pursuit of grant funding can provide additional funds for NMCWD project and program implementation.

4.12.4 Organizational Capacity

The NMCWD has experienced modest growth in its staffing; converting from a solely consulting staff from 1959 to 2004, to hiring its first administrator in 2005, to its current three full-time staff. The increase in staff since 2005 has allowed the District to expand its project and program capacity, especially with regard to its education and outreach program. However, there is concern that staff capacity limitations may hinder the District's ability to efficiently and effectively implement this Plan.

4.12.5 Leveraging Partnerships

To optimize efficiency and effectiveness, the District collaborates with several outside organizations on a number of efforts to improve education and watershed management. Leveraging partnering

opportunities, including funding or project and program implementation partnerships, can help the District accomplish its objectives more efficiently and cost effectively.

4.12.6 Prioritization

Given that the NMCWD is funded by tax levy, there are financial limitations to the District's water resource management efforts. Staff capacity limitations also impact the projects and programs that can be undertaken by the District. Therefore, it is important that the District develop a prioritization system to evaluate project and partnering opportunities, including administration of cost share grant programs. The prioritization system should include consideration of how anticipated outcomes align with specific goals identified within this Plan.

4.12.7 Priority Issues/Opportunities

During the development of this Plan, the Board of Managers, local cities, and other stakeholders identified organizational management as an important issue, including the following specific priority issues/opportunities:

- Considering alternate funding avenues, including pursuit of grant funding.
- Evaluating staff capacity limitations and assessing need for additional staff and/or consultant services.
- Expanding partnerships with other local governments or organizations to increase the efficiency and effectiveness of project implementation.
- Reviewing District rules and regulatory programs periodically and adjusting, as needed.

5.0 General Statement of Goals and Policies

Nine Mile Creek Watershed District (NMCWD)
Mission Statement

To manage, protect and enhance water resources in the Nine Mile Creek watershed in collaboration with our partners and community stakeholders, always using sound science to guide decision-making.

This section of the Plan presents the goals, objectives, policies, and actions that pertain to water resources within the NMCWD, organized in the following ten major topic areas:

Section 5.1	Stormwater Management
Section 5.2	Surface Water Management
Section 5.3	Open Spaces and Recreational Uses
Section 5.4	Wetland Management
Section 5.5	Groundwater Management
Section 5.6	Land Use Management
Section 5.7	Flood Management
Section 5.8	Climate Change Adaptation
Section 5.9	Education and Outreach
Section 5.10	Organizational Management

In establishing its goals, the District recognizes they are the end toward which its efforts and ambitions are directed. The goals are not rules but rather a statement of purposes. To achieve these goals, the District has identified policies and actions that guide present and future management decisions. The policies are not regulations or a program but instead are an effort to prudently manage the affairs of the District. Many of the policies and actions included in this Plan require collaboration with Federal, State, local governments and citizens to be effective. One purpose of the Plan is to enable a cooperative effort to achieve common goals.

The following subsections (Sections 5.1 through 5.10) address the issues described in Section 4.0. Each topic area is organized in the same tabular format: an overarching goal is addressed by one or more policies, articulated through specific actions. For some topic areas, the overarching goal is broken down into two or more objectives, which are similarly addressed by policies and actions.

5.1 Stormwater Management

The District has established goals, policies, and actions to address stormwater management issues described in Section 4.2. The goals, objectives, policies and actions related to stormwater management are summarized in Table 5-1.

Table 5-1 Stormwater Management Goals, Policies, and Actions

GOAL:	**Stormwater will be managed to maintain or reduce impacts to downstream waterbodies.**		
Objective 1:	Maintain or reduce stormwater runoff rates, volumes and pollutant loadings to downstream waterbodies.		
POLICIES		**ACTIONS**	
1.	Ensure stormwater runoff from new development and redevelopment sites is regulated to maintain or reduce runoff rates and volumes, and reduce pollutant loadings to receiving waters.	A.	Implement stormwater volume, quality and rate-control criteria in District rules.
2.	Enhance existing stormwater management effectiveness through redevelopment opportunities.	A.	Participate in planning and development of stormwater management systems to enhance treatment as redevelopment occurs.
		B.	Educate developers and the general public about the importance of stormwater management at redeveloping sites.
3.	Manage stormwater collaboratively with other local governments.	A.	Ensure, through the local surface water management plan review process, implementation of stormwater management standards and criteria that protect water resources and encourage innovative stormwater management techniques.
		B.	Work with other local governments to implement innovative stormwater management demonstration projects and/or programs.
		C.	Provide technical assistance to cities in updating their local surface water management plans to ensure city plans describe and plan for implementation of programs and projects that are consistent with NMCWD's plan and identify and plan for water-resources protections and improvements that the cities are uniquely suited to implement.

4.	Ensure stormwater management systems are maintained.	A.	Maintain and improve stormwater management facility maintenance standards in collaboration with the cities of the District to help ensure that facilities retain their effectiveness and that they are maintained in accordance with current best, practices.
		B.	Develop a stormwater management facility maintenance system to document maintenance agreements and track compliance.
		C.	NMCWD maintenance efforts – both hands-on activities and oversight of others – will be focused on ensuring that NMCWD-constructed and – permitted facilities are maintained.
5.	Promote regional stormwater management, where appropriate.	A.	Work with local governments in identifying high-priority areas, planning, and development of regional stormwater management facilities to enhance treatment and provide flexibility for stormwater management compliance as redevelopment occurs.
		B.	Establish a regional stormwater-management compliance option in the NMCWD rules.
6.	Support use of both structural and nonstructural measures to reduce runoff rates, volumes and pollutant loading.	A.	Promote and/or implement innovative stormwater management demonstration projects and programs.
		B.	Promote and/or conduct educational programming regarding effective stormwater management.
7.	Promote stormwater capture and reuse to reduce runoff volume and conserve groundwater.	A.	Work with cities and other public or private partners to evaluate opportunities for stormwater reuse projects.
		B.	Work with cities and other public or private partners to implement stormwater reuse projects.
8.	Manage runoff to prevent erosion.	A.	Update NMCWD rules as needed and implement through permitting program.
9.	Promote groundwater recharge by implementing stormwater infiltration projects in areas with high recharge potential.	A.	Work with cities and other public or private partners to evaluate and implement stormwater infiltration projects that promote groundwater recharge.

Objective 2:	Manage public ditch systems within the Nine Mile Creek watershed in accordance with statutory requirements.		
POLICIES		**ACTIONS**	
1.	Implement statutory requirements as the ditch authority in Nine Mile Creek.	A.	Manage public ditches in NMCWD in accordance with statutory requirements.
2.	Seek to abandon public ditches where appropriate.	A.	Review status of public ditch systems of NMCWD and abandon, where appropriate.

5.2 Surface Water Management

The District has established goals, objectives, policies, and actions to address surface water management issues for lakes and streams described in Section 4.3 and Section 4.4, respectively. This section also addresses aquatic invasive species issues described in Section 4.7. The goals, objectives, policies and actions related to surface water management are summarized in Table 5-2.

Table 5-2 Surface Water Management Goals, Objectives, Policies, and Actions

GOAL:	**The surface water quality of the lakes and streams of the District will be protected and enhanced.**		
Objective 1:	Monitor District lakes and streams to assess achievement of water quality goals, detect changes in water quality, inform the design and identify impacts of management activities and capital projects.		
POLICIES		**ACTIONS**	
1.	Monitor District lakes to assess achievement of water quality goals, detect changes, and evaluate impacts of lake and watershed management activities.	A.	Develop/document lake monitoring plan and update annually.
		B.	Collect, interpret and report water quality and ecological indicator data annually.
		C.	Establish and support a citizen monitoring program.
2.	Monitor District streams to assess achievement of water quality goals and impacts of watershed management activities.	A.	Develop/document stream monitoring plan and update annually.
		B.	Maintain and operate existing continuous flow gauging and storm runoff-activated automatic sampling stations on Nine Mile Creek. Interpret and report results of flow and pollutant monitoring data annually.
		C.	Monitor water quality parameters annually during base flow conditions to assess support of fish and aquatic life in the stream.
		D.	Monitor fish community in Nine Mile Creek annually to assess attainment with MPCA biological standards.
		E.	Monitor macroinvertebrate community annually to determine 'biotic index' values and detect changes in stream water quality.
		F.	Monitor stream habitat annually to assess stream substrate, stream bank erosion, and sediment accumulation.

3.	Conduct targeted monitoring to assess pollutant sources and measure success of District management activities.	A.	Conduct targeted monitoring of lakes, streams, and stormwater to assess pollutant sources and measure success of District management activities.
Objective 2:	Manage all major waterbodies for non-degradation of water quality, with allowance for natural variability.		
POLICIES:		**ACTIONS:**	
1.	Minimize water quality impacts from new development, redevelopment, and land disturbing activities.	A.	Implement stormwater management rules through the NMCWD permitting program.
2.	Ensure stormwater management systems are maintained.	A.	Operate, monitor, and maintain current and future NMCWD water quality improvement systems to ensure the designed benefits are achieved.
		B.	Work with other local governments and private entities to confirm stormwater management systems are maintained.
3.	Assess waterbodies for non-degradation; develop and implement management strategies and capital improvements, as needed.	A.	Conduct periodic trend analyses of lake and stream water quality data to identify declining water quality trends.
		B.	Develop management strategies for lakes and stream segments with declining water quality.
		C.	Implement lake, stream and watershed management measures to prevent declining water quality.
		D.	Consider the unique characteristics of each subwatershed when developing management strategies and understand how these characteristics affect the water quality, quantity, and ecological potential of each water resource.
4.	Develop and implement a targeted aquatic invasive species management strategy.	A.	Conduct periodic inventory and assessment of aquatic invasive species in District waterbodies.
		B.	Develop a targeted aquatic invasive species management strategy.
		C.	Work with agencies and local stakeholders to manage invasive species.

Objective 3:	Improve lake water quality to achieve District lake management goals.		
POLICIES		**ACTIONS**	
1.	Establish implementation programs on a subwatershed basis.	A.	Conduct additional Use Attainability Analyses (UAAs) for District lakes, as needed, in partnership with cities when appropriate.
		B.	Update prior lake Use Attainability Analyses (UAAs), as needed, to verify or revise lake management recommendations, in partnership with cities when appropriate.
		C.	Work with agencies, cities, and other stakeholders to establish subwatershed-based implementation programs.
2.	Work with the MPCA and other agencies and stakeholders to complete Total Maximum Daily Load (TMDL) and/or Watershed Restoration and Protection Strategy (WRAPS) studies, where applicable.	A.	Actively participate in the TMDL and/or WRAPS process.
		B.	Work with MPCA and other agencies and stakeholders to determine appropriate roles and responsibilities in implementing load reduction measures identified in the TMDL and WRAPS processes.
		C.	Integrate District UAA, TMDL and WRAPS studies, where applicable, to address impairments.
3.	Implement water quality management/improvement actions.	A.	Consider implementation of recommended programs and projects from UAAs, TMDL, and WRAPS studies.
		B.	Work with cities and other stakeholders to promote implementation of recommendations from UAA, TMDL, and WRAPS studies.
		C.	Develop and maintain a system to track pollutant load reductions achieved toward meeting UAA, TMDL, and/or WRAPS goals.
Objective 4:	Improve the water quality in Nine Mile Creek to meet or exceed MPCA water quality standards.		
POLICIES:		**ACTIONS:**	
1.	Identify and implement measures to reduce chloride concentrations in Nine Mile Creek.	A.	Identify and target priority chloride sources to Nine Mile Creek.
		B.	Work with winter salt applicators to reduce salt usage on roadways and other hard surfaces.
		C.	Implement District cost-share program to support reduction of salt use on roadways, parking lots, and sidewalks.
		D.	Conduct educational programming on salt usage.

2.	Identify and implement measures to increase dissolved oxygen concentrations in Nine Mile Creek.	A.	Investigate primary causes of low dissolved oxygen throughout Nine Mile Creek and potential remedial measures.
		B.	Implement measures to increase dissolved oxygen concentrations, in collaboration with agencies and stakeholders.
3.	Work with the MPCA and other agencies and stakeholders to complete Total Maximum Daily Load (TMDL) and/or Watershed Restoration and Protection Strategy (WRAPS) studies, where applicable.	A.	Consider implementation of recommended projects and programs from UAAs, TMDL, and WRAPS studies.
		B.	Work with cities and other stakeholders to promote implementation of recommendations from UAA, TMDL, and WRAPS studies.
		C.	Develop and maintain a database to track pollutant load reductions achieved through implementing water quality management/improvement actions.
4.	Improve the stability of Nine Mile Creek and reduce erosion.	A.	Identify and target areas prone to erosion.
		B.	Conduct stream stabilization improvement projects.
		C.	Implement stormwater management rules through the NMCWD permitting program.
		D.	Identify and implement stormwater volume reduction projects and practices in the watershed.

5.3 Open Spaces and Recreational Uses

The District has established goals, objectives, policies, and actions to address open space and recreational use issues described in Section 4.5. The goals, objectives, policies and actions related to open space and recreational use are summarized in Table 5-3.

Table 5-3 Open Spaces and Recreational Uses Goals, Objectives, Policies, and Actions

GOAL:	**Recreational uses of District water resources will be improved, or at least maintained.**		
Objective 1:	Promote public access to water resources within the Nine Mile Creek watershed.		
POLICIES		**ACTIONS**	
1.	Enhance access to water resources, while protecting and conserving natural areas.	A.	Work with cities and developers to provide access to water resources through the development/redevelopment process or in conjunction with NMCWD water management projects, while protecting and conserving natural areas.
Objective 2:	Protect and promote preservation and enhancement of natural areas to improve the quality and recreational use of water resources within the Nine Mile Creek watershed.		
POLICIES		**ACTIONS**	
1.	Protect and enhance natural areas to improve fish and wildlife habitat, water quality and recreational opportunities	A.	Implement natural area and habitat improvements as part of NMCWD capital improvement projects.
		B.	Partner with other local governments, agencies, and other organizations to pursue natural area, recreation, and habitat protection and enhancement opportunities.
2.	Maintain natural stream corridor qualities for recreational users and general public.	A.	Evaluate Nine Mile Creek corridor for opportunities to restore natural function and scenic values.
		B.	Partner with other local governments and private landowners to improve stream corridor through buffers, riparian plantings and restoration projects.
3.	Avoid negative impacts and fragmenting of locally and regionally significant natural areas and corridors when feasible, and mitigate when unavoidable.	A.	Work with other local governments to identify locally and regionally significant natural areas and corridors and promote preservation and/or management of these areas.

5.4 Wetland Management

The District has established goals, objectives, policies, and actions to address wetland management issues described in Section 4.6. The goals, objectives, policies and actions related to wetland management are summarized in Table 5-4.

Table 5-4 Wetland Management Goals, Objectives, Policies, and Actions

GOAL:	**The acreage, functions, and values of wetlands within the Nine Mile Creek watershed will be maintained and enhanced.**		
Objective 1:	Work to achieve no net loss of acreage, function, and value of wetlands within the Nine Mile Creek watershed.		
POLICIES		**ACTIONS**	
1.	Manage wetlands through NMCWD administration of the Wetland Conservation Act (WCA) and the NMCWD rules.	A.	Administer Wetland Conservation Act (WCA) requirements as the responsible Local Government Unit (LGU) for the cities of Eden Prairie, Edina, Hopkins, and Richfield.
		B.	Provide technical assistance in wetland-related matters in Bloomington and Minnetonka, and assume LGU status if requested.
		C.	Implement wetland management rules through the NMCWD permitting program.
2.	Work with other local governments to adopt land use and development ordinances or other regulatory controls to complement NMCWD's wetland protection rule and achieve no net loss of wetland acreage, function, and value.	A.	Establish an incentive program for implementation of wetland buffer areas on private properties.
3.	Achieve no net loss of wetland acreage, function, and values on District-sponsored projects.	A.	Pursue wetland enhancement, restoration, and creation opportunities to offset potential wetland losses within the District.
4.	Promote wetland replacements within the same subwatershed whenever possible.	A.	Administer WCA and the NMCWD rules.
5.	Require avoidance of direct or indirect wetland disturbance for all developments and land disturbing activities.	A.	Administer WCA and the NMCWD rules.
6.	Prohibit use of high value wetlands for stormwater management where other alternatives exist.	A.	Administer Wetland Conservation Act (WCA) and the NMCWD rules.

Objective 2:	Protect and restore high-quality wetlands within the Nine Mile Creek watershed.		
POLICIES		**ACTIONS**	
1.	Protect and restore high-quality wetland areas, sensitive habitats, sensitive animal and plant species, and rare or endangered species.	A.	Inventory wetlands within the watershed, including delineation, functions and values assessment.
		B.	Compile and track wetland functions and values assessments conducted within the Nine Mile Creek watershed.
		C.	Identify rare and high-quality wetland plant communities, and sensitive habitats and animal and plant species for protection.
		D.	Develop wetland restoration and protection plan to address high-quality wetlands areas, sensitive habitats and plant species, and rare, endangered, and threatened plants and animals within watershed.
		E.	Partner with other local governments to identify and implement wetland restoration opportunities.
		F.	Work with other local governments and natural resource agencies to manage invasive species and restore native species.

5.5 Groundwater Management

The District has established goals, objectives, policies, and actions to address groundwater management issues described in Section 4.8. The goals, objectives, policies and actions related to groundwater management are summarized in Table 5-5.

Table 5-5 Groundwater Management Goals, Objectives, Policies, and Actions

GOAL:	**Groundwater quality and quantity will be protected and conserved for appropriate and sustainable beneficial uses.**		
Objective 1:	Increase the District's understanding of groundwater resources, including groundwater-surface water interaction and the effects of community water use.		
POLICIES		**ACTIONS**	
1.	Collect and evaluate data relevant to increasing the District's understanding of groundwater resources.	A.	Develop a groundwater monitoring plan, including consideration of monitoring groundwater levels and contaminant concentrations.
		B.	Continue collection of static groundwater levels from observation wells throughout the watershed.
		C.	Study the interaction of groundwater and surface water resources in the Nine Mile Creek watershed to better understand the impacts of groundwater on lake, wetland and stream hydrology and to identify areas with high aquifer recharge potential.
		D.	Summarize groundwater monitoring data annually in the District Engineer's Report and provide data to the appropriate state agencies
2.	Cooperate with other state and local agencies to identify and fill data gaps.	A.	Collaborate with others to research infiltration impacts on groundwater and develop a consistent approach to protecting areas sensitive to groundwater contamination.
		B.	Collaborate with other agencies to enhance groundwater monitoring efforts.

Objective 2:	Protect groundwater quality and quantity.		
POLICIES		**ACTIONS**	
1.	Participate in regional groundwater planning efforts.	A.	Support the Minnesota Department of Health (MDH) and other state, regional, and local agencies in implementing wellhead protection programs and plans within the District.
		B.	Partner with Hennepin County, other local water management organizations, cities, and state agencies to develop a regional groundwater management plan, and participate in regional groundwater planning efforts.
2.	Protect groundwater quality through the District's permitting process, city plan review, and education efforts.	A.	Require cities to provide the District with updates to their Wellhead Protection Plans.
		B.	Implement the District stormwater rule and permitting program, including volume control.
		C.	Conduct review of District rules to ensure rules are adequately protective of groundwater quality.
3.	Support the implementation of best management practices (BMPs) for wellhead protection areas.	A.	Account for possible impacts to groundwater and wellhead-protection areas when designing and implementing District capital projects.
		B.	Support the identification of and sealing of abandoned wells.
4.	Promote groundwater conservation and sustainable groundwater use.	A.	Require cities to adopt and implement a groundwater-conservation policy.
		B.	Work with cities and state agencies to promote the use of, and reduce regulatory barriers to, stormwater reuse.
		C.	Encourage cities to develop groundwater sustainability goal(s).

Objective 3:	Protect and expand groundwater recharge, especially as necessary to protect and improve groundwater-dependent natural resources.		
POLICIES		**ACTIONS**	
1.	Promote groundwater recharge – especially where it will protect and improve ground-water dependent natural resources.	A.	Identify and map areas in the watershed based on potential for (and limitations to) groundwater recharge.
		B.	Work with cities to encourage recharge within their regulatory controls and other guidance, especially where it will protect and improve groundwater-dependent natural resources.
		C.	Seek opportunities to incorporate recharge into District projects, especially where it will protect and improve groundwater-dependent natural resources.

5.6 Land Use Management

The District has established goals, objectives, policies, and actions to address land use management issues described in Section 4.10. The goals, objectives, policies and actions related to land use management are summarized in Table 5-6.

Table 5-6 Land Use Management Goals, Objective, Policies, and Actions

GOAL:	**Water resources will be protected and enhanced by integrating water resources management with land use planning.**		
Objective 1:	Protect and enhance District water resources through participation in local planning efforts and implementation of the cities' comprehensive land use plans and zoning.		
POLICIES		**ACTIONS**	
1.	Collaborate with cities to identify and promote water resource improvement opportunities as part of local or regional planning efforts.	A.	Participate in local and regional land use planning efforts to identify opportunities to achieve District goals, objectives and policies.
		B.	Inform local and regional land use planning efforts by providing information and analysis regarding opportunities for improved water resources management and protection.
		C.	Provide assistance to cities to incorporate low-impact development requirements into local controls.
2.	Ensure consistency of 2017-18 local water management and comprehensive plan updates with NMCWD plan.	A.	Assist cities in development of local water management plans.
		B.	Review city local water management plans for consistency with District goals and policies.
Objective 2:	Protect and enhance water resources by ensuring the use and development of land is regulated to protect water resources.		
POLICIES:		**ACTIONS:**	
1.	Require development, redevelopment and other land-disturbing activities within the watershed to prevent impacts on water resources, including cumulative impacts.	A.	Implement District rules through the permitting program.
		B.	Ensure coordination of the District's regulatory program with local land use controls to support the District's policies and objectives.
2.	The presence of environmentally sensitive natural resource areas should guide land use management decisions.	A.	Coordinate the District's regulatory program with local land use controls to support the District's policies and objectives.
3.	Ensure that impacts of development on water resources, including cumulative impacts, are understood and considered.	A.	Assist cities in understanding the individual and cumulative impacts of development on water resources.

Objective 3:		Coordinate land use planning with flood risk management to minimize risk to public safety and property.	
POLICIES		**ACTIONS**	
1.	Prevent floodplain encroachment in order to maintain no net loss of floodplain storage	A.	Work with cities to identify floodplain areas and permissible land uses.
		B.	Work with cities to develop and distribute educational materials on floodplain locations, protection, and floodplain land use restrictions.

5.7 Flood Management

The District has established goals, objectives, policies, and actions to address flood management issues described in Section 4.1. The goals, objectives, policies and actions related to floodplain management are summarized in Table 5-7.

Table 5-7 Flood Management Goals, Objective, Policies, and Actions

GOAL:	**Human life and permanent structures will be protected from damage due to flooding.**		
Objective 1:	Manage the floodplain to prevent encroachment and maintain flood storage volume.		
POLICIES		**ACTIONS**	
1.	Ensure a no net loss of floodplain storage.	A.	Place restrictive covenants on titles of properties, if necessary, to ensure floodplain protection.
		B.	Assess effectiveness of District floodplain management rule and update as necessary.
		C.	Manage floodplains to maintain critical 100-year flood storage volumes.
		D.	Maximize upstream floodwater storage.
2.	The natural function of the floodplain as a floodwater storage area will be protected from encroachment.	A.	Work with other local governments to establish natural vegetated buffers on all publicly owned lands adjacent to Nine Mile Creek and stormwater detention areas.
		B.	Pursue opportunities to preserve, restore, and manage floodplain wetlands.
Objective 2:	Reduce the risk to public safety and permanent structures due to flooding.		
POLICIES		**ACTIONS**	
1.	Local water management plans and other regulatory controls will include provisions that restrict construction of new structures within the floodplain and other flood prone areas.	A.	Require local stormwater management plans to maintain critical 100-year flood storage volume.
		B.	Work with cities to identify floodplain areas and permissible land uses.
		C.	Assist cities with the development and adoption of land-use ordinances to be compliant with District, County, and State flood protection requirements.

2.	Work with cities to address increased flood potential from NOAA Atlas 14 precipitation frequency depths.	A.	Assist cities in identifying and prioritizing flooding problems identified using Atlas 14 precipitation frequency estimates.
		B.	Assist cities in identifying improvement alternatives to address regional flooding problems.
		C.	Assist cities in implementing infrastructure improvements to address regional flooding problems.
		D.	Work with cities to incorporate flood risk information into local land-use controls.
3.	Understand and address the potential for increased flood risk due to predicted changes in climate.	A.	Assess increased flood risk due to predicted climate changes.
		B.	Work with cities and stakeholders to understand the increased flood risks and identify potential adaptation strategies.
		C.	Review District rules and policies for adequacy under climate change scenario(s).

5.8 Climate Change Adaptation

The District has established goals, objectives, policies, and actions to address climate change adaptation issues described in Section 4.9. The goals, objectives, policies and actions related to climate change adaptation are summarized in Table 5-8.

Table 5-8 Climate Change Adaptation Goals, Objective, Policies, and Actions

GOAL:	**Adverse impacts of climate change on the watershed and its water resources will be minimized.**		
Objective 1:	Minimize the adverse impacts of climate change on the watershed and its water resources.		
POLICIES		**ACTIONS**	
1.	Promote climate change adaptation to minimize property damage and impacts to District natural and water resources.	A.	Evaluate impacts and develop a District climate change adaptation strategy to identify natural and water resource vulnerabilities to climate change and potential adaptation strategies.
		B.	Work with other local governments and other stakeholders to educate regarding the impacts of climate change and assist in developing city-specific climate change adaptation strategies.
		C.	Work with other local governments to implement climate change adaptation strategies.
		D.	Collaborate with other natural resource management agencies to utilize current data and develop shared strategies.

5.9 Education and Outreach

The District has established education and outreach goals, objectives, policies, and actions. As education and outreach is a primary tool of the District, the policies and action described in this section address all of the issues identified in Section 4.0, as well as the specific education and outreach issues described in Section 4.11. The District's goals, objectives, policies and actions related to education and outreach are summarized in Table 5-9.

Table 5-9 Education and Outreach Goals, Objective, Policies, and Actions

GOAL:	**District water resources will be protected and enhanced through effective education and outreach programs.**		
Objective 1:	To educate and engage those that live, work, or recreate in the Nine Mile Creek watershed.		
POLICIES		**ACTIONS**	
1.	Provide education & outreach programming that aligns with District goals and priorities.	A.	Review and prioritize educational programming annually for alignment with District goals and policies.
		B.	Support projects that demonstrate effective and innovative landscape and stormwater management practices.
		C.	Maintain and develop new partnerships to provide educational programming.
		D.	Develop and distribute educational materials.
		E.	Host, conduct, or partner to provide educational workshops, trainings and events.
		F.	Partner with agencies and other groups to develop, implement, or host education programs related to stormwater best management practices, sustainable land use practices, chloride reduction, and other topics related to the District's Water Management Plan goals.
2.	Prioritize and tailor education and outreach programming to target audiences.	A.	Identify and prioritize target audiences. Audiences may include: District residents, local elected and appointed officials, city staff, schools, businesses, faith communities, and others.
		B.	Identify specific needs for diverse audiences.
		C.	Disseminate educational materials and information to target audiences, including developers, elected and appointed officials, residents, and others.
		D.	Continue to develop programming that targets and engages multiple learning styles.

		E.	Develop a communication strategy for reaching targeted audiences.
3.	Promote behavior change through targeted educational programming.	A.	Continue to implement educational approaches that foster and promote behavior change.
		B.	Support educational programs that utilize a behavior change approach.
4.	Seek opportunities to use art to engage stakeholders and foster a stewardship principle.	A.	Continue to develop partnerships to use art as an engagement tool to reach new audiences and to incorporate art into educational programming.
		B.	Incorporate public art into District capital improvement projects, when feasible.
		C.	Incorporate art programming and public art at Nine Mile Creek Discovery Point.
5.	Provide opportunities for volunteers to engage with the District.	A.	Incorporate volunteer events and opportunities into education programming, as achievable.
		B.	Partner with cities, agencies, businesses, nonprofits and others for volunteer events.
		C.	Provide service learning opportunities, when possible.
6.	Encourage and promote implementation of Best Management Practices (BMPs) in the watershed.	A.	Continue to implement the District's cost share program, which provides financial assistance to engage stakeholders to implement BMPs.
		B.	Provide planning grants to nonprofits meeting the grant criteria to engage stakeholders and provide assistance in planning for BMP implementation.
Objective 2:	To provide effective education and outreach through Nine Mile Creek Discovery Point.		
POLICIES		**ACTIONS**	
1.	Provide educational programming that aligns with District goals and priorities.	A.	Develop and maintain permanent and temporary educational exhibits.
		B.	Host, conduct, or partner to provide educational workshops, trainings and events.
		C.	Develop and maintain educational signage.
		D.	Host an annual state-of-the-watershed event to update stakeholders on District progress towards accomplishing its goals.

2.	Demonstrate effective and innovative landscape and stormwater management for residential and commercial land uses.	A.	Develop and maintain innovative stormwater management practices.
		B.	Conduct and demonstrate landscape restoration techniques.
		C.	Conduct and demonstrate invasive species management techniques.
		D.	Continue to provide leadership in low-impact site design and landscape maintenance by experimenting in innovative site design and maintenance techniques.
3.	Provide opportunities to engage the public and promote a stewardship principle.	A.	Develop and promote volunteer opportunities at Nine Mile Creek Discovery Point.
		B.	Continue to develop and promote educational programming that builds the connection between people and nature.
		C.	Promote and work to increase participation in Discovery Point programming.
		D.	Use the District's website communication methods such as social media to engage the public and promote stewardship of the District water and natural resources.
4.	Seek opportunities to use art to engage stakeholders in learning that fosters a stewardship principle.	A.	Seek ways to incorporate art into the Discovery Point landscape and building.
		B.	Develop partnerships to use art as an engagement tool to reach new audiences and to incorporate art into Discovery Point programming.
Objective 3:	Increase the effectiveness of the District's education and outreach program through partnerships.		
POLICIES		**ACTIONS**	
1.	Coordinate education and outreach efforts and promote efficient and effective education and outreach through partnerships with cities, other local and state agencies, nonprofits, and other organizations.	A.	Assist in distributing materials or promoting programs developed by other organizations.
		B.	Assist in promoting, developing, and/or implementing education and outreach programs and materials in partnership with other organizations.
		C.	Meet yearly with cities to coordinate education and outreach efforts.

2.	Engage new and maintain existing partnerships.	A.	Assist in distributing materials or promoting programs developed by other organizations.
		B.	Assist in promoting, developing, and/or implementing education and outreach programs and materials in partnership with other organizations.
		C.	Financially sponsor programs and the development of new education programs, when appropriate.
Objective 4:	Build a stewardship principle among those that live, work, and recreate in the Nine Mile Creek watershed.		
POLICIES		**ACTIONS**	
1.	Provide opportunities to experience water and natural resources and practice stewardship.	A.	Host, conduct, or partner to provide programs in/at District resources.
		B.	Model and demonstrate stewardship practices at Discovery Point.
		C.	Develop and/or promote volunteer opportunities.
2.	Promote access to District water resources.	A.	Prepare and provide information to District cities and the public regarding locations to access and experience District water resources.
		B.	Host, conduct, or partner to provide programs in/at District resources.
3.	Maintain existing and establish new partnerships to support programs that build stewardship.	A.	Partner with local public and private organizations to conduct events.
		B.	Partner with local public and private organizations to promote programs that build stewardship.
Objective 5:	Improve management and protection of District water resources through effective and open communication and stakeholder participation		
POLICIES		**ACTIONS**	
1.	Provide information to District stakeholders, including the public, regarding District policies, programs, and projects.	A.	Use District's website to provide timely information on District policies, programs, studies, and projects, including posting meeting dates, times, locations, agendas, and meeting minutes.
		B.	Review and keep content on District's website current.
		C.	Explore alternative methods of communication to expand communication with District stakeholders.

2.	Promote awareness of the District's presence and its role in managing water resources.	A.	Continue to communicate information regarding District activities and programs to the public through newsletters, the District website, social media, local newspapers, participating in community events, and other communication methods.
3.	Provide opportunities for effective public involvement and input on District policies, programs, and projects.	A.	Support and maintain an active Citizens Advisory Committee (CAC) representative of the entire watershed.
		B.	Host public engagement and input forums on District programs and projects.
		C.	Provide timely periodic updates to stakeholders regarding policies, programs, and projects of interest.
		D.	Develop and implement an education and outreach strategy for all District capital improvement projects.
		E.	Periodically conduct surveys regarding District citizen concerns.
4.	Continue to build a network of community leaders that educate and advocate for effective water resource management and protection.	A.	Support and maintain an active Citizens Advisory Committee (CAC) representative of the entire watershed.
		B.	Support education and outreach programs that encourage citizen engagement and citizen leadership for clean water.

5.10 Organizational Management

The District has established goals, objectives, policies, and actions related to District organizational management. The policies and action described in this section address specific organizational management issues described in Section 4.12. The District's goals, objectives, policies and actions related to organizational management are summarized in Table 5-10.

Table 5-10 Organizational Management Goals, Objectives, Policies, and Actions

GOAL:	**The organization will be managed in an efficient, effective, and responsible manner.**		
Objective 1:	Manage District affairs in a fiscally responsible manner.		
POLICIES		**ACTIONS**	
1.	The District will levy to fund its operations (e.g., facilities and staff), programs, capital improvement projects, and maintenance.	A.	The District will diligently comply with state and Hennepin County budgeting and levying requirements and protocols.
2.	The District will ensure that its permitting program is fee-support in accordance with Minn. Stat. § 103D.345.	A.	Defray the cost of its permitting program by collecting application fees.
		B.	Periodically review costs of administering its permitting program in comparison with fees collected.
		C.	Periodically review permitting program administration and evaluate opportunities to improve efficiency.
3.	Enforcement of rules of the District will be by civil action; criminal conduct will be reported to municipal or county authorities for investigation and prosecution.	A.	Maintain the District's program of inspections of permitted projects and take enforcement action when needed to ensure compliance with NMCWD regulatory requirements.
4.	The District will seek supplemental funding sources to accomplish its goals and objectives.	A.	Identify and pursue grant funding to help achieve District goals and objectives.
		B.	Seek partnerships, or cost-sharing, to help achieve District goals and objectives.

Objective 2:	Manage District operations, program, and projects effectively and efficiently.		
POLICIES		**ACTIONS**	
1.	Prioritize programs and projects to achieve District goals and objectives in an efficient and cost effective manner.	A.	Biennially review the District implementation program relative to current opportunities, emerging issues, and other evolving factors.
		B.	Prepare an annual budget and work plan with consideration for the items identified in the District's Plan.
2.	Evaluate and consider the short- and long-term (life cycle) costs of programs and projects when evaluating their effectiveness.	A.	Identify and/or develop tools to effectively measure life-cycle costs and benefits from District projects.
3.	Periodically evaluate District progress in working toward its goals and objectives through its implementation program.	A.	Biannually review and evaluate the District implementation program considering past accomplishments, available resources, and progress towards goals.
4	Strengthen the District's capacity to accomplish its goals and objectives.	A.	Periodically assess staffing resources and needs to most effectively distribute and accomplish District tasks.
		B.	Periodically assess office equipment needs to reduce maintenance costs and provide technology consistent with the current state of the practice.
5.	Provide science-based, informed, goal-oriented decision making.	A.	Continue to collect relevant monitoring and performance data to measure project and program success and inform future decisions.
Objective 3:	Leverage partnerships to achieve more efficient and effective water resource management.		
POLICIES		**ACTIONS**	
1.	Coordinate water resource management efforts and collaborate with District partners, including residents, cities, pertinent governmental units, and other organizations, to promote efficiency and cost effective use of funds for water resource management.	A.	Identify opportunities to incorporate water resource management efforts into capital improvement projects and major redevelopment projects.
		B.	Provide financial and technical assistance to District partners for water resource management and protection activities.
		C.	Promote innovative water resource management through implementation of District projects and support of projects by District partners.
		D.	Coordinate water quality monitoring efforts to avoid redundancy.

6.0 Implementation Program

6.1 Implementation Program

As outlined in Section 3.1, the District will take on a number of specific responsibilities in implementing this plan.

Section 6.0 sets forth the programs, projects and other actions the District will undertake to implement its goals and priorities for the next 10 years of water resource management in the Nine Mile Creek watershed and fulfill the responsibilities described in Section 3.1. The implementation program achieves its purposes through programs and activities gathered under the following headings:

- Regulatory Controls and Permitting Program
- Data Collection, Assessment and Management
- Education and Outreach
- Projects and Capital Improvements
- Administration

The District's operations and programs are summarized in Table 6-1 along with the anticipated costs. The District's anticipated capital improvement projects for the next 10 years are shown in Table 6-2. These two tables describe the programs and projects that NMCWD contemplates undertaking to implement this plan. The entries in the tables range from basic ongoing operational functions of the organization to possible major capital projects, the need for which has been identified, but the exact parameters of which have not yet been determined. Similarly, while some of the expenditures stated in the tables are well-known and understood, many others represent costs of *possible* projects and programs. The tables will guide NMCWD's annual planning, budgeting and levying processes, but do not represent budgets themselves. Before any of the work in Table 6-1 commences, the Board of Managers will proceed according to state law to establish and promulgate the first annual (2018) draft budget for implementation of the plan. The budget will be subject to public review and comment before it is finalized by the managers to establish a levy for the coming year's work in accordance with Minnesota Statutes section 103D.911. The budget also will include project work identified in Table 6-2 which has been or will be separately ordered and levied for by the managers in accordance with the procedures for public and peer review and comment in Minnesota Statutes section 103B.251. (Funds for implementation of the Nine Mile Creek stabilization and restoration project in Edina, for example, have already been collected by NMCWD.) While the tables identify work NMCWD *could* do, further public review and approval steps will occur each year to establish a budget that balances NMCWD's ambitions for water resource protection and improvement with the realities of fiscal limitations.

Table 6-1 and Table 6-2 provide an anticipated schedule for the District's operations, programs, and capital improvement projects for the next 10 years. While the tables lay out a proposed schedule of activities, the actual schedule may change due to circumstances such as the ability to successfully leverage outside resources for specific activities or projects or the timing of projects completed in partnership with other entities.

The following subsections set forth the District's implementation program in detail. A critical premise for the implementation section of the plan is that while the District assumes overall responsibility for implementing its programs and activities, the majority of the programs, projects and activities described in this section will benefit from engagement and partnership with watershed cities, Hennepin County, and other cooperators, as described in this Plan.

6.2 Regulatory Controls and Permitting Program

To implement, in part, its 2007 plan and in fulfillment of the mandate in Minnesota Statutes section 103D.341, the District adopted a comprehensive update of its rules in 2008. The rules regulate the use and development of land within the Nine Mile Creek watershed and represent, in conjunction with the state Wetland Conservation Act, a comprehensive approach to:

- Floodplain Management and Drainage Alterations
- Wetlands Management
- Stormwater Management
- Erosion and Sediment Control
- Waterbody Crossings and Structures
- Shoreline and Streambank Improvements
- Sediment Removal

The District Rules apply to proposed land-disturbing activities that meet specific criteria; each rule includes a specific threshold or thresholds that determine applicability (i.e., a proposed project may trigger the wetland management rule, but may not trigger the stormwater management rule). In addition, the District regulates small appropriations from public waters as required by Minnesota Statutes section 103B.211, subdivision 4.

The District rules set performance standards and generally do not specify means or methods by which regulated parties must achieve the standards (though well-established peer guidance is referenced and utilized to gauge expected performance of facilities and practices). The performance standards established in the 2008 comprehensive revision of the District rules have been successfully, efficiently and effectively implemented and have required only limited adjustments in 2011 (mostly clarifications to language to better effect the intent of the rules) and 2015 (a slight adjustment in the applicability of the District stormwater provisions to single-family home properties). The standards and criteria in the District rules that have been most critical in the rules' contribution to the implementation of the District plan are:

- **Floodplain Management and Drainage Alterations**
    - Two-foot vertical freeboard
    - No net loss of 100-year flood storage
    - No risk-increasing alteration or blockage of creek flood flows (50-foot clear zone)
- **Wetlands Management**
    - Priority on in-watershed replacement of impacts
    - Buffer requirement
    - Treatment of stormwater prior to discharge to a wetland (i.e., pre-treatment)
- **Stormwater Management**
    - No increase in runoff rate from existing discharge points
    - Retention onsite of the first inch of stormwater volume
        - Volume-banking option
    - Average annual removal of 60 percent of phosphorus and 90 percent suspended solids
    - Permanent maintenance of stormwater management facilities
- **Erosion and Sediment Control**
    - Site inspection and management in accordance with stormwater pollution prevention plan consistent with state-promulgated standards
- **Waterbody Crossings and Structures**
    - Conservation of hydraulic and navigation capacity, water quality, wildlife passage, waterbody cross section and bed conditions, and fish spawning
    - Minimal-impact approach to address a specific need related to a construction, improvement, repair, or removal of a waterbody crossing
- **Shoreline and Streambank Improvements**
    - Demonstration of need
    - Sequencing to favor naturalized stabilization
    - 3:1 slopes
    - Minimal waterbody encroachment
    - Prohibition on cosmetic armoring
    - Limitations on retaining walls
- **Sediment Removal**
    - Conservation of waterbody cross section, bed and banks, fish spawning areas
    - Erosion and sedimentation control,
    - Limitations on placement, storage, or disposal of excavated material

For purposes of adoption of this plan, the District rules and WCA are incorporated by reference as the thresholds, standards and criteria for regulatory protection of water resources in the Nine Mile Creek watershed. (The District is the local government unit administering WCA in Eden Prairie, Edina, Hopkins and Richfield; the City of Bloomington and the City of Minnetonka exercise WCA authority within their respective jurisdictions, as do the MnDOT and the Minnesota State College and University System for wetlands on state right-of-way property and within the Normandale Community College campus, respectively.)

In conjunction with the finalization of this plan, the District initiated a comprehensive analysis of the capacity of and efficiency with which the thresholds, standards, requirements and criteria in its rules will contribute to implementation of the goals, objectives and policies in Section 5.0. In addition, the District's meetings with its Technical Advisory Committee for the development of the plan included identification of elements of the rules that should be reviewed and issues to be considered in implementing the plan. To see these efforts through, the District initiated rulemaking in conjunction with the adoption of the plan to consider revisions to the District regulatory program and rules, including:

- **Floodplain Management and Drainage Alterations**
    - Analyze need for revisions responsive to climate change
    - Require development and redevelopment projects to maintain 100-year flood storage volumes
- **Wetlands Management**
    - Require subwatershed-based replacement wetland siting
    - Require replacement – or at least demonstrated avoidance – of indirect impacts to wetlands
    - Prohibit use of high-value wetlands for stormwater management except when no other alternative is available
- **Stormwater Management**
    - Review of threshold for District permit requirement, including applicability to single-family home properties
    - Revise/Expand options for regional stormwater management
    - Add specific provisions for stormwater reuse
    - Add exemption from volume retention requirement for sites with contaminated soils
    - Integrate elements of the state Minimal Impact Design Standards, including provisions for protection of drinking water (Drinking Water Supply Management Areas and Wellhead Protection Zones)
    - Incorporate specific provisions to ensure groundwater recharge where appropriate, especially as necessary to protect identified groundwater-dependent resources
    - Strengthen assurances of stormwater management facility maintenance
    - Integrate a winter salt application plan submittal requirement
- **Erosion and Sediment Control**
    - Review the threshold for District permit requirement

The District will develop and hone draft revisions to its rules in a robust stakeholder-engagement process before issuing for the 45-day public comment period required by state law (Minn. Stat. § 103D.341). In adopting the final revisions to the rules, the Board of Managers will concurrently take the necessary statutory steps to incorporate the revised rules into this plan. (The amended rules adopted April 10, 2018 are incorporated into this plan as Appendix E.)

Subsection 6.2.1 below describes the structure of the District permitting program while Subsection 7.1 specifies the framework for watershed cities' determinations as to whether to authorize the District to continue to exercise sole regulatory authority to achieve the water resources protection provided by the District rules. Under any circumstances, the District will continue to exercise authority for permitting under rules that apply to activities that present potential impacts to waterbodies that are shared by two or more cities.

6.2.1 Permit Program

Utilizing authority found in Minnesota Statutes sections 103B.211, subdivision 1(a), and 103D.341, the District ensures that its rules contribute measurably to the implementation of its plan. The regulatory program will produce substantive water resources protection by operating a well-managed permitting program. The District will continue to rely on operation of a comprehensive permitting program to implement its water management plan.

Any person or entity undertaking an activity that triggers one or more District regulatory thresholds must obtain the required NMCWD permit prior to commencing the activity. The District rules specify the requirements and performance standards applicable to these activities, and the process for obtaining District permits.

In its local water management plan in accordance with Minnesota Statutes section 103B.235, a city must determine whether to amend its official controls (ordinances) and policies to provide protection of water resources at least as effective as provided by the District rules or defer exercise of sole regulatory authority to the District. If the city elects to exercise sole regulatory jurisdiction over the subject matter of one or more District rules, the city must amend its official controls (ordinances) and policies to provide protection of water resources at least as effective as provided by the District rules or defer exercise of sole regulatory authority to the District within 180 days of adoption of its plan.

Consistent with this regulatory framework (which is outlined in Minnesota Rules 8410.0160), the District will require as a condition of approval of a local water management plan that the city's plan state that the city will update its ordinances to maintain conformity to the NMCWD rules or defer exercise of regulatory authority for the work covered by the revised rule within one year after NMCWD provides notice that it has significantly revised a rule. (The city's plan should allow 60 days for NMCWD review). Cities that defer exercise of regulatory authority to the District need to establish protocols to ensure that applicants for other city land-use approvals are referred to the District to obtain relevant necessary approvals under the District rules.

6.2.2 Wetlands Management

As noted, the District is the local government unit responsible for administering the Wetland Conservation Act in Eden Prairie, Edina, Hopkins and Richfield (see Section 3.1). In addition to administering the WCA, the District has adopted a Wetlands Management rule that applies in all watershed cities. The purpose of this dual regulation is to assure achievement of District goals and policies and to protect and enhance water resources. Requirements in the NMCWD Rules (as amended) related to wetlands address:

- Wetland replacement
- Buffers
- Stormwater treatment
- Information and required exhibits (e.g., signage)

Specific requirements and performance standards are included in the NMCWD Rules.

6.2.3 Erosion and Sediment Control

As a general matter, the District rules ensure consistency with the recommendations and performance specifications for erosion and sediment control (ESC) BMPs published in the *Minnesota Stormwater Manual*. But the District permitting process requires that the ESC and stormwater pollution prevention plans for a particular project will achieve compliance with District standards and criteria.

6.2.4 Stormwater Management

The District has adopted a stormwater management rule for the purposes of ensuring that development and redevelopment sites provide effective runoff management. The rule requires that onsite retention and regional water quality treatment systems operate together to manage peak runoff rates to achieve rates equal to or below existing rates; manage runoff volume through abstraction requirements; provide water quality treatment to remove sediment, other pollutants and nutrients from stormwater and snowmelt runoff; and providing for nondegradation of surface waterbodies in the watershed. The District encourages and works with prospective permit applicants to explore land-use design options that reduce the need for constructed stormwater management systems.

6.2.5 Floodplain Management

The District has a goal to protect human life and property from damage due to flooding. To this end, the District has adopted a Floodplain Management and Drainage Alterations rule. The District established a District-defined floodplain, based on Atlas 14 precipitation frequency estimates, that encompass the channels of watercourses, and those portions of the adjoining floodplains that are reasonably required to carry and discharge floodwater and provide water storage during a 100-year flood assuming ultimate development conditions. The District-defined floodplain extent and elevations are presented on Figure 2-8 and Figure 2-9, respectively.

District performance standards included in the rule are applicable only to the District-defined floodplain. (Additional requirements may apply within areas identified as floodplains by the Federal Emergency Management Agency and shown on FEMA Flood Insurance Rate Maps.)

6.2.6 Variances & Exceptions

The District may grant a variance from the minimum standards and criteria in the District rules if the District Board of Managers determines that the application meets the standard in the District variances and exceptions rule, which presently articulates an undue hardship standard. The District will consider, however, modifying its variance standard to the practical difficulties standard that has been codified in state law for other land-use decisions since the last major revision of the District rules. (*See, e.g.,* Minn. Stat. § 462.357, subd. 6.) In approving a variance, the Board of Managers may condition the variance so as

to ensure conservation of water resources using sound scientific principles for the protection of the public health and welfare and the prudent use of the natural resources.

The District also has established a framework for the approval of an "exception" where an applicant demonstrates that better water resource protection can be achieved through an innovative approach than would be achieved by strict compliance with the District rules.

6.2.7 Enforcement

The District regularly inspects all permitted work sites and a monthly report is made to the managers. To a significant extent the District has relied on communication with permittees and property owners, and coordination with water resources staff in the relevant city to address noncompliance with relevant permit and rule requirements.

After adoption of revisions to the District rules to implement the new and updated goals, objectives and policies in this plan and conclusion of review of updated city local water management plans (which must be completed and adopted by December 31, 2018), the District will examine its enforcement process to ensure it is appropriately scaled to the scope of the District regulatory program. At a minimum, due process protections – procedures to ensure the permittees who have committed an apparent violation receive notice and an opportunity to be heard by the Board of Managers – will be incorporated into the District rules and associated program guidance. As a general matter, the District will use an escalating enforcement process, whereby permittees and those who should have a permit but do not are given the opportunity to voluntarily come into compliance with District requirements. A matter will be elevated to a hearing before the Board – and from there, possible district court enforcement – only for property owners who fail to avail themselves of opportunities to work with District staff to ensure water resource protection.

6.3 Data Collection, Assessment and Management

A primary goal of the District is to protect and enhance the surface water quality of the lakes and streams of the District. To accomplish this goal, the District operates an extensive lake and stream management program. Generally, the program includes:

- Data Collection (monitoring)
- Assessment (e.g., studies)
- Implementation of projects and programs

6.3.1 Data Collection

Monitoring of District waterbodies is essential to developing an understanding of past and present conditions within the watershed and determining the need for action by the District or other entities.

The District conducts a lake and stream monitoring program for water quality purposes. The District has expanded these programs to address water quality impairments that must be addressed through the MPCA's WRAPS or TMDL processes. This data collection program is designed to establish baseline

conditions, track changes, and inform additional studies (e.g., feasibility studies, lake management plans) to identify BMPs for implementation to achieve water quality goals for both lakes and streams. The data collection program also allows the District to measure the success of past and/or ongoing implementation projects.

The District will annually submit the collected data that has been quality-controlled and quality-assured to the appropriate state agency. The District will also summarize the collected data in an annual report, to be made available on the NMCWD website. The District encourages the local units of government collecting data to submit the data to the District and other regulatory agencies.

The stream and lake level sampling locations monitored through District programs are shown on Figure 2-10.

6.3.1.1 Lakes

The District's lake level monitoring program began in 1960 and was comprised of the three Anderson Lakes and Bush Lake. The program was expanded in 1963 to include monthly monitoring of 26 lakes within the watershed. The data are summarized and provided to the MDNR annually.

The District monitors the water quality of all of its major lakes on a rotating basis. Samples are typically collected once in April after ice-out and then monthly during June through September and analyzed for a range of parameters including:

- Nutrients (total phosphorus, total dissolved phosphorus, orthophosphate, total nitrogen, total kjeldahl nitrogen, and nitrate+nitrite nitrogen)
- Chlorophyll *a*
- Chloride
- Field parameters (e.g., clarity/transparency, temperature, pH, specific conductivity, dissolved oxygen)

Generally, District monitoring is performed at one location at the deepest point of the lake. Comparable monitoring at additional sampling sites may also be undertaken where lake basin morphology has created distinctly different hydrologic or limnologic sub-basins, or where major lake tributaries influence lake water quality.

In addition to monitoring chemical water quality, the District typically completes phytoplankton (algae) and zooplankton monitoring and conducts early-summer and late-summer aquatic plant (macrophyte) surveys.

Historically, the program involved monitoring of one-third of the District lakes during each of three consecutive years, followed by data analysis and reporting of results, including updated temporal trend analyses during the fourth year. However, the monitoring schedule in recent decades has varied in support of conducting Use Attainability Analyses and monitoring to design and measure success of capital improvement projects. Going forward, a monitoring plan and schedule will be prepared and updated annually.

6.3.1.2 Streams

The District conducts stream water quality monitoring activities at three permanent flow-gaging and automated sampling stations (see Figure 2-10). The sampling stations are equipped to collect continuous monitoring data year-round at 15-minute intervals. A fourth monitoring location is maintained by the Metropolitan Council as part of its Watershed Outlet Monitoring Program (WOMP). These three District stations and the Metropolitan Council's WOMP station are distributed along the creek as follows:

Main Stem	West 98th Street 106th Street (Metropolitan Council)
North Branch	West 72nd Street
South Branch	West 78th Street

Comprehensive data collection occurs at these sites including information on the following parameters:

- Flow
- Precipitation
- Field Parameters (e.g., pH, temperature, turbidity, specific conductivity)
- Chemical water quality, including:
    - Dissolved oxygen
    - Nutrients
    - Chlorides
    - Metals
    - Solids

Samples are collected on a stage-activated basis during periods of elevated stream flow following runoff-producing storm events throughout the ice-free season. These storm event-related samples are supplemented by monthly fair weather grab samples collected year-round.

Stream water quality monitoring also includes annual surveys of seven reference stream reaches (see Figure 2-10) to assess the ecological health of Nine Mile Creek. Each year these same stream reaches are reevaluated to determine stream substrate and aquatic habitat conditions, and both benthic macroinvertebrates and fish species present are quantified. Evaluating benthic macroinvertebrates (bottom-dwelling aquatic organisms, mainly insects) in a stream provides a long-term assessment of its water quality. Biological monitoring of benthic invertebrates and fish are conducted according to MPCA- and MDNR-approved methods, including electrofishing with backpack shocking equipment.

6.3.1.3 Wetlands

The District has not historically performed regular monitoring of wetlands. As discussed in greater detail below, though, the District will be seeking opportunities to restore wetlands in the watershed. If such efforts are effective, the District will need to incorporate ongoing wetland monitoring as part of the resource assessment and management activities identified in Section 6.3.2.

6.3.1.4 Groundwater

The District performs groundwater monitoring, including the collection of static draft aquifer groundwater levels. The District will continue to summarize the data annually and will provide the data to the appropriate state agencies.

As explained in more detail in Subsection 6.3.2.3 below, over the life of this Plan, the District will also cooperate with other groundwater management entities to identify and fill data gaps, including seeking opportunities to increase understanding of groundwater-surface water interaction and understand the impacts of infiltration BMPs on groundwater resources. The District also will support watershed cities' efforts to develop, update and implement groundwater-conservation plans.

6.3.2 Resource Assessment and Management

The District's deep institutional understanding of the water resource systems in the Nine Mile Creek watershed has been vital to the success of its management and regulatory efforts to date. As explained in greater detail below, the District has conducted Use Attainability Analyses to help it work with watershed cities to prioritize and develop capital improvement projects to remove pollutants from stormwater flow to lakes and streams, to stabilize streams suffering the effects of increased urbanization and to protect infrastructure from flood damage. While the District's has a rich database of information to draw on to develop further projects to address threats to water resource health, the implementation of this plan will necessarily involve continued assessment and analysis.

This section of the plan explains how continuing research and analysis will shape management efforts that will include identification and prioritization of critical capital improvement projects, which are discussed in Section 6.6.

6.3.2.1 Lakes and Streams

To determine the need for District management efforts, the District evaluates lake and stream health relative to applicable water quality standards and management goals.

The District has historically used a process referred to as Use Attainability Analyses (UAAs) to assess water quality conditions relative to the desired beneficial uses that can reasonably be achieved and maintained for a given waterbody and identify management recommendations. The UAA considers observed water quality, estimated water quality under fully developed conditions, and recommends management strategies to achieve water quality goals. While the UAA process has historically addressed a wide range of goals (e.g., water quantity, aquatic communities, recreational use, wildlife), the primary focus of the studies has been achievement of the District's water quality goals.

In implementing this Plan, the District will expand its emphasis on the role of ecological indicators in overall lake and stream health, as well as the feedback mechanisms between these indicators. The District's approach to lake and stream health assessment and management, described further below, establishes the analytical basis for the District's efforts to protect and improve water resource health.

The District's general strategy is to implement improvements in the upstream portions of the watershed first and move toward the downstream portions. Upstream water quality improvements result in reduced pollutant loads to downstream water resources. This strategy allows for the implementation of projects with the most benefits and impacts throughout the watershed. It is important to note that this general strategy is not intended to limit the District's ability to implement projects in other portions of the watershed where there is strong local support, availability of grant dollars, interested partners, and/or the ability to incorporate water resource management facilities or techniques into a project being pursued by another public entity.

Lake Management

The District's approach to lake health assessment is illustrated on Figure 6-1. This approach considers the following primary factors affecting lake ecological health:

- Chemical water quality (e.g., phosphorus concentrations)
- Aquatic communities
    - Macrophytes
    - Fish
    - Phytoplankton
    - Zooplankton
- Water Quantity
    - Groundwater
    - Surface Water

The District's approach also considers how recreation and wildlife habitat affect and are affected by overall lake health.

Figure 6-1. NMCWD Holistic Lake Health Assessment Factors

Table 6-3 summarizes the factors to be considered in the District's lake assessment approach. Numerical goals exist for some factors (e.g., MPCA water quality standards), while other ecological lake health factors are assessed relative to narrative criteria without strict numerical goals. For example, the District has adopted a subset of the MPCA's water quality standards (found in Minnesota Rules 7050) to assess the chemical water quality of lakes and streams (see Section 2.3.3 and Table 2-2). The District will collaborate with stakeholders and regulatory agencies (e.g., MPCA, MDNR) to develop lake-specific numerical goals for ecological indicators (e.g. macrophytes) where appropriate.

Table 6-3 Summary of Evaluation Factors for Holistic Lake Health Assessment

Chemical Water Quality	Aquatic Communities	Water Quantity	Recreation	Wildlife
Nutrients	Macrophyte Species Richness and Floristic Quality (Aquatic Plant IBI)[1]	Water levels	Shore Access	Upland Biodiversity
Chloride	Invasive species	Bounce	Navigation Channels	Buffer Extent/Width
Sediment	Phytoplankton Populations	Groundwater levels	Aesthetics	
Clarity	Blue-green algae		Use Metrics	
Chlorophyll *a*	Zooplankton Populations			

[1] Lake plant eutrophication Index of Biotic Integrity (IBI) methodology developed by the MDNR and MPCA.

The District will implement an adaptive management approach to managing its lakes. Adaptive management is an ongoing, systematic approach for natural resource management, with an emphasis on identifying and predicting the outcome of management alternatives, implementing alternatives and monitoring the outcome(s), and incorporating what is learned into ongoing or future management decisions.

The District will review lake monitoring data annually to assess progress toward the District's lake management goals. For lakes that are meeting the goals, the District will continue periodic monitoring to track variations in water quality and potential trends. If water quality declines, the District will update the lake-specific Use Attainability Analysis to identify additional protection and improvement measures. For lakes that do not meet the District's lake management goals, watershed and/or in-lake management practices will be completed to improve water quality based on recommendations from the lake-specific Use Attainability Analyses. In some cases, the Use Attainability Analyses may need to be updated prior to implementing improvement projects to verify conclusions and recommendations based on additional data, changes in lake conditions, availability of more sophisticated modeling approaches, and/or advancements in stormwater treatment techniques and/or in-lake management practices.

A key component of the Use Attainability Analysis process is evaluating the attainability of the water quality goals. For some lakes, the District's water quality goals may not be achievable within a reasonable timeframe; in such cases, lake-specific goals will be developed, where appropriate, to guide lake management decisions. The lake-specific goals may include targets for lake health factors beyond water quality, such as aquatic plant communities or fisheries.

UAAs will be completed in conjunction with MPCA-led TMDL and/or WRAPS studies if the timing coincides, but the District may proceed with UAA updates and implementation of recommended actions from UAAs ahead of initiation of TMDL or WRAPS study. Non-capital projects or programs recommended

in these studies will be added to the District's implementation program in Table 6-1; while capital projects may be added to the capital improvements program in Table 6-2. The District's role in implementing a program or project will be determined in accordance with its prioritization methodology, which is detailed in Section 6.6.

Stream Management

The District has completed two stream stabilization projects to address erosion issues: the Lower Valley Restoration Project in Bloomington and the headwater reaches of the North Fork of Nine Mile Creek in Hopkins. The Lower Valley Restoration was completed in 1991 to address significant erosion issues in this steep portion of Nine Mile Creek and restore portions of the creek damaged from the 1987 superstorm. In 1997 and 2003, the District completed physical assessment of Nine Mile Creek using the classification system developed by D.L Rosgen in "A Classification of Natural Rivers" (Rosgen, 1994) and identified areas of the stream that have degraded due to stream bank erosion (see Section 4.4). Following the assessment, the District began addressing the identified areas of degradation, beginning at the upstream end of the creek system and progressing downstream. In 2012-2014, the District completed the Hopkins Streambank Stabilization and Restoration project along the headwaters of the North Fork.

Following the District's strategy of working upstream to downstream, the District commenced a third stream restoration project along the North Fork of the Creek in 2017 (see Table 6-2). The South Fork reaches have not yet been stabilized. Minimal investigation of conditions along the South Fork has occurred in recent years; further assessment is needed. The Main Stem between Marsh Lake and Old Shakopee Road in Bloomington has not yet been stabilized and continues to be prone to erosion. The District will continue to conduct periodic inspections to assess streambank stability and target areas prone to erosion.

These projects and additional work to be undertaken in implementing this plan will contribute to achieving the District's goal of meeting or exceeding MPCA water quality standards in Nine Mile Creek. The stream water quality problems identified by the District's annual evaluation and special studies include excess chloride concentrations and low biological integrity, mainly related to low dissolved oxygen and sediment concentrations and periodic low flow conditions (see Section 4.4). The District will continue to conduct annual monitoring and assessment of stream health to evaluate attainment of water quality standards and track progress in addressing previously identified problems.

The MPCA has recently developed new criteria to assess the biotic integrity of stream systems, including a new fish index of biotic integrity (IBI) and macroinvertebrate IBI methodology. In implementing this Plan, the District will assess the Nine Mile Creek system using the MPCA IBI criteria, and conduct a biological stressor identification study if the new criteria indicate the stream is biologically impaired. The creek IBI assessment will be completed in conjunction with an MPCA-led TMDL and/or WRAPS study, if the timing coincides, but the District could elect to proceed with the assessment before the TMDL or WRAPS study is commenced.

Additional projects or programs recommended as a result of annual monitoring and special stream studies will be included and prioritized in the District's implementation program (sees Tables 6-1 and 6-2) over the 10 years of the Plan.

6.3.2.2 Wetlands

NMCWD has been protecting wetlands within the watershed for several decades, most notably through implementation of the Wetland Conservation Act and District rules. The goal of WCA is to achieve no net loss in the quantity, quality, and biological diversity of existing Minnesota wetlands. A 2014 review of WCA implementation within the Nine Mile Creek watershed found that there has been a net loss of 3.6 acres of wetland area within the watershed since WCA became law in 1991, based on comparison of wetland loss versus new wetland created through replacement. When public value credits (i.e., credits for activities that protect wetlands including upland buffers surrounding wetlands and storm basins) are added to the accounting, there has been a net gain of 3.1 acres wetland area within the Nine Mile Creek watershed since 1991.

While the District has been protecting wetlands throughout the watershed through its regulatory controls and permitting program, the District has not historically been involved in wetland assessment and/or management. In developing this plan, though, the managers underscored the importance of conserving wetlands in the watershed – especially what few high quality wetlands remain. In addition, the managers have directed staff to seek out opportunities to restore and expand wetlands. This will necessarily first involve an inventory and assessment of locations suitable for wetland restoration within the watershed to identify opportunities – as well as identification of rare and high-quality plant communities and sensitive habitats for protection. The District will also seek to partner with local governments and other stakeholders to develop and implement wetland restoration and protection projects and plans within the watershed.

6.3.2.3 Groundwater

The District's goal is to protect groundwater quality and quantity to preserve it for appropriate and sustainable beneficial uses. Historically, the District has not assumed a lead role in groundwater management, and currently does not have a defined groundwater management program. As part of the implementation of this Plan, the District will undertake efforts to better understand local groundwater resources, analyze the challenges facing them and work with public and private stakeholders to effectively allocate resources to improving and protecting groundwater. The District's emphasis will be on shallow aquifers that have direct and relatively immediate effects on surface waters; it will study the interaction between groundwater and surface water to better understand the impacts of groundwater on lake, wetland, and stream hydrology. The District will also identify and map areas within the watershed based on potential (and limitations to) surficial groundwater recharge.

Other assessment and management activities the District will perform with regard to groundwater management include:

- Participating in regional groundwater planning efforts.
- Providing technical assistance, as requested, to cities during the development and/or implementation of their groundwater-conservation policies and municipal wellhead protection plans, and reviewing updates to wellhead protection plans.
- Cooperating with local government units to educate the general public concerning the use of BMPs to prevent contamination of groundwater supplies and the importance of these measures in protecting groundwater supplies.
- Preventing negative quality and quantity impacts to groundwater and groundwater-dependent surface waters through permit review, research opportunities, and education efforts.
- Supporting the identification and sealing of abandoned wells.

The District will continue to coordinate with cities to promote groundwater conservation and reduce regulatory barriers to water reuse.

6.3.2.4 Flood Management

From its inception, the District has recognized its obligation to minimize the risk of and mitigate potential damage from flooding. A 100-year flood envelope was established in 1961 assuming ultimate watershed land use development conditions, predicated upon the comprehensive plans of cities within the District. The District has also implemented several flood control projects to address previously identified local and intercommunity flood issues.

The District has developed a hydrologic and hydraulic model of the Nine Mile Creek watershed. The District uses this model to estimate 100-year flood levels and peak discharges of existing and proposed stormwater management facilities, as well as estimate flood profile information that corresponds to the peak discharges of channelized flow passing through the watershed. The extent of the floodplain adjacent to Nine Mile Creek corresponding to the Atlas 14 100-year flood elevations is shown on Figure 2-8. The District uses the model corresponding to Atlas 14 precipitation frequency estimates to identify areas of potential flood risk and evaluate management options to address those risks. Floodplain extent and elevations for hydrologic systems within each municipality may be obtained from the municipal offices and shall be incorporated in local plans (see Section 7.0).

The District intends to continue working with cities to protect public and private property through coordinated floodplain management. The District reviews and approves municipal local water management plans and will continue to review local land use development and redevelopment through implementation of its rules. The District will evaluate need for its leadership on regional flood management projects through implementation of or contribution to specific flood-management projects. The District also will continue to share hydrologic and hydraulic model results with the cities and assist in

evaluating local flood risk that more appropriately falls under the jurisdiction of an individual city. By coordinating planning, cities and the District will avoid excessive capital costs and distribute the obligation of property owners to control flood waters.

The District continues to minimize the risk of future flooding issues through its permit program, which requires development and redevelopment projects to maintain flood-storage capacity and meet floodplain and building elevation standards included in the NMCWD Rules (see Section 6.2).

6.4 Education and Outreach Program

The District has established goals, objectives, policies and actions to promote management and improvement of water resources through education and public outreach (see Section 5.9). To that end, the District has established an extensive Education and Outreach Program consisting of three primary components:

- Outreach programs
- Communications
- Advisory committees

As part of Plan implementation, the District will develop an Education and Outreach Plan to guide the implementation of its education and outreach efforts. The Education and Outreach Plan considers target audiences, emerging issues and topics, communication methods, and available resources in outlining strategies to best accomplish the District's educational goals and objectives. The District will periodically review its Education and Outreach Plan and update the plan as needed.

6.4.1 Outreach Programs

The District seeks to involve residents and other stakeholders through a variety of education & outreach programs. The goal of the District's education and outreach programs is to engage residents and other participants in effective learning to build stewardship principles and work toward behavior change that will protect and improve the NMCWD. The District seeks to meet this goal through the education and outreach program by being flexible and adaptive to meeting changing needs and requirements of the community, different environmental concerns, new and/or evolving partnerships, and changing methods for reaching audiences.

The District offers a variety of programs, seminars, workshops, and trainings targeting different key audiences. The District's key audiences include: families and adult residents, K12 students, educators, local elected and appointed officials, and environmental professionals. To understand the scope of the education and outreach program, a number of the District's current programs and audiences are described below.

The District encourages families and adults to appreciate the wonders of nature within the watershed through its Summer Education Series. Past programs have included family fishing, shoreline restoration workshops, and creek walks. The District periodically offers homeowner seminars to encourage homeowners to keep their property water friendly. Topics include yard care, landscaping and water

conservation. The District also trains Master Water Stewards through the Freshwater Society. This training course, based on the successful Master Gardener and Master Naturalist programs, aims to educate the public on water quality and stormwater management.

The District's school programs include hands-on components and active demonstrations, so students can learn by doing. Lessons are tailored to educational level and individual classroom needs. Lesson topics include watersheds, the water cycle, macroinvertebrates, and more. District staff also host field trips to Nine Mile Creek and ponds to learn about water science at the source.

The District partners with other watershed and natural resource management organizations to offer educational training to professionals. Trainings address best management practices related to turf and lawn management, application of road salt, and other topics. The District also partners with the University of Minnesota Extension to offer Nonpoint Education for Municipal Officials (NEMO). These programs educate elected and appointed officials in stormwater best management practices.

More information about the District's educational programs is available from the District website at: 9-Mile Creek Watershed District: Get Involved Programs [Ref. 39].

The District also seeks volunteers to aid the District in pursuing its goals. The District solicits volunteers for the Metropolitan Council's Citizen Assisted Monitoring Program (CAMP). Volunteers in CAMP collect water samples in District waterbodies twice a month from April through October. The data are used to see water quality trends and make lake management decisions. Training and equipment are provided.

More information about District volunteer opportunities is available from the District website at: 9-Mile Creek Watershed District Get Involved Programs: Volunteer Opportunities [Ref. 40].

In addition to developing and implementing training, exhibits, events, and other activities, the District also provides financial support to other organizations providing watershed educational resources. Besides its traditional programs, the District leverages its Discovery Point site as an educational tool. Discovery Point includes educational exhibits and demonstration projects including a rainwater garden, permeable surfaces, water reuse, and habitat restoration.

6.4.2 Communications

Through its Education and Outreach Program, the District develops and distributes information about the NMCWD and water resource management through a variety of media. The District publishes an annual report consistent with Minnesota Rules 8410. The annual report identifies the Board of Managers and current advisory committee members and discusses the District's goals, policies, funding mechanisms, and its role in local water management. The annual report also describes how to contact the District, when public meetings are held, where the District's Plan can be viewed, and other information relative to the implementation of the Plan.

The District maintains a current website. The website contains the location, time, agenda, and minutes for District meetings; contact information for District staff; studies and reports, including the current water management plan and annual activity reports; rules and requirements; and other resources. The District

updates its website on a regular basis to provide the most accurate information about District activities and water resource issues. The District website is available at: 9-Mile Creek Watershed District [Ref. 1].

In addition to its annual report and website, the District provides information through articles and news releases to local newspapers and distributed through email, social media, and the District website. Such communications address District activities and events, District projects, water resources best management practices, and other educational resources.

6.4.3 Advisory Committees

The District also has established and supports two advisory committees: one is a Technical Advisory Committee (TAC) composed primarily of municipal engineers who advise the District and offer review comments and advice; the other is a Citizens Advisory Committee (CAC). The CAC assists in developing programs and activities that help improve and protect the water resources of the NMCWD. The CAC helps with projects and activities that assist the watershed carry out its mission, such as planning the District's Summer Education Series and reviewing residential cost share grants.

6.5 Administrative Programs

The NMCWD administrative programs are an integral part of the District strategy to achieve the goals set by this Plan and the Board of Managers. It is through administrative programs that the District will manage operations, provide fiscal management, and develop and implement methods/programs for measuring, tracking, and reporting progress towards meeting the goals of the District identified in this Plan (see Section 5.0). Measurement methods/programs may include monitoring efforts (e.g., water quality monitoring, BMP performance monitoring); surveys and other solicited feedback; tracking the numbers and types of participants in District programs, projects, and events; and financial audits. As part of this effort, the District will review this Plan at least every 2 years to assess its progress in implementation as part of the District's evaluation and reporting activities (see Section 3.1).

6.5.1 District Fiscal Management

The District will fund its operations and implementation program using three primary sources:

1. Property tax levy (including savings from previous levies)
2. Grant funds
3. Contributions from cities or public entities for cooperative projects

Most of the District's funds for implementing capital projects, programs, and other operations are raised through a property tax levy. This tax is an ad valorem tax (a tax on all taxable parcels in the District that is based on property value). The NMCWD legal boundary defines the area of land that comes under the District's jurisdiction, and the area upon which the ad valorem tax is applied. The legal boundary must follow property boundaries or other legally definable boundaries (e.g., roads), and a single property cannot be in more than one watershed district. This can result in differences between the legal boundary and the hydrologic boundary. The District will keep the legal boundary matched to its hydrologic

boundary as accurately as possible, so that the land that drains to District water resources is captured within the legal boundary to the maximum extent possible.

In the Twin Cities metropolitan area, watershed districts have the authority to levy an ad valorem tax to pay for the costs of implementing their water management plans. (Minn. Stat. § 103B.241.) This includes costs related to the District's operations (e.g., facilities and staff), programs, capital improvement projects, and maintenance. .

Grants are also an important funding source for the District. The District will continue to apply for grants to offset project costs whenever possible and cost effective. The District will also seek partnerships, or cost-sharing, to reduce its portion of project costs.

Every year the District will prepare an annual budget and work plan with consideration for the items identified in this Plan (e.g., goals, objectives, implementation items). The process will incorporate program evaluation, track changes to the original plan content and projections, and determine if plan amendments are required.

The District historically collected funds through project-specific levies in accordance with Minnesota Statutes section 103D.905, subdivision 3, for construction of basic water management projects petitioned for by, for the most part, watershed cities. Through sound management of District finances and successful grant-writing, the District has completed petitioned-for capital projects for a total cost less than funds levied, leaving the District with unassigned capital funds. In 2013, the Board of Managers established a policy for the use of unassigned funds to offset future levy amounts for capital project implementation, assigning all funds levied in prior years as Capital Project Reserve funds, assigned to offsetting the costs of capital projects as petitioned by watershed cities or citizens, or ordered by the Board of Managers in accordance with Minnesota Statutes section 103B.251 to implement the goals and purposes of the District's plan. The criteria for the expenditure of Capital Reserve Funds comport with those stated in Subsection 6.6.2 for prioritization of District engagement in project development and implementation.

Tables 6-1 and 6-2 describe the programs and projects that NMCWD contemplates undertaking to implement this plan. The entries in the tables range from basic ongoing operational functions of the District to possible projects, the need for which has been identified, but the exact parameters of which have not yet been determined. Similarly, while some of the expenditures stated in the tables are well-known and understood costs, many others represent costs of *possible* projects and programs. The tables will guide NMCWD annual planning, budgeting and levying, but do not represent budgets. Before any of the work in Table 6-1 commences, the Board of Managers will proceed according to state law to establish and promulgate the first annual (2018) draft budget for implementation of the plan. The budget will be subject to public review and comment before it is finalized by the managers to establish a levy for the coming year's work. The budget also will include project work identified in Table 6-2 which has been or will have been separately ordered and levied for by the managers in accordance with the procedures for public and peer review and comment in Minnesota Statutes section 103B.251. (Funds for implementation of the Nine Mile Creek stabilization and restoration project in Edina, for example, have already been collected by NMCWD.) While the tables identify work NMCWD *could* do, further public review and

approval steps will occur each year to establish a budget that balances NMCWD's ambitions for water resource protection and improvement with the realities of fiscal limitations.

6.5.2 Staffing Plan

The District has three full-time employees as of the writing of this Plan. The District engages a consulting engineer to assist in technical issues, including administration of District rules, water resource monitoring and management, engineering design, and other issues. The District also engages a legal advisor to assist in legal issues, including administration of District rules and advising on general District matters.

The District will assess staff capacity annually as part of work plan and budget development. Other possible staff needs could result from regulatory changes and requests for services from residents and local units of government within the District, among others. These requests are now being met with existing resources. The District may hire additional staff as needs arise.

6.5.3 Office Space and Equipment

The District office is located on a five acre wooded site overlooking the Cardinal Creek Conservation Area. The land and original home were donated to the District. The District renovated and added to the house and began operating there in 2014, naming the site Discovery Point. The office and grounds were designed to meet the needs of the District into the foreseeable future while also serving as an educational tool. Working stormwater facilities and artful landscape features provide opportunities to learn while enjoying its peaceful surroundings.

The District headquarters provides for staff offices, support facilities, and meeting facilities. The offices are equipped with the necessary office equipment and program support equipment to perform required staff and Board functions such as staff computing and communications, site maintenance activities, classroom education activities, and hosting of meetings and educational seminars.

It is the intent of the District to provide necessary space, support services, and equipment for District staff to perform their required tasks in an efficient and cost-effective manner. The District's budget will provide for routine equipment replacement to reduce maintenance costs and provide technology consistent with the current state of the practice.

6.6 Projects and Capital Improvements

The NMCWD implements projects, on its own and with its partners through the District's grant and cost share programs, and capital improvements to achieve its goals. These projects and improvements complement the District's regulatory program and other District programs described in Sections 6.1 through 6. 3, and represent a critical tool for management of water resources within the watershed. Capital improvements differ from other projects in that they are limited to physical improvements; projects include such efforts as diagnostic studies, planning, and other non-structural solutions.

Programs and projects planned for implementation within the 10-year life of this Plan are summarized in Table 6-1, including estimated costs and schedules for implementation. Table 6-2 focuses exclusively on capital improvement projects. For purposes of future allocation of resources and grant-seeking efforts,

capital projects are prioritized. The priorities here were assigned through review by members of the Technical Advisory Committee and the Board of Managers, with the latter providing the final determination where assignment of priorities differed. In addition, Table 6-2 includes a designation of whether NMCWD will take the lead in constructing a project – i.e., implement the project with the support of a watershed city and others but otherwise independently – or seek to implement the project through a partnership, the specifics of which would be determined in the study of the problem to be addressed, assessment of feasibility of the specific project and development of the design. For most of the projects included in Table 6-2, both lead and partnership roles are possible because the particular entry includes projects that likely will be pursued either by NMCWD in a lead role or in a partnership approach. (The specific partnership option of a special cost-share project is discussed in more detail in Subsection 6.6.3 below.)

6.6.1 Completed Projects

The District historically has undertaken Basic Water Management Projects on a cooperative basis in response to petitions from its constituent cities. The earliest District projects focused on flood control and water quantity improvements. In the late-1990s and early 2000s, the District shifted its focus to implementation of the recommended best management practices (BMPs) from the completed lake Use Attainability Analyses (UAAs). The Minnetonka Lakes Water Quality Improvement projects, completed in 2006, included implementation of BMPs to protect and/or improve Lone, Minnetoga, Shady Oak, Glen, Holiday, Wing, and Rose lakes. The Eden Prairie Lakes Water Quality Improvement projects, conducted from 2008 to 2013, included implementation of BMPs to protect and/or improve Bryant, Anderson (Northwest, Southwest, Southeast) and Birch Island lakes. During 2012-2014, the District constructed the Hopkins stream stabilization project to reduce erosion and stabilize the headwaters area of the North Fork of Nine Mile Creek.

The District's completed projects include the following:

- Marsh Lake, 1970
- Bredesen Park, 1973-1978
- Normandale Lake, 1978
- Lower Valley Restoration, 1990-1991, ongoing maintenance
- Hopkins Culvert, 1993
- Lake Smetana, 1998-1999 and 2001-2002
- Bush Lake Outlet, 1999-2000
- Minnetonka Lakes Improvements, 2003-2006
- Bloomington Culvert Improvements, 2006
- Eden Prairie Lakes Water Quality Improvements, 2008-2013
- Hopkins Streambank Stabilization and Restoration, 2012-2014

The District has completed design of the Edina Streambank Restoration project, which will restore approximately 16,000 feet of Nine Mile Creek from TH 169 to West 77th Street, as well as realign approximately 3,400 feet of Nine Mile Creek from Brook Drive to the SOO Line Railroad and approximately 650 feet of Nine Mile Creek from the SOSO Line Railroad to West 70th Street in Edina. The

project, conducted in partnership with the City of Edina, will reduce erosion and sedimentation in the creek, improving water quality and habitat in the creek and downstream waterbodies. The project is anticipated to be completed in 2017-2018.

Historically, the District and watershed cities have shared responsibility for maintenance of District-implemented capital improvements upon completion. More recent projects have been supported by a cooperative agreement specifying the parties' responsibilities – finished-project maintenance among them. Future capital improvement projects will be conducted pursuant to such agreements, which will provide for drafting and implementing a maintenance plan describing responsibilities for maintenance throughout the planned life of the project and assigning responsibility to the party best suited to such tasks.

6.6.2 Current and Future Project Prioritization

In addition to completing the implementation of the Nine Mile Creek Streambank Restoration in Edina, the District will implement the capital improvements in Table 6-2 to help achieve the goals of the District. The entries in the table reflect water resource improvements identified as needed in Use Attainability Analyses or flood improvement studies completed by the District. The CIP table also includes specific cost and timing information in keeping with state requirements (see Minnesota Rules 8410.0105, subp. 2). As the District refines its understanding of the structural measures that can contribute to achieving protection and management strategies (through, e.g., feasibility studies), specifics of projects in Table 6-2 will move forward. When necessary because the District's refinement of its strategy for achieving resource-management goals results in a wholly new project – one outside the framework established by the CIP – the CIP will be amended through the process described in Section 8.0 of the plan.

The District has historically implemented capital-improvement projects through a petition process to assure strong coordination and partnership with the affected cities, so the collaborative approach is not a new one for NMCWD. Cities may continue to petition for projects as the District implements this plan. The District prefers to utilize its detailed understanding of watershed hydrology and the needs identified in this Plan to collaboratively develop capital implementation projects with substantial input and ongoing involvement from the city or cities in which the project would take place, as well as regional and state governmental entities.

Given that the watershed is almost entirely developed and in many areas, watershed cities are putting considerable resources and time into redevelopment and revitalization strategies, a critical new element to NMCWD's capital-improvement approach will be integration of water-resource management facilities and structures into redevelopment efforts. Sometimes the District will retain the lead role in implementing such project – e.g., conducting the feasibility study, budgeting District funds for construction, contracting for the work – and the project will be prosecuted through the standard CIP implementation program provided in Minnesota Statutes section 103B.251. Implementation may only require the District to lend its expertise and experience to the design and implementation of a water-resources project integrated into work undertaken by another entity. In such cases, the partner would take the lead in contracting for and overseeing completing the project. Watershed cities are the most likely partners for such work, but

Hennepin County, private developers and state agencies could also have project plans that could serve as an appropriate venue for a productive water resources protection and improvement project.

Early in the process of implementing this plan, the District will engage planning and community development staffs and boards in the watershed cities to initiate discussions regarding development of such collaborative approaches. Cities and others also may approach the District with ideas. The nature and extent of the District's involvement will depend on a myriad of factors. Some of these will be case-specific, but to provide as much transparency and useful guidance as possible (both for itself and for possible partners), the Board of Managers directed the development of a prioritization tier system for considering projects and guiding the extent of the District's involvement – which may change along the course of a project's evolution:

Top priority – work that will:

- Advance NMCWD's progress toward completion of a Use Attainability Analysis.
- Advance NMCWD's progress toward implementation of a completed UAA.
- Contribute to the completion of a study, data collection or assessment scope of work already identified as a NMCWD priority.
- Contribute to minimizing the risk of and mitigating potential damage from regional flooding.
- Contribute to a Total Maximum Daily Load or Watershed Restoration and Protection Strategy study or implementation of a TMDL- or WRAPS-derived project in the watershed.

Second priority – work that will:

- Enhance or improve previously completed watershed projects.

Third priority – work that will:

- Advance NMCWD's interests in a project related to water resources management in the watershed.
- Address local flooding issues.

The District will continue to look for a written commitment of support from its partner cities when developing a capital project, but prefers to move away from the formality and procedural structure imposed by a petition in favor of a resolution of support or similar statement from the governing council.

Design and construction will be undertaken utilizing funds levied for under authorities in the Metropolitan Surface Water Management Act and Capital Project Reserve funds, which the Board of Managers established to allocate funds collected but unused for basic water management projects. Careful management of resources, successful grant-writing and delays in securing land rights necessary to complete some capital work led to this unassigned balance of funds. The Board of Managers ensured that the funds would remain dedicated to capital improvements consistent with the District plan through creation of the Capital Project Reserve and a policy and criteria for its use.

To select and prioritize projects within the three tiers described above, the Board of Managers consider the nature and extent of District engagement in capital work through, in part, evaluation under the following criteria to determine whether District involvement will:

1. Improve and protect water resources beyond what would be achieved through compliance with District or other regulatory requirements;
2. Be supported by the city or cities in which the project is located;
3. Contribute to achieving water resource-improvement goals in the Plan;
4. Improve and protect water quality;
5. Reduce the rate and volume of stormwater runoff that drains off the landscape and promote infiltration;
6. Prevent erosion and reduce sedimentation of District water resources;
7. Protect against or reduce potential for damage from flooding along Nine Mile Creek;
8. Protect and restore high quality wetlands;
9. Improve water-resource habitat for wildlife;
10. Maximize cost-effectiveness and efficiency through collaboration with public and private entities and ability to draw on outside funding sources (e.g., grant programs);
11. Demonstrate or test innovative techniques and technology; or
12. Have watershed-wide or multi-jurisdictional benefits.
13. Address a waterbody impairment that is subject to a TMDL or WRAPS study (see Section 2.3.1)

Projects will be ordered by the Board of Managers only after all interested parties are given the opportunity to review and comment through the process prescribed by Minnesota Statutes section 103B.251 and the managers have determined that the project cost-effectively achieves District goals and is in the public interest.

As noted, when a potential water resource capital improvement is part of a broader property redevelopment or revitalization effort a public entity is developing – on its own or in partnership with private property owners and developers – the District will consult with city representatives about undertaking the water project under the District's cost-share program (see Section 6.6.3). Utilizing the cost-share approach allows the District to contribute design and implementation expertise and funding for stormwater management, water resource enhancement, or projection and/or flood control elements of projects, while the city or other public or private entity takes the lead on the implementation of the overall project.

6.6.3 Cost Share and Grant Program

The NMCWD implements projects with its partners through the District's grant and cost share programs. The District has determined that the water resource protection and improvement needs identified in this Plan can often be addressed most effectively by integrating watershed objectives into other infrastructure, development, and redevelopment activities or improvement projects conducted by other entities. These

projects complement the District's regulatory and capital improvement programs. The District's cost share and grant programs are described in the subsequent subsections.

6.6.3.1 Competitive Cost Share Program

The District established a competitive cost-share program under the auspices of its education and outreach program in 2008. The cost-share program provides District funding for project elements that exceed minimum regulatory requirements. The program offers financial assistance for implementation of best management practices that:

1. Improve water quality or increase the capacity of the watershed to store water;
2. Preserve, protect and restore native plant and wildlife communities, with emphasis on lakes, rivers and wetlands; and
3. Protect and conserve groundwater quality and quantity.

Competitive cost share grants for implementing improvement projects are available to residents, homeowner and lake associations, nonprofits, schools, businesses, and cities for projects located within the watershed boundaries. The Board of Managers establishes an annual budget for cost-share funding, and periodically reviews and adjusts, as necessary, the eligibility criteria. Presently, grants are awarded for up to 75% of project cost, on a reimbursement basis, for materials, labor, engineering, and consulting fees. The maximum grant award varies by applicable, with up to $3,000 for residential projects, up to $10,000 for townhome, condominium, or lake associations, and up to $25,000 for commercial, government, or nonprofit projects.

Applications are reviewed by staff, and residential applications are also review by the District's Citizens Advisory Committee. All projects must be approved by the NMCWD Board of Managers. In each case, the participating property owner must commit to long term maintenance (either 5 or 10 years, depending on the project type), and making the project available for education signage to capitalize on the education and outreach potential of the work.

The competitive cost share program is funded annually through a portion of the District's levy funds (see Section 6.5.1). The criteria for the consideration of specific projects for cost share funding have been established by the Board of Managers and consideration of revisions may be initiated by the Board of Managers in response to changing conditions in the watershed, to implement new initiatives developed by staff or otherwise as circumstances warrant. The District will conduct a thorough stakeholder engagement process prior to any revision of the cost-share criteria.

Detailed information regarding cost share program eligibility, application guidelines, and deadlines are available from the District website at: 9-Mile Creek Watershed District: Get Involved: Grants [Ref. 41].

6.6.3.2 Planning Grants and Projects

Planning grants were established by the District in 2016 as a 3-year pilot program to build capacity within nonprofit organizations to apply for District or other cost share grants and implement best management practices. The grants are available for nonprofit organizations that are held by an organization that is

open and accessible to the public that hold 2.5 acres or more of land located within the District. Through the grant, organizations work with a consultant selected by the District to develop a Conceptual Stormwater and Sustainable Landscape Plan. The District funds 100% of the cost to develop the concept plan, up to a determined maximum amount ($5,000 for the 3-year pilot program beginning in 2016). As part of the grant, organizations that participate are required to host an educational workshop on a water-related topic and write a newsletter article about the site plan. Planning grants are funded annually through a portion of the District's levy funds. Grant applications are reviewed by staff. All applications must be approved by the NMCWD Board of Managers.

The District applied for and was awarded an Accelerated Implementation Grant for this work from BWSR through the Clean Water, Land and Legacy Amendment in 2017. The grant allowed the District to assess nonprofit parcels for targeted BMP installation on prioritized locations in the watershed. The District conducted outreach at the identified sites to garner support for partnering with the NMCWD on installation of a BMP at each project location. The outcome of the grant led to the development of preliminary design plans and cost estimates for stormwater BMPs on these prioritized sites owned by nonprofit organizations in the watershed. Working in partnership with the property owner in each case but taking a lead role given its expertise in BMP design and construction, the District will install at least one BMP on each property. The outcomes of these projects will reduce stormwater runoff rates, volumes, and pollutant loadings to downstream waterbodies in the District. The organizational, technical, and financial leadership that the District offers on these projects ensures installation of BMPs in strategic locations in the watershed. Without District leadership, the resources to complete these projects may otherwise be unavailable.

6.6.3.3 Special Cost Share Projects

As discussed in the introduction to this subsection of the Plan, through implementation of its cost share and capital improvement programs, the District has determined that the water resource protection and improvement needs identified in this Plan can often be addressed most effectively by integrating watershed objectives into other infrastructure, development, and redevelopment activities planned by public and private land owners. To facilitate its productive and efficient engagement with city land-use planners and other potential partners to pursue project opportunities in keeping with elements in the CIP in Table 6-2, the District has developed specific guidelines, development steps and a management structure for special cost-share projects. In this development phase, the District seeks to scale its involvement, with possible District contributions including:

- Assessment of options for or feasibility of options to address a water resources management issue
- Partnering to assess options for or feasibility of options to address a water resources management issue
- Making District staff and/or engineer available to assist with a scope of work
- Contribution of funding to completion of a scope of work
- Providing access to NMCWD data.

The District generally will undertake this approach for projects that are selected by the Board of Managers based on the prioritization criteria outlined in Subsection 6.6.2 and that will require:

- Dedication of District plan-implementation or Capital Project Reserve funds;
- Dedication of the unique experience, design capacity and extensive knowledge of watershed hydrology offered by the District staff and engineer; and/or
- Collaborative development and implementation with watershed cities and private developers, as well as regional and state agencies.

Once a particular project has been selected and the District's engagement has been scaled in accordance with the criteria, projects involving contributions of District funds for capital improvements will be the subject of a hearing conducted in accordance with Minnesota Statutes section 103B.251 prior to ordering by Board of Managers.

The District anticipates that special cost share projects will require the annual dedication of at least $25,000 in District funds, as well as BMP design and education and outreach expertise, all of which will support the integration of innovative water-resource improvement and protection systems and practices into public, private and public-private land-redevelopment projects undertaken for broader public purposes. After ordering by the Board of Managers, special cost-share projects will be conducted in accordance with a cooperative agreement among the partners, outlining the roles and responsibilities of each as relates to the District-funded work. Long-term maintenance of structural BMPs will be provided for in the cooperative agreement, and for work on privately owned property a maintenance declaration will be recorded on the title.

The District will budget funding as well as staff and engineering time annually for special cost-share projects. Projects that require resources that exceed the available funding in a given budget cycle will be multiyear endeavors, for which specific budget and resource allocations will be made after initial development under the baseline annual program. This structure reflects the fact that projects requiring greater resources will also have longer planning timelines, allowing the District to budget accordingly.

Table 6-1 District Implementation Programs and Projects during 10-year Plan Cycle

Implementation Items		Goal Reference	Priority (H= high, M= medium, L= low)	NMCWD Role (Lead, Partner, or Participant)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total Estimated Cost (2018-2027)
Data Collection (DC)															**$2,345,000**
DC-1	Develop and implement a groundwater monitoring plan, including identification of abandoned wells and well abandonment procedures.	5.5.1.1.A., 5.5.1.1.B.	**M**	Partner	$10,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$55,000
DC-2	Develop and implement a lake monitoring plan including water levels, water quality, and ecological indicators.	5.2.1.1.A., 5.2.1.1.B., 5.10.3.1.D.	**H**	Lead	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000	$95,000	$950,000
DC-3	Summarize annually the results of District data collection programs, assess conditions relative to standards, perform QA/QC, review the data for trends, document results in monitoring report(s), and provide a data summary to appropriate state agencies.	5.2.1.1.B., 5.2.1.2.B., 5.2.2.3.A., 5.5.1.1.D., 5.10.2.4.A.	**H**	Lead	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$250,000
DC-4	Develop and implement a stream monitoring plan including assessment of water quality, continuous flow, substrate and bank conditions, and ecological indicators (e.g. fish and macroinvertebrates).	5.2.1.2.A., 5.2.1.2.B., 5.2.1.2.C., 5.2.1.2.D., 5.2.1.2.E., 5.2.1.2.F., 5.10.3.1.D.	**H**	Lead	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$800,000
DC-5	Conduct periodic inventory and assessment of aquatic invasive species.	5.2.2.4.A.	**M**	Partner	$10,000			$10,000			$10,000			$10,000	$40,000
DC-6	Conduct targeted monitoring of lakes, streams, and stormwater to assess pollutant sources and measure success of District management activities.	5.2.1.3.A.	**H**	Lead	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$250,000
Education and Outreach (EO)															**$1,483,000**
EO-1	Develop and annually update the District's Education and Outreach Plan, updating the plan as necessary to address emerging issues, audiences, and communication strategies.	5.9.1.1.A., 5.9.1.2.A., 5.9.1.2.B., 5.9.1.2.D., 5.9.1.2.E., 5.9.1.3.A., 5.9.2.3.B., 5.9.5.1.C.	**H**	Lead	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$7,500	$75,000
EO-2	Develop and host events, exhibits, and demonstrations at Discovery Point, including an annual state-of-the-watershed event to update stakeholders on progress towards accomplishing District goals.	5.9.2.1.A., 5.9.2.1.D., 5.9.2.3.C., 5.9.3.1.B.	**H**	Lead	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$300,000

Table 6-1 District Implementation Programs and Projects during 10-year Plan Cycle

Implementation Items		Goal Reference	Priority (H= high, M= medium, L= low)	NMCWD Role (Lead, Partner, or Participant)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total Estimated Cost (2018-2027)
EO-3	Support and collaborate with other entities implementing education and outreach programs that promote citizen engagement and leadership for watershed management.	5.9.1.1.C., 5.9.1.1.F., 5.9.1.4.A., 5.9.5.4.B., 5.9.1.3.B.	**H**	Lead	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$30,000	$300,000
EO-4	Develop, maintain, and distribute educational communications and other materials in support of the District's educational goals (e.g., signage, website, newsletters, brochures).	5.9.1.1.D., 5.9.2.3.D., 5.9.5.1.A., 5.9.5.1.B., 5.9.1.2.C.	**H**	Lead	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$45,000	$450,000
EO-5	Develop and deliver educational materials, workshops, demonstrations, and/or presentations addressing emerging issues, innovative strategies, and best management practices.	5.9.1.1.E., 5.8.2.1.B., 5.8.1.1.B., 5.9.1.1.B., 5.2.3.1.D., 5.9.2.1.B., 5.9.2.1.C., 5.9.2.2.A., 5.9.2.2.B., 5.9.2.2.C., 5.9.2.2.D., 5.9.3.1.A., 5.9.3.2.A., 5.9.3.3.A., 5.9.3.3.B., 5.9.3.2.B., 5.5.2.4.B.	**H**	Lead/Partner	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$250,000
EO-6	Coordinate the District's volunteer program(s) and support volunteer programs coordinated by other entities.	5.9.1.5.A., 5.9.1.5.B., 5.9.1.5.C., 5.9.2.3.A., 5.9.3.1.C., 5.3.1.2.C., 5.2.1.1.C.	**H**	Lead/Partner	$3,500	$3,500	$3,500	$3,500	$3,500	$3,500	$3,500	$3,500	$3,500	$3,500	$35,000
EO-7	Support and maintain an active Citizens Advisory Committee (CAC) representative of the entire watershed.	5.9.5.3.A.	**H**	Lead	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$10,000
EO-8	Develop a program to incorporate public art into the District's projects and facilities.	5.9.1.4.B., 5.9.1.4.C., 5.9.2.4.A., 5.9.2.4.B.	**M**	Lead	$5,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$23,000

Table 6-1 District Implementation Programs and Projects during 10-year Plan Cycle

Implementation Items		Goal Reference	Priority (H= high, M= medium, L= low)	NMCWD Role (Lead, Partner, or Participant)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total Estimated Cost (2018-2027)
EO-9	Engage the public and solicit public input on District projects and programs.	5.9.5.3.B., 5.9.5.3.E.	**H**	Lead	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$20,000
EO-10	Regularly communicate information about District activities, projects, and progress towards goals to cities, residents, and other stakeholders.	5.9.5.1.D., 5.9.5.2.A., 5.9.5.3.C., 5.9.5.3.D.	**H**	Lead	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$20,000
Operations and Administration (OA)															**$6,945,000**
OA-1	Establish and implement an Incentive Program for implementation of wetland buffer areas on private properties.	5.4.1.2.A.	**H**	Lead	$20,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$110,000
OA-2	Work with cities to provide technical support for floodplain issues, including identification of floodplains, review of land uses, identification of improvement alternatives, and assistance in implementing city projects to address these issues.	5.7.2.1.B., 5.7.2.1.C., 5.7.2.3.A., 5.7.2.3.B., 5.7.2.3.C., 5.7.2.3.D., 5.7.1.1.D., 5.7.2.3.B.	**H**	Partner	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$200,000
OA-3	Assist cities in implementing climate change adaptation strategies.	5.8.1.1.C.	**M**	Partner	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$50,000
OA-4	Identify and/or develop tools to effectively measure life-cycle costs and benefits of District projects.	5.10.2.2.A.	**H**	Lead		$10,000									$10,000
OA-5	Participate in local and regional resource and land planning activities, as appropriate, to identify and leverage opportunities to achieve District goals, objectives and policies.	5.5.2.1.B., 5.6.1.1.A., 5.6.1.1.B.	**H**	Partner	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$100,000
OA-6	Assist cities in the development of local water management plans and review plans for consistency with District goals and policies.	5.6.1.2.A., 5.1.1.3.A, 5.1.1.3.C, 5.6.1.2.B.	**H**	Lead/Partner	$25,000	$25,000								$25,000	$75,000
OA-7	Review Biennially District performance relative to identified goals, planned implementation items, and available resources; revise programs as necessary.	5.10.2.1.A., 5.10.2.3.A., 5.10.2.3.B., 5.10.2.3.C.	**H**	Lead		$20,000		$20,000		$20,000		$20,000		$20,000	$100,000
OA-8	Implement annual work plan in pursuit of District goals, consistent with available resources and applicable legal requirements.	5.10.1.1.A., 5.10.1.4.A., 5.10.2.1.B.	**H**	Lead	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$600,000	$6,000,000
OA-9	Update District's Water Management Plan	5.10.2.1.C.	**H**	Lead									$50,000	$100,000	$150,000

Table 6-1 District Implementation Programs and Projects during 10-year Plan Cycle

Implementation Items		Goal Reference	Priority (H= high, M= medium, L= low)	NMCWD Role (Lead, Partner, or Participant)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total Estimated Cost (2018-2027)
OA-10	Provide technical assistance to cities, developers, and other stakeholders to promote incorporation of water and natural resource benefits into capital improvement, development, and redevelopment projects.	5.10.3.1.A., 5.10.3.1.B., 5.3.1.1.A., 5.3.2.3.A.	**H**	Lead/Partner	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$100,000
OA-11	Work with local governments to identify and implement strategies to reduce road salt usage.	5.2.4.1.B.	**H**	Lead/Partner	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$50,000
Maintenance (M)															**$1,037,000**
M-1	Maintain and improve stormwater management facility maintenance standards in collaboration with cities; work with the cities and private entities to confirm facilities are maintained.	5.1.1.4.A., 5.2.2.2.B.	**H**	Lead	$10,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$19,000
M-2	Develop a stormwater management facility maintenance system to document maintenance agreements and track compliance.	5.1.1.4.B.	**H**	Lead	$5,000	$5,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$18,000
M-3	Operate, monitor, and maintain current and future NMCWD water quality improvement facilities to ensure the designed benefits are achieved.	5.1.2.1.B, 5.1.2.1.A, 5.2.2.2.A.	**H**	Lead	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000	$1,000,000
Rules and Permitting (RP)															**$1,950,000**
RP-1	Continue to implement the District's permitting program, including inspections and enforcement actions.	5.1.1.1.A., 5.2.3.3.B., 5.2.4.1.A., 5.2.2.1.A 5.2.4.3.C, 5.7.1.1.A, 5.7.1.1.C, 5.10.1.3.A., 5.10.1.2.A., 5.4.1.1.C.	**H**	Lead	$155,000	$155,000	$155,000	$155,000	$155,000	$155,000	$155,000	$155,000	$155,000	$155,000	$1,550,000
RP-2	Review periodically permitting program administration and costs; evaluate opportunities to improve efficiency.	5.10.1.2.B., 5.10.1.2.C.	**H**	Lead		$5,000					$5,000				$10,000
RP-3	Review periodically District rules and update as necessary.	5.5.2.2.C, 5.7.1.1.B., 5.7.2.4.C., 5.1.1.8.A.	**H**	Lead	$20,000						$10,000	$10,000			$40,000
RP-4	Administer WCA requirements as the responsible Local Government Unit (LGU) for the cities of Eden Prairie, Edina, Hopkins, and Richfield; provide technical assistance, as requested, in wetland-related matters in Bloomington and Minnetonka.	5.4.1.1.B., 5.4.1.1.A.	**H**	Lead	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000	$35,000	$350,000

Table 6-1 District Implementation Programs and Projects during 10-year Plan Cycle

Implementation Items		Goal Reference	Priority (H= high, M= medium, L= low)	NMCWD Role (Lead, Partner, or Participant)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total Estimated Cost (2018-2027)
Studies (S)															**$1,330,000**
S-1	Evaluate impacts and develop a District climate change adaptation strategy to identify natural and water resource vulnerabilities to climate change and potential adaptation strategies.	5.8.1.1.A.	**H / M**	Lead				$15,000							$15,000
S-2	Assess increased flood risk due to predicted climate changes.	5.7.2.4.A.	**H**	Lead/Partner	$70,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$160,000
S-3	Conduct study of groundwater and surface water interaction in Nine Mile Creek watershed to better understand the impacts of groundwater on lake, wetland and stream hydrology; and identify and map areas in the watershed based on potential for (and limitations to) groundwater recharge.	5.5.1.1.C., 5.5.3.1.A.	**H**	Lead		$80,000									$80,000
S-4	Collaborate with others to research infiltration impacts on groundwater and develop a consistent approach to protecting areas sensitive to groundwater contamination.	5.5.1.2.A.	**H**	Participant			$10,000	$10,000							$20,000
S-5	Inventory areas within the District for possible natural space restoration or enhancement and maintain a database of these opportunities.	5.3.2.1.A.	**M**	Lead/Partner		$10,000									$10,000
S-6	Complete update of Use Attainability Analyses for Normandale Lake.	5.2.3.1.B.	**H**	Lead	$25,000										$25,000
S-7	Conduct Use Attainability Analyses for Lake Edina.	5.2.3.1.A.	**H**	Lead	$45,000										$45,000
S-8	Update Use Attainability Analyses for Lake Cornelia (North and South).	5.2.3.1.B.	**H**	Lead	$30,000										$30,000
S-9	Update Use Attainability Analyses for Lake Smetana.	5.2.3.1.B.	**H**	Lead		$30,000									$30,000
S-10	Update Use Attainability Analyses for Indianhead and Arrowhead Lakes.	5.2.3.1.B.	**M**	Lead				$45,000							$45,000
S-11	Update Use Attainability Analyses for Mirror Lake.	5.2.3.1.B.	**M**	Lead					$30,000						$30,000
S-12	Update Use Attainability Analyses for Penn Lake.	5.2.3.1.B.	**M**	Lead							$30,000				$30,000
S-13	Update Use Attainability Analyses for Bush Lake.	5.2.3.1.B.	**H**	Lead					$30,000						$30,000
S-14	Update Use Attainability Analyses for Birch Island Lake.	5.2.3.1.B.	**H**	Lead				$30,000							$30,000

Table 6-1 District Implementation Programs and Projects during 10-year Plan Cycle

Implementation Items		Goal Reference	Priority (H= high, M= medium, L= low)	NMCWD Role (Lead, Partner, or Participant)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total Estimated Cost (2018-2027)
S-15	Update Use Attainability Analyses for Bryant Lake.	5.2.3.1.B.	**H**	Lead								$30,000			$30,000
S-16	Update Use Attainability Analyses Glen, Lone, Minnetoga, and Shady Oak Lakes.	5.2.3.1.B.	**H**	Lead									$60,000		$60,000
S-17	Update Use Attainability Analyses for Anderson Lakes.	5.2.3.1.B.	**H**	Lead							$45,000				$45,000
S-18	Update Use Attainability Analyses for Holiday, Wing, and Rose Lakes.	5.2.3.1.B.	**M**	Lead				$30,000							$30,000
S-19	Complete or update Use Attainability Analyses (UAAs), as needed	5.2.3.1.A., 5.2.3.1.B.	**M**	Lead									$45,000		$45,000
S-20	Work with agencies and stakeholders to develop subwatershed-based implementation programs for the North Fork of Nine Mile Creek.	5.2.3.1.C.	**H**	Lead		$50,000									$50,000
S-21	Work with agencies and stakeholders to develop subwatershed-based implementation programs for the South Fork of Nine Mile Creek.	5.2.3.1.C.	**H**	Lead			$50,000								$50,000
S-22	Work with agencies and stakeholders to develop subwatershed-based implementation programs for main stem Nine Mile Creek (downstream of Normandale Lake).	5.2.3.1.C.	**M**	Lead								$50,000			$50,000
S-23	Identify and target priority chloride sources to Nine Mile Creek.	5.2.4.1.A.	**H**	Lead		$20,000									$20,000
S-24	Investigate primary causes of low dissolved oxygen throughout Nine Mile Creek and develop potential remedial measures.	5.2.4.2.A.	**H**	Lead					$20,000						$20,000
S-25	Conduct periodic inspections of Nine Mile Creek to identify and target areas prone to erosion.	5.2.4.3.A.	**H**	Lead		$20,000		$20,000		$20,000		$20,000		$20,000	$100,000
S-26	Prepare a District wetland inventory that identifies high-value wetlands within the watershed, rare and high-quality wetland biological communities, and identifies opportunities for restoration and/or protection.	5.4.2.1.A, 5.4.2.1.B, 5.4.2.1.C., 5.4.2.1.E., 5.4.2.1.D.	**H**	Lead			$50,000				$50,000	$50,000			$150,000
S-27	Develop restoration and/or protection plans to address high-quality wetlands areas, sensitive habitats and plant species, and rare, endangered, and threatened plants and animals within watershed.	5.4.2.1.D.	**H**	Lead				$20,000	$20,000	$20,000	$20,000	$20,000			$100,000

Table 6-1 District Implementation Programs and Projects during 10-year Plan Cycle

	Implementation Items	Goal Reference	Priority (H= high, M= medium, L= low)	NMCWD Role (Lead, Partner, or Participant)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total Estimated Cost (2018-2027)
Projects (P)															**$4,705,000**
P-1	Work with cities to establish natural vegetated buffers on all publicly owned lands adjacent to Nine Mile Creek and stormwater detention areas.	5.7.1.2.A.	**M**	Partner	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$50,000
P-2	Develop and implement strategies to manage invasive species in coordination with natural resource agencies.	5.4.2.1.F., 5.2.2.4.C., 5.2.2.4.B.	**M**	Partner	$5,000	$5,000	$15,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$60,000
P-3	Identify and implement natural resource protection and enhancement projects, including the restoration strategy for NMCWD Discovery Point, and seek opportunities to include open space, recreational, and habitat benefits into District capital projects.	5.3.2.1.A., 5.3.2.1.A., 5.3.2.1.B., 5.3.2.2.B., 5.3.2.2.A.	**H**	Lead	$75,000	$75,000	$75,000	$50,000	$25,000	$20,000	$20,000	$20,000	$20,000	$20,000	$400,000
P-4	Work with local governments in identification, planning, and development of regional or site-specific stormwater management systems to enhance treatment.	5.1.1.5.B., 5.1.1.2.A, 5.1.1.2.B, 5.1.1.5.A.	**H**	Lead		$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$225,000
P-5	Implement opportunities for enhanced stormwater management in cooperation with cities or other public and private partners through the District's cost share program, including stormwater reuse projects and innovative stormwater management demonstration projects.	5.9.1.6.A., 5.2.4.1.C., 5.9.1.6.B., 5.1.1.7.B., 5.1.1.7.A., 5.1.1.6.A., 5.10.3.1.C.	**H**	Lead	$380,000	$380,000	$380,000	$380,000	$380,000	$380,000	$380,000	$380,000	$380,000	$380,000	$3,800,000
P-6	Establish a wetland bank within the District for District-sponsored projects.	5.4.1.4.A.	**H**	Lead					$50,000	$50,000	$50,000				$150,000
P-7	Actively participate in the TMDL and WRAPS process for District waterbodies, incorporating UAAs or other District studies where applicable.	5.2.3.2.A.	**H**	Lead/Partner	$10,000	$10,000									$20,000
				Totals	$2,061,000	$2,114,000	$1,950,000	$2,005,000	$1,930,000	$1,885,000	$1,995,000	$1,975,000	$1,930,000	$1,950,000	$19,795,000

Table 6-2. District Capital Improvement Projects during 10-year Plan Cycle

Item Number	Implementation Items	Priority (H= high, M= medium, L= low)	NMCWD Role (Lead, Partner, or Participant)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total Estimated Cost (2018-2027)
1	Stabilize and restore the North Fork of Nine Mile Creek in Edina[1].	**H**	Lead	$1,500,000										$1,500,000
2	Implement recommendations of Normandale Lake UAA (2005) and/or subsequent studies (see S-6 from Table 6-2), which may include in-lake alum treatment, aquatic plant management, and/or construction of two stormwater treatment ponds within the North Fork and South Fork watersheds.	**H**	Lead/Partner	$500,000	$500,000									$1,000,000
3	Implement recommendations of Lake Cornelia UAA (2010) and/or subsequent studies (see S-8 from Table 6-2), which may include management of curlyleaf pondweed and carp, alum treatment of phosphorus-rich lake sediment, construction of a stormwater treatment pond and/or an iron-enhanced sand filter just upstream of North Lake Cornelia.	**H**	Lead/Partner		$500,000	$500,000								$1,000,000
4	Implement structural improvement recommendations from the Pentagon Park/Border Basin Regional Stormwater Management Study.	**H**	Lead/Partner		$500,000									$500,000
5	Implement recommendations of Lake Edina UAA or WRAPS, once completed.	**M**	Lead/Partner			$500,000								$500,000
6	Implement Southeast Anderson Lake improvement recommendations from Anderson Lakes UAA (2005), which includes alum treatment of phosphorus-rich lake sediment and additional curlyleaf pondweed management, as needed.	**H**	Lead/Partner			$200,000								$200,000
7	Implement recommendations of Lake Smetana UAA (2003) and/or subsequent studies (see S-9 from Table 6-2), which may include stormwater pond upgrades in SL-2, SL-6, and SL-11 and construction of new stormwater ponds in SL-7 and SL-19A (see Appendix A for potential locations).	**H**	Lead/Partner				$1,000,000							$1,000,000
8	Implement recommendations of Lake Holiday, Wing Lake and Rose Lake UAA (2010) and/or subsequent studies, which may include alum treatment of phosphorus-rich lake sediment in each lake, aquatic plant management, watershed infiltration BMPs and construction of an iron-enhanced filtration system to treat flows from Lake Holiday.	**M**	Lead/Partner					$500,000	$500,000					$1,000,000
9	Stabilize the South Fork of Nine Mile Creek.	**H**	Lead					$1,000,000	$500,000					$1,500,000
10	Implement measures to increase dissolved oxygen concentrations, in collaboration with agencies and stakeholders.	**H**	Lead/Partner						$250,000					$250,000

Table 6-2. District Capital Improvement Projects during 10-year Plan Cycle

Item Number	Implementation Items	Priority (H= high, M= medium, L= low)	NMCWD Role (Lead, Partner, or Participant)	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Total Estimated Cost (2018-2027)
11	Implement recommendations of draft Arrowhead and Indianhead Lakes UAA (2006) and/or subsequent studies (see S-10 from Table 6-2), which may include management of curlyleaf pondweed and alum treatment of phosphorus-rich lake sediment.	**M**	Lead/Partner							$25,000	$100,000	$25,000		$150,000
12	Implement recommendations of draft Mirror Lake UAA (2004) and/or subsequent studies (see S-11 from Table 6-2), which may include management of curlyleaf pondweed, alum treatment of phosphorus-rich lake sediment, upgrade of stormwater pond in ML-3, and construction of a stormwater pond in ML-16 (see Appendix A for potential locations).	**M**	Lead/Partner							$250,000				$250,000
13	Stabilize the Main Stem of Nine Mile Creek between Marsh Lake and 102nd Street in Bloomington.	**H**	Lead								$1,000,000	$1,000,000		$2,000,000
14	Implement recommendations of Penn Lake UAA (2003) and/or subsequent studies (see S-12 from Table 6-2), which may include management of purple loosestrife, goose management, and construction of a stormwater pond to treat runoff from future I-35W expansion.	**M**	Lead/Partner									$150,000		$150,000
15	Implement recommendations from other UAAs (or UAA updates), TMDLs, WRAPS studies, and/or stream assessments, as needed.	**H**	Lead/Partner							$500,000			$500,000	$1,000,000
16	Implement recommendations from other regional flood studies, as needed (e.g., Metro Boulevard /Edina Industrial Park regional flood mitigation).	**M**	Lead/Partner			$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$2,000,000
17	Implement BMPs identified through Accelerated Implementation Grant on prioritized privately owned, nonprofit sites.	**H**	Lead		$125,000	$125,000								$250,000
18	Implement recommended protection and restoration projects based on results of S-26 inventory or rare and high-quality biological communities	**H**	Lead							$140,000		$110,000		$250,000
			Totals:	$2,000,000	$1,625,000	$1,575,000	$1,250,000	$1,750,000	$1,500,000	$1,165,000	$1,350,000	$1,535,000	$750,000	$14,500,000

[1] Estimated project cost does not included anticipated costs during 2017.

7.0 Local (City) Water Management

NMCWD has engaged water resources staff from the cities within the watershed – Richfield, Hopkins, Minnetonka, Eden Prairie, Edina and Bloomington – throughout the development of this Plan. These individuals – along with representatives of state agencies, Hennepin County and the Metropolitan Council—constitute the District's Technical Advisory Committee, which met five times to review the District's approach to its plan update and provided additional feedback via correspondence. This close consultation reflects the long history of collaboration and cooperation between the District and the cities within its watershed. These relationships represent one of the organization's strengths, and while this Plan sets forth an implementation program the District can carry out independently, it also provides strategies for the District to collaborate with watershed cities, state agencies, private landowners and others to fulfill water resources protection and improvement goals. It also details the manner in which the District can support cities' development and redevelopment goals by taking on responsibility for integrating resource protection into land-use changes.

This section outlines local water management planning requirements for cities and how the Nine Mile Creek Watershed District's implementation program will integrate with other local governments' water resources protection and improvement work. This section also assesses the financial and administrative impacts of the Plan on local units of government.

7.1 City Responsibilities

7.1.1 Requirements for Local Water Management Plans

Local water management plans are required to conform to applicable state law and the NMCWD Plan. Minnesota Rules chapter 8410 and Minnesota Statutes section 103B.235, subdivision 2 include specific requirements for local water management plan content, and this plan does not amend the requirements imposed by state law. Particularly relevant among those is that cities in the watershed must submit their draft local water management plans to the District for review and approval (Minn. Stat. § 103B.235).

NMCWD review and approval of local water management plans will be conducted in accordance with relevant state law.

Chapter 8410 was amended in 2015 to tie cities' local water plan update schedule to the 10-year cycle for cities' submission of updated comprehensive plans to the Metropolitan Council. A city's comprehensive plan must contain an updated and watershed-organization approved local water plan. Given that state law mandates the updated comprehensive plans be submitted by December 31, 2018, NMCWD expects to see a surge of requests for approval of local water plans in the 2017-18 window established by Minnesota Rule 8410.0105, subpart 9 and 8410.0160, subpart 6.

Generally, the policies and goals established in each city's local water management plan must be consistent with the NMCWD Plan. More specifically, the District requires that local water plans include the city's commitment to:

- Providing any updates to the city's wellhead protection plan.

- Consideration in collaboration with the District of the necessary controls to prevent flooding caused by changes in land use or re/development of specific properties.
- Adoption and implementation of groundwater-conservation policy.
- Coordination with the District in developing floodplain information and setting consistent flood elevations.
- Maintaining critical 100-year flood storage volumes.

This Plan contains all required and necessary data and analysis, and cities are free to adopt content of this Plan within their local water plan by reference. The District anticipates, though, that all six watershed cities will be preparing their own plans, as they have in the past. Cities' plans may be submitted prior to the date of adoption of this Plan, but, again, the close interaction between the cities and District during the development of this plan make it clear that the District's review of cities' local water plans under the framework established here rather than the District's 2008 plan, as amended, should not present substantial additional regulatory, financial or programmatic burdens on watershed cities. (This framework for ensuring consistency and protectiveness of official controls pertaining to water resources was amended into the 2008 NMCWD Water Management Plan in August 2016.)

Cities are encouraged to consult with NMCWD staff early on in their planning process to determine collaboratively the most practical approach to meeting the requirements of the NMCWD Plan and Minnesota statutes and rules. The District will work closely with cities as needed in local plan preparation, review, and implementation.

7.1.2 Permitting Authority

Under Minnesota Statutes section 103B.235 and the related structure in Minnesota Rules 8410, after NMCWD reviews and approves a watershed city's local water management plan, the city must adopt and implement the plan within 120 days and determine whether to amend its official controls (ordinances) and policies to provide protection of water resources at least as effective as provided by the NMCWD rules or defer exercise of sole regulatory authority to NMCWD within 180 days. Alternatively, the city may opt in its plan to defer the sole exercise of regulatory authority to the District.

In the event that a city elects to update its ordinances and implement water resources protections via its land-use regulatory program, the city and NMCWD will enter into a memorandum of understanding (MOU) detailing the scope of each entity's exercise of regulatory authority (i.e., who will regulate what). The MOU also will establish a process and schedule for exchanging progress reports, the city's submission of permitting information to the District and regular meeting to ensure water-resources management concerns and projects are pursued via the most effective and cost-efficient route possible. The MOU also will provide procedures and a timeline for the District's reengagement of all of its regulatory authority if the city is found not to have adopted the necessary official controls or implemented a complete and effective regulatory program.

Consistent with the regulatory framework outlined in Minnesota Rules 8410.0160, NMCWD will require as a condition of approval of a local water management plan wherein the city elects to exercise sole regulatory authority that the city commit to update, as necessary, its ordinances over the effective life of

the local water plan to maintain conformity with the NMCWD rules within 1 year after NMCWD provides notice that it has significantly revised a rule or rules. (The city's plan should allow 60 days for NMCWD review of a pending ordinance amendment.) A city that elects to exercise sole regulatory authority in its plan may later – in response to a District rule update or otherwise – choose to defer exercise of regulatory authority to the District.

With regard to the Wetland Conservation Act, the District presently administers the state wetland law in Eden Prairie, Hopkins, Richfield and Edina. The cities of Minnetonka and Bloomington act as the WCA Local Government Unit for their jurisdictions, as do the MnDOT and Minnesota State College and University System for state transportation projects and projects within the Normandale Community College campus, respectively. The District does not expect to seek a change to the present array of administration, but would consider assuming WCA authority from either of the cities presently administering the law if asked to do so.

Cities that defer exercise of regulatory authority to the District need to establish protocols to ensure that applicants for other city land-use approvals are referred to the District to obtain relevant necessary approvals under the District rules. In the resolution approving a city plan providing for such a regulatory implementation program, the District will outline a schedule for regular meetings to update city representatives on the District regulatory program and ensure water-resources management concerns and projects are pursued effectively and cost-efficiently.

7.2 Impact on Local Governments

The District's intention is to limit additional requirements imposed upon local units of government while still accomplishing the District's purposes and implementing the Plan. As already noted, this Plan does not add to the planning burden imposed by state law, and in fact creates opportunities for cities and others to reduce costs through collaboration. The District's implementation program will be funded through tax levies.

Cities and other local units of government may be affected by additional costs of compliance of projects (e.g., road reconstruction) with District regulatory standards and criteria. But these costs could well be offset by the diminished burden of implementing regulatory requirements for water resources protection for cities that opt to defer those duties to the District.

The District does need to see commitment in local water management plans to a few specific actions described in Subsection 7.1.1 and commitment to communications from watershed cities. But the requirements there involve communication and coordination that should amount to only a nominal burden and one that will be more than offset by the resulting support from the District. The requirement that a city adopt and implement a groundwater conservation policy and, in the event a city defers regulation to the District, develop and implement protocols for directing permit-applicants to NMCWD are exceptions. But the city can tailor such a policy to both its specific circumstances and needs, as well as available resources for such an effort. Otherwise this plan has been developed with a mind to providing cities with opportunities to collaborate and partner with the District for water resource protection work, consistent with the historic and historically productive relationship among these entities.

The District is not changing the wetland regulation burden for the member cities since the District is willing to continue to act as the LGU responsible for administering WCA for those cities that do not wish to serve as the LGU.

8.0 Plan Development, Review, and Amendment

8.1 Plan Development and Public Input

This Plan was developed with input from a wide range of stakeholders. Initially, the District solicited input from local and state plan review agencies in accordance with Minnesota Rules 8410.0045, subpart 3. Then, during Plan development, District staff conducted workshops with the agency and city staff who serve on its Technical Advisory Committee (TAC); the TAC discussed sections of the plan as they were drafted in five meetings from May 2016 to January 2017. District staff also sought input from the Citizens Advisory Committee (CAC).

The District also made efforts to get input from watershed residents early on in the planning process. A public meeting was held on May 4, 2016 to give citizens the opportunity to offer input and insight on issues that affect Nine Mile Creek as well as District lakes, wetlands, and other resources. At this event, approximately twenty residents from around the watershed participated in identifying key issues and potential actions regarding clean water and related ecological issues. A more detailed summary of the Community Input Forum is provided in Appendix B of this Plan. The District also hosted an online survey, which was designed with assistance from the CAC and completed by over 700 residents. The results of the online survey are summarized Appendix C of this Plan.

The results of the public meeting and online survey were compiled and organized and presented to the Board of Managers at its May 5, 2016 workshop. Issue identification workshops were held with the Board on April 7, 2016 and May 5, 2016. The Board then performed an issue prioritization exercise with consideration of the results from the public meetings, TAC input, response letters from state review agencies and cities, and online survey. This process resulted in identification of the issues summarized in Section 4.0 and the goals, objectives, policies and actions summarized in Section 5.0. The issue identification exercise was conducted using topic categories that vary from the ten major topic areas for the goals, objectives, policies and actions in Section 5.0. A diagram showing the relationship between the issue identification/prioritization topic categories and the goals/policies/actions categories is included in Appendix D.

Board workshops were held on June 8, 2016, September 8, 2016, October 13, 2016 and November 1, 2016 to discuss District goals, objectives, policies, and actions (Section 5.0). These workshops included providing feedback from the TAC on draft goals, objectives, policies, and actions. Board workshops on January 6, 2017 and February 2, 2017 focused on the District's implementation programs (Section 6.0). The managers held a final workshop March 2, 2017, to provide direction on and comments for final drafting.

8.2 Plan Review and Approval

The Plan was submitted for formal 60-day review in March 2017. The District received comments on the draft Plan and responded to Plan reviewers' comments in writing. After formal review of the NMCWD Plan, the District held a public hearing on the draft Plan on July 19, 2017. BWSR subsequently approved the NMCWD 2017-2027 Water Management Plan on September 27, 2017. The Board of Managers formally adopted the NMCWD 2017-2027 Water Management Plan on October 18, 2017.

8.3 Plan Amendments

This Plan will guide District activities through 2027, or until superseded by adoption and approval of a subsequent Plan. This Plan will remain in full force and effect until any revision is approved by BWSR. All amendments to this Plan will follow the procedures set forth in this section and as required by Minnesota laws and rules. Plan amendments may be proposed by any person to the Board of Managers, but only the Board of Managers may initiate the amendment process. All recommended plan amendments must be submitted to the District in writing, along with a statement of the problem and need, the rationale for the amendment, and an estimate of the cost.

As a general matter, only significant changes to goals, policies, standards, administrative procedures or capital improvements as described in the Plan will prompt the District to amend the Plan. Any plan amendment will proceed in accordance with the process provided in Minnesota Rules 8410.0140.

Amendments to this Plan will be presumed to be subject to the minor-amendment review process provided in Minnesota Rules 8410.0140, subpart 2. This assumption is based on several factors:

1. NMCWD's long history of research, planning and engagement in and rich knowledge of threats to water resources health in the Nine Mile Creek watershed;

2. NMCWD's long history of engagement of city representatives and others in the development, design and implementation of projects and programs; and

3. NMCWD's extensive outreach to and close collaboration with city and state agency representatives and watershed residents in the development of this Plan.

Approximately 2 years prior to the expiration date of this Plan (in 2025), the District will begin the process of updating its Plan (unless a revised schedule is developed by BWSR in accordance with Minnesota Statutes section 103B.231, subdivision 3a). The updated Plan will meet the requirements of the applicable Minnesota laws and rules.

The District will review its implementation program at least every 2 years as part of its evaluation and reporting duties (see Section 3.1) and revise its implementation program as needed.

Technical information (especially water quality data) will require frequent updating, whenever new site-specific data are generated by state, federal, and regional agencies, counties, cities, the District, individuals, or developers. The District intends to post this updated information on the NMCWD website 9-Mile Creek Watershed District [Ref. 1] with hard copies available upon request. Other parts of this Plan may also require occasional revision.

8.3.1 Amendment Format and Distribution

The District will prepare and distribute plan amendments in a format consistent with Minnesota Rules 8410. The District will maintain a distribution list of everyone who receives a copy of the Plan. Unless the entire plan is reprinted, any amendment proposed by NMCWD will be distributed in ~~strikeout~~/underline form of replacement pages for the plan. Draft amendments will be distributed electronically to the list of agencies and individuals who are either required to receive amendments or who have asked for same, and

will be posted on the NMCWD website: 9-Mile Creek Watershed District [Ref. 1]. Proposed amendments will be provide in hard-copy form if requested, but in the first instance NMCWD will distribute amendments and receive comments electronically. A current copy of this Plan will be available on the District web site.

8.3.2 Local Water Management Plan Amendment Format and Distribution

Local water management plans should be amended in accordance with Minnesota Statutes section 103B.235, subdivision 5, and Minnesota Rules 8410.0160, subpart 4. Amendments will be timely reviewed and, in accordance with applicable requirements of state law, approved on a determination by NMCWD that the amendment ensures that the local water plan remains consistent with NMCWD's plan.

9.0 References

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10.0 Website References

Information Referenced	Website Address	Website Reference #
9-Mile Creek Watershed District website.	https://www.ninemilecreek.org/	1
Climate: information about Hennepin County (Hennepin County).	http://hennepinwestmesonet.org/#/ afd	2
Climate: information about Twin Cities Metropolitan area (MDNR).	http://www.dnr.state.mn.us/climate/twin_cities/index.html	3
Climate: local data from Midwestern Regional Climate Center (MRCC).	http://mrcc.isws.illinois.edu/CLIMATE/	4
Climate: wide range of climate info—National Oceanic and Atmospheric Administration (NOAA).	http://www.nws.noaa.gov/climate/index.php?wfo=mpxhttp://www.dnr.state.mn.us/climate/index.html	5
Climate: other MN climate info: Minnesota Department of Natural Resources (MDNR).	http://www.dnr.state.mn.us/climate/index.html	6
Public Waters Inventory (PWI) maps (MDNR).	http://www.MDNR.state.mn.us/waters/watermgmt_section/pwi/maps.html	7
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MN Board of Water and Soil Resources (BWSR) website.	http://www.bwsr.state.mn.us	27
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MPCA guidance for disposal of sediment (MPCA).	http://www.pca.state.mn.us/index.php/view-document.html?gid=18075	30
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Minnesota State Historic Preservation Offices (SHPO) website.	http://www.mnhs.org/shpo/	35
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Assessment guidance manual (MPCA).	https://www.pca.state.mn.us/sites/default/files/wq-iw1-04.pdf)	38
9-Mile Creek Watershed District "Get Involved Programs."	https://www.ninemilecreek.org/get-involved/programs/	39
9-Mile Creek Watershed District "Get Involved Program Volunteer opportunities."	https://www.ninemilecreek.org/get-involved/volunteer-opportunities/	40
9-Mile Creek Watershed District "Get Involved Grants."	https://www.ninemilecreek.org/get-involved/grants/	41
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Appendices

Appendix A

Project Synopses of Lake Use Attainability Analyses (from NMCWD 2007 Water Management Plan)

Project Synopsis:
Anderson Lakes Use Attainability Analysis

A Use Attainability Analysis (UAA) is a scientific assessment of a water body's physical, chemical, and biological conditions. This assessment provides the foundation for a lake-specific best management practices (BMPs) plan that is used to maintain or attain the existing and potential beneficial uses of a lake, such as swimming, fishing, or aesthetic viewing.

Goals for Anderson Lakes

Southeast Anderson Lake:
Level II Classification—
Summer-average Secchi disc reading ≥ 1.0 m (3.3 ft)

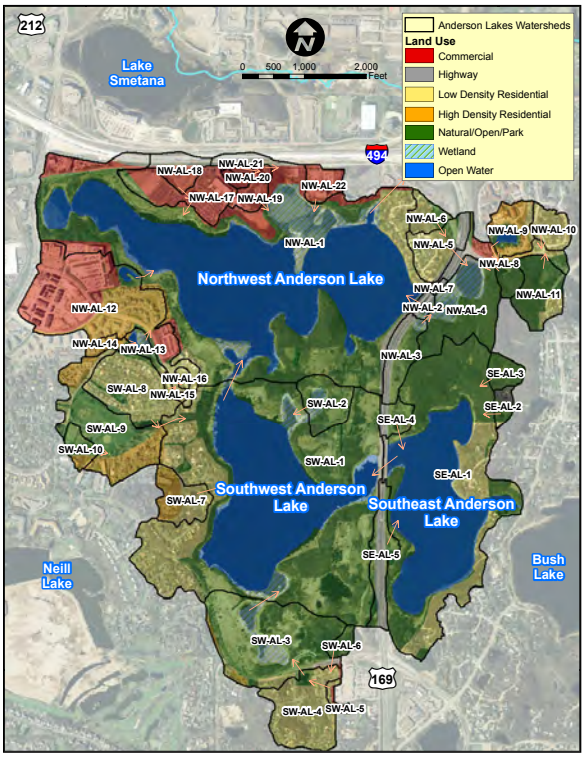
Southwest Anderson Lake:
Level II Classification—
Summer-average Secchi disc reading ≥ 1.0 m (3.3 ft)

Northwest Anderson Lake:
Level III Classification—
Summer-average Secchi disc reading ≥ 0.5 m (1.6 ft)

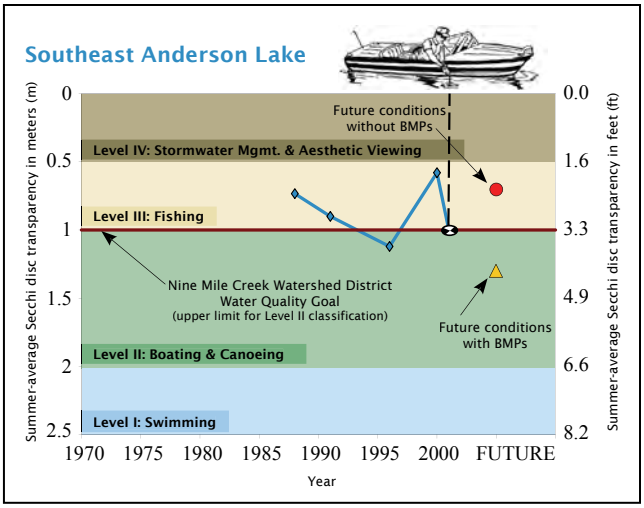
Investigative Techniques

The Anderson Lakes UAA includes both a water quality analysis and prescription of protective measures for all three lakes and their watersheds. This analysis and prescription is based on:

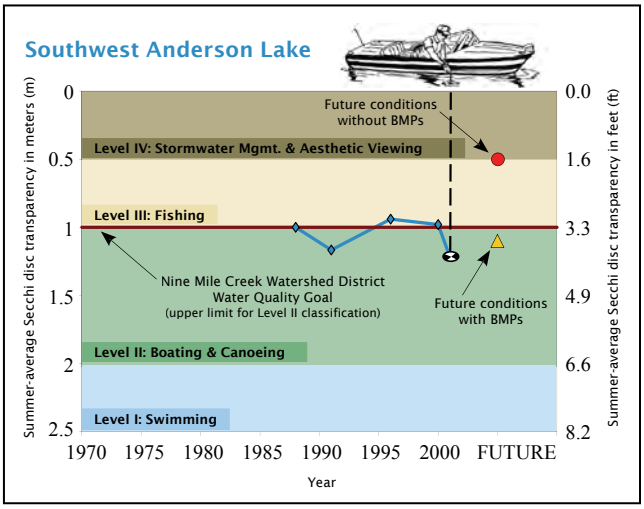
- Historical water quality data
- Intensive lakewater quality study
- P8 computer simulation modeling of runoff water quality
- Lake hydrologic and phosphorus budget analyses (see reverse)
- Best management practices (BMPs) analysis

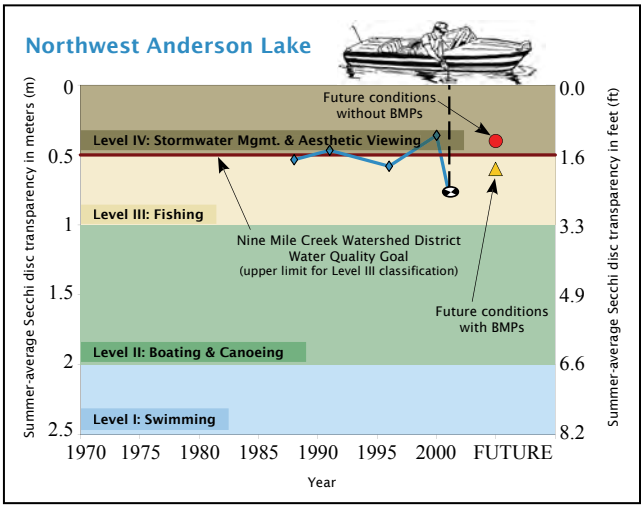


The land use on a lake's watershed directly impacts the water quality in the lake. Therefore, the Anderson Lakes UAA assessed existing and ultimate watershed land-use conditions.



These graphs illustrate historic and predicted future summer-average water clarity (transparency). Transparency is measured as the depth at which a black-and-white patterned disc (a Secchi disc) disappears from view as it is lowered into the water.





Water Quality Problems

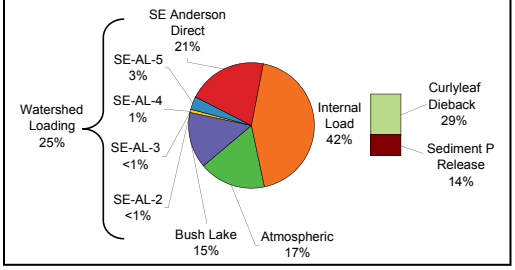
- **Aesthetic Issues**
  Problem: Summer algal blooms (caused by high phosphorus levels)

  Cause: Urban stormwater runoff conveying large amounts of phosphorus to the lake

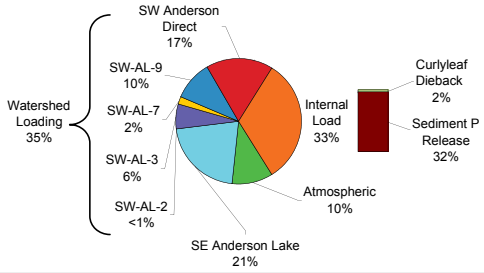
- **Biological Issues**
  Problem: Exotic lake weed species (pictured at right)

  Cause: Curlyleaf pondweed, Eurasian watermilfoil, and purple loosestrife

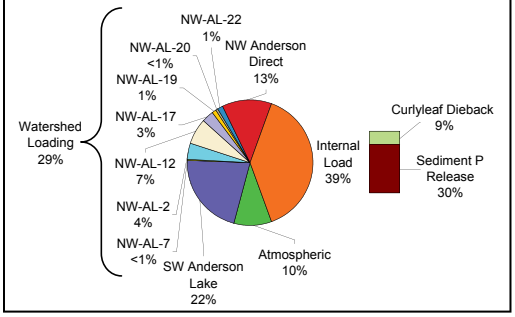
Southeast Anderson Lake Annual Phosphorus Budget (129 lbs)
Model Calibration Year (May 1, 2000 to April 30, 2001) Using Existing Land Use



Southwest Anderson Lake Annual Phosphorus Budget (288 lbs)
Model Calibration Year (May 1, 2000 to April 30, 2001) Using Existing Land Use



Northwest Anderson Lake Annual Phosphorus Budget (527 lbs)
Model Calibration Year (May 1, 2000 to April 30, 2001) Using Existing Land Use



Internal phosphorus loading from the dieback of curlyleaf pondweed and the release of sediment-bound phosphorus contributes significant amounts of phosphorus to all three lakes.

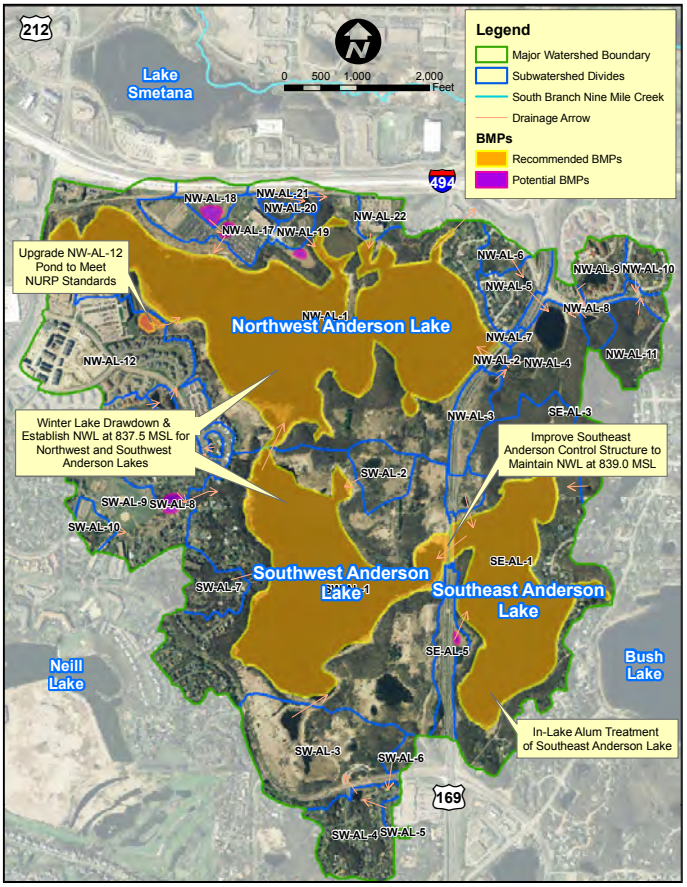
Purple loosestrife is an exotic species that invades wetlands and lake shorelines. It outcompetes native species and, if left unchecked, will eventually become the dominant plant wherever it appears.

Curlyleaf pondweed is an invasive aquatic plant that releases nutrients into the water when it dies back in early summer.

Recommended Remedial Measures*

In-Lake BMPs—Implementing the projects listed below will improve water quality sufficiently to fully meet the Nine Mile Creek Watershed District's goals.

- Improvement of the control structure between Southeast and Southwest Anderson lakes.
- A drawing down of the water levels in Southwest and Northwest Anderson lakes to control non-native aquatic vegetation such as curlyleaf pondweed.
- Improvement of the water quality and stormwater detention efficiency of a runoff detention pond (NW-AL-12) east of Prairie Lakes Drive.
- Whole-lake alum-plus-lime application to Southeast Anderson Lake's entire surface area to reduce the annual phosphorus load by 14 percent.
- Whole-lake endothal treatments for the management of curlyleaf pondweed to reduce Southeast Anderson Lake's annual phosphorus load by 29 percent.



**Implementation of remedial measures may change based on municipal petitions.*

Project Synopsis:
Birch Island Lake Use Attainability Analysis

A Use Attainability Analysis (UAA) is a scientific assessment of a water body's physical, chemical, and biological conditions. This assessment provides the foundation for a lake-specific best management practices (BMPs) plan that is used to maintain or attain the existing and potential beneficial uses of a lake, such as swimming, fishing, or aesthetic viewing.

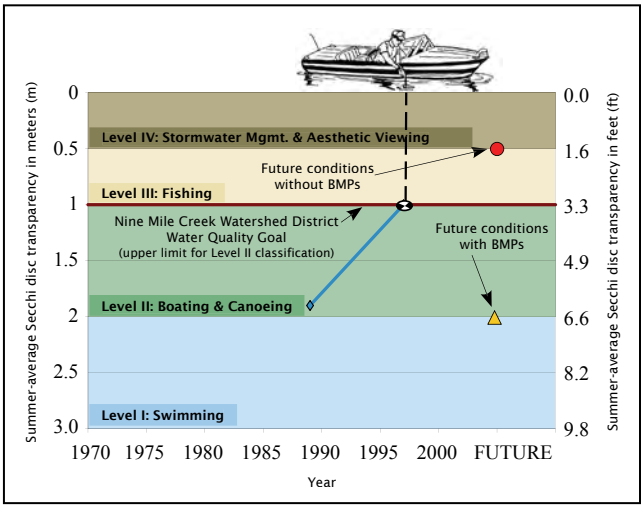
Goals for Birch Island Lake

Nine Mile Creek Watershed District
Water Quality Goal:
Maintain Level II Classification—full support of swimmable use, but threatened.

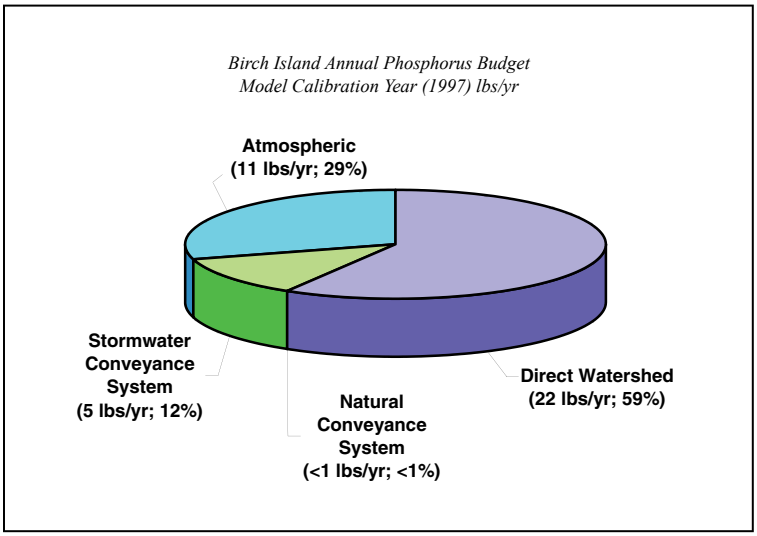
Investigative Techniques

The Birch Island Lake UAA includes both a water quality analysis and prescription of protective measures for Birch Island Lake and its watershed. This analysis and prescription is based on:

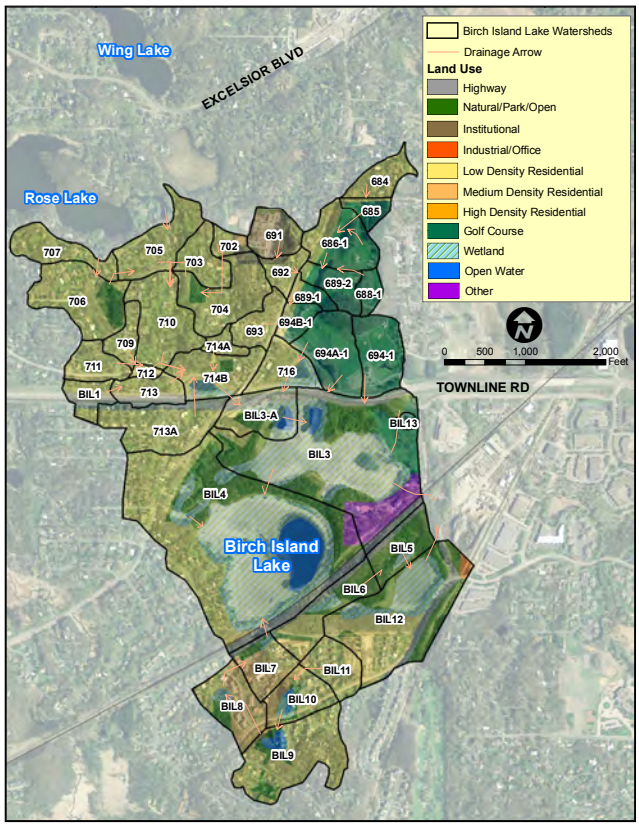
- Historical water quality data
- Intensive lakewater quality study
- P8 computer simulation modeling of runoff water quality
- Lake hydrologic and phosphorus budget analyses (see below)
- Best management practices (BMPs) analysis



This graph illustrates Birch Island Lake's historic and predicted future summer-average water clarity (transparency). Transparency is measured as the depth at which a black-and-white patterned disc (a Secchi disc) disappears from view as it is lowered into the water.



Surface water runoff from Birch Island Lake's watershed contributes roughly 59 percent of the lake's annual phosphorus load.



The land use on a lake's watershed directly impacts the water quality in the lake. Therefore, the Birch Island Lake UAA assessed existing and ultimate watershed land-use conditions. The Birch Island watershed is dominated by low-density residential land use.

Water Quality Problems

- ***Recreational Issues***
  Problem: Summer algal blooms (caused by high phosphorus levels)

  Cause: Urban stormwater runoff conveying large amounts of phosphorus to the lake

- ***Biological Issues***
  Problem: Exotic lake weed species (see below)

  Cause: Purple loosestrife

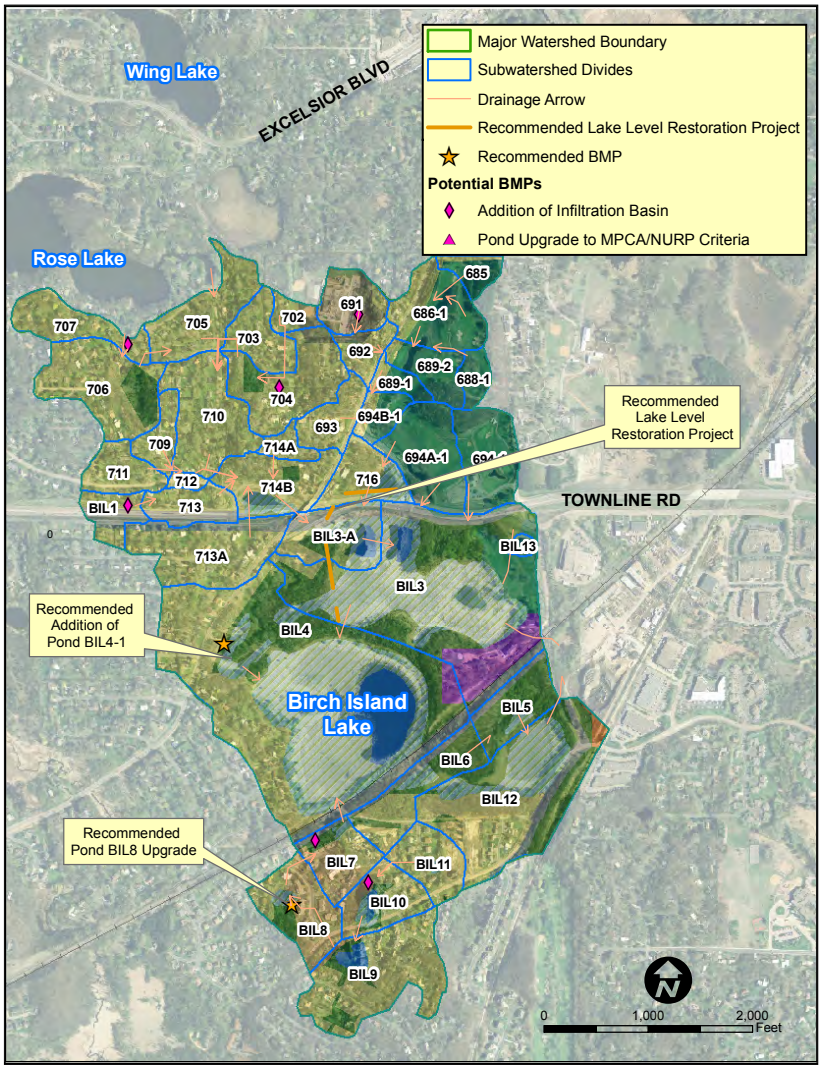
Purple loosestrife is an exotic species that invades wetlands and lake shorelines. It out-competes native species and, if left unchecked, will eventually become the dominant plant wherever it appears. Purple loosestrife not only displaces native plants, but also diminishes wetland habitat value for a variety of native animals.

Recommended Remedial Measures*

Conventional Runoff BMP—Three improvements are recommended for Birch Island Lake's watershed, including:

- One new stormwater treatment/detention pond (Pond BIL4-1) will allow the district's Level II classification to be attained or maintained for average, wet, and model calibration climatic conditions. It will also reduce the annual phosphorus load between 18 and 45 percent and improve the Secchi disc transparency by up to 40 percent, to between 0.7 and 1.8 meters, depending on the climatic condition.
- Improvement of an existing runoff detention pond (BIL8) south of Birch Island Lake, along Lesley Lane. This basin is proposed to have a surface area of about 0.28 acres and a water quality storage volume below the normal water level of roughly 1.15 acre-feet.
- Construction of a pipe bypass system to convey groundwater and surface water runoff from north of CSAH 62 directly to Birch Island Lake to restore the lake's historic hydrology. The recommended appraoch is to bypass the roadway embankment with both surface and groundwater flow.

Biological Management—The district will continue macrophyte (aquatic plant) surveys to monitor the growth of exotic plant species (purple loosestrife).



*Implementation of remedial measures may change based on municipal petitions.

Project Synopsis:

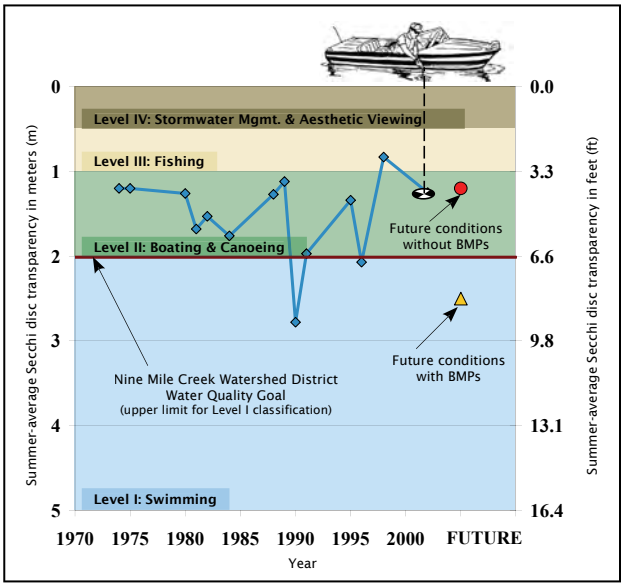
Bryant Lake Use Attainability Analysis

A Use Attainability Analysis (UAA) is a scientific assessment of a water body's physical, chemical, and biological conditions. This assessment provides the foundation for a lake-specific best management practices (BMPs) plan that is used to maintain or attain the existing and potential beneficial uses of a lake, such as swimming, fishing, or aesthetic viewing.

Goals for Bryant Lake

Nine Mile Creek Watershed District
Water Quality Goal:
Level I Classification—full support of swimmable use and a Secchi disc reading ≥ 2.0 m.

Minnesota Pollution Control Agency
Swimmable Use Goal:
Full support of swimming with a total phosphorus concentration < 40 micrograms/liter and a Secchi disc reading ≥ 1.2 m.



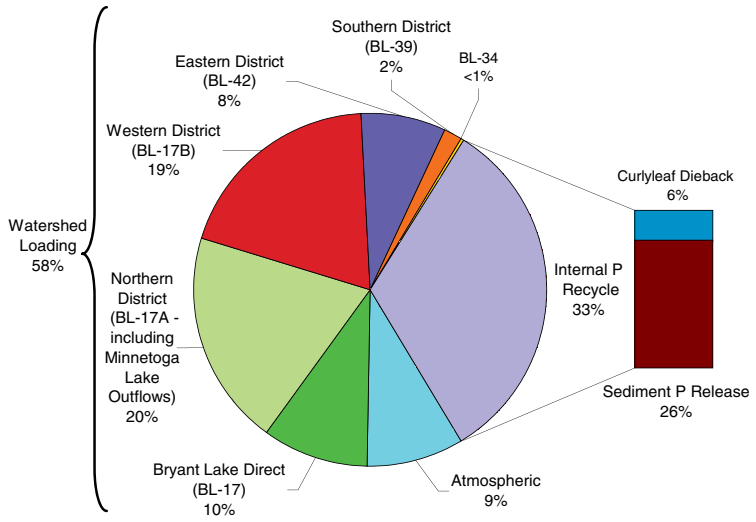
This graph illustrates Bryant Lake's historic and predicted future summer-average water clarity (transparency). Transparency is measured as the depth at which a black-and-white patterned disc (a Secchi disc) disappears from view as it is lowered into the water.

Investigative Techniques

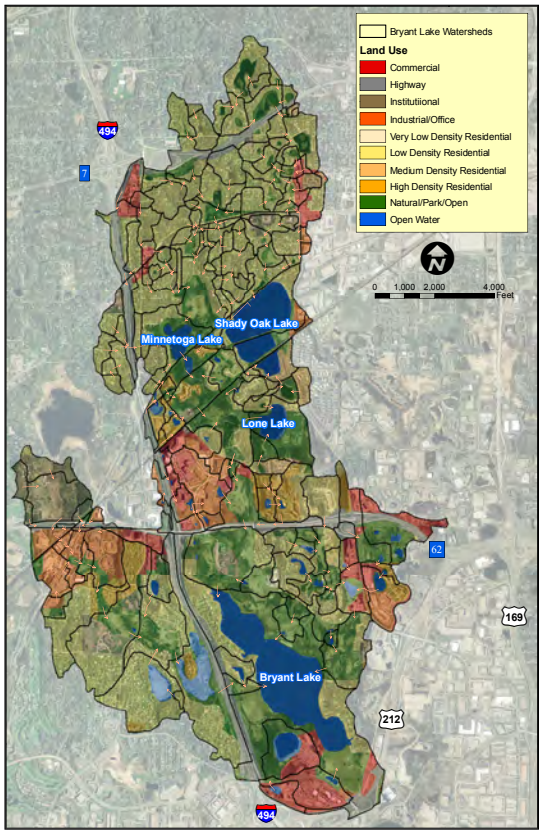
The Bryant Lake UAA includes both a water quality analysis and prescription of protective measures for Bryant Lake and its watershed. This analysis and prescription is based on:

- Historical water quality data
- Aquatic plant surveys
- Intensive lakewater quality study
- P8 computer simulation modeling of runoff water quality
- Lake hydrologic and phosphorus budget analyses (see below)
- Best management practices (BMPs) analysis

Bryant Lake Annual Phosphorus Budget (629 lbs)
Model Calibration Year (Oct. 1997 to Sept. 1998) Using Existing Land Use



Internal phosphorus loading caused by the release of sediment-bound phosphorus contributes significant amounts of phosphorus to Bryant Lake.



The land use on a lake's watershed directly impacts the water quality in the lake. Therefore, the Bryant Lake UAA assessed existing and ultimate watershed land-use conditions.

An invasive aquatic plant, Eurasian watermilfoil adversely impacts aquatic ecosystems by forming dense canopies that often shade out native vegetation. It can "travel" from lake to lake via boat trailers.

Curlyleaf pondweed is an invasive aquatic plant that releases nutrients into the water when it dies back in early summer.

Purple loosestrife is an exotic species that invades wetlands and lake shorelines. It out-competes native species and, if left unchecked, will eventually become the dominant plant wherever it appears.

Water Quality Problems

- ***Swimming Issues***
  Problem: Summer algal blooms (caused by high phosphorus levels)

  Cause: Urban stormwater runoff conveying large amounts of phosphorus to the lake

- ***Biological Issues***
  Problem: Exotic lake weed species (see left)

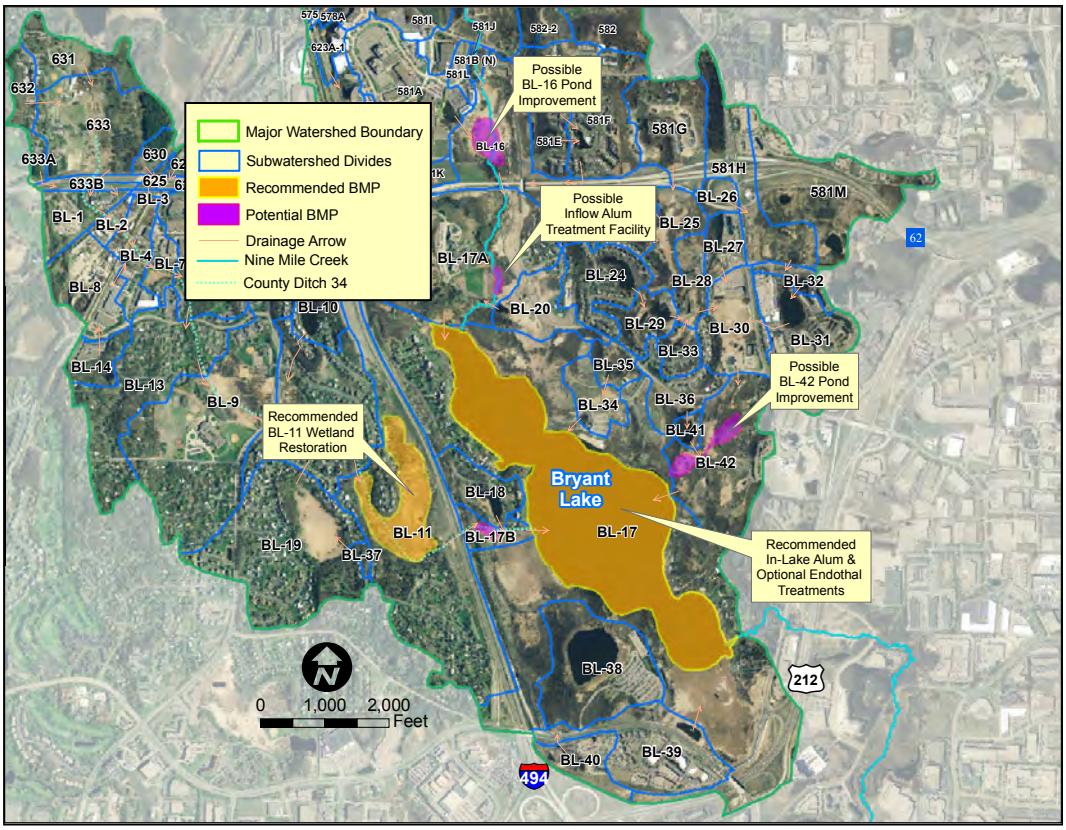
  Cause: Curlyleaf pondweed, Eurasian watermilfoil, and purple loosestrife

Recommended Remedial Measures*

Watershed BMPs—Restoring wetland (BL-11) located west of I-494 will reduce the May-September total phosphorus load by 6 percent.

In-Lake BMPs—Implementing the projects listed below will improve water quality sufficiently to fully meet the Minnesota Pollution Control Agency's swimmable-use goal.

- Whole-lake alum applications to the surface area of Bryant Lake to reduce the annual phosphorus load by 21 percent
- *Optional:* Whole-lake endothal treatments for the management of curlyleaf pondweed to reduce the annual phosphorus load by 6 percent. The optional treatment would be coordinated with Three Rivers Park District to treat specific areas as needed.
- *Optional:* Management of Eurasian watermilfoil in cooperation with Three Rivers Park District



*Implementation of remedial measures may change based on municipal petitions.

Project Synopsis:
Bush Lake Use Attainability Analysis

A Use Attainability Analysis (UAA) is a scientific assessment of a water body's physical, chemical, and biological conditions. This assessment provides the foundation for a lake-specific best management practices (BMPs) plan that is used to maintain or attain the existing and potential beneficial uses of a lake, such as swimming, fishing, or aesthetic viewing.

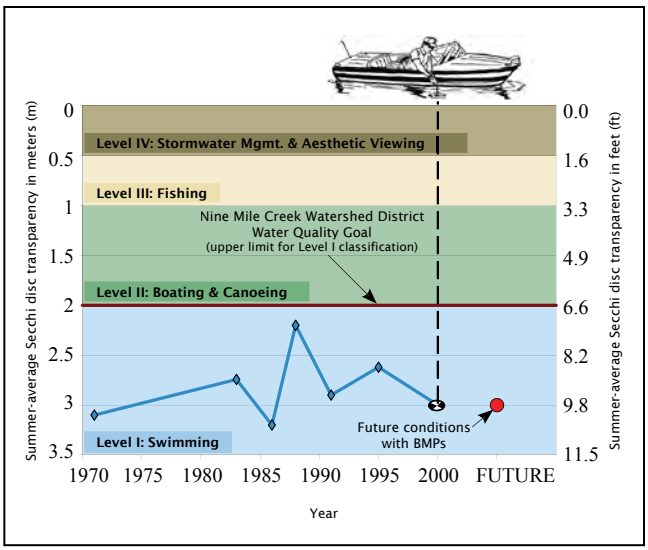
Goals for Bush Lake

Nine Mile Creek Watershed District Water Quality Goal:
Level I Classification—full support of swimmable use and a Secchi disc reading ≥ 2.0 m.

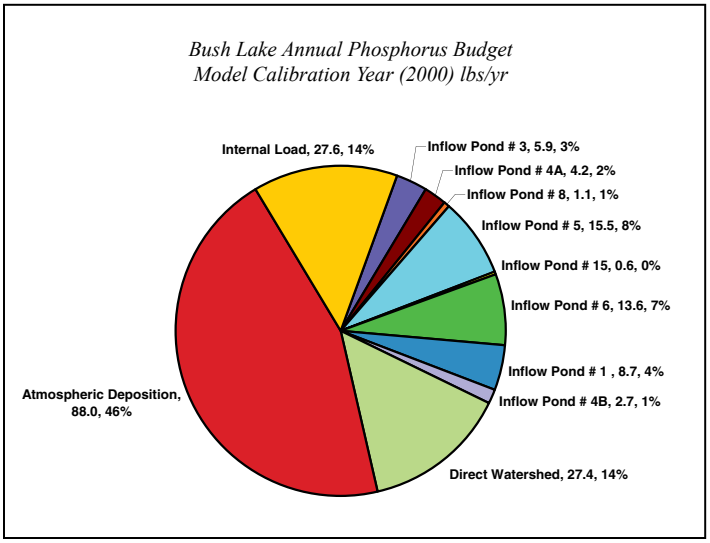
Investigative Techniques

The Bush Lake UAA includes both a water quality analysis and prescription of protective measures for Bush Lake and its watershed. This analysis and prescription is based on:

- Historical water quality data
- Aquatic plant surveys
- Intensive lakewater quality study
- P8 computer simulation modeling of runoff water quality
- Lake hydrologic and phosphorus budget analyses (see below)
- Best management practices (BMPs) analysis



This graph illustrates Bush Lake's historic and predicted future summer-average water clarity (transparency). Transparency is measured as the depth at which a black-and-white patterned disc (a Secchi disc) disappears from view as it is lowered into the water.



Atmospheric deposition accounts for more than 46 percent of Bush Lake's annual phosphorus load.

The land use on a lake's watershed directly impacts the water quality in the lake. Therefore, the Bush Lake UAA assessed existing and ultimate watershed land-use conditions.

An invasive aquatic plant, Eurasian watermilfoil adversely impacts aquatic ecosystems by forming dense canopies that often shade out native vegetation. It can "travel" from lake to lake via boat trailers.

Curlyleaf pondweed is an invasive aquatic plant that releases nutrients into the water when it dies back in early summer.

Purple loosestrife is an exotic species that invades wetlands and lake shorelines. It outcompetes native species and, if left unchecked, will eventually become the dominant plant wherever it appears.

Water Quality Problems

Biological Issues

Problem: Exotic lake weed species (see left)

Cause: Urban stormwater runoff conveying large amounts of phosphorus to the lake; curlyleaf pondweed, Eurasian watermilfoil, and purple loosestrife

Recommended Remedial Measures*

Conventional Runoff BMPs—No further BMPs are required to meet the district's water quality goals.

Water Quality Goal Modification—More stringent goals are recommended to provide greater protection of Bush Lake.

- Total phosphorus concentration $\leq$ 24 micrograms per liter
- Chlorophyll *a* concentration $\leq$ 7 micrograms per liter

Biological Management Techniques—

- Aquatic plant management
- Whole-lake fluridone treatment to control Eurasian watermilfoil and curlyleaf pondweed

Harvesting Eurasian watermilfoil is a biological management technique used on many area lakes.

Purple loosestrife can be managed by releasing root-boring weevils onto the plants.

Digging loosestrife by hand is another possible management method.

*Implementation of remedial measures may change based on municipal petitions.

Project Synopsis:
Glen Lake Use Attainability Analysis

A Use Attainability Analysis (UAA) is a scientific assessment of a water body's physical, chemical, and biological conditions. This assessment provides the foundation for a lake-specific best management practices (BMPs) plan that is used to maintain or attain the existing and potential beneficial uses of a lake, such as swimming, fishing, or aesthetic viewing.

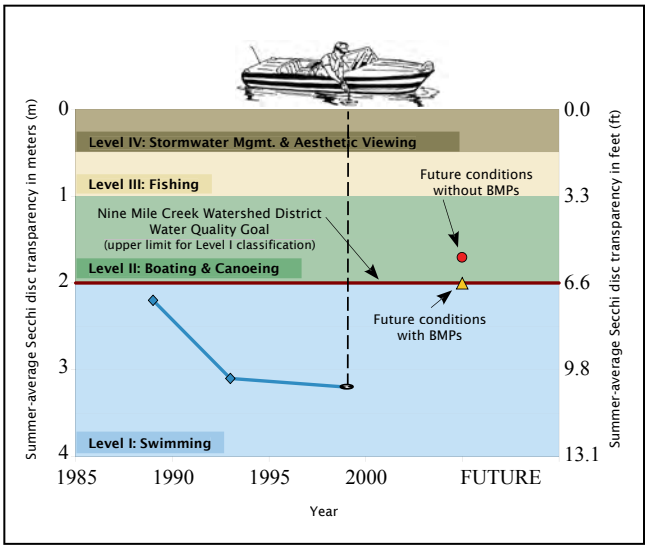
Goals for Glen Lake

Nine Mile Creek Watershed District Water Quality Goal:
Level I Classification—full support of swimmable use and a Secchi disc reading ≥ 2.0 m.

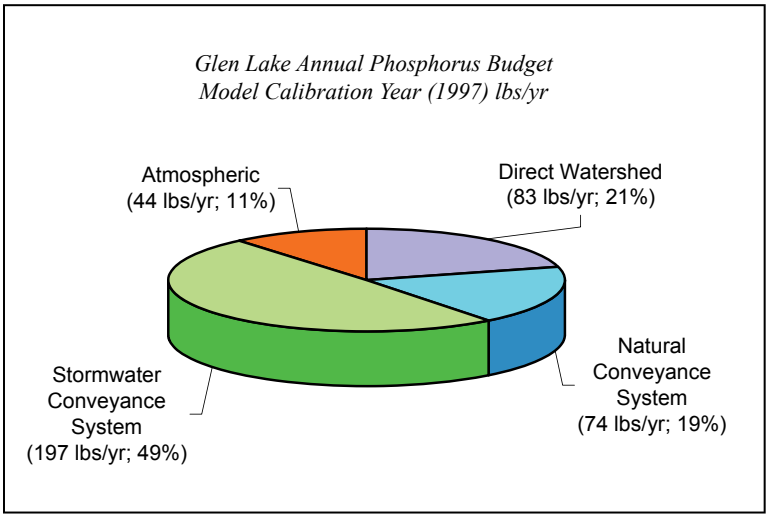
Investigative Techniques

The Glen Lake UAA includes both a water quality analysis and prescription of protective measures for Glen Lake and its watershed. This analysis and prescription is based on:

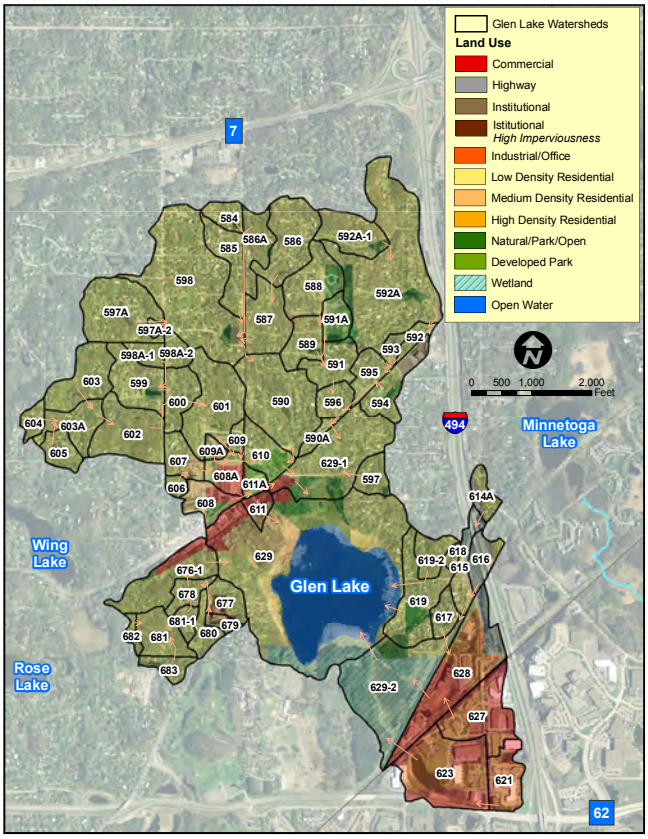
- Historical water quality data
- Intensive lakewater quality study
- P8 computer simulation modeling of runoff water quality
- Lake hydrologic and phosphorus budget analyses (see below)
- Best management practices (BMPs) analysis



This graph illustrates Glen Lake's historic and predicted future summer-average water clarity (transparency). Transparency is measured as the depth at which a black-and-white patterned disc (a Secchi disc) disappears from view as it is lowered into the water.



The stormwater conveyance system contributes roughly half of Glen Lake's annual phosphorus load.



The land use on a lake's watershed directly impacts the water quality in the lake. Therefore, the Glen Lake UAA assessed existing and ultimate watershed land-use conditions.

Purple loosestrife is an exotic species that invades wetlands and lake shorelines. It outcompetes native species and, if left unchecked, will eventually become the dominant plant wherever it appears.

Purple loosestrife can be managed by releasing root-boring weevils onto the plants.

Digging loosestrife by hand is another possible management method.

Water Quality Problems

Swimming Issues

Problem: Summer algal blooms

Cause: Urban stormwater runoff conveying large amounts of phosphorus to the lake

Biological Issues

Problem: Exotic lake weed species (see left)

Cause: Purple loosestrife

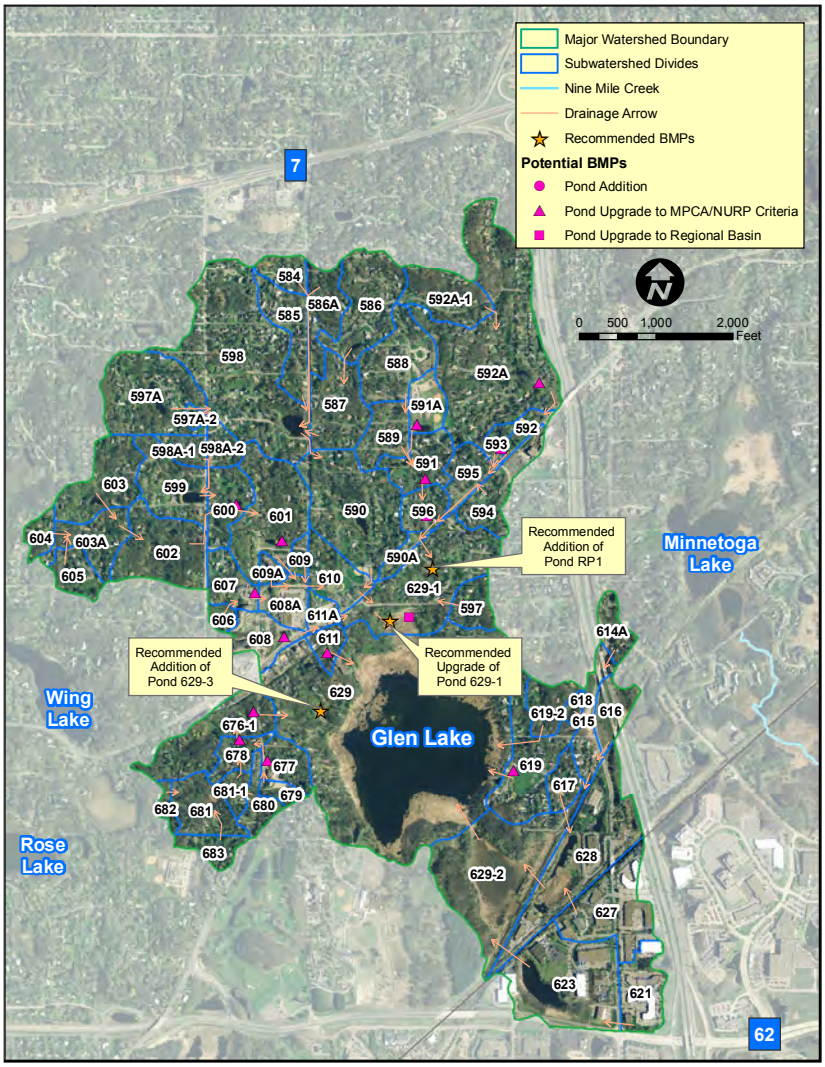
Recommended Remedial Measures*

Conventional Runoff BMPs—Implementing the projects listed below will improve water quality sufficiently to fully meet the Nine Mile Creek Watershed District's goals.

- Add two new stormwater runoff treatment/detention ponds (692-3 and RP1)
- Upgrade pond 629-1 from the City of Minnetonka Surface Water Management Plan in order to meet Minnesota Pollution Control Agency (MPCA) and Nationwide Urban Runoff Program (NURP) criteria for a regional runoff detention/treatment pond

Biological Management Techniques—

- Aquatic plant management (see left)



**Implementation of remedial measures may change based on municipal petitions.*

Project Synopsis:

Lone Lake Use Attainability Analysis

A Use Attainability Analysis (UAA) is a scientific assessment of a water body's physical, chemical, and biological conditions. This assessment provides the foundation for a lake-specific best management practices (BMPs) plan that is used to maintain or attain the existing and potential beneficial uses of a lake, such as swimming, fishing, or aesthetic viewing.

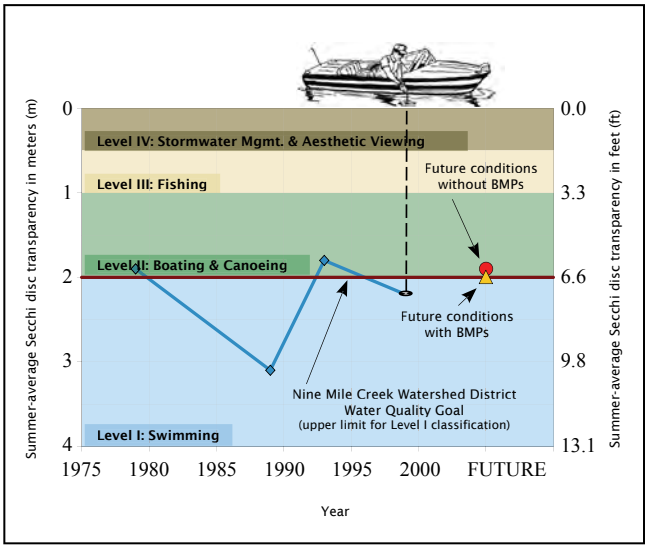
Goals for Lone Lake

Nine Mile Creek Watershed District Water Quality Goal:
Level I Classification—full support of swimmable use and a Secchi disc reading ≥ 2.0 m.

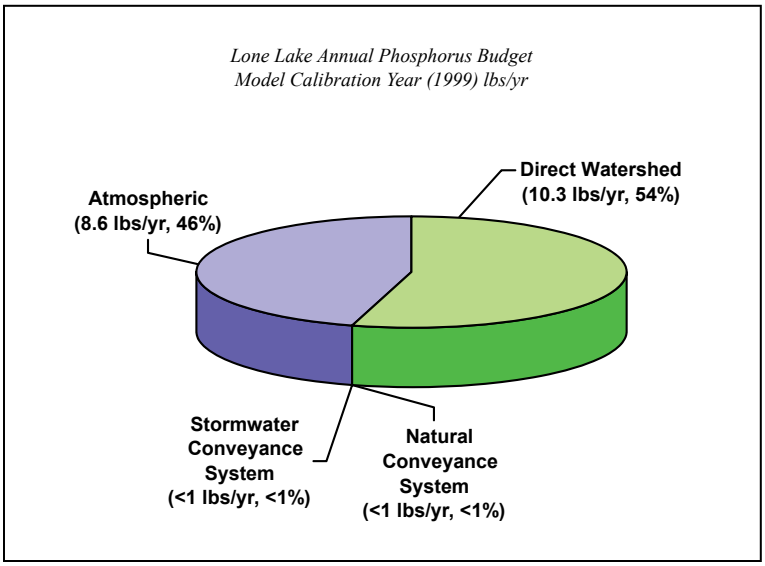
Investigative Techniques

The Lone Lake UAA includes both a water quality analysis and prescription of protective measures for Lone Lake and its watershed. This analysis and prescription is based on:

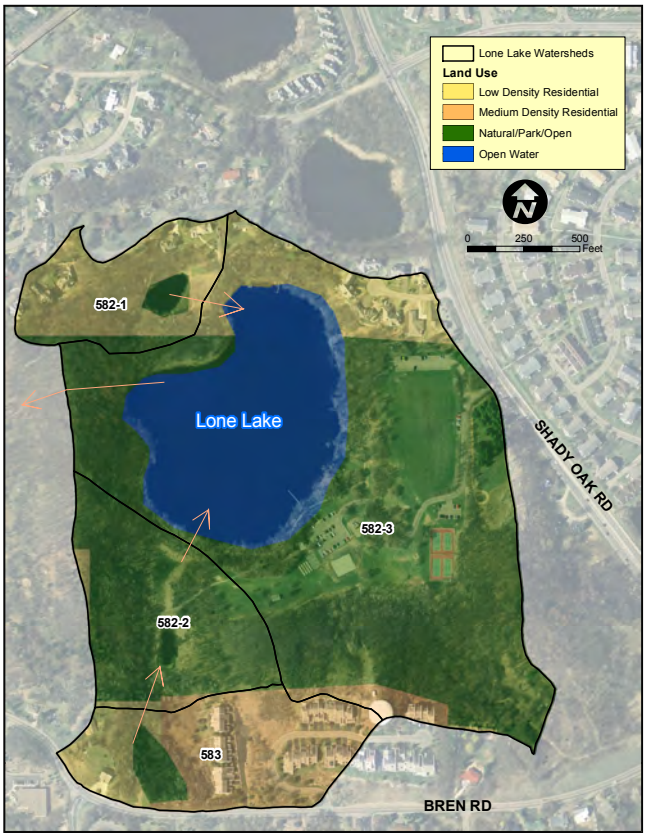
- Historical water quality data
- Intensive lakewater quality study
- P8 computer simulation modeling of runoff water quality
- Lake hydrologic and phosphorus budget analyses (see below)
- Best management practices (BMPs) analysis



This graph illustrates Lone Lake's historic and predicted future summer-average water clarity (transparency). Transparency is measured as the depth at which a black-and-white patterned disc (a Secchi disc) disappears from view as it is lowered into the water.



Surface runoff from Lone Lake's direct watershed contributes roughly 54 percent of the lake's annual phosphorus load.



The land use on a lake's watershed directly impacts the water quality in the lake. Therefore, the Lone Lake UAA assessed existing and ultimate watershed land-use conditions.

Purple loosestrife is an exotic species that invades wetlands and lake shorelines. It out-competes native species and, if left unchecked, will eventually become the dominant plant wherever it appears.

Purple loosestrife can be managed by releasing root-boring weevils onto the plants.

Digging loosestrife by hand is another possible management method.

Water Quality Problems

Swimming Issues

Problem: Summer algal blooms

Cause: Urban stormwater runoff conveying large amounts of phosphorus to the lake

Biological Issues

Problem: Exotic lake weed species (see left)

Cause: Purple loosestrife

Recommended Remedial Measures*

Conventional Runoff BMPs—Implementing the projects listed below will improve water quality sufficiently to fully meet the Nine Mile Creek Watershed District's goals.

- Add one new stormwater runoff treatment/detention ponds (582-3)

Biological Management Techniques—

- Aquatic plant management (see left)

**Implementation of remedial measures may change based on municipal petitions.*

Project Synopsis:
Minnetoga Lake Use Attainability Analysis

A Use Attainability Analysis (UAA) is a scientific assessment of a water body's physical, chemical, and biological conditions. This assessment provides the foundation for a lake-specific best management practices (BMPs) plan that is used to maintain or attain the existing and potential beneficial uses of a lake, such as swimming, fishing, or aesthetic viewing.

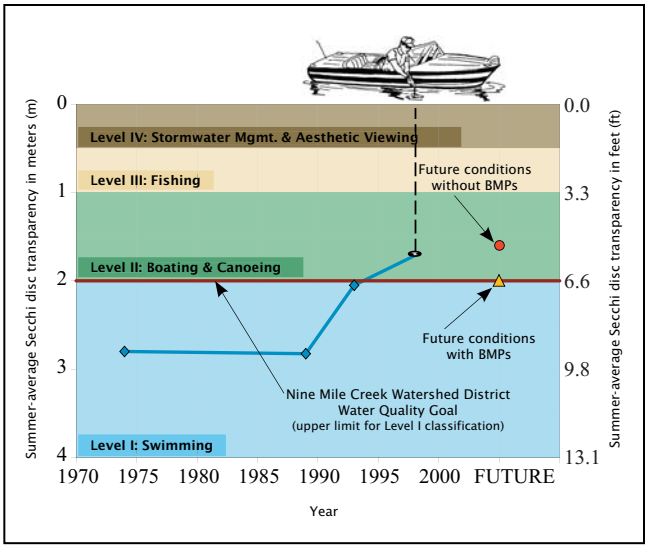
Goals for Minnetoga Lake

Nine Mile Creek Watershed District Water Quality Goal:
Level I Classification—full support of swimmable use and a Secchi disc reading ≥ 2.0 m.

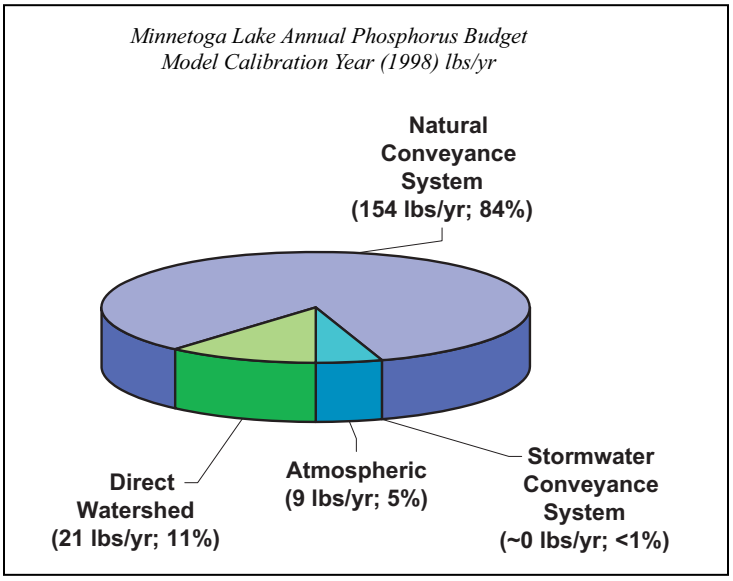
Investigative Techniques

The Minnetoga Lake UAA includes both a water quality analysis and prescription of protective measures for Minnetoga Lake and its watershed. This analysis and prescription is based on:

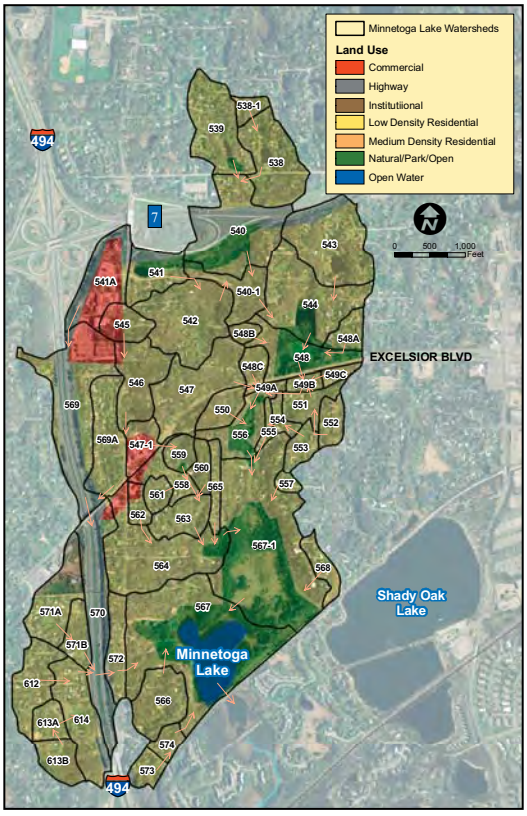
- Historical water quality data
- Intensive lakewater quality study
- P8 computer simulation modeling of runoff water quality
- Lake hydrologic and phosphorus budget analyses (see below)
- Best management practices (BMPs) analysis



This graph illustrates Minnetoga Lake's historic and predicted future summer-average water clarity (transparency). Transparency is measured as the depth at which a black-and-white patterned disc (a Secchi disc) disappears from view as it is lowered into the water.

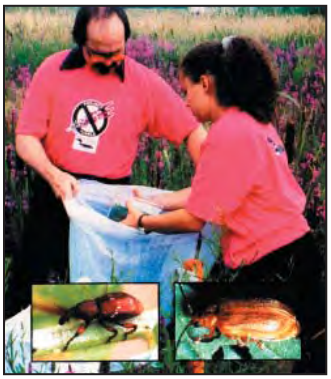


Minnetoga Lake's natural conveyance system contributes roughly 84 percent of the lake's annual phosphorus load.



The land use on a lake's watershed directly impacts the water quality in the lake. Therefore, the Minnetoga Lake UAA assessed existing and ultimate watershed land-use conditions.

Purple loosestrife is an exotic species that invades wetlands and lake shorelines. It outcompetes native species and, if left unchecked, will eventually become the dominant plant wherever it appears.



Purple loosestrife can be managed by releasing root-boring weevils onto the plants.

Digging loosestrife by hand is another possible management method.

Water Quality Problems

Swimming Issues

Problem: Summer algal blooms

Cause: Urban stormwater runoff conveying large amounts of phosphorus to the lake

Biological Issues

Problem: Exotic lake weed species (see left)

Cause: Purple loosestrife

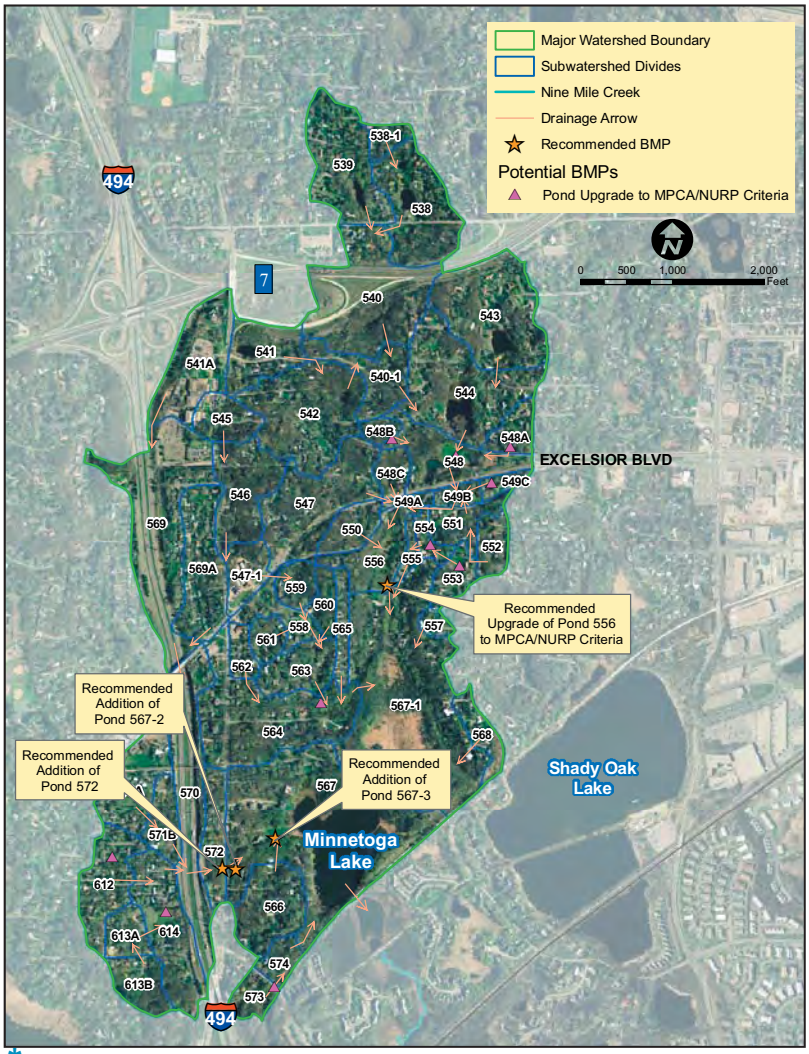
Recommended Remedial Measures*

Conventional Runoff BMPs—Implementing the projects listed below will improve water quality sufficiently to fully meet the Nine Mile Creek Watershed District's goals.

- Add three new stormwater treatment ponds (572, 567-2**, and 567-3)
- Upgrade pond 556 for the City of Minnetonka Surface Water Management Plan (to meet Minnesota Pollution Control/Nationwide Urban Runoff Program criteria for a regional runoff detention pond)

Biological Management Techniques—

- Aquatic plant management (see left)



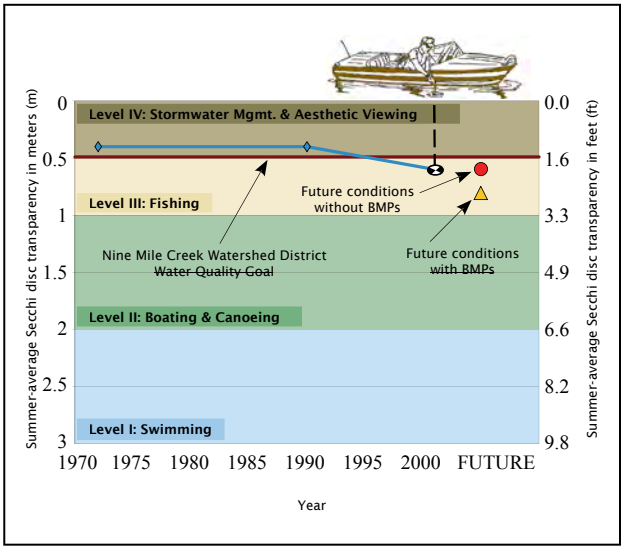
*Implementation of remedial measures may change based on municipal petitions.
**The final design did not include construction of 567-2.

Project Synopsis:
Mirror Lake Use Attainability Analysis

A Use Attainability Analysis (UAA) is a scientific assessment of a water body's physical, chemical, and biological conditions. This assessment provides the foundation for a lake-specific best management practices (BMPs) plan that is used to maintain or attain the existing and potential beneficial uses of a lake, such as swimming, fishing, or aesthetic viewing.

Goals for Mirror Lake

Nine Mile Creek Watershed District Water Quality Goal:
Level IV Classification—intended for runoff management and aesthetic viewing; a Secchi disc reading ≤ 0.5 m.

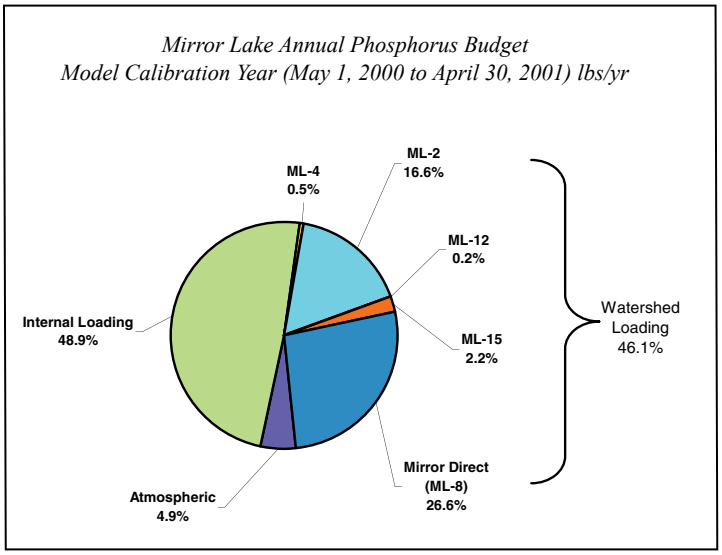


This graph illustrates Mirror Lake's historic and predicted future summer-average water clarity (transparency). Transparency is measured as the depth at which a black-and-white patterned disc (a Secchi disc) disappears from view as it is lowered into the water.

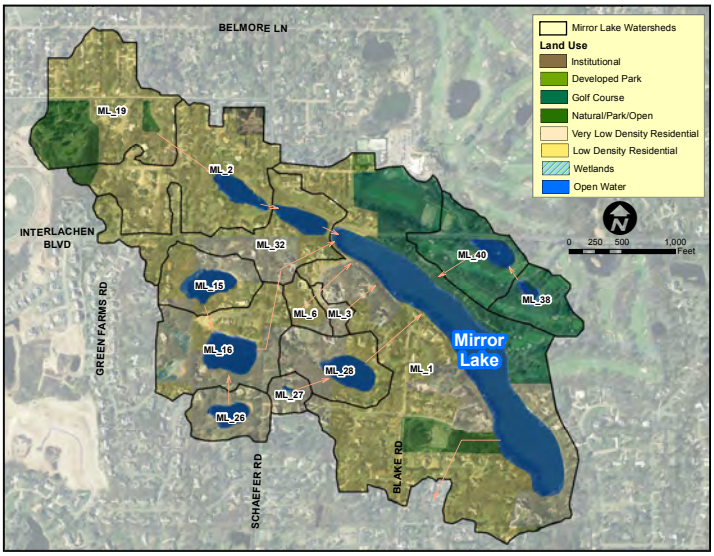
Investigative Techniques

The Mirror Lake UAA includes both a water quality analysis and prescription of protective measures for Mirror Lake and its watershed. This analysis and prescription is based on:

- Historical water quality data
- Aquatic plant surveys
- Intensive lakewater quality study
- P8 computer simulation modeling of runoff water quality
- Lake hydrologic and phosphorus budget analyses (see below)
- Best management practices (BMPs) analysis



Internal phosphorus loading from the dieback of curlyleaf pondweed and the release of sediment-bound phosphorus contributes nearly 50 percent of Mirror Lake's annual phosphorus load.



The land use on a lake's watershed directly impacts the water quality in the lake. Therefore, the Mirror Lake UAA assessed existing and ultimate watershed land-use conditions.

Curlyleaf pondweed is an invasive aquatic plant that releases nutrients into the water when it dies back in early summer.

Purple loosestrife is an exotic species that invades wetlands and lake shorelines. It outcompetes native species and, if left unchecked, will eventually become the dominant plant wherever it appears.

Purple loosestrife can be managed by releasing root-boring weevils onto the plants.

Water Quality Problems

- ***Recreational Issues***
  Problem: Summer algal blooms (caused by high phosphorus levels)

  Cause: Urban stormwater runoff conveying large amounts of phosphorus to the lake

- ***Biological Issues***
  Problem: Exotic lake weed species (see left)

  Cause: Curlyleaf pondweed and purple loosestrife

Recommended Remedial Measures*

Conventional Runoff BMPs

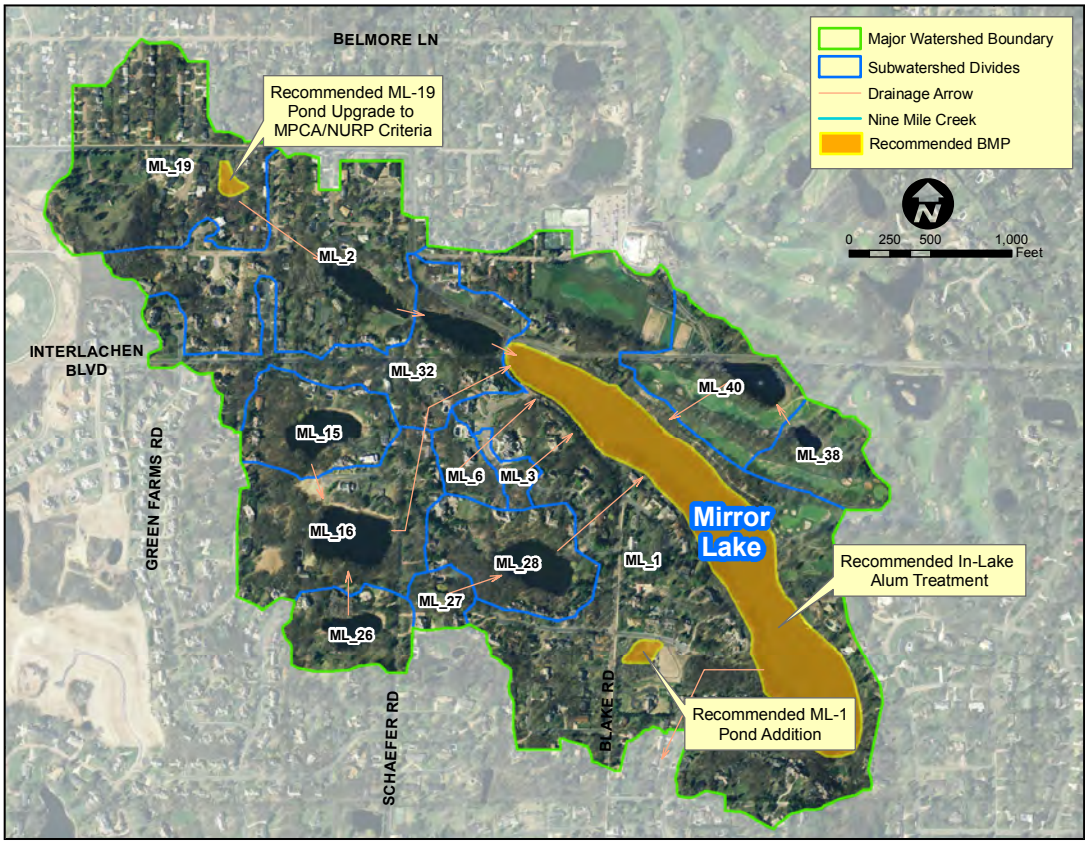
- Add water quality treatment volume to existing pond ML-3
- Construct a new water quality treatment pond in subwatershed ML-16

In-Lake BMPs

- Alum application to the entire surface area of Mirror Lake to reduce the annual phosphorus load by roughly 34 percent
- Manage curlyleaf pondweed with whole-lake endothal treatments to reduce the lakeweed's impact on water quality

Biological Management Techniques

- Manage purple loosestrife by releasing specific beetle species



*Implementation of remedial measures may change based on municipal petitions.

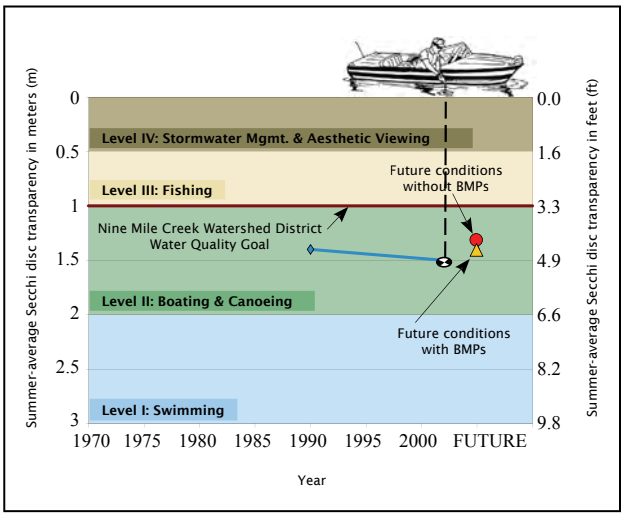
Project Synopsis:
Normandale Lake Use Attainability Analysis

A Use Attainability Analysis (UAA) is a scientific assessment of a water body's physical, chemical, and biological conditions. This assessment provides the foundation for a lake-specific best management practices (BMPs) plan that is used to maintain or attain the existing and potential beneficial uses of a lake, such as swimming, fishing, or aesthetic viewing.

Goals for Normandale Lake

Nine Mile Creek Watershed District
Water Quality Goal:
Level II Classification—full support of swimmable use, but threatened; Secchi disc reading ≥ 1.0 m. (3.2 ft.) and total phosphorus concentrations ≤ 75 micrograms per liter

Minnesota Pollution Control Agency
Swimmable Use Goal:
Full support of swimming with a total phosphorus concentration < 40 micrograms/liter and a Secchi disc reading ≥ 1.2 m.

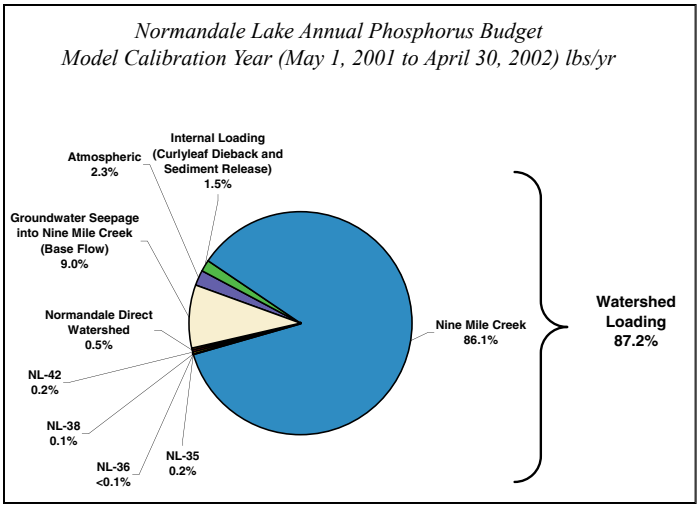


This graph illustrates Normandale Lake's historic and predicted future summer-average water clarity (transparency). Transparency is measured as the depth at which a black-and-white patterned disc (a Secchi disc) disappears from view as it is lowered into the water.

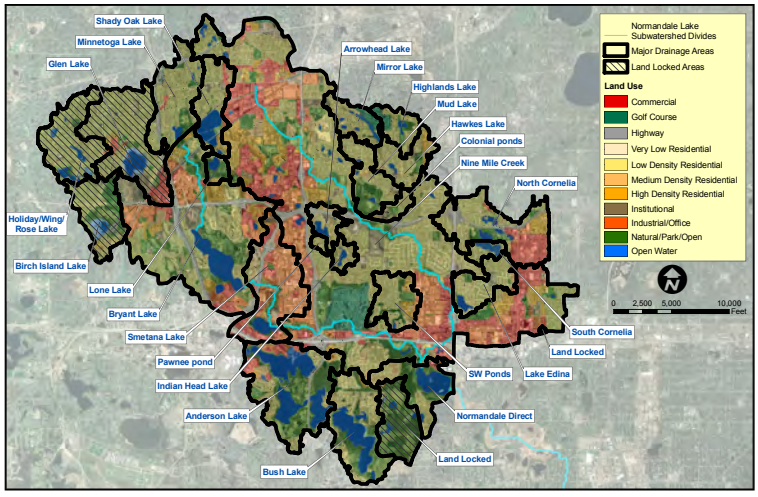
Investigative Techniques

The Normandale Lake UAA includes both a water quality analysis and prescription of protective measures for Normandale Lake and its watershed. This analysis and prescription is based on:

- Historical water quality data
- Aquatic plant surveys
- Intensive lakewater quality study
- P8 computer simulation modeling of runoff water quality
- Lake hydrologic and phosphorus budget analyses (see below)
- Best management practices (BMPs) analysis



Surface runoff conveyed to Normandale Lake via Nine Mile Creek contributes roughly 87 percent of the lake's annual phosphorus load.



The land use on a lake's watershed directly impacts the water quality in the lake. Therefore, the Normandale Lake UAA assessed existing and ultimate watershed land-use conditions.

Curlyleaf pondweed is an invasive aquatic plant that releases nutrients into the water when it dies back in early summer.

Purple loosestrife is an exotic species that invades wetlands and lake shorelines. It out-competes native species and, if left unchecked, will eventually become the dominant plant wherever it appears.

Water Quality Problems

- ***Recreational Issues***
  Problem: Summer algal blooms (caused by high phosphorus levels)

  Cause: Urban stormwater runoff conveying large amounts of phosphorus to the lake

- ***Biological Issues***
  Problem: Exotic lake weed species (see left)

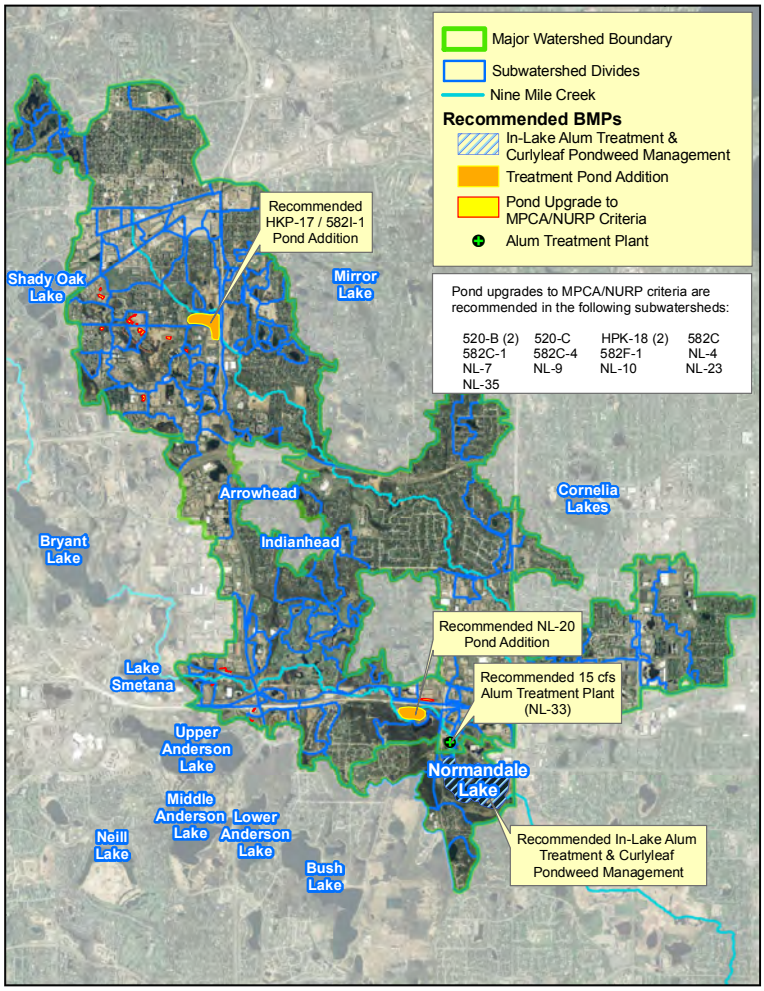
  Cause: Curlyleaf pondweed and purple loosestrife

Recommended Remedial Measures*

No additional BMPs are required to meet the district's or the MPCA's water clarity goal for Normandale Lake. However, additional BMPs are required to meet the district's total phosphorus goal of less than 75 micrograms per liter. The BMPs necessary are:

- Improve Bryant and Smetana lakes' water quality
- Add two water quality treatment ponds—one pond would be located along the north fork of Nine Mile Creek in Hopkins while the other would be located along the south fork of Nine Mile Creek just upstream of East Bush Lake Road

To meet the MPCA's swimmable-use goal for total phosphorus, an alum treatment facility, located at the confluence of the north and south forks of Nine Mile Creek, with the capacity to treat 15 cubic feet per second of stream flow is necessary.



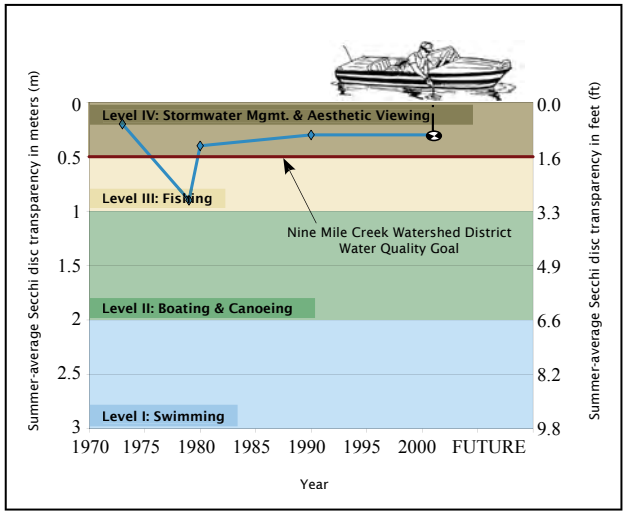
*Implementation of remedial measures may change based on municipal petitions.

Project Synopsis:
Penn Lake Use Attainability Analysis

A Use Attainability Analysis (UAA) is a scientific assessment of a water body's physical, chemical, and biological conditions. This assessment provides the foundation for a lake-specific best management practices (BMPs) plan that is used to maintain or attain the existing and potential beneficial uses of a lake, such as swimming, fishing, or aesthetic viewing.

Goals for Penn Lake

Nine Mile Creek Watershed District
Water Quality Goal:
Level IV Classification—intended for runoff management and aesthetic viewing; Secchi disc reading ≤ 0.5 m.

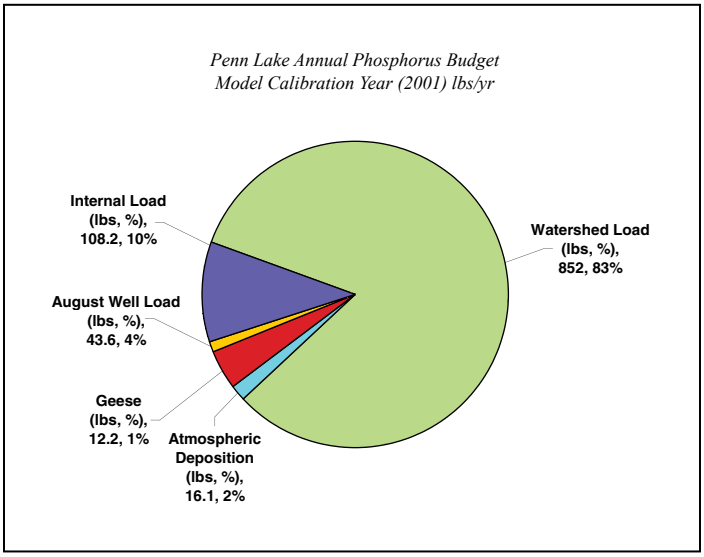


This graph illustrates Penn Lake's historic and predicted future summer-average water clarity (transparency). Transparency is measured as the depth at which a black-and-white patterned disc (a Secchi disc) disappears from view as it is lowered into the water.

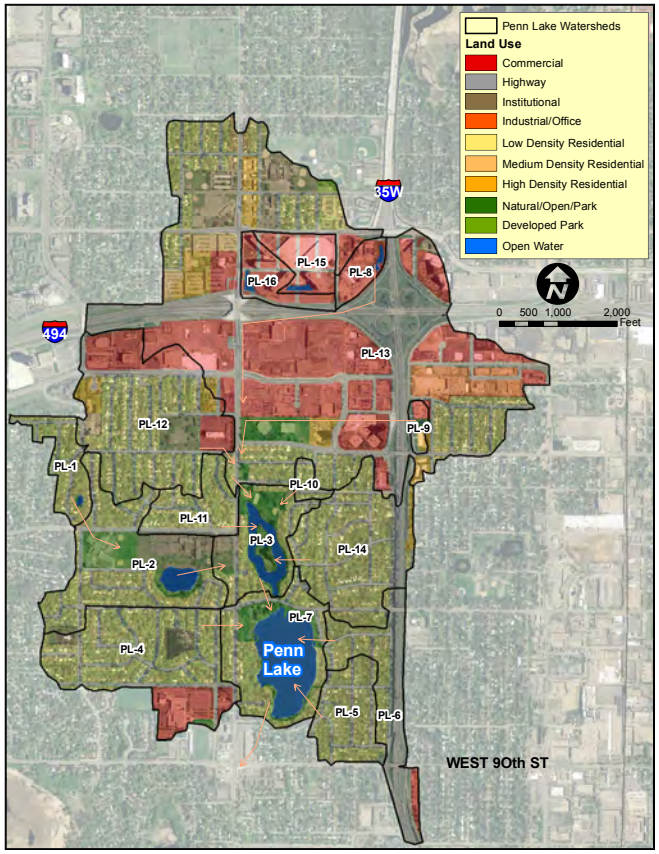
Investigative Techniques

The Penn Lake UAA includes both a water quality analysis and prescription of protective measures for Penn Lake and its watershed. This analysis and prescription is based on:

- Historical water quality data
- Aquatic plant surveys
- Intensive lakewater quality study
- P8 computer simulation modeling of runoff water quality
- Lake hydrologic and phosphorus budget analyses (see below)
- Best management practices (BMPs) analysis



The annual phosphorus budget indicates watershed runoff contributes the largest amount of phosphorus to Penn Lake (~83 percent), while geese contribute roughly 4 percent of the annual phosphorus load.



The land use on a lake's watershed directly impacts the water quality in the lake. Therefore, the Penn Lake UAA assessed existing and ultimate watershed land-use conditions.

Purple loosestrife is an exotic species that invades wetlands and lake shorelines. It outcompetes native species and, if left unchecked, will eventually become the dominant plant wherever it appears.

Water Quality Problems

- ***Recreational Issues***
  Problem: Summer algal blooms (caused by high phosphorus levels)

  Cause: Urban stormwater runoff conveying large amounts of phosphorus to the lake

- ***Biological Issues***
  Problem: Exotic lake weed species (see left)

  Cause: Purple loosestrife

Recommended Remedial Measures*

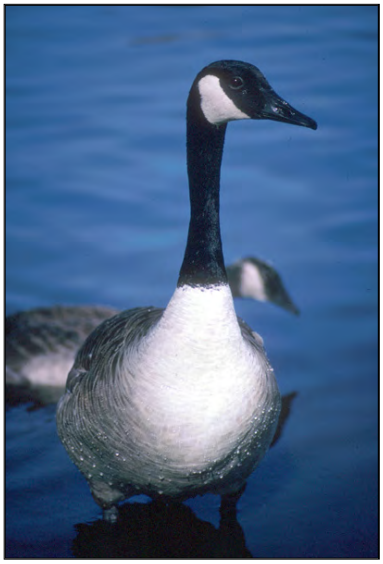
Conventional Runoff BMPs

- Pretreatment of runoff from future 35W expansion

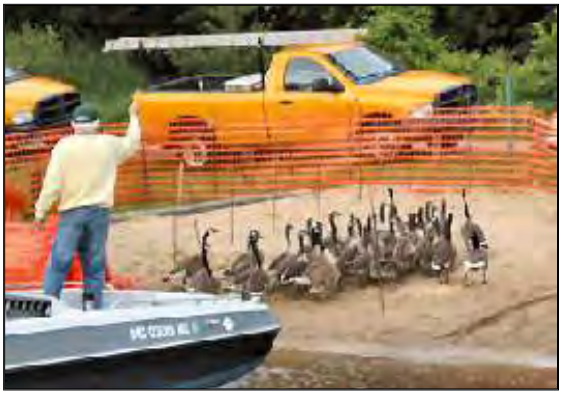
Biological Management Techniques

- Manage purple loosestrife by releasing specific beetle species
- Continue annual goose removal program

Purple loosestrife can be managed by releasing root-boring weevils onto the plants.



The annual goose removal program continues to help reduce this source of phosphorus to Penn Lake.



Geese are herded into a pen where the Department of Natural Resources assesses the birds, relocating some to distant locations and slaughtering others for donation to local food shelves.

Digging loosestrife by hand is another possible management method.

*Implementation of remedial measures may change based on municipal petitions.

Project Synopsis:
Shady Oak Lake Use Attainability Analysis

A Use Attainability Analysis (UAA) is a scientific assessment of a water body's physical, chemical, and biological conditions. This assessment provides the foundation for a lake-specific best management practices (BMPs) plan that is used to maintain or attain the existing and potential beneficial uses of a lake, such as swimming, fishing, or aesthetic viewing.

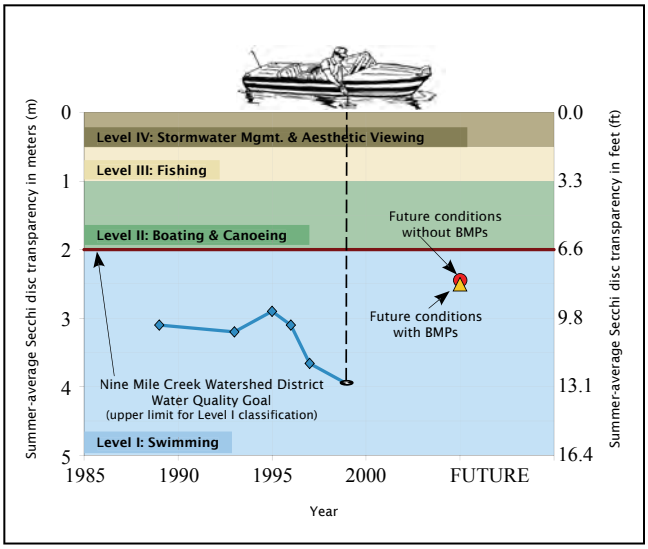
Goals for Shady Oak Lake

Nine Mile Creek Watershed District Water Quality Goal:
Level I Classification—full support of swimmable use and a Secchi disc reading ≥ 2.0 m.

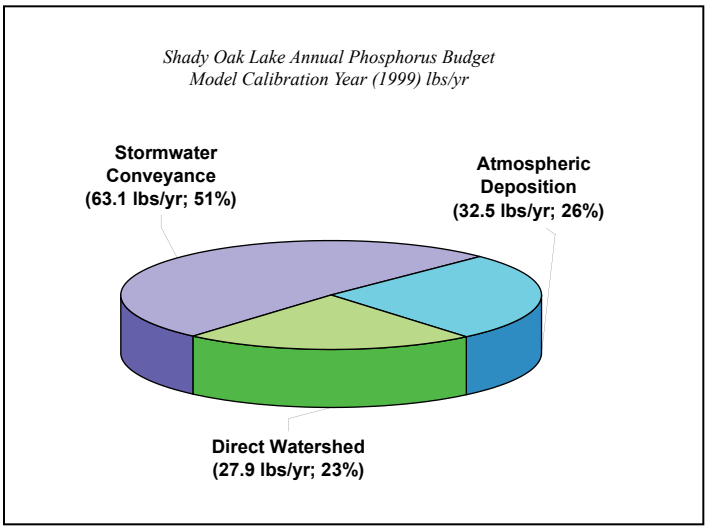
Investigative Techniques

The Shady Oak Lake UAA includes both a water quality analysis and prescription of protective measures for Shady Oak Lake and its watershed. This analysis and prescription is based on:

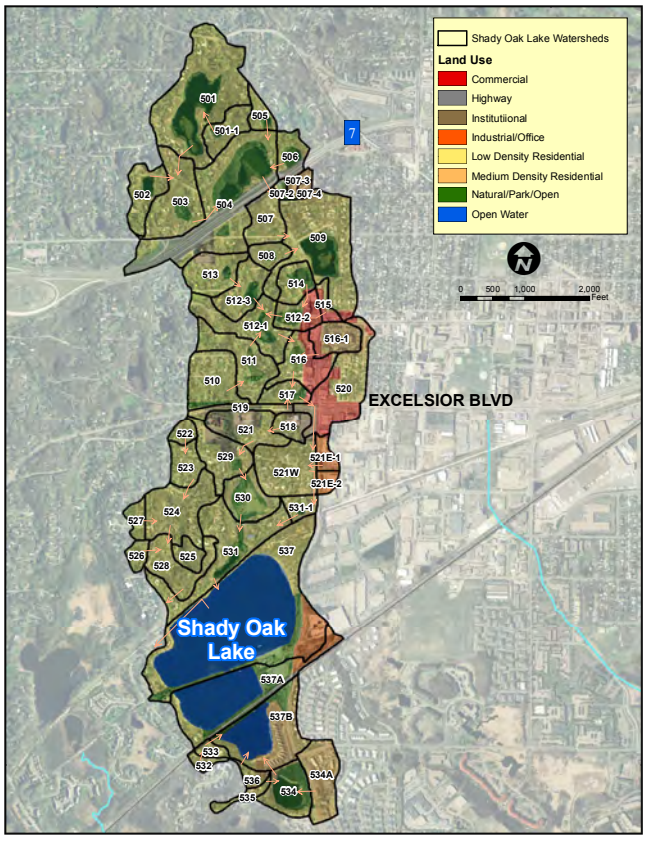
- Historical water quality data
- Intensive lakewater quality study
- P8 computer simulation modeling of runoff water quality
- Lake hydrologic and phosphorus budget analyses (see below)
- Best management practices (BMPs) analysis



This graph illustrates Shady Oak Lake's historic and predicted future summer-average water clarity (transparency). Transparency is measured as the depth at which a black-and-white patterned disc (a Secchi disc) disappears from view as it is lowered into the water.



Stormwater conveyance accounts for more than 50 percent of Shady Oak Lake's annual phosphorus load.



The land use on a lake's watershed directly impacts the water quality in the lake. Therefore, the Shady Oak Lake UAA assessed existing and ultimate watershed land-use conditions.

An invasive aquatic plant, Eurasian watermilfoil adversely impacts aquatic ecosystems by forming dense canopies that often shade out native vegetation. It can "travel" from lake to lake via boat trailers.

Purple loosestrife is an exotic species that invades wetlands and lake shorelines. It outcompetes native species and, if left unchecked, will eventually become the dominant plant wherever it appears.

Purple loosestrife can be managed by releasing root-boring weevils onto the plants.

Water Quality Problems

Swimming Issues

Problem: Summer algal blooms (caused by high phosphorus levels)

Cause: Urban stormwater runoff conveying large amounts of phosphorus to the lake

Biological Issues

Problem: Exotic lake weed species (see left)

Cause: Eurasian watermilfoil and purple loosestrife

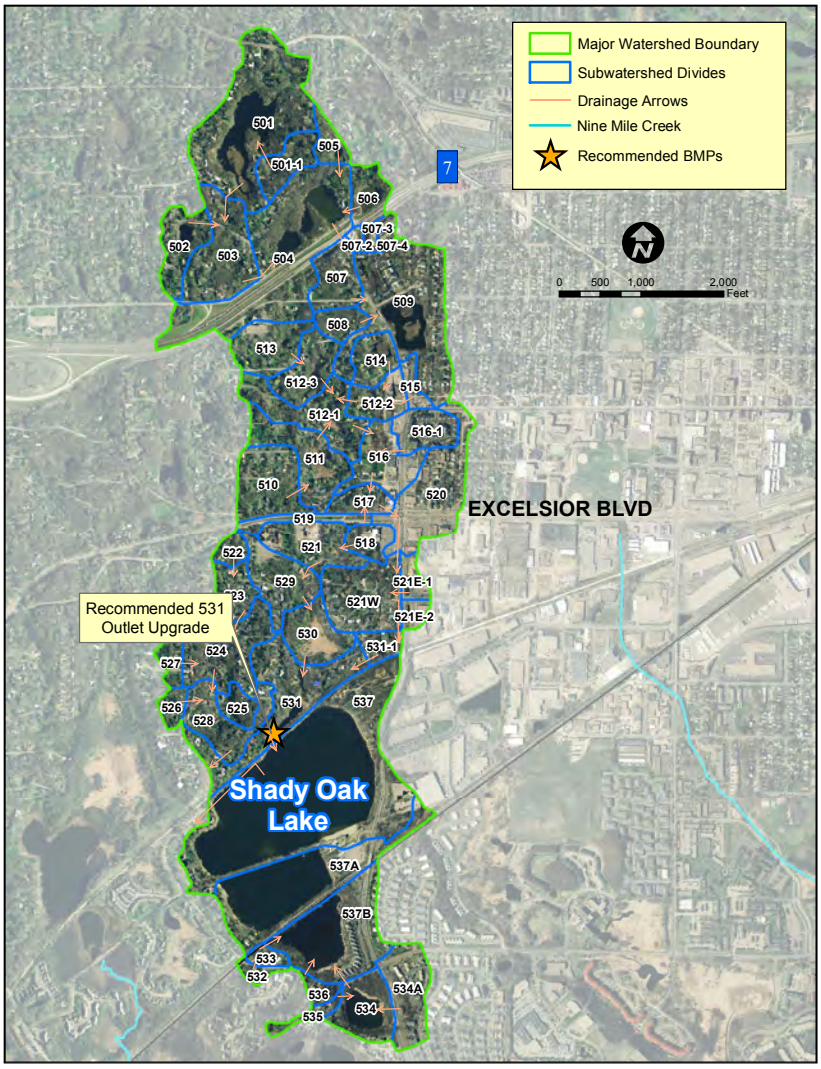
Recommended Remedial Measures*

Conventional Runoff BMPs—No further BMPs, besides those prescribed by the Minnetonka Water Resources Management Plan, are required to meet the district's water quality goals. However, elevating the outlet from pond 531 could improve the water quality in the lake.

Harvesting Eurasian watermilfoil is a biological management technique used on many area lakes.

Biological Management Techniques—

- Aquatic plant management



*Implementation of remedial measures may change based on municipal petitions.

Project Synopsis:
Smetana Lake Use Attainability Analysis

A Use Attainability Analysis (UAA) is a scientific assessment of a water body's physical, chemical, and biological conditions. This assessment provides the foundation for a lake-specific best management practices (BMPs) plan that is used to maintain or attain the existing and potential beneficial uses of a lake, such as swimming, fishing, or aesthetic viewing.

Goals for Smetana Lake

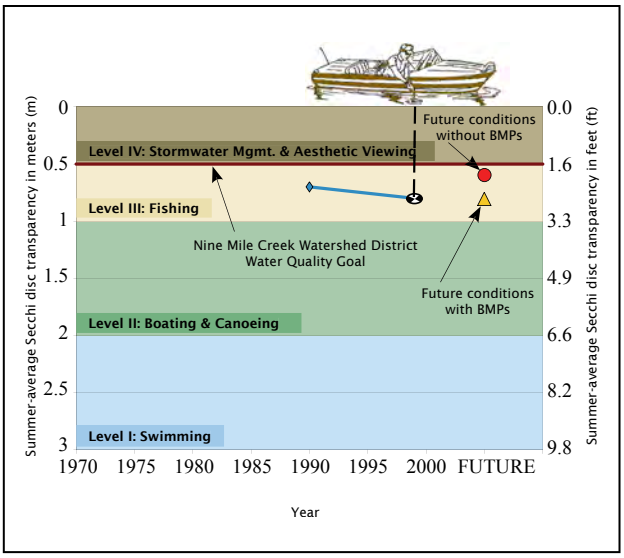
Nine Mile Creek Watershed District Water Quality Goal:

Level III Classification—partial support of swimmable use and a Secchi disc reading ≥ 0.5 m.

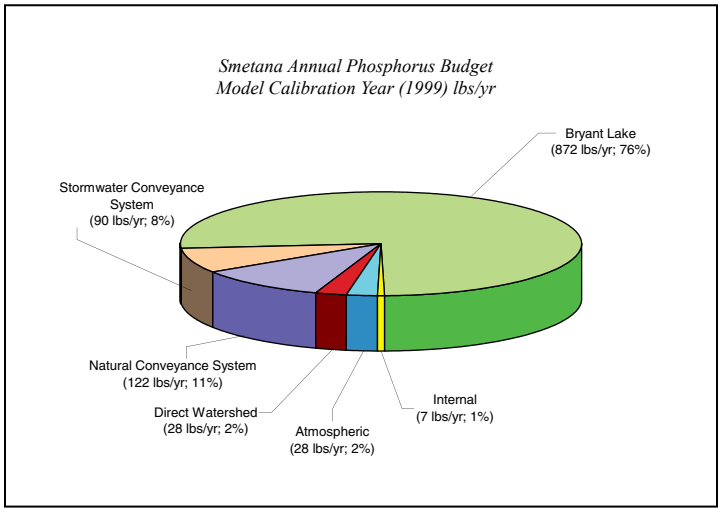
Investigative Techniques

The Smetana Lake UAA includes both a water quality analysis and prescription of protective measures for Smetana Lake and its watershed. This analysis and prescription is based on:

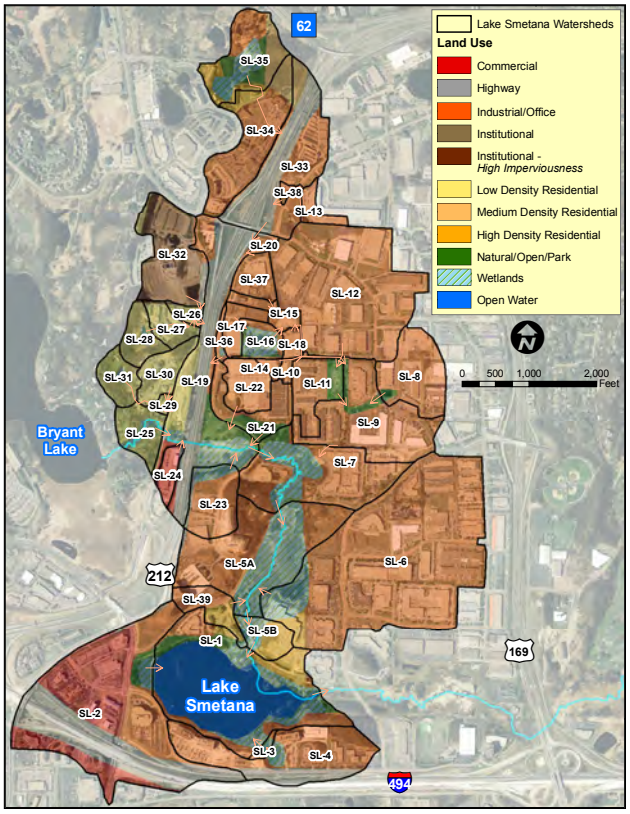
- Historical water quality data
- Intensive lakewater quality study
- P8 computer simulation modeling of runoff water quality
- Lake hydrologic and phosphorus budget analyses (see below)
- Best management practices (BMPs) analysis



This graph illustrates Smetana Lake's historic and predicted future summer-average water clarity (transparency). Transparency is measured as the depth at which a black-and-white patterned disc (a Secchi disc) disappears from view as it is lowered into the water.



The annual phosphorus budget indicates outflows from Bryant Lake contribute the largest amount of phosphorus to Smetana Lake (~76 percent).



The land use on a lake's watershed directly impacts the water quality in the lake. Therefore, the Smetana Lake UAA assessed existing and ultimate watershed land-use conditions.

Curlyleaf pondweed is an invasive aquatic plant that releases nutrients into the water when it dies back in early summer.

Purple loosestrife is an exotic species that invades wetlands and lake shorelines. It outcompetes native species and, if left unchecked, will eventually become the dominant plant wherever it appears.

Water Quality Problems

- ***Swimming Issues***
  Problem: Summer algal blooms (caused by high phosphorus levels)

  Cause: Urban stormwater runoff conveying large amounts of phosphorus to the lake

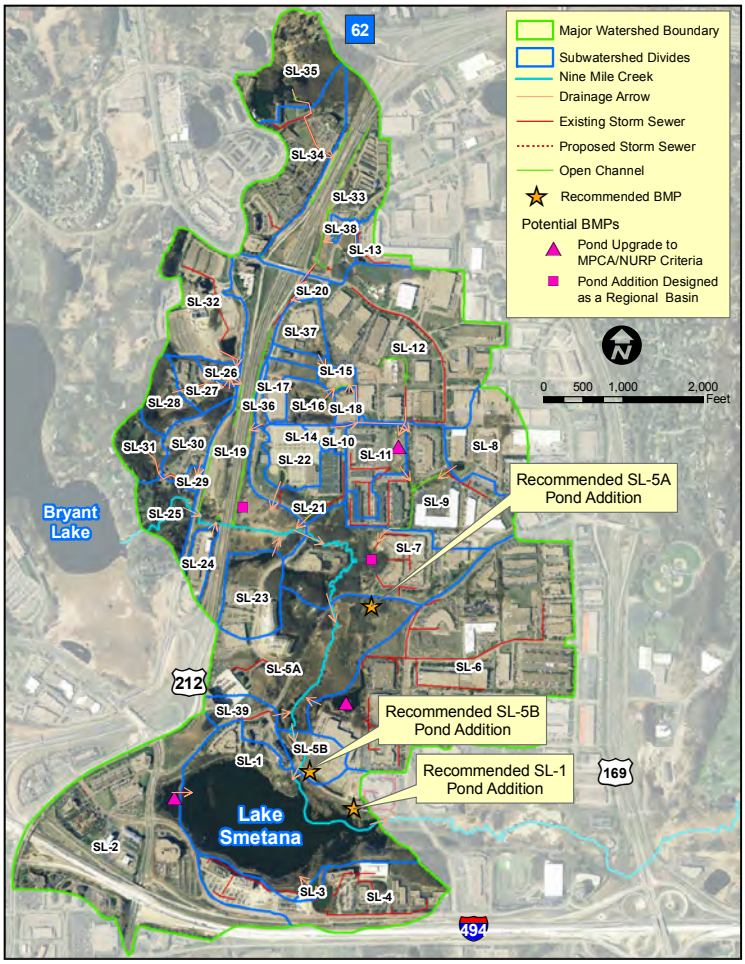
- ***Biological Issues***
  Problem: Exotic lake weed species (see left)

  Cause: Curlyleaf pondweed and purple loosestrife

Recommended Remedial Measures*

No additional BMPs are required to meet the district's water quality goal for Smetana Lake (a level III classification). However, additional BMPs could be implemented to enhance the lake's water quality during various climatic conditions.

- Implementation of BMPs on the Bryant Lake watershed will also improve Smetana Lake's water quality.
- Implementation of all the illustrated BMPs, combined with improved Bryant Lake water quality (the analysis assumed Bryant Lake water quality meets the district's goal for that lake), would reduce the annual phosphorus load by 90 to 219 pounds/year (8 to 19 percent).
- Summer average Secchi disc transparency is estimated to improve minorly, by up to 0.2 meters.



*Implementation of remedial measures may change based on municipal petitions.

Appendix B

Summary Memo of May 4, 2016 Community Input Forum

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Memorandum

To: Nine Mile Creek Watershed District Board of Managers
From: Janna Kieffer
Subject: Summary of May 4, 2016 Community Input Forum
Date: June 14, 2016
Project: Water Management Plan Update
c: Bob Obermeyer, Erica Sniegowski, Kevin Bigalke and Michael Welch

On May 4, 2016 the Nine Mile Creek Watershed District (NMCWD) hosted a community input forum to inform citizens about the NMCWD and the update of its Water Management Plan and solicit feedback regarding citizen issues and concerns. The forum was held at the Centennial Lakes Pavilion in Edina. Attendance included 18 citizens, three Nine Mile Creek staff members, two NMCWD managers, and one NMCWD consultant.

Meeting Agenda

At the onset of the meeting, participants were greeted by NMCWD staff and asked to sign in and prepare a name tag. Participants were given a colored dot and instructed to locate their residence on a large map of the Nine Mile Creek watershed. At the sign-in table, participants were also given 3" x 5" cards with instructions to answer each of three strategic questions which were shown on a large projection screen. The questions were in relation to which NMCWD resources were used, how they were used and what people most valued about the resources within the watershed. During a welcome and overview by the District administrator, staff collected the 3" x 5" cards which were then tabulated and results were presented at the end of the meeting.

The attendees were arranged into small groups of 4-8 people per table in order to facilitate the next part of the meeting, the "brain sprinting" exercise. The "brain sprinting" exercise was a timed effort that focused on gathering responses in a rapid, repeating sequence. The first round of the exercise focused on generating the key issues/concerns in relation to the water resources within the NMCWD, such as invasive species, animal habitats, stormwater and other pollutants, water quality, aquatic vegetation, increased development/impervious surfaces and the need for education and maintenance. The second round of the "brain sprinting" exercise was then to identify potential solutions to the issues identified in the first round. The "brain sprinting" responses were tabulated on pre-printed sheets that were gathered at the end of the meeting. After the exercise, each of the small groups were given a chance to discuss some key issues and solutions from their table, selecting one issue and solution to share with the larger group.

Next, NMCWD staff led a brief question and answer session, followed by a summary of next steps in the planning process, and a quick presentation of which resources the group most used, how they used the resources, and a summary of what the group most valued about the water resources within the Nine Mile Creek watershed. The meeting was then adjourned.

Documenting the Results

NMCWD staff gathered a variety of information from the community input forum, including:

- A colored dot on the District watershed map for each person that attended the meeting.
- The three 3" x 5" cards for each participant that included answers to three strategic questions.
- One sheet (two sides) for each participant that summarized the issues and solutions identified in the "brain sprinting" exercise.

At sign-in, attendees were given a colored dot and instructed to locate their residence on a large map of the Nine Mile Creek watershed. A photo of the "dot" map is included as Figure 1. The majority of attendees were from Edina and Bloomington, with one representative from both the cities of Eden Prairie and Hopkins. As seen in Figure 1, a large portion of the forum participants were from a residential neighborhood near Normandale Lake.

Staff compiled the answers to each of the three strategic questions and organized the responses into similar categories. This information was summarized based on the number of responses in each category (in a spreadsheet) and summarized in graphical format at the closing of the forum meeting (see Figures 2 through 4).

All responses collected during the "brain sprinting" exercise were compiled into a spreadsheet as a first step. The responses were then organized into gross categories and then further refined into more specific categories. The compiled results for the key issues of concern and ideas for improvement are presented in Figures 5 and 6, respectively. As noted above, a large portion of the forum participants reside in Bloomington. As such, many comments specific to Normandale Lake were shared during the brain sprinting exercise.

Incorporating the Results into the NMCWD Plan Update

A summary of the May 4, 2016 Community Input Forum was provided to the NMCWD Board of Managers at their May 5, 2016 Board Workshop. This information, along with input gathered from the community input survey, was considered as the Board of Managers conducted issue identification and prioritization for the Water Management Plan update. Feedback from the community input forum is also being used as staff develop goals, policies, and implementation activities for inclusion in their updated Water Management Plan.

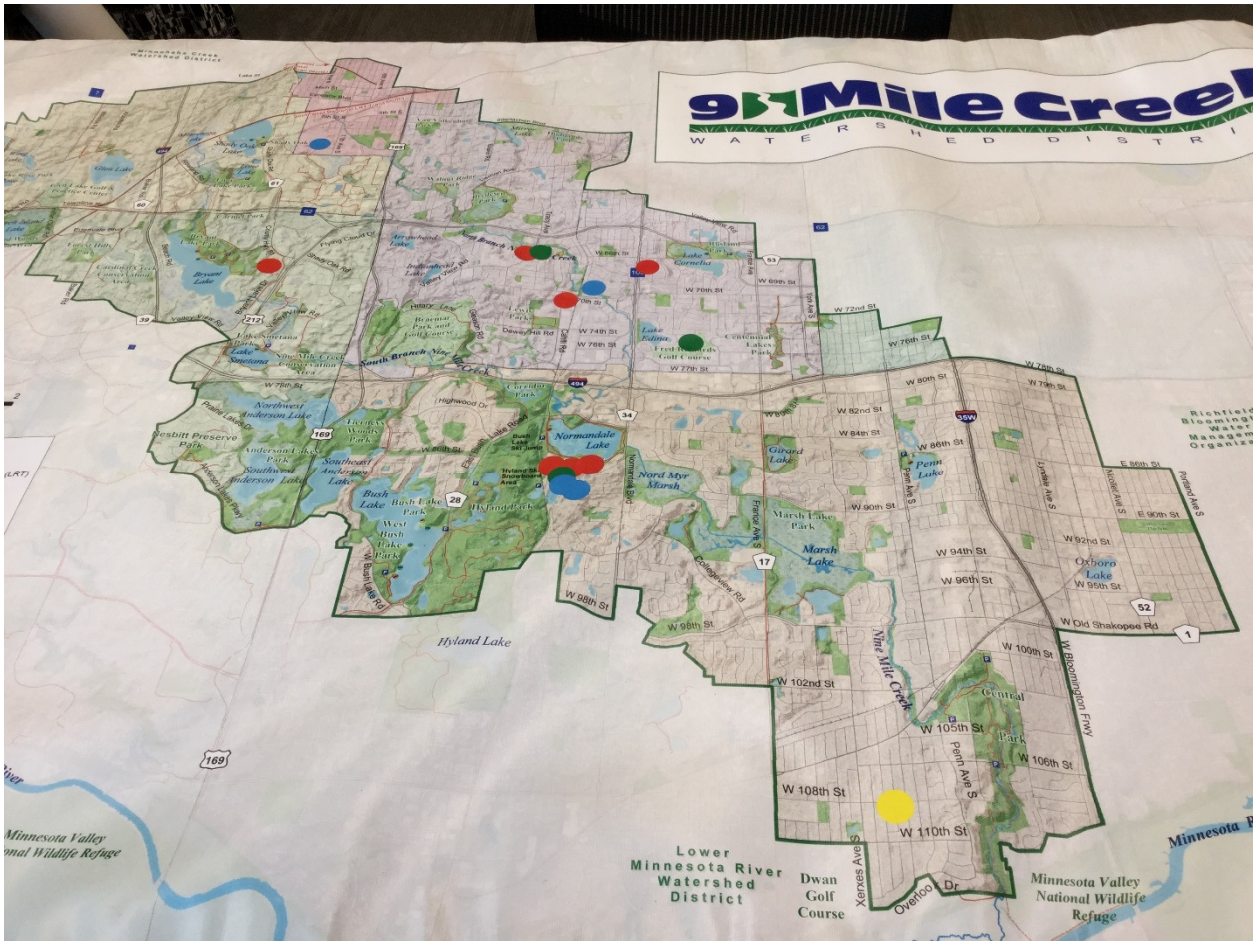

Figure 1. Watershed "dot" map, with dots representing where forum attendees live.

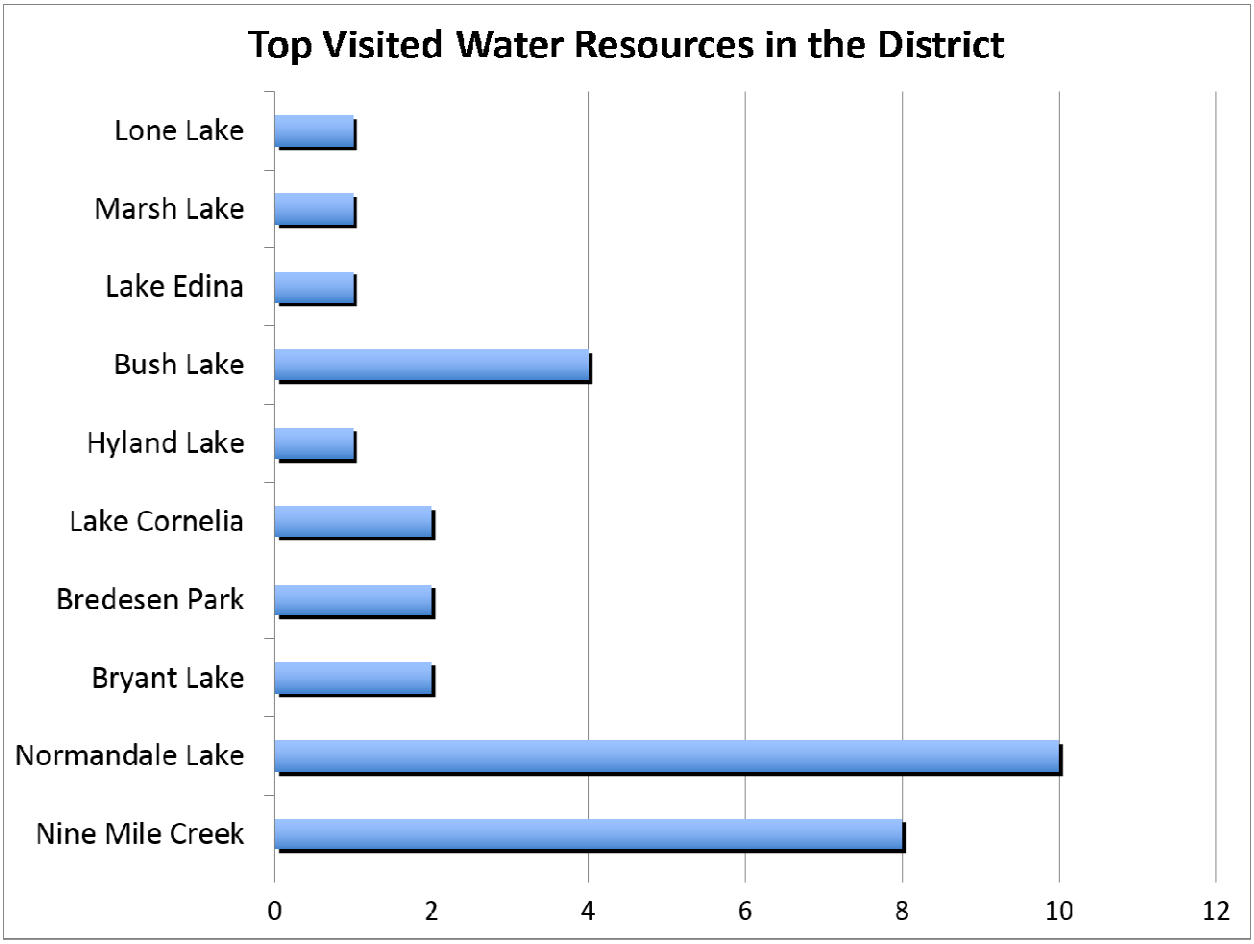

Figure 2. Summary of responses to question "What lakes, creeks, and/or wetlands do you visit in the watershed?"

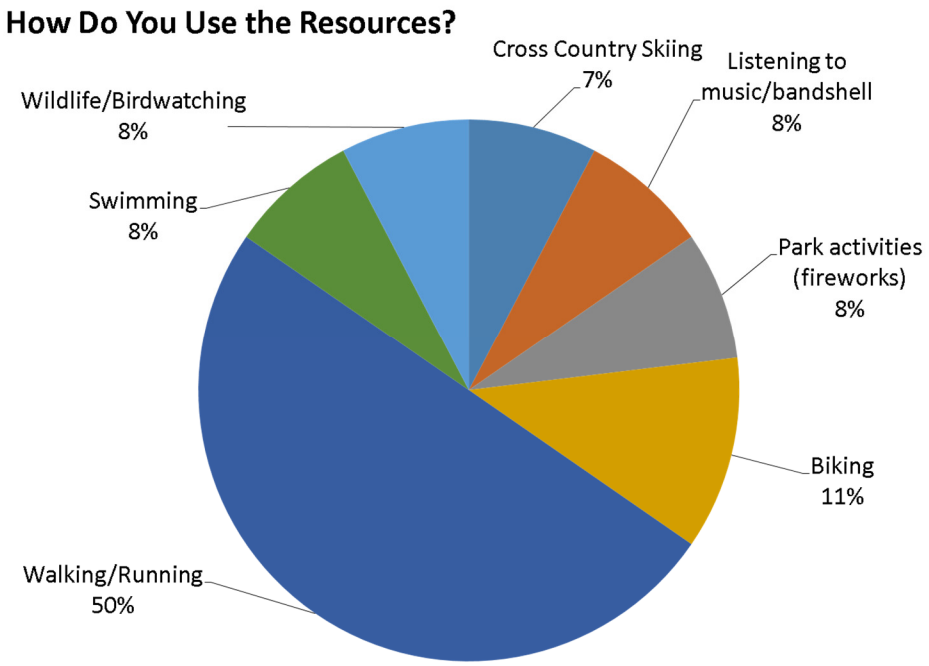

Figure 3. Summary of responses to question "How do you use the lakes, creeks, and/or wetlands in the watershed?"

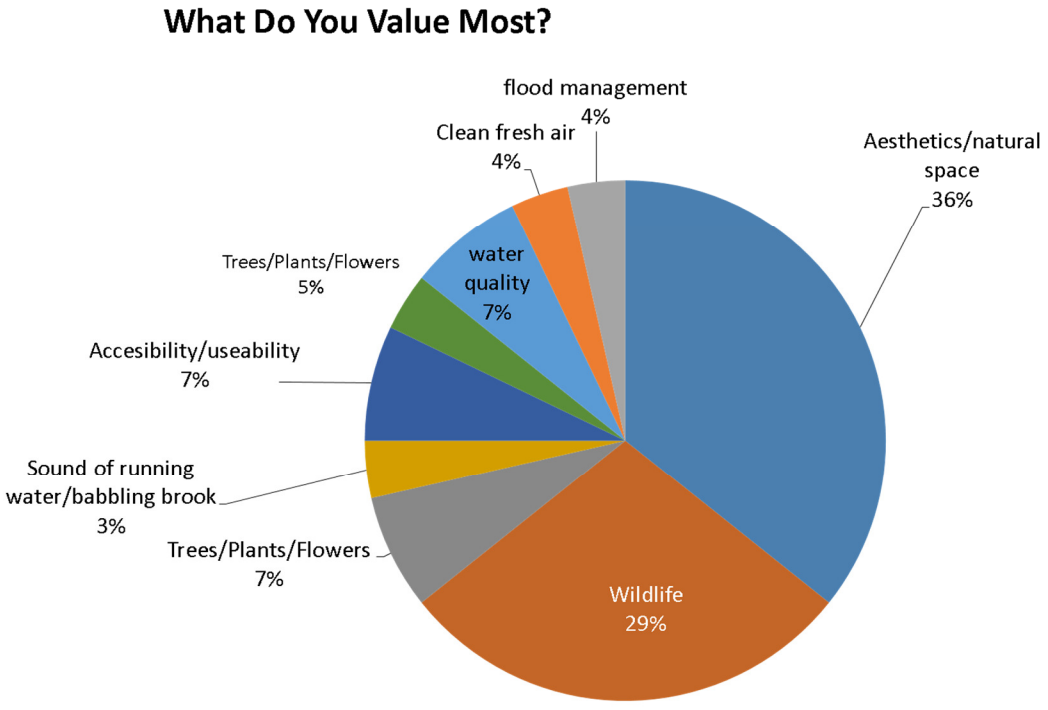

Figure 4. Summary of responses to question "What do you value most about your local lakes, creeks, and wetlands?"

Normandale Lake

- Too Much Algae [10]
- Contaminated Influent [5]
- Limited Recreational Activities [5]
- Inadequate Implementation of Long-term Solutions [4]
- Odor [4]
- Concern about District Approach [3]
- Nonresponsive to Public Comments [3]
- Too Many Aquatic Plants [3]
- No Clear Definition of Success [2]
- Conservation of Habitat [1]
- Ineffective Spending [1]
- Insufficient Access [1]
- Not Enough Interaction with Army Corps of Engineers [1]
- Visual Aesthetics [1]
- Wildlife Protection [1]

Surface Water & Groundwater Quality

- Poor Quality of Runoff [10]
- General Poor Water Quality [5]
- Impacts of Poor Water Quality on Habitat [4]
- Too Much Algae [4]
- Too Much Fertilizer Use [4]
- Erosion & Stabilization [4]
- Sediment Filling Ponds [4]
- Chlorides in Runoff [2]
- Dumping into Storm Sewer or Waterbodies [2]
- Geese [2]
- Pet Waste Disposal [2]
- Insufficient Buffers/BMPs [1]
- Low Fish Population [1]
- Not Enough Stormwater Reuse [1]
- Pollution Management [1]
- Impervious Surfaces [1]
- Sedimentation [1]

Ecology/AIS

- Wildlife Protection [8]
- Invasive Species [4]
- Terrestrial Invasive Species (Buckthorn) [3]
- Coyotes [2]
- Conservation of Habitat [1]
- Further Spread of Invasive Species [1]
- Overpopulation of Deer [1]
- Protection of Existing Wetlands [1]
- Too Many Aquatic Plants [1]
- Too Many Mosquitoes [1]
- Support Aquatic Life [1]
- Not Enough Wetlands [1]

Flooding

- Flooding [3]
- Need Increased Floodplain Management [1]
- Shallow Pond Levels [1]

Education and Outreach

- More Education – Quality & Use of the Resources [4]
- More Citizen Engagement [3]
- Develop Incentive Program [1]
- More Education – Buffer Plantings [1]
- More Education – Lawn Practices [1]
- More Education – Rain Gardens [1]

Land Use Planning & Recreational Use

- Insufficient Access [6]
- Need More Walkway & Bikeway Installation and Upkeep [4]
- Impacts Caused by Development & Redevelopment [3]
- Inadequate Parking Space at Lakes [1]
- Limited Recreational Activities [1]

Organization Management

- Need Better Coordination with Cities and Other Government Entities [4]
- Need Increased BMP & Water Quality Funding [3]
- Maintain Spending Levels [1]
- Need Sustainable Management [1]
- Not Enough Communication with the Public [1]
- Poor Public Meeting Structure [1]

Figure 5. Brain Sprinting Exercise: **Key Issues of Concern**

Note: [#] indicates frequency of comment

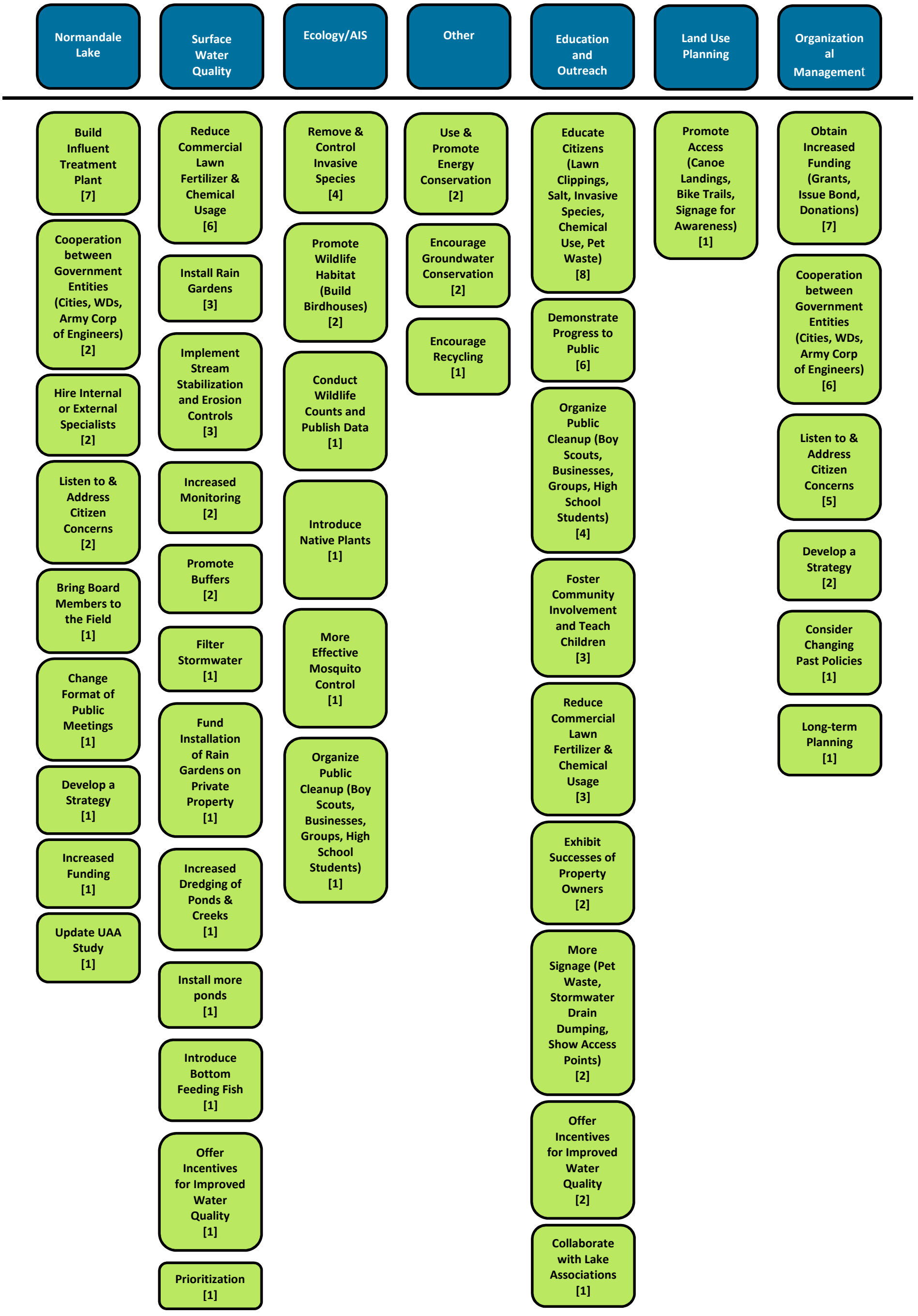

Figure 6. Brain Sprinting Exercise: **Ideas for Improvement**

Note: [#] indicates frequency of comment

Appendix C

Summary of Online Public Input Survey

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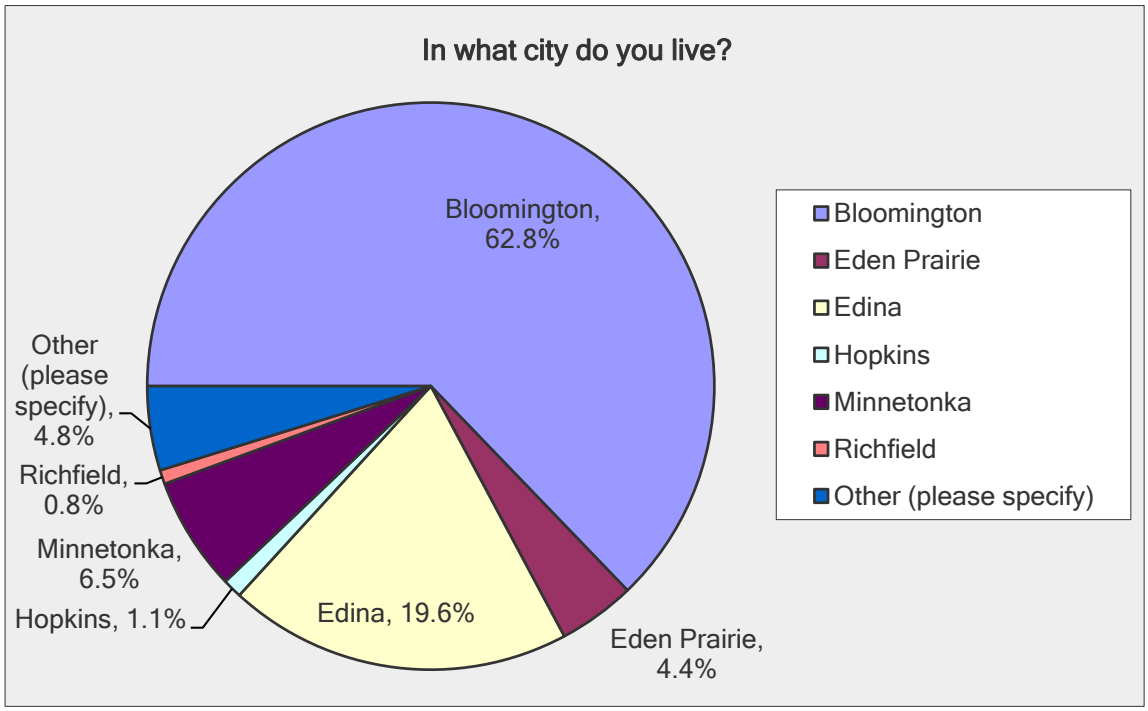
Memorandum

To: NMCWD Board of Managers
From: Greg Williams and Janna Kieffer
Subject: NMCWD Plan Update - Summary of Online Survey Results (update through May 26, 2016)
Date: June 15, 2016
c: Kevin Bigalke, Bob Obermeyer, Erica Sniegowski, Michael Welch

As part of the plan update process, the Nine Mile Creek Watershed District has collected community input through an online survey. The survey has been active since February 18, 2016 and received 719 responses (as of May 26, 2016). This memorandum presents the responses to the survey, including categorical responses and open-ended comments. This information may be used as the Board of Managers seeks to prioritize issues to be addressed in the plan. Responses to survey question 13 ("What do you think should be the top four priorities for the District over the next 10 years?") may be especially helpful.

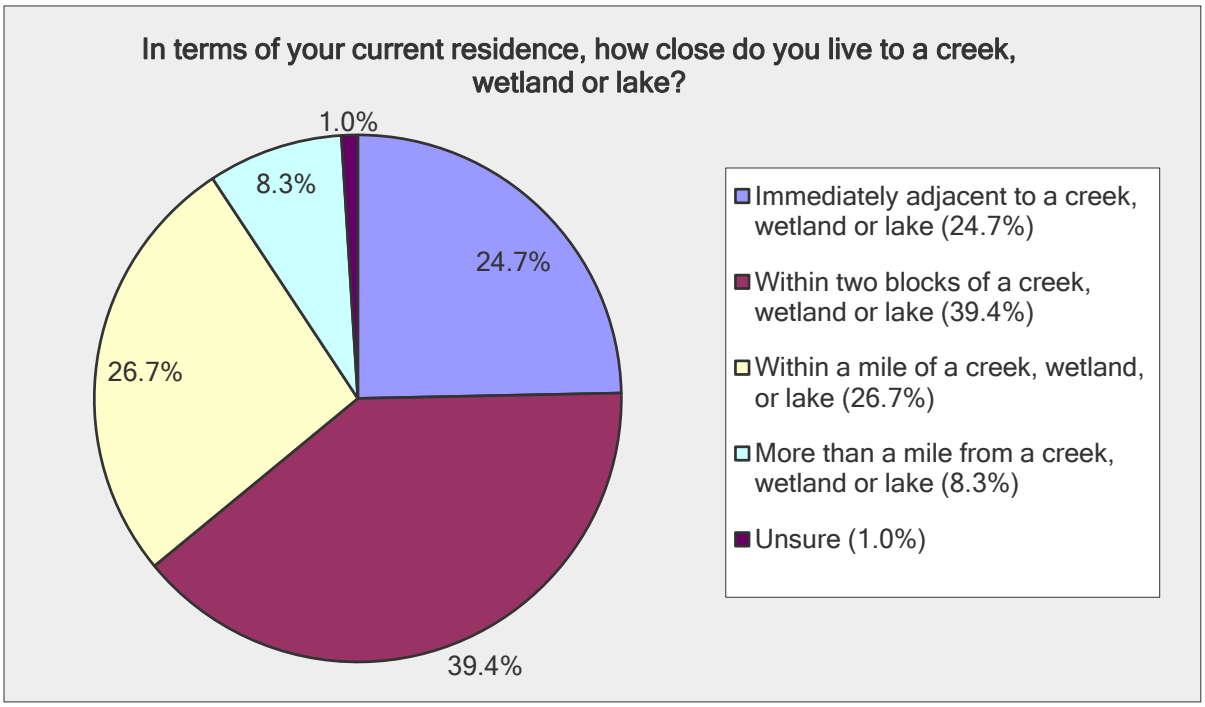
Survey Results

Question 1: In what city do you live? (719 responses)



Over 60% of respondents live in Bloomington. A total of 35 respondents identified other cities, including most commonly: Minneapolis (9), Apple Valley (4), and St. Paul (3). Several respondents listing "other" noted that they work in Bloomington.

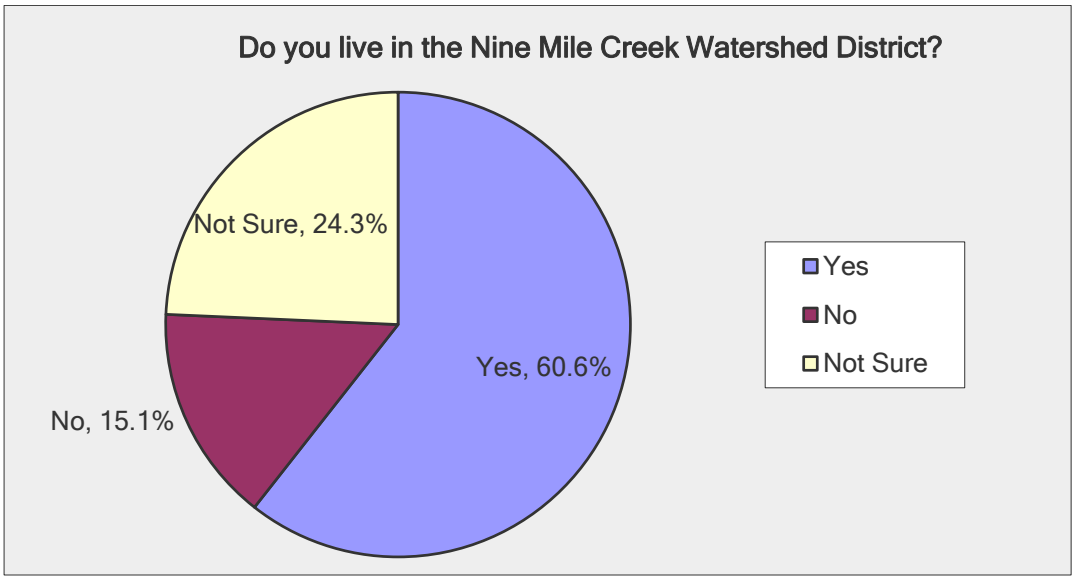
Question 2: In terms of your current residence, how close do you live to a creek, wetland or lake? (719 responses)



About two thirds of the survey respondents live less than two blocks from a creek, wetland, or lake. The survey asked those living adjacent to a waterbody to identify the waterbody. A complete list of waterbodies identified in Question 2 is included at the end of this memo. Waterbodies identified by three or more respondents include:

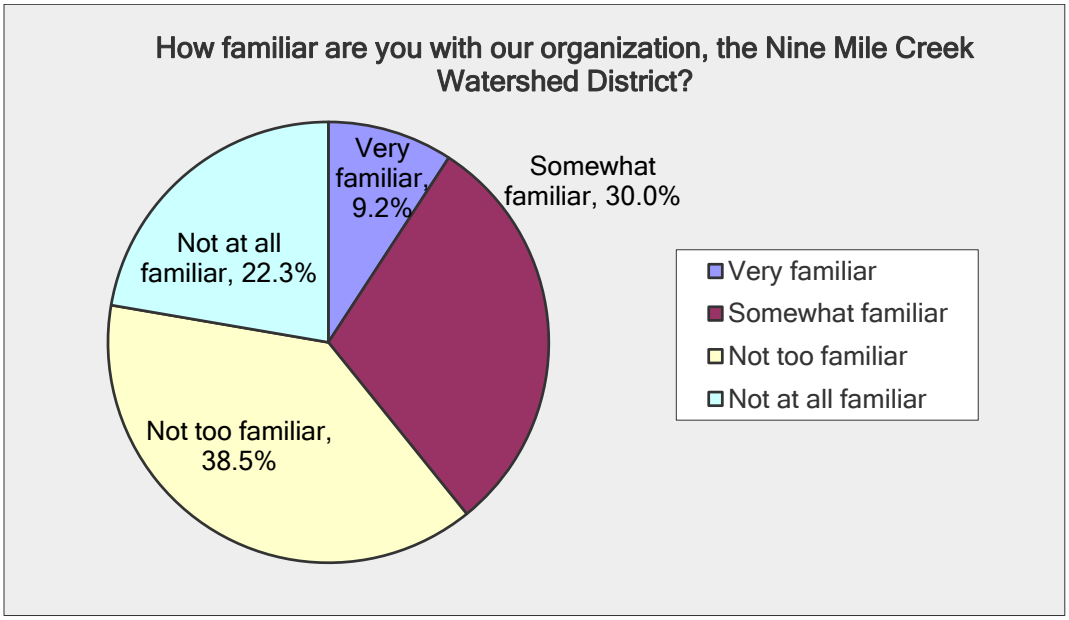
- Nine Mile Creek (65)
- Normandale Lake (27)
- Lake Minnetoga (11)
- Hyland Lake (9)
- Arrowhead Lake (9)
- Bush Lake (8)
- Minnesota River (6)
- Penn Lake (6)
- Shady Oak Lake (6)
- Anderson Lakes (3)
- Mirror Lake (3)
- Dewey Hills Pond (3)

Question 3: Do you live in the Nine Mile Creek Watershed? (719 responses)



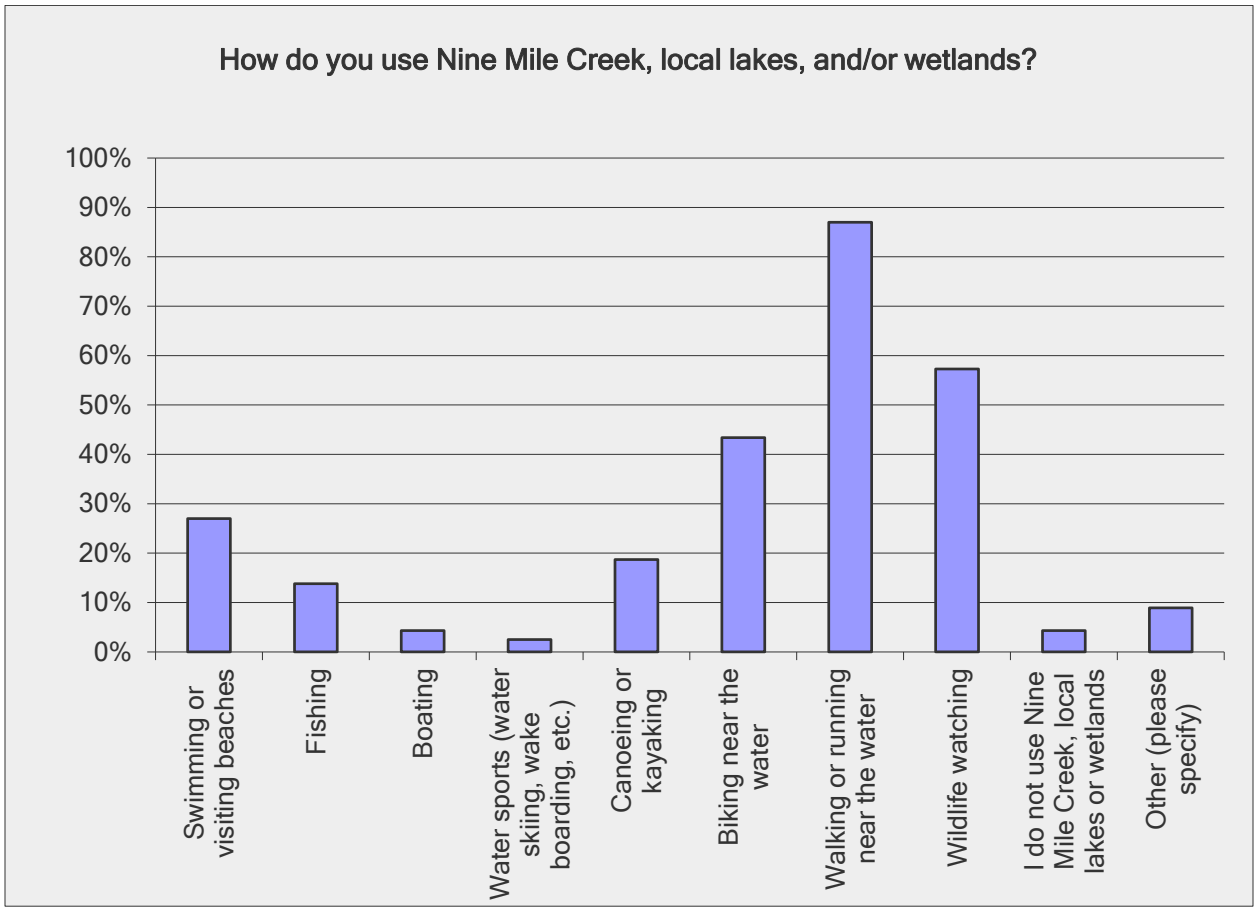
About 60% of respondents live within the District. About a quarter of respondents are unsure whether they live within the District.

Question 4: How familiar are you with our organization, the Nine Mile Creek Watershed District? (719 responses)



Approximately 60%of the respondents indicated that they are not familiar with the District. Less than 10% of respondents are very familiar with the District.

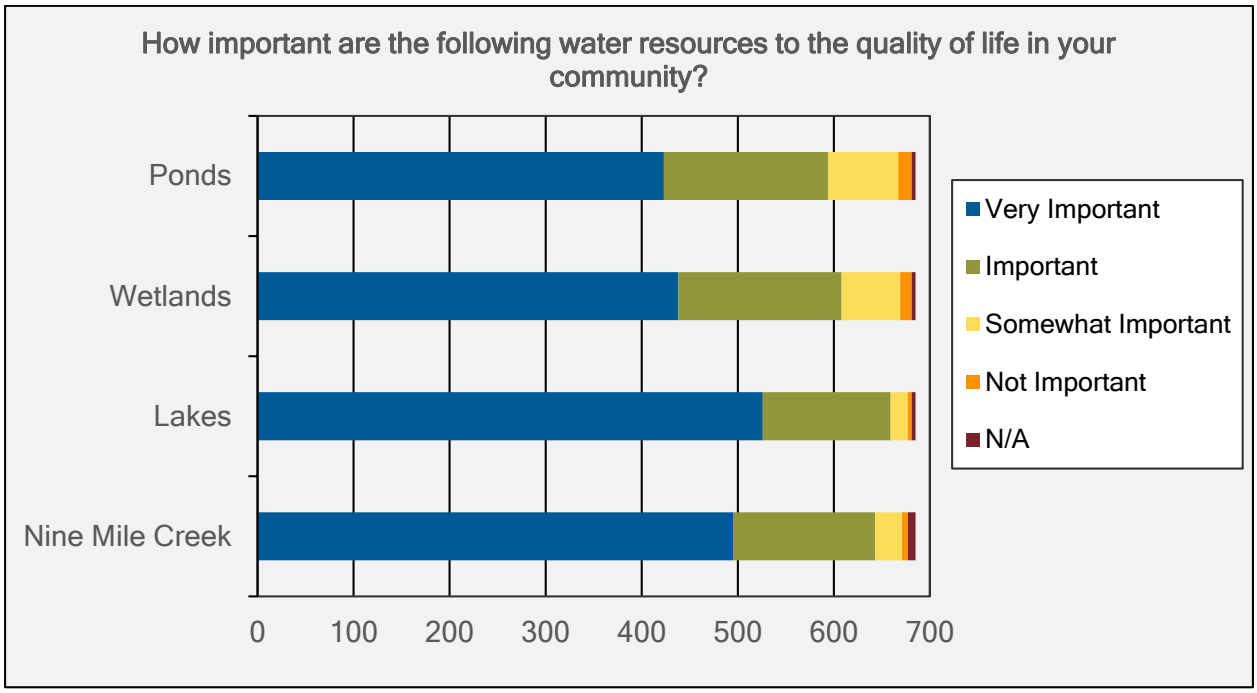
Question 5: How do you use Nine Mile Creek, local lakes, and/or wetlands? (685 responses)



The most common uses include those that involve simply "being around" the waterbody (e.g., walking, running). Sixty of the 685 respondents identified "other" uses; Most of the other uses identified may generally be included in the pre-selected categories and are not presented individually in this memo. Because respondents may select multiple responses, it is likely that the "other" responses are also counted within the most applicable category. Other uses commonly specified in the other category include:

- Winter activities (ice skating, snowshoeing, and cross-country skiing)
- Exercising dogs (including letting them drink the lake water)

Question 6: How important are the following water resources to the quality of life in your community? (685 responses)

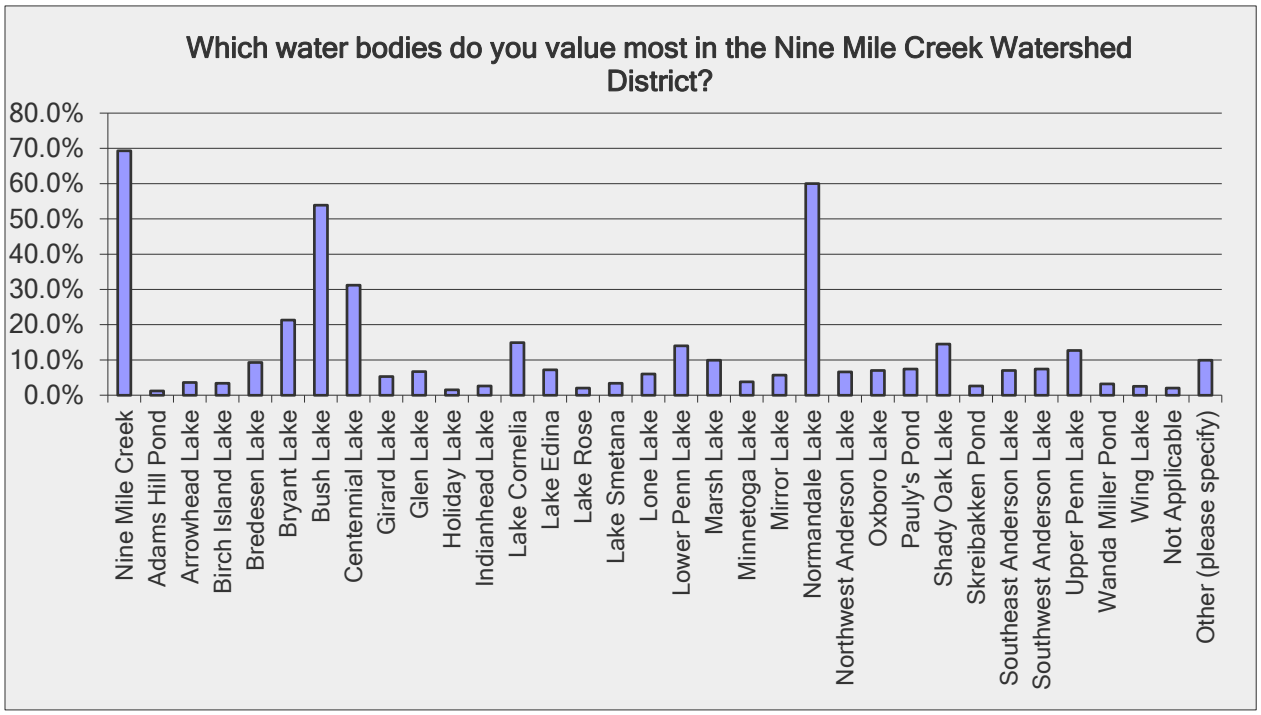


The majority of the 685 respondents considered each of the listed resources as very important. Over 85% of respondents considered each resource either important or very important. Respondents generally considered lakes to be most important, followed by the creek, then wetlands and ponds. Thirty-five respondents provided comments on this question. Most of the comments were related to the following topics:

- Water quality
- Wildlife habitat, health, and diversity
- Green space, aesthetics, and recreation

A complete list of the open-ended responses to question 6 is attached to this memorandum.

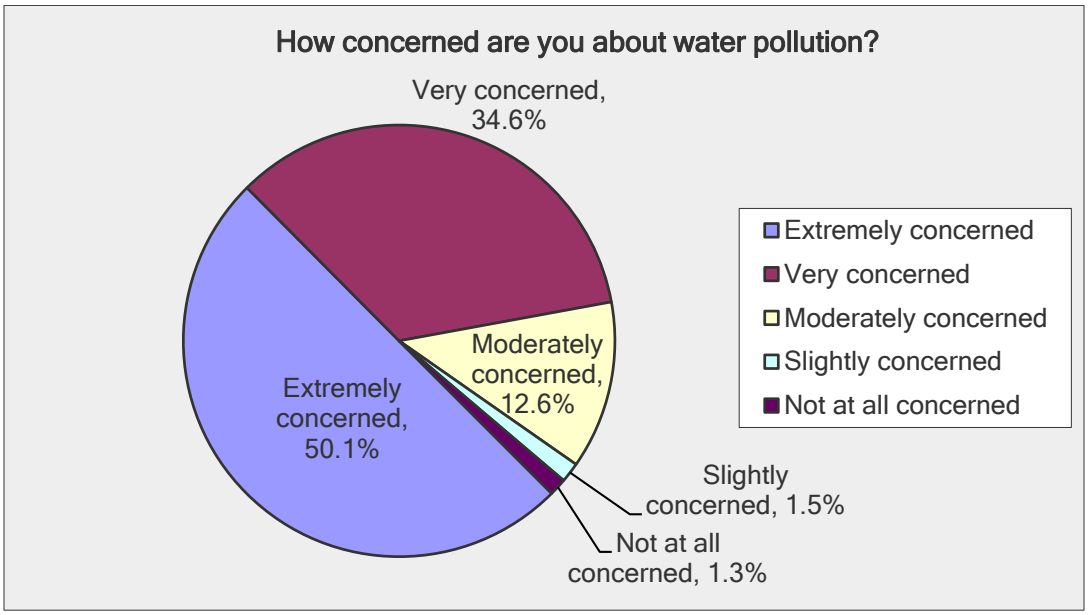
Question 7: Which water bodies do you value most in the Nine Mile Creek Watershed District? (685 responses)



Nine Mile Creek was valued by 70% of respondents. Normandale Lake and Bush Lake were the next most highly rated waterbodies. Centennial Lake and Bryant Lake were the only other lakes valued by over 20% of respondents. Of 68 open-ended responses, 22 noted that all waterbodies in the District are valuable. The open ended responses included several other lakes within the District (and some outside the District), including:

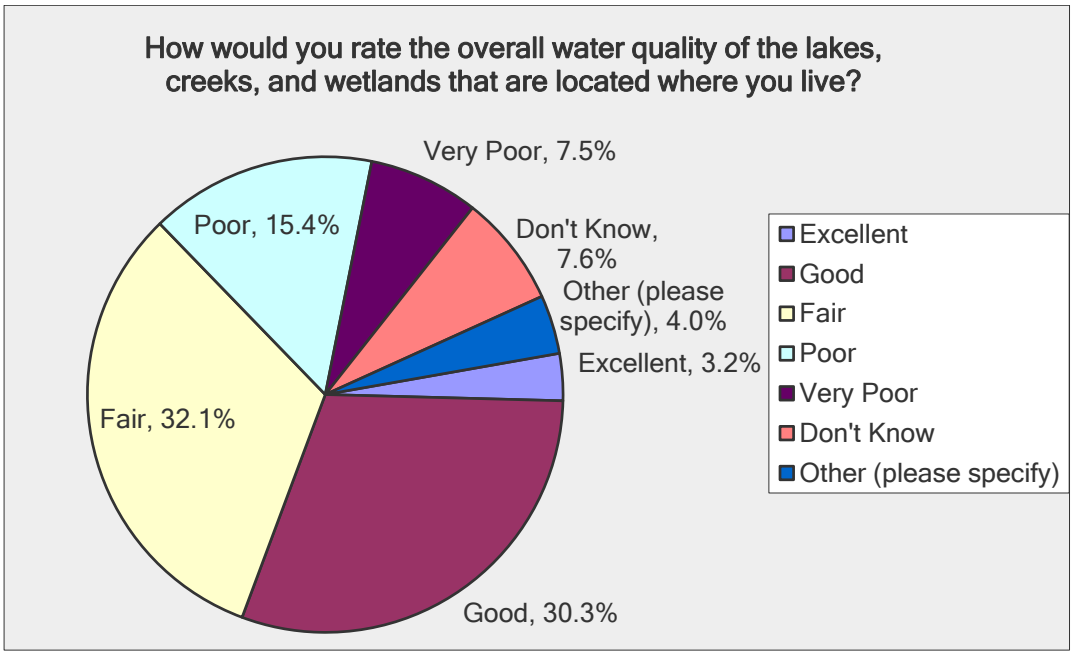
- Hyland Lake (9)
- Hawkes Lake (6)
- Minnesota River (3)
- Cardinal Creek (2)
- Canterbury Pond
- Cote Pond
- Dewey Hill Ponds
- Overlook Lake
- Round Lake
- Sandro Pond
- Stauder Lake
- Tierney Woods wetlands
- Timberglade Pond
- Topview Pond

Question 8: How concerned are you about water pollution? (683 responses)



About 85% of respondents indicated a high level of concern over water quality, and nearly all respondents indicated some concern.

Question 9: How would you rate the overall water quality of the lakes, creeks, and wetlands that are located where you live? (683 responses)

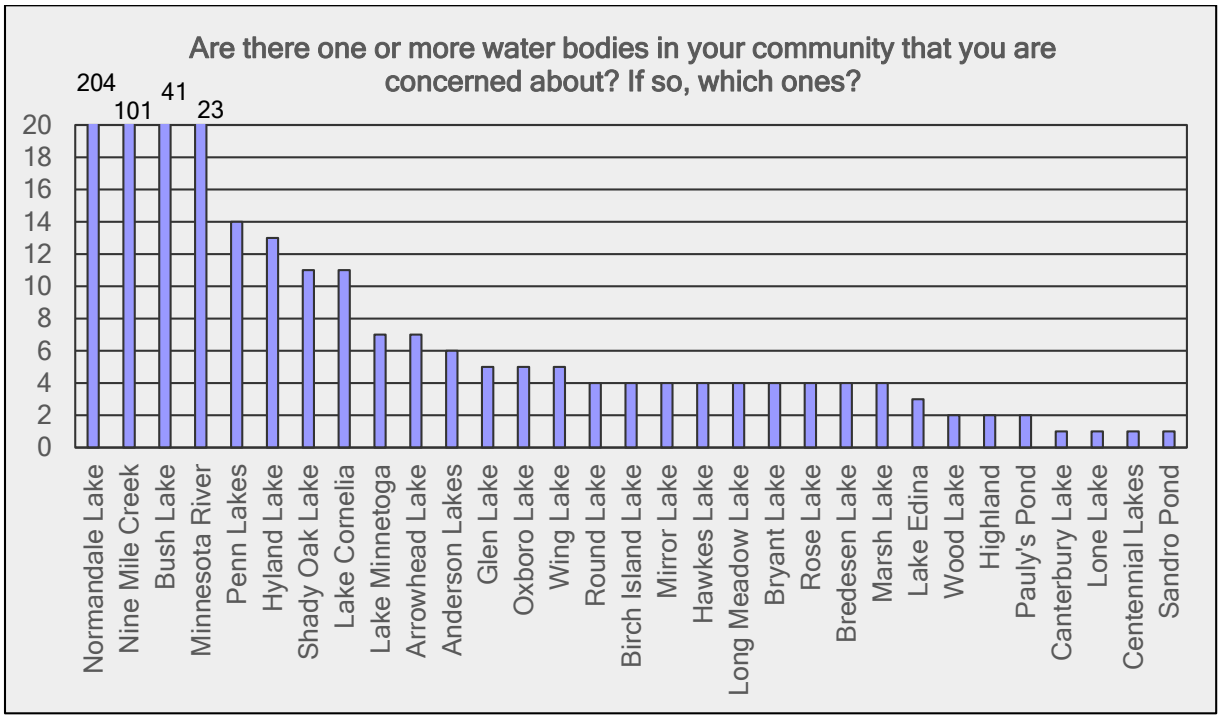


Respondents' views on overall water quality were split with about one third rating water quality good or better, one third rating water quality as fair, and one third rating water quality as poor or worse. There were 27 open-ended responses. Common open-ended responses identified the following water quality concerns:

- Algal blooms (odor and aesthetics)
- Debris/trash
- Weeds
- Normandale Lake water quality
- Nine Mile Creek water quality

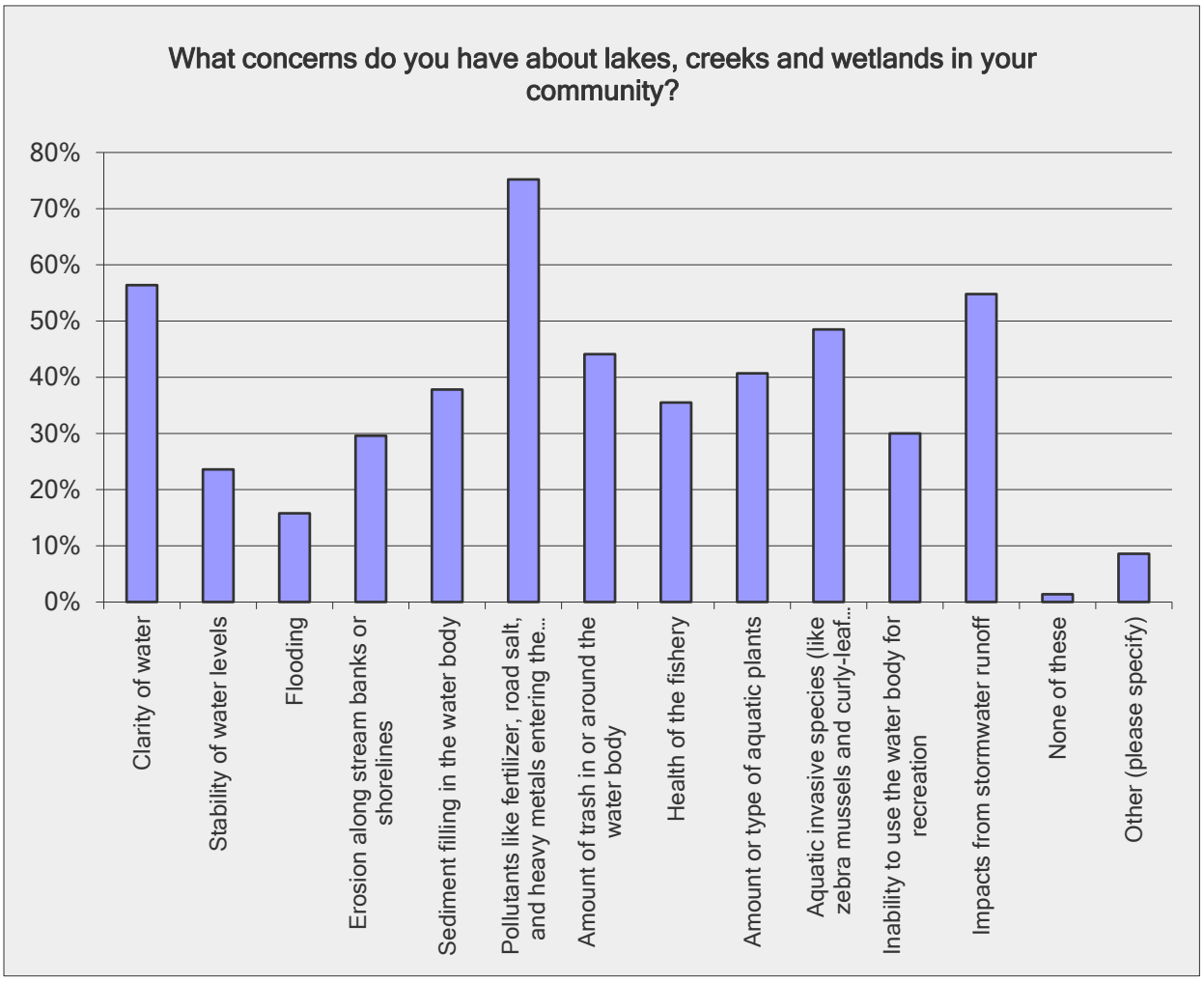
A complete list of the open-ended responses to question 9 is attached to this memo.

Question 10: Are there one or more water bodies in your community that you are concerned about? If so, which ones? (662 responses)



Responses to question 10 varied widely. Many responses did not identify any waterbodies as a particular concern, while others cited all waterbodies in the District as a concern. Over 200 responses sited Normandale Lake as a concern, and 101 responses cited Nine Mile Creek as a concern. Other waterbodies receiving a high number of responses included Bush Lake (41 responses) and the Minnesota River (23 responses).

Question 11: What concerns do you have about lakes, creeks and wetlands in your community? (662 responses)

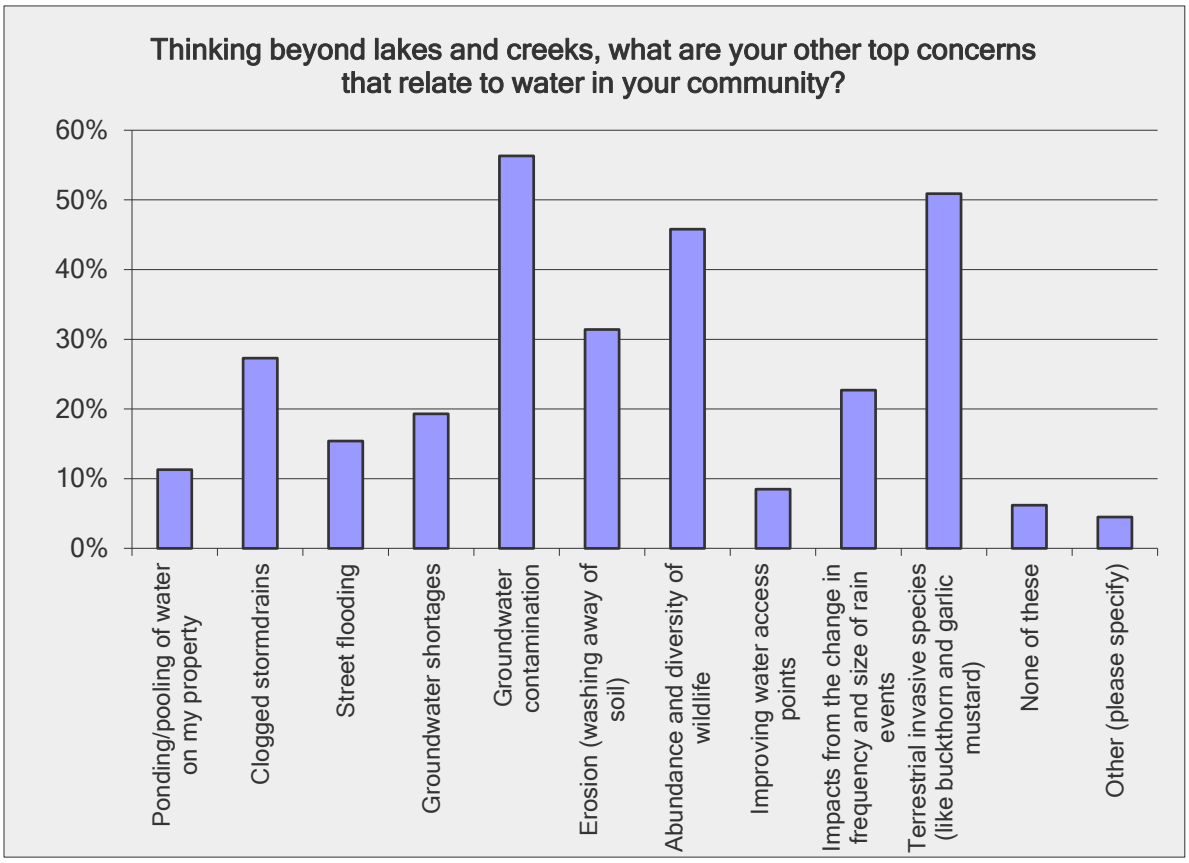


The most commonly identified concerns included pollutants (75%), water clarity (56%), and stormwater runoff impacts (55%). Aquatic invasive species was identified by about 50% of respondents as a concern. Stability of water levels and flooding were identified as a concern by only 24% and 16% of respondents, respectively. Fifty-six respondents specified other concerns via open-ended responses, including:

- Odor issues
- Algal blooms
- Weeds (impacts to aesthetics and recreation)
- Pet waste, fertilizer, road salt and other pollutants

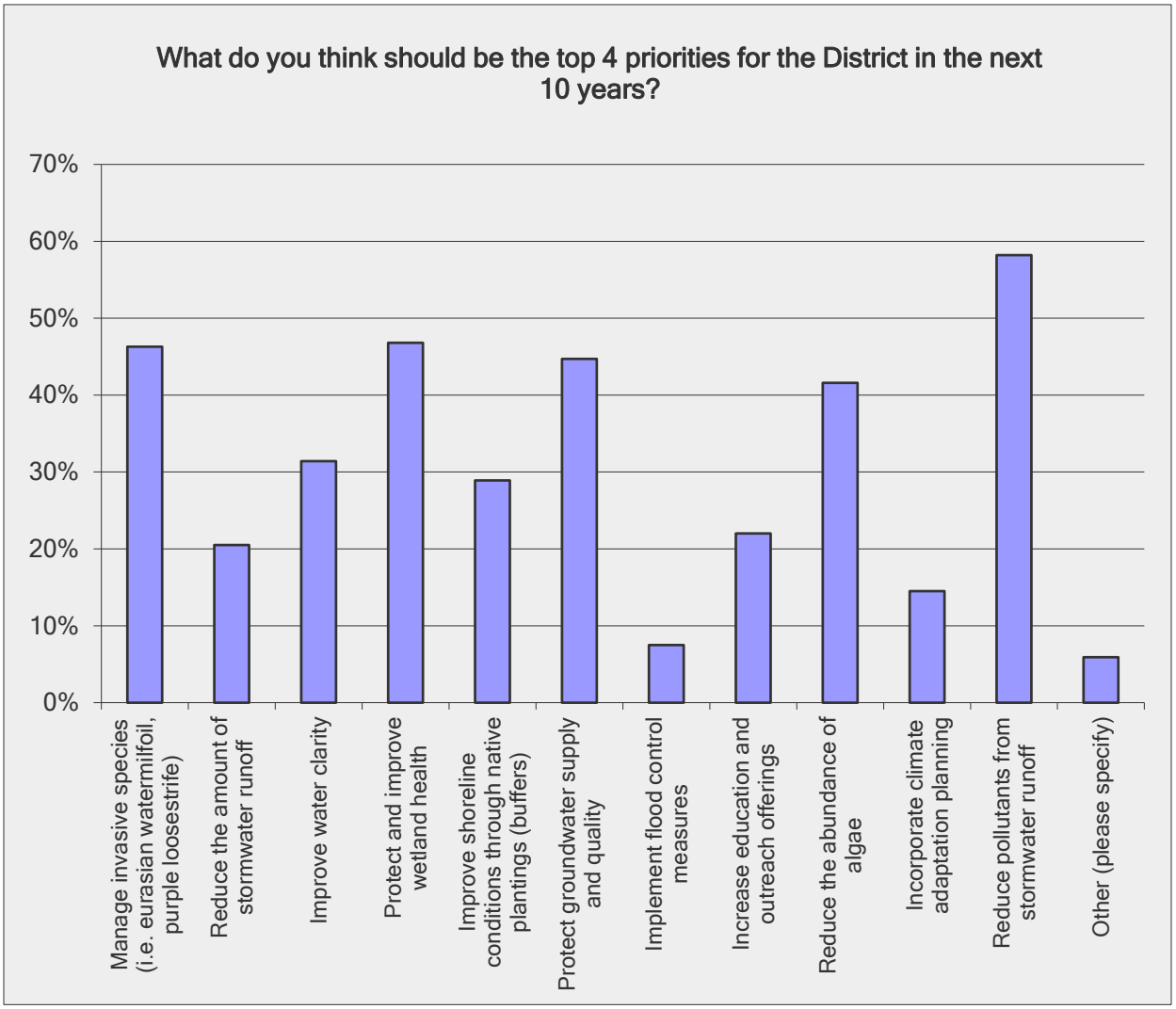
A complete list of the open-ended responses is attached to this memorandum.

Question 12: Thinking beyond lakes and creeks, what are your other top concerns that relate to water in your community? (662 responses)



Of the options included in question 12, groundwater contamination (56%), terrestrial invasive species (51%), and wildlife diversity (46%) were identified as concerns by the most respondents. Improving water access (9%), private property flooding (11%), and street flooding (15%) concerned the fewest respondents. Thirty respondents identified specific concerns in open-ended responses. Most of the open-ended responses may be categorized as one of the available categories in question 11 or question 12. The open-ended responses to question 12 are attached to this memo.

Question 13: What do you think should be the top 4 priorities for the District in the next 10 years? (615 responses)



From the options provided in question 13, the top District priority as identified by respondents should be:

1. Reduce pollutants from stormwater (58%)

After the top priority, there are four concerns rated with similar priority,

2. Protect and improve wetland health (47%)
3. Manage invasive species (46%)

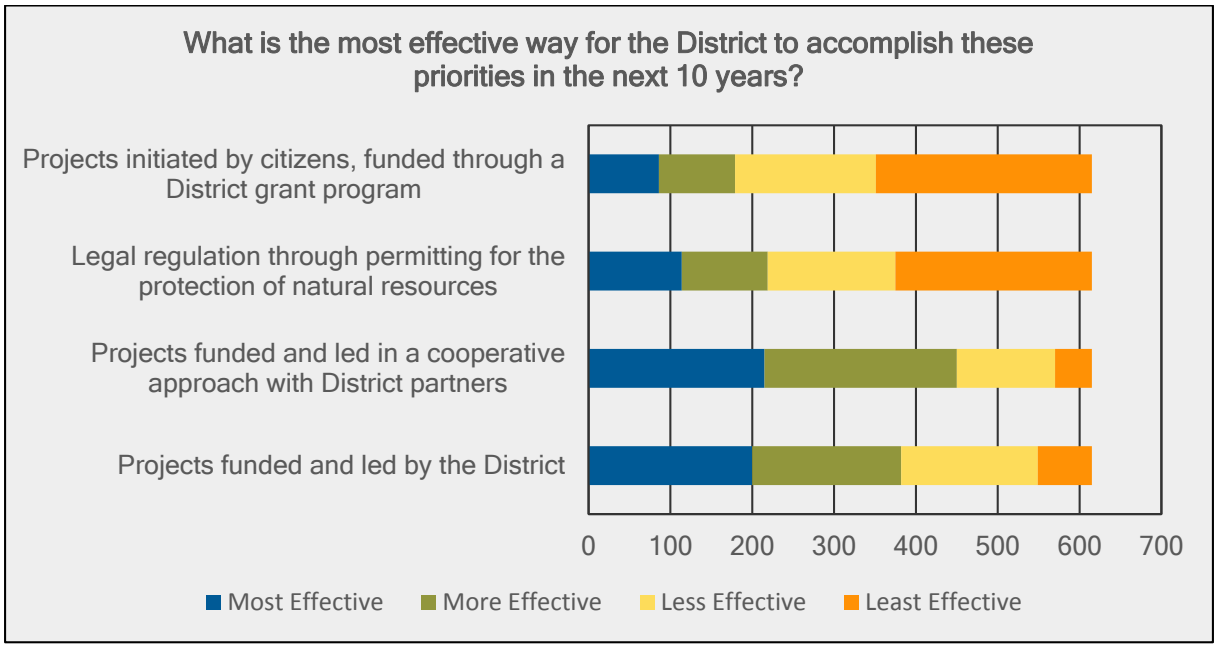
4. Protect groundwater supply and quality (45%)
5. Reduce the abundance of algae (42%)

Thirty-six respondents provided open-ended responses. Many of the responses are specific items falling into the provided categories (e.g., reduce buckthorn). Other priorities identified in the open-ended responses not included within the provided categories include:

- Improving waterbody access
- Reduce pollutants (road salt, fertilizer)
- Improving fisheries
- Conservation
- Education

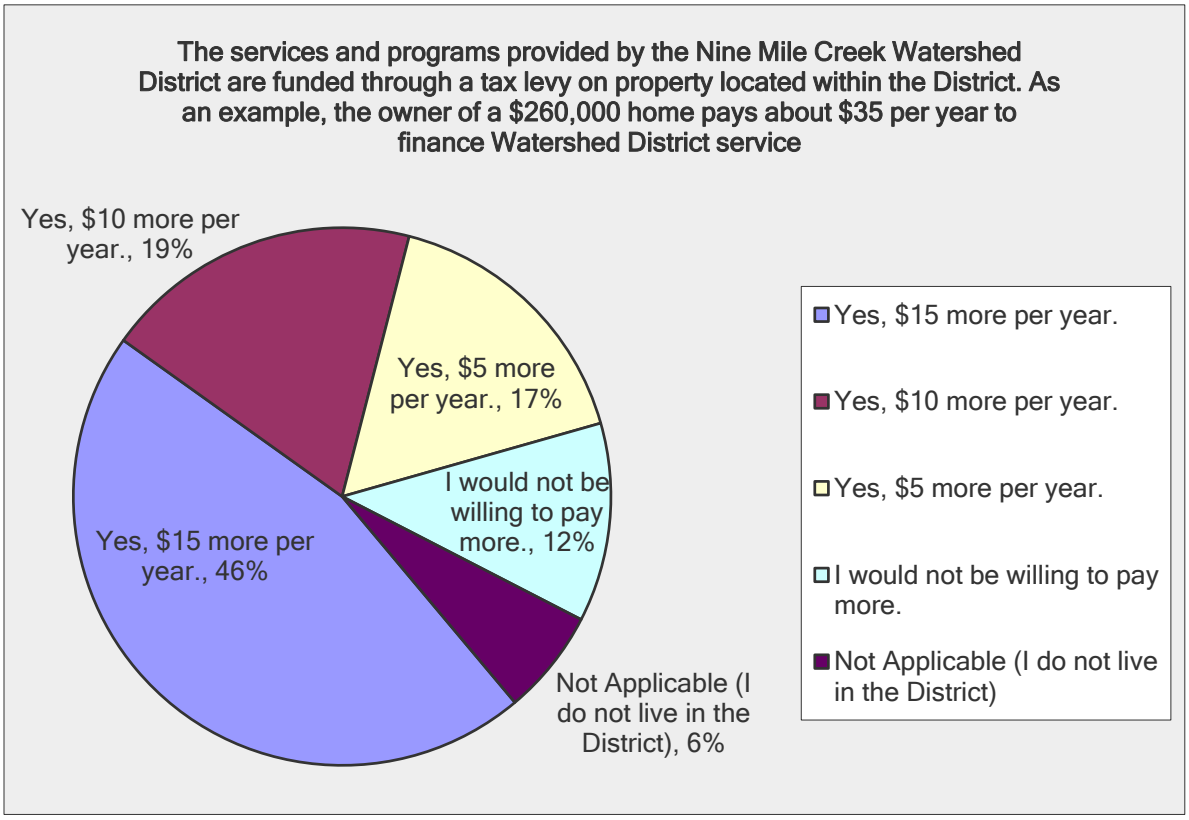
A complete list of the open-ended responses to question 13 is attached to this memo.

Question 14: What is the most effective way for the District to accomplish these priorities in the next 10 years? (615 responses)



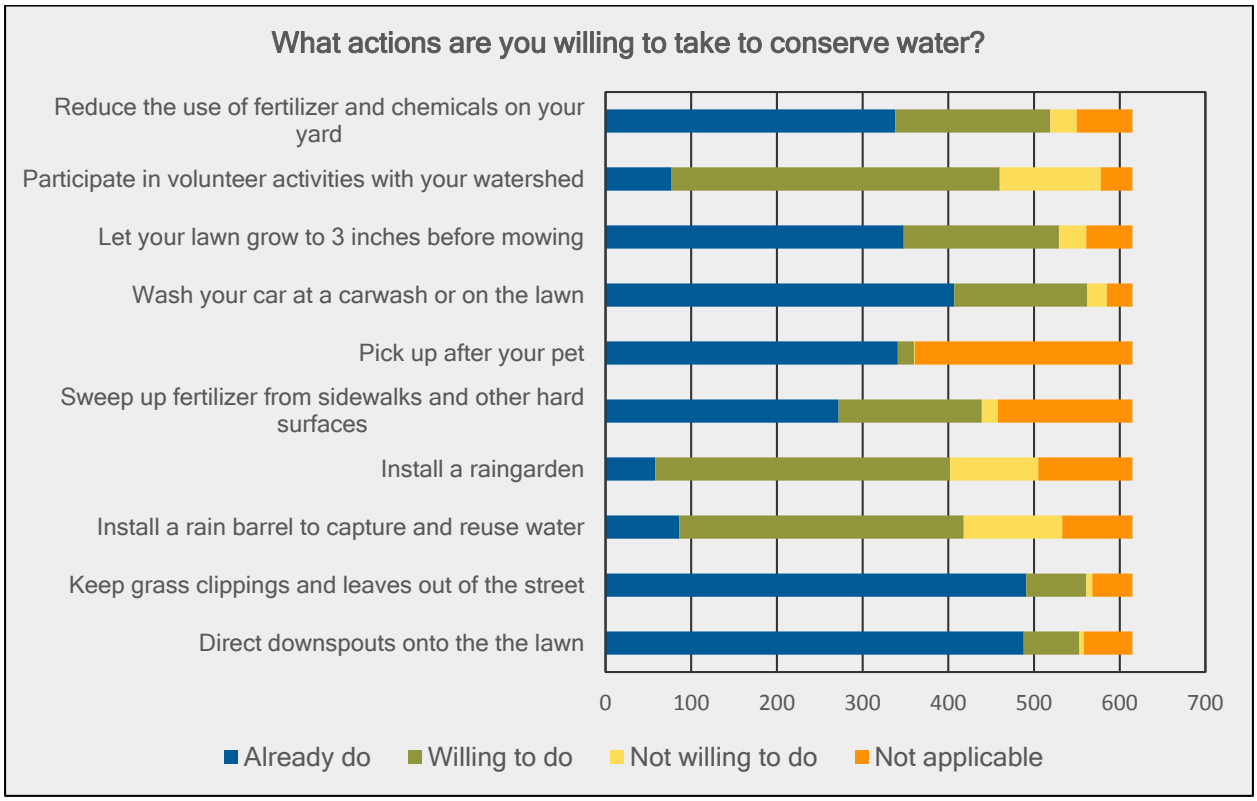
Most survey respondents see projects funded and led by the District or in cooperation with District partners as the most effective way to accomplish District priorities. Survey respondents generally consider the permitting program and citizen-led projects funded by District grants as less effective.

Question 15: The services and programs provided by the Nine Mile Creek Watershed District are funded through a tax levy on property located within the District. As an example, the owner of a $260,000 home pays about $35 per year to finance Watershed District services and programs, while the owner of a $360,000 home pays about $48 per year. Would you be willing to pay an additional amount to support clean water by funding additional water quality services and programs provided by the Nine Mile Creek Watershed District? (615 responses).



Survey results included 64 open-ended responses. Open-ended responses specifying a dollar amount (or no increase) were assigned to the appropriate existing category for reporting purposes (e.g., an open-response of $100/year was added to the $15/year category). Many open-ended responses stated that respondents would be willing to pay more only to perform specific projects/benefits (e.g., clean up Normandale Lake), or only if accomplishments could be demonstrated.

Question 16: What actions are you willing to take to protect water quality or conserve water? (615 responses).



The results indicate that many respondents are already taking action or would be willing to take action to conserve water. The most common practices already in place include directing downspouts onto lawns and keeping grass clippings out of the street. Few respondents have installed a raingarden, installed a rain barrel, or participated in watershed volunteer opportunities. Over half the respondents, however, would be willing to take these actions.

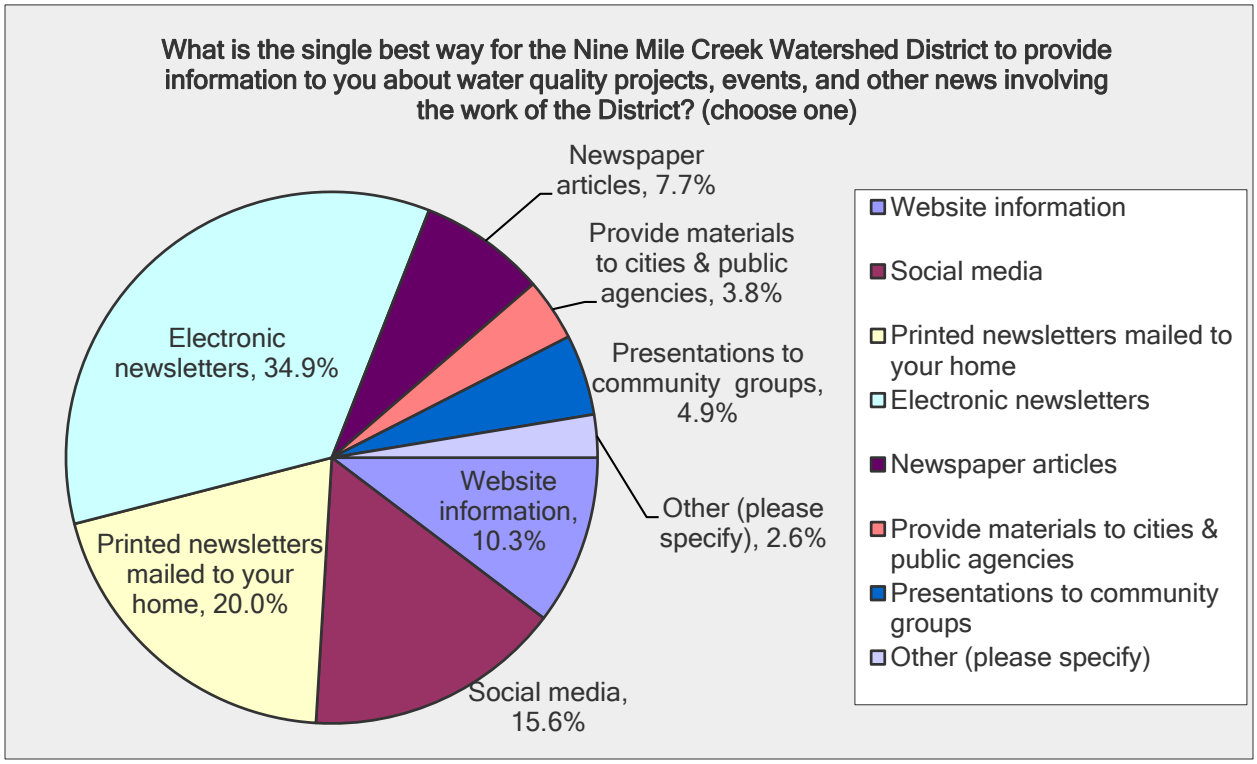
Question 17: Do you have any other comments, questions, or concerns? (152 responses)

Ninety-nine survey respondents provided a response (other than "No") to this question. Responses varied widely, but some common themes were present, including:

- Thanking for the District's efforts and opportunity to provide input
- Requesting action to address Normandale Lake water quality issues
- Continuing/increasing public awareness and education
- Reducing focus/efforts on trails

A complete list of the responses to question 17 is attached to this memo.

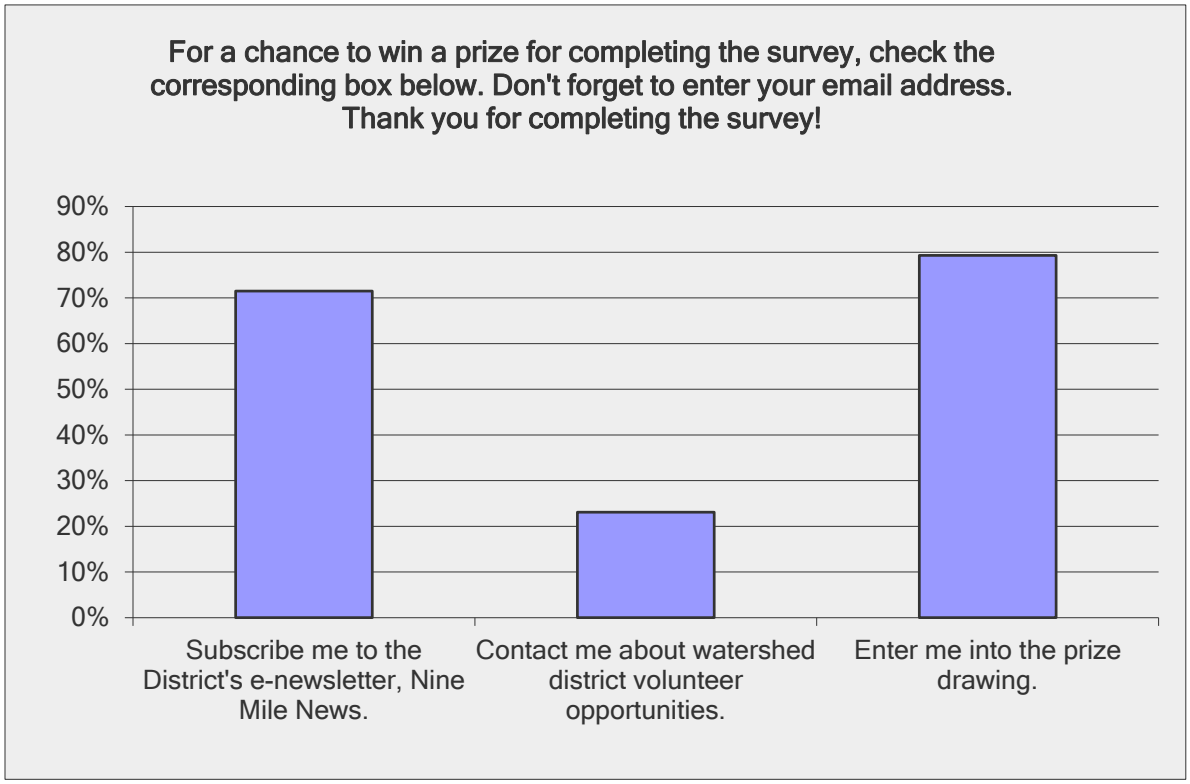
Question 18: What is the single best way for the Nine Mile Creek Watershed District to provide information to you about water quality projects, events, and other news involving the work of the District? (610 responses)



About 60% of respondents preferred electronic communication methods (e-newsletters, social media, website), while about 30% preferred printed media. Whether printed or electronic, over half of the respondents identified newsletters as the single best way to provide information. Only 5% of respondents preferred in-person communications. Sixteen respondents provided an open-ended response. Most open ended responses noted the need to use multiple media. The open-ended responses also cited:

- Telephone
- District inspectors
- Local television and Minnesota Public Radio

Question 19: For a chance to win a prize for completing the survey, check the corresponding box below. Don't forget to enter your email address. Thank you for completing the survey!



Over 70% of survey respondents (328) wanted to be subscribed to the District's e-newsletter, while 105 respondents wished to be contacted about District volunteer opportunities. The 106 survey respondents willing to be contacted about volunteer opportunities is less than the 383 respondents who identified themselves as willing to participate in watershed volunteer opportunities in question 16.

Nine Mile Creek Watershed District Community Survey

Question 2 Open Ended Responses

If you live adjacent to a creek, wetland or lake, what is the name or description of location of that water body?		
Number	**Response Date**	**Comments**
1	5/8/2016	Xerxes Pond
2	5/6/2016	Timberglade
3	5/5/2016	Lake Normandale
4	5/3/2016	lake minnetoga
5	5/1/2016	Bryant park
6	4/30/2016	lake minnetoga
7	4/29/2016	Eagle Lake & Eagle Creek
8	4/28/2016	Minnesota River
9	4/27/2016	Minnehaha Creek
10	4/27/2016	McGinty Pond
11	4/27/2016	9 mile creek
12	4/27/2016	Nine Mile Creek
13	4/27/2016	Hyland Lake Park Res.
14	4/27/2016	Nine Mile Creek
15	4/27/2016	Nine Mile Creek
16	4/26/2016	9 Mile Creek
17	4/26/2016	9 mile creek
18	4/26/2016	Nine Mile Creek
19	4/26/2016	Nine Mile
20	4/26/2016	Hyland
21	4/26/2016	hyland lake
22	4/26/2016	Bush Lake and Hylands preserve
23	4/26/2016	Normandale Lake
24	4/26/2016	Across street from 9 mi creek
25	4/26/2016	Nine Mile Creek
26	4/26/2016	Minnesota River
27	4/26/2016	Hyland Lake Park Preserve
28	4/26/2016	Hyland Park Preserve
29	4/26/2016	the wetland/creek east of France Avenue
30	4/26/2016	Lake minnetoga
31	4/26/2016	Normandale lake
32	4/26/2016	on Nine Mile Creek at 98th street
33	4/26/2016	Long Meadow Lake
34	4/26/2016	Long Meadow Lake
35	4/26/2016	Lake 1, 2 or 3???
36	4/25/2016	Bush Lake, Hyland Lake
37	4/25/2016	South of 84th between oxborgh & Morris
38	4/25/2016	Minnesota River Valley and Lake Normandale
39	4/25/2016	Just east of Poplar Bridge
40	4/25/2016	bush lake and runoff pond on our property
41	4/25/2016	Canterbury Pond, SE corner of 102nd and France
42	4/25/2016	Ponds near Olson Elementary/Olson Middle School
43	4/25/2016	Bush
44	4/25/2016	Hyland Lake
45	4/25/2016	9 Mile Creek / Nord Myr Park
46	4/25/2016	Nine Mile Creek
47	4/25/2016	Lake Minnetoga
48	4/25/2016	Morris Road/Heritage Hills pond
49	4/25/2016	Anderson Lakes

50	4/25/2016	Normandale LAke
51	4/25/2016	MN River Valley
52	4/25/2016	98th and Dakota~ Hyland Lake, Ponds at 99th and Dakota, Ponds behind St Ed's Church, Normandale Lake, Nine Mile Creek
53	4/25/2016	Lake Girard
54	4/25/2016	9 mile
55	4/25/2016	Nine Mile Creek
56	4/25/2016	Marce bog between Yukon and Bush Lake
57	4/25/2016	Normandale Lake District
58	4/25/2016	Minnesota River
59	4/25/2016	We're on Auto Club by the River
60	4/25/2016	Minnesota
61	4/25/2016	Hawkes Lake
62	4/22/2016	Highland park lake
63	4/22/2016	Nine Mile Creek
64	4/22/2016	Bush Lake
65	4/22/2016	Arrowhead lake Edina
66	4/22/2016	Normandale Lake
67	4/21/2016	Nine Mile Creek
68	4/20/2016	Normandale Lake
69	4/20/2016	Bush Lake, Pond in Bill Warren Park
70	4/11/2016	Lake Locklear
71	4/11/2016	creek near 70th and Lake Cornelia - Edina Lk
72	4/7/2016	MN Valley National Wildlife Refuge
73	4/7/2016	Directly across from Creek Valley Elementary
74	4/5/2016	Glen Lake
75	4/4/2016	Glen Lake
76	3/31/2016	Prior Lake
77	3/29/2016	Lake Minnetoga
78	3/29/2016	Lake Minnetoga
79	3/28/2016	live in Lake Forest Development which is surrounded by several wetlands and abuts 9 Mile Creek
80	3/27/2016	Nine Mile Creek
81	3/25/2016	Nine mike
82	3/25/2016	Nine Mile Creek area
83	3/25/2016	Wetland adjacent to Butternut Circle, Minnetonka
84	3/25/2016	wetlands Forest Lake Townhomes
85	3/25/2016	Nine Mike Creek
86	3/25/2016	south branch of nine mile creek
87	3/24/2016	Lake Rose
88	3/22/2016	Lower Penn Lake
89	3/22/2016	arrowhead lake
90	3/22/2016	Nine Mile Creek on Westbrooke Way in Hopkins by the Community Garden
91	3/21/2016	Mirror Lake
92	3/21/2016	arrowhead lake
93	3/21/2016	Arrowhead Lake
94	3/21/2016	Arrowhead Lake
95	3/20/2016	Arrowhead Lake
96	3/20/2016	9 mile creek
97	3/19/2016	No name
98	3/19/2016	Lower Penn
99	3/18/2016	Lower Penn
100	3/18/2016	Dewey Hill condo ponds
101	3/18/2016	Dewey Hill South Condo. Private pond/marsh
102	3/18/2016	between 102nd st and Old Shakopee Rd

103	3/18/2016	Sandro Pond and Normadale Lake
104	3/17/2016	Normandale Lake
105	3/17/2016	Normandale Lake
106	3/17/2016	Edenbrook Preservation Area
107	3/17/2016	Normandale lake
108	3/17/2016	Normandale lake
109	3/17/2016	Penn Lake
110	3/17/2016	Red Rock Lake
111	3/17/2016	Nine Mile Ceeek
112	3/17/2016	Purgatory Creek
113	3/17/2016	Shady Oak Lake
114	3/17/2016	lower penn lake
115	3/17/2016	Red rock lake (marshy part)
116	3/17/2016	Creek and lake
117	3/16/2016	9 Mile Creek.
118	3/16/2016	Nine Mile Creek
119	3/16/2016	Nine Mile Creek
120	3/16/2016	Arrowhead Lake
121	3/16/2016	Nine Mile Creek
122	3/16/2016	Nine mile creek
123	3/16/2016	Nine Mile Creek
124	3/16/2016	Knoll Lake
125	3/16/2016	Carmel Pond at Fallbrook Rd & Thornhill Rd
126	3/16/2016	Swamp next to Nine Mile Creek
127	3/16/2016	Oak Pond
128	3/15/2016	Nine Mile Creek
129	3/15/2016	Nine Mile Creek
130	3/15/2016	Skriebakken Lake
131	3/15/2016	Nine Mile Creek
132	3/15/2016	I'm not certain actually ... Opus area off Bren Road.
133	3/15/2016	Bush Laje
134	3/15/2016	Live adjacent to drainage tunnel that feeds (eventually) into 9 mile creek
135	3/15/2016	bush lake
136	3/15/2016	North Branch of Nine Mile Creek
137	3/15/2016	9 mile creek, north fork
138	3/15/2016	nine mile creek runs along my backyard
139	3/15/2016	nine mile creek
140	3/15/2016	Nine Mile Creek
141	3/15/2016	bass ponds across the street from me
142	3/15/2016	Mirror Lake
143	3/15/2016	Nine Mile Creek
144	3/15/2016	Nine Mile Creek
145	3/15/2016	Lewis Park Pond
146	3/14/2016	Nine mile creek
147	3/14/2016	Nine mile creek is just behind our house(by the train tracks, on Abercrombie dr)
148	3/14/2016	unknown
149	3/14/2016	Nine Mile Creek
150	3/14/2016	Walnut ridge park wetland area
151	3/14/2016	Normandale Lake
152	3/14/2016	nine mile creek
153	3/14/2016	Nine Mile Creek at Lincoln Drive and Dovre Drive
154	3/14/2016	Nine Mile Creek
155	3/14/2016	Nine Mile Greek
156	3/14/2016	Arrowhead Lake
157	3/14/2016	Mirror lakes

158	3/14/2016	Nice Mile Creek and Marsh Lake
159	3/14/2016	Skriebakken Lake
160	3/14/2016	Normandale Lake
161	3/14/2016	shady oak lake
162	3/14/2016	Shady Oak Lake
163	3/13/2016	Shady Oak Lake
164	3/13/2016	Minnetoga lake (mud lake)
165	3/13/2016	Hawkes Lake
166	3/13/2016	Dewey Hills III Townhouse Association Pond
167	3/12/2016	Shady Oak Lake
168	3/12/2016	Normandale Lake
169	3/12/2016	Lake Normandale
170	3/12/2016	nine mile creek
171	3/11/2016	Arrowhead Lake
172	3/11/2016	Nine mile creek
173	3/9/2016	Minnetoga
174	3/9/2016	Lake Minnetoga
175	3/8/2016	Anderson Lakes
176	3/8/2016	Credit River
177	3/8/2016	Anderson Lake
178	3/8/2016	Normandale Lake
179	3/8/2016	Lake Normandale
180	3/7/2016	Normandale Lake
181	3/7/2016	Normandale Lake
182	3/7/2016	Parker's Lake
183	3/7/2016	2 miles from the creek, but walk with a friend within two blocks of creek
184	3/7/2016	Normandale Lake
185	3/7/2016	Nord Myr Park/Nine Mile Creek/Mt Normandale Lake
186	3/7/2016	Diamond Lake
187	3/7/2016	Sandro Pond
188	3/7/2016	Normandale Lake
189	3/7/2016	Nine mile creek
190	3/7/2016	Credit River
191	3/7/2016	Nine Mile creek and Normandale Lake
192	3/7/2016	Normandale Lake, wet land across Normandale Blvd
193	3/7/2016	Normandale Lake
194	3/7/2016	Normandale Lake
195	3/7/2016	Normandale Lake, Nine Mile Creek
196	3/7/2016	Creek, wetland that goes into Normandale Lake
197	3/7/2016	Pond behind long brake trail and Delaney boulevard
198	3/6/2016	Edenvale
199	3/6/2016	Nine mile creek
200	3/6/2016	Nine Mile Creek
201	3/6/2016	Nine Mile Creek
202	3/6/2016	Hyland Park
203	3/6/2016	Normandale Lake
204	3/6/2016	Normandale Lake
205	3/6/2016	Nine Mile Creek
206	3/6/2016	Nine Mile Creek
207	3/6/2016	Nine Mile Creek, Normandale Lake
208	3/6/2016	Normandale Lake
209	3/6/2016	Nord Myr Marsh
210	3/5/2016	Lake Minnetoga
211	3/5/2016	Unnamed
212	3/5/2016	Nine Mile Creek

213	3/5/2016	Outlet water pond?
214	3/4/2016	Lake Phalen
215	3/3/2016	Nine Mile Creek
216	3/2/2016	Minnetoga Lake
217	2/26/2016	Nine Mile Creek
218	2/20/2016	9 mile Creek
219	2/20/2016	Minnesota River
220	2/20/2016	Heritage lake plus storm water pond
221	2/20/2016	Penn lake
222	2/20/2016	9 mile creek
223	2/18/2016	Manor Homes of Edina

Nine Mile Creek Watershed District Community Survey

Question 6 Open Ended Responses

How important are the following water resources to the quality of life in your community?		
Number	**Response Date**	**Comments**
1	5/6/2016	The creek, river, lakes and ponds are all important. I hope others agree so we can begin to take care of them finally!
2	4/27/2016	Appreciate wild life habitat preservation
3	4/27/2016	We live near Terrace Oaks Park in Burnsville and appreciate the ponds and wetlands within it.
4	4/26/2016	Since 9 mile creek empties into normandale lake is it very important due to what it brings into the lake
5	4/26/2016	Ponds and wetlands add greatly to the beauty of Bloomington.
6	4/26/2016	afrail cattails and lily pads will completely enclose our lake
7	4/26/2016	Water = Life
8	4/26/2016	open space is important
9	4/25/2016	Even though I do not use these resources regularly, my husband and I are very aware of how critical they are to our environment. they add greatly to the quality of life in Bloomington, even as we drive by. Necessary for wildlife, to regulate run off, and for other environmental reasons.
10	4/25/2016	all are important to wildlife diversity
11	4/21/2016	Green space is diminishing due to over-building, so 9-mile creek is even more precious to mental health
12	4/9/2016	I live in apartment complex with no storm water mitigation
13	3/31/2016	With continual reduction of water quality and increasing hard cover of land, all water bodies are extremely important
14	3/22/2016	The sight of bald eagles, egrets, herons, geese and ducks, as well as the migratory wildfowl that fly through in the spring enhance our standard of living.
15	3/22/2016	Aren't they necessary to survive? Don't we need water?
16	3/17/2016	I am very concerned about pollution from properties along 9 mile creek.
17	3/17/2016	I think all these water resources are important for waterfowl reproduction
18	3/17/2016	Water quality is an issue in Edina; unfortunately Edina's development policies have done little to protect our water assets and, in fact, have harmed them.
19	3/16/2016	Nine Mile Creek is (was) a unique ribbon of wilderness in the middle of our city.
20	3/16/2016	I live on a pond
21	3/15/2016	Water is vital to life, ours and that of other species.
22	3/15/2016	I really can't think of anything more important to me and my family than the water.
23	3/15/2016	We're kidding ourselves to think any waterway isn't important in our lives, whether we have direct interaction or not.
24	3/14/2016	Nine mile creek feels very unclean around my house. It's not the kind of water I'd like to Swim in, and it's cluttered with litter
25	3/14/2016	Water sources are extremely important for both mind and body. It is also attractive to the city to have clean water sources for both play and visual interest.
26	3/14/2016	Nature is very important to me and my family
27	3/13/2016	These are the reasons we moved here and stay here
28	3/12/2016	R
29	3/9/2016	Something is causing the water quality to get progressive worse each year
30	3/8/2016	Water quality plus wildlife habitat
31	3/7/2016	I work in Bloomington but live in Apple Valley.
32	3/6/2016	Normandale Lake needs attention.
33	3/6/2016	The entire world of water is extremely important
34	3/5/2016	Too much fertilization in our neighborhood!
35	2/18/2016	Water resources are hugely important across the board!

Nine Mile Creek Watershed District Community Survey

Question 9 Open Ended Responses

How would you rate the overall water quality of the lakes, creeks, and wetlands that are located where you live?		
Number	**Response Date**	**Comments**
1	4/26/2016	Nine Mile Creek to the west of Hwy 169 between Lincoln/5th St. & Londonderry exits appears to be very polluted
2	4/26/2016	Normandale Lake gets very green and smelly during the warm months.
3	4/25/2016	Ponds not to good
4	4/25/2016	I really don't know , but I hope the water quality is somewhere between fair and good.
5	4/25/2016	Am always concerned when I read about ecoli in Bush Lake, etc.
6	4/25/2016	Lots of pond scum on Normandale Lake
7	4/21/2016	too much rubbish, trees and plants are cut down so animals don't have shelter, tires and junk are thrown in the water, not enough barrier (native/prairie grass) to protect wildlife habitat
8	4/11/2016	too many cattails
9	3/21/2016	In Arrowhead, I wish there was maybe more movement - not sure it's that fresh
10	3/17/2016	Normandale lake is an unsightly, smelly, green marsh in the summer
11	3/16/2016	Concerned about the weeds/algae blooms as it relates water quality.
12	3/16/2016	I am watching the creek fill in and get shallower
13	3/16/2016	It is a travesty that Nine Mile Creek Watershed District supports rather than challenges the pollution of NMC from runoff from yards and salt from local highways. The salt contamination is terrible - parts of the creek don't freeze over because of the salt runoff. WHERE IS 9MC Watershed District?
14	3/15/2016	I'm concerned because we've just taken it for granted for too many years.
15	3/15/2016	I'm right on the creek and I'd love to help clean it up. We try to fish out debris, but we can see how polluted it is and can't do much else to help ourselves.
16	3/14/2016	We clean up trash all the time. Nine Mile is just a highway for all the trash starting in Hopkins... and into the Minnesota River. Yes there is wildlife am constantly surprised its still there based on the excessive water intake after rains and drought in summer.
17	3/14/2016	Most are good, except Normandale Lake, which looks like it's in terrible shape. Completely covered in weekds.
18	3/14/2016	Very poor since the road construction on Shady Oak rd was completed. You can see the different algae around the drains coming into the lake. I have seen what looks like oil in the water near the drain on the south side of the big part of Shady Oak lake. Also having been on the lake for 15+ years the weeds are thicker.
19	3/9/2016	It was originally called mud lake- I believe this was done for a reason
20	3/7/2016	Normandale Lake is no longer a jewel in the neighborhood. It is unsightly and the smell is offensive.
21	3/7/2016	While they look great in the spring, they quickly clog up with algae and other growth that chokes the life of the water
22	3/7/2016	We have a tremendous amount of algae in Lake Normandale, the primary lake in Bloomington
23	3/7/2016	Lake Normandale is disgusting
24	3/6/2016	FAIR overall, some POOR like Normandale Lake especially
25	3/6/2016	Normandale and Hyland lakes are very concerning however!
26	3/5/2016	I WILL HAVE TO RESEARCH THIS... I CAN ONLY HOPE THE ANSWER IS EXCELLENT... WITH ALL THE SALT RUN OFF I QUESTION THE QUALITY. OUR STREET DRAINS RUN INTO THE CREEK.
27	2/20/2016	Algee

Nine Mile Creek Watershed District Community Survey

Question 11 Open Ended Responses

What concerns do you have about lakes, creeks and wetlands in your community?		
Number	**Response Date**	**Comments**
1	5/6/2016	Temperature of water. Nine mile used to be trout stream.
2	4/26/2016	No longer can fish or canoe on the lake. Just looking at it is disgusting - discourages using it as the primary walking area.
3	4/26/2016	Concerned about cattails and lily pads filling in lake
4	4/26/2016	state government draining to lower water levels which encourage invasive cat tails to explode and make havens for mosquitoes
5	4/26/2016	Got smelly last year
6	4/26/2016	Trees that are dying and falling in.
7	4/25/2016	Odor from algae, appearance of algae, invasive fish
8	4/25/2016	Growing weeds around the edge, no fertilizer is used in the area of water
9	4/25/2016	E. coli at beaches
10	4/25/2016	Dead trees surrounding Normandale Lake.
11	4/25/2016	I am concerned at the gas leakage from the pumps at the Cut Rate station on Old Shakopee and Xerxes in Bloomington. I think that gas is running directly into Nine Mile Creek. the station should be closed and the Brown Field cleaned up.
12	4/21/2016	neighbors raking leaves into the creek
13	4/21/2016	toxic waste (pet excrement) people don't pick up (they think it's "organic"
14	4/20/2016	algae level every summer is terrible and becomes smelly
15	4/7/2016	Lake Normandale is terrible!
16	4/5/2016	pet waste
17	3/25/2016	Addition of large apartment building on a small 3 acre plot surrounded by wetlands (on Rowland)
18	3/25/2016	concern on flood insurance and preserving nature
19	3/24/2016	Normandale lake is choked with weeds in the summer and literally stinks so bad sometimes its uncomfortable to be near
20	3/21/2016	Wish there were less reeds so that we could canoe, etc.
21	3/19/2016	Round lake
22	3/18/2016	The "rape" of 9 mile Creek in Heights Park for an unnecessary bike trail
23	3/18/2016	It doesn't even look like a lake by mid summer - it's all just green sludge.
24	3/18/2016	The Smell is terrible in the summer
25	3/17/2016	Mercury and phosphorus from ferlilizer runoff on 9 mile creek
26	3/17/2016	algae on waterbodies
27	3/17/2016	Over development, allowing developers to clear cut lots (no enforcement of tree preservation ordinance), use of chemicals all contribute to degradation of the water assets in our community
28	3/16/2016	Smell and algae
29	3/16/2016	You can see the impact of the Watershed District's failure to focus on pollution.
30	3/15/2016	Thank you for doing something about water quality. We care!!!
31	3/15/2016	mosquito control
32	3/15/2016	mosquitos
33	3/15/2016	the city clear cut all the trees along nine mile creek to make way for a stupid bike trail and walking path
34	3/15/2016	All checked
35	3/14/2016	invasive cat tails have taken over areas surrounding nine mile. beautiful wetlands have turned into grasslands.
36	3/14/2016	Normandale Lake turns green from alge - too ugly and often too smelly to walk around
37	3/13/2016	Draining of Storm water from salted streets into our ponds and the change (deterioration of water and shoreline) that is producing
38	3/12/2016	Portions of the lake are being overtaken by seaweed and muck, making those portions of the lake unusable to swimmers/boaters in the summer
39	3/12/2016	Smelly
40	3/12/2016	Smell and look of the lake

Nine Mile Creek Watershed District Community Survey

Question 11 Open Ended Responses

What concerns do you have about lakes, creeks and wetlands in your community?		
Number	**Response Date**	**Comments**
41	3/12/2016	Smelly plant growth
42	3/8/2016	Algae bad smell
43	3/7/2016	Summer algae bloom covers most of the lake. Can't we keep phosphates out of the lake?
44	3/7/2016	Mountain bike recreation damage to the trails which ultimately impact the lakes, creeks and wetlands.
45	3/7/2016	Odor coming off of the water due to sediment, storm runoff, etc.
46	3/7/2016	Smell
47	3/7/2016	the green gunk on the water and the smell
48	3/7/2016	Algae
49	3/6/2016	pollution from insecticides, herbicides
50	3/6/2016	Algae problem - the lake is covered 90% of the time
51	3/6/2016	excessive algae
52	3/6/2016	Odor from algae, appearance of algae, invasive fish
53	3/5/2016	Chlorinated water?
54	3/5/2016	Smells bad in summer
55	3/5/2016	Runoff
56	2/20/2016	Odor from water body
57	2/20/2016	Walking trail is flooded

Nine Mile Creek Watershed District Community Survey

Question 12 Open Ended Responses

Thinking beyond lakes and creeks, what are your other top concerns that relate to water in your community?		
Number	**Response Date**	**Comments**
1	5/1/2016	Want water quality buy-in from public?....Enable Access!
2	4/28/2016	Now you've got me worried about all of these!
3	4/28/2016	MN Big Agriculture factory farms that pollute the ecosystem of MN. Am also concerned about water quality for the animals that are confined and mistreated in these facilities
4	4/28/2016	generally concerned with many of these but none are "top" concerns
5	4/27/2016	Impermeable ground cover(buildings, garages,driveways, etc.) Rapid runoff after storms reducing groundwater recharge.
6	4/26/2016	cattail plants in lake
7	4/26/2016	When helping to pick up litter with my son's Scout Troop I chose to focus on the many tiny mint wrappers blown into & around the lake from TGIF's across the Hwy. to Normandake Lake
8	4/26/2016	incompetence of state government wrecking lake after lake throughout state by intentionally lowering water levels to help ducks and hurt everything else
9	4/25/2016	Should encourage traditional native plantings, non-fertilizers, native grasses
10	4/25/2016	Pollutants from fertilizer and road salt.
11	4/25/2016	Non point source water pollution is a major concern for this urban watershed. Catch basins such as the one on Upper Penn Lake and rain gardens throughout the watershed should lessen the effect of contaminants getting into the watershed.
12	4/25/2016	Of course, the Flint crisis makes us aware of the critical importance of allocating public tax funds to to upgrading pipes, treatment plants etc.
13	4/21/2016	LACK of abundance and diversity of wildlife, litter, erosion
14	3/24/2016	Normandale Lake is a Weed choked lake. It is filled with sediment and should be dredged
15	3/22/2016	If there is a lot of rain, there is flooding on the east side of the corner of Smetana and 11th Street.
16	3/20/2016	Sediment collection from run-off; pollutants from run-off
17	3/20/2016	I was in the hospital last week and was getting an IV that I thought had a painkiller added to the liquid. When they removed the IV they emptied the rest down the sink. As I was drowsy and anxious to get out of the hospital, I didn't say anything. Later I was wondering where that went? I will be asking the Dr. when I go in for my follow-up.
18	3/17/2016	Poor and illegal farming practices damaging watersheds
19	3/17/2016	Increased: density, size of homes, allowing tree removal, increase of impervious surfaces all contribute to degradation of the watershed in our community. Lack of policy and enforcement of policy contributes to the degradation of the watershed in our community.
20	3/17/2016	I am concerned that curb and gutters are a major contributor to pollutants and low ground water levels.
21	3/16/2016	The Watershed District chose to support the 3 Rivers Park District "trail" that will replace 39+ acres of wetland and wildlife habitat with pavement and gravel
22	3/15/2016	Thank you for caring. How can we all help?
23	3/15/2016	Not enough rain garden type filtering systems.
24	3/15/2016	Hhhshs
25	3/14/2016	The buckthorn in the Marsh Lake area is so thick that nothing else can grow.
26	3/13/2016	contamination from salting our roads and streets
27	3/8/2016	The number of coyotes has grown in our community; affecting the safety of our pets
28	3/7/2016	See above comment regarding mountain bike usage.
29	3/7/2016	Buckthorn and garlic mustard are destroying my neighborhood
30	3/5/2016	Yard-stuff going into storm sewers

Nine Mile Creek Watershed District Community Survey

Question 13 Open Ended Responses

What do you think should be the top 4 priorities for the District in the next 10 years?		
Number	**Response Date**	**Comments**
1	5/12/2016	Increase game fishing in Normandale lake
2	5/6/2016	Education of residents still necessary. They need to be bombarded with education and training!
3	5/3/2016	not sure?
4	5/1/2016	more access
5	4/27/2016	Reduce variability of stormwater runoff with rain gardens and other retention devices
6	4/27/2016	I don't feel adequately informed to enough select 4 main areas.
7	4/27/2016	Eliminating coyotes in the watershed district. They limit the enjoyment and use and are serious safety concerns.
8	4/26/2016	Underground water suppky
9	4/26/2016	Difficult to judge because I really don't know the "big picture" so can only respond to my area of concern.
10	4/26/2016	stop encouraging invasive species by artificially reducing water levels. This has been a disaster on many lakes. The science you're using is flawed!
11	4/26/2016	Buckthorn
12	4/25/2016	reduce odor
13	4/25/2016	Clean up the edges of creeks (9 mile-Minnehaha)as in general there are no fertilizers used on them. It used to be really nice to actually walk along a creek and actually see it and maybe sit on the bank and watch the water go by.
14	4/25/2016	make people (county and city) stop using chemicals on property
15	4/25/2016	Continue efforts to deepen and widen the areas of the creek especially through Edina. There will continue to be challenges with peak flow times and runoff, however I am of the opinion that continued stream stabilization to the Creek and putting in storm water retention ponds in areas could help. I recommend the board address any and all open spaces be utilized or sought after in order to control storm water. The next step would be to offer cost sharing for parking lot retrofits, etc that would allow for rain gardens.
16	4/25/2016	Stop use of road salt unless absolutely necessary. Only the steepest road grades should see it. Extra salt should be mechanically collected within 24 hours of application.
17	4/11/2016	have incomplete knowledge of needs from studies
18	4/7/2016	A war on Buckthorn
19	3/22/2016	Iwould think there could be a multi-focused effort to assure clean water and reduce invasive species.
20	3/18/2016	Reduce weeds - Huge Lily Pads/weeds that take over the Summer Months at Normandale Lake
21	3/17/2016	Force residents along 9 mile creek to not fertilize their yards within 50 feet of 9 mile creek. Investigate all possible pollution sources along 9 mile creek.
22	3/17/2016	Improve fisheries
23	3/17/2016	I really have no idea - the water clarity on Shady Oak Lake is excellent and I want to stay that way
24	3/17/2016	Turn the pump on at lower penn lake!!!
25	3/17/2016	All of the above could be achieved through stronger protection policies and enforcement of those policies especially with respect to development. The onus to protect the environment should be on the developers. That is not happening in our community. We have allowed examples such as getting rid of 30 year conservation easements so that individuals can build a house with a bigger footprint. That is ecologically irresponsible.
26	3/16/2016	I'm not an expert. You should prioritize :)
27	3/16/2016	The Watershed District's conservation mandate has been ignored in favor of development of "amenities" for bikers. Preserving wildlife habitat and wetland from contamination and development is the meaning of conservation.
28	3/15/2016	2,3,4 - street flooding is the only concern i have
29	3/15/2016	Really, everything is important.
30	3/15/2016	mosquito control

Nine Mile Creek Watershed District Community Survey

Question 13 Open Ended Responses

What do you think should be the top 4 priorities for the District in the next 10 years?		
Number	**Response Date**	**Comments**
31	3/15/2016	get rid of buckthorn
32	3/15/2016	keep government out and let private enterprise manage
33	3/15/2016	Getting businesses to chip in funds to help clean it up!
34	3/7/2016	Fixing Normandale Lake.
35	3/5/2016	Restrict fertilization
36	2/18/2016	Salt control on roads

Nine Mile Creek Watershed District Community Survey

Question 17 Open Ended Responses

Do you have any other comments, questions, or concerns?		
Number	**Response Date**	**Comments**
1	5/6/2016	I have no "lawn". I compost all of my yard waste. I use NO chemicals, even hose water. I have multiple rain barrels around the house for watering. It works and it's easy once you get started.
2	5/3/2016	Pollution, fertilizers, crap that effect wildlife
3	5/1/2016	Access,please.
4	4/28/2016	I have no idea how to answer #14.
5	4/28/2016	Thank you for your efforts at keeping this conversation alive.
6	4/27/2016	Looking forward to a decent bridge over 9-mile Creek on river path(I'm too old for boards-on-a-log). The new trail will attract more people and build interest in the Creek, which is largely invisible to most folks. I would like to see a more level bicycle route across the Creek and 35W south of Old Shakopee Rd. 106th Street is quite dangerous and difficult for bicycles. Best wishes to the District.
7	4/27/2016	Don't let climate change fanatics hijack our environmental programs.
8	4/27/2016	important work! thank you for asking!!
9	4/27/2016	My #1 concern is the expanding population of coyotes in the district. Need to control them.
10	4/26/2016	Would like to see an initiative to conduct yearly trash pick up around lakes and streams
11	4/26/2016	I appreciate all the hard work that already goes into the preservation of our natural resources
12	4/26/2016	while this lake was a manmade lake therefore not "natural" it serves the same purpose and is very important to bloomington and the surrounding area. The investment required to build the bandshell was intended to bring the community together and the lake is part of that.
13	4/26/2016	The rain sheets off our driveway to the curb & into the storm drain. I looked into it but it just costs too much for us to install a permeable driveway -- like $15,000. for pavers.
14	4/26/2016	Willing to do more and pay more as long as the money and efforts go directly to the issues at hand
15	4/26/2016	Glad you have programs during the week.
16	4/26/2016	Thank you! It was difficult to only pick 4 too priorities. I wish to add any climate change related planning. I would also love help or information concerning installing a rain garden.
17	4/26/2016	fallen trees in creek blocking proper creek flow
18	4/25/2016	Reduce codes that say you must cut lawn at certain length, encourage natural native plants and yards instead of water sucking and fertilizing extensive lawns.
19	4/25/2016	The proposed paved trail along the river in Bloomington must be blocked!
20	4/25/2016	people that live in managed developments do not have choices on what is put on the lawns or how runoff is handled. Education of townhome and apt. owners is needed.
21	4/25/2016	The watershed is pretty much developed and will continue to have challenges, however I have traveled quite a bit and the watershed is much much better than quite a bit of the older US cities. Much of our storm water is being diverted to infiltration areas as compared to other developed areas of the country. Continued work needs to be done in Edina and the Hopkins areas to stabilize and widen the stream, which will be hard but can be done with the cooperation of those Cities. One or two large storm water retension pond / wildlife areas could do wonders for those down stream.
22	4/25/2016	More education and awareness of contractors dumping in street drains as I hve witnessed this twice in the last 12 months
23	4/25/2016	The challenge is great and we all need to be involved to protect our natural resources. They make our lives and community great.
24	4/25/2016	I wonder about the management of the drainage ponds around our lake. Also, as many of our neighbors hire lawn services, I wonder if those companies are monitored for what they are putting on the lawns.
25	4/25/2016	I appreciate the opportunity to participate in this survey. Good luck managing the results!
26	4/25/2016	managers. A great example is the MN River Valley in Bloomington. Their is an existing natural trail that is used by tens of thousands of people that coexists with the flood plain. The DNR/Bloomington want to allow a polluting paved trail that will harm the natural area and send
27	4/25/2016	Would love to see regulations against chemical lawn care. No need for perfection especially at the risk of health to all of us, human, animals and plants!

Nine Mile Creek Watershed District Community Survey

Question 17 Open Ended Responses

Do you have any other comments, questions, or concerns?		
Number	**Response Date**	**Comments**
28	4/25/2016	A cleaner Normandale Lake would mean more aquatic activities there
29	4/25/2016	See previous comments.
30	4/22/2016	Thanks for your work.
31	4/22/2016	I have no lawn & only weed wack a couple times per year.
32	4/21/2016	I wish our district offered design help for rain gardens or shoreline erosion prevention. We're willing to do so much, but can't afford the cost of design work. We'll do our own labor and buy the plants!
33	4/21/2016	Unfortunately I live in a condo and the association is not willing to do ANYTHING! That would be a great place to start educating.
34	4/11/2016	ques 14 was difficult to answer.
35	4/9/2016	Apartment dweller. Cannot have rain barrel. Called city about regulation, none. As resident we pay % water.
36	4/1/2016	Hope for community involvement
37	3/31/2016	Water quality is rapidly approaching a crisis; delayed action will be very costly and difficult
38	3/25/2016	Concerned about new apt. building changing the water level behind my property. Lived here 26 years and have never experienced these high levels. Was told would not see any changes. We do. Very concerning.
39	3/25/2016	I think many Minnetonka residents do not realize they live in the Nine Mile creek district. Perhaps we should do signage at the borders as Minnehaha creek district does.
40	3/22/2016	I am pleased you are asking these questions. If you have a newsletter or website, please let me know.
41	3/22/2016	We need to educate. Especially the school system. Edina Schools are located on Nine Mile Creek and will harm the environment with the referendum.
42	3/20/2016	It is a crime that the district permitted the destruction of the wooded area for the Three Rivers bike trail. It is a travesty and 9 mile district failed to protect the pristine area just for a few bicyclists. People who live around the new bike freeway you are building were ignored and marginalized by bureaucrats. This was jammed down the throats of the neighborhoods and all buttoned up behind closed doors. No transparency at all. Shameful.
43	3/18/2016	Rain barrels/rain gardens will not reverse the irreparable damage that the District's bike trail along and even over 9 Mile Creek will inflict on this water course
44	3/18/2016	I live in a condo building.
45	3/18/2016	Please address Normandale Lake Community - its a beautiful area and I believe the Lake would benefit from serious TLC.
46	3/17/2016	Please do something about Normandale Lake. The watershed board should be embarrassed by the quality of water and the algae bloom.
47	3/17/2016	No more regulation.
48	3/17/2016	Raise the drain at the end of penn lake or turn on pump when it gets low!!!
49	3/17/2016	I would like more information on how the current funding is being allocated and what programs are executed today and at what cost to the district taxpayers?
50	3/17/2016	I appreciate the good work of 9 mile Creek and the grant programs that they offer!
51	3/17/2016	I am concerned that this survey does not ask any questions about the impact of development policies and enforcement on the watershed; I wonder why not.
52	3/16/2016	The District appears to move very slowly, and I'd like to see it do more projects and less studies and education/outreach. I would like to see more outreach communication about projects; I am not one to look for information and visit the website; I like to see stories in the newspaper and holding open house meetings at libraries, having a booth at city forums, etc. Overall, I understand you are a very small District (not like Minihaha), so you are doing what you can.
53	3/16/2016	The participation of the watershed district in the bike path that is destroying wetlands and wildlife habitat along the creek makes a travesty of of this survey's emphasis on water quality and conservation.
54	3/16/2016	I am hopeful that our church would be willing to put in a rain garden between the parking lot and the Hawke Lakes to reduce pollutant run off.

Nine Mile Creek Watershed District Community Survey

Question 17 Open Ended Responses

Do you have any other comments, questions, or concerns?		
Number	**Response Date**	**Comments**
55	3/16/2016	environment and clean water instead of surrendering to local development pressures and demands of the Bike Edina Task Force to put pavement ahead of wetlands and wildlife habitat.
56	3/16/2016	The cost of some of these is not feasible at this time for me. Such as downspouts. I have a significant amount of water that lands on my driveway.
57	3/16/2016	I hope 9 mile CWSD will do more outreach and education.
58	3/15/2016	More emphasis on educating public; less money and effort on providing recreational opportunities (leave that to park authorities)
59	3/15/2016	I get the impression that this was simply a sort of push poll to raise the taxes. We pay enough taxes in aggregate. Gov't needs to be better figure out how to allocate and be more efficient/resourceful with the current tax levels. Many residents are still hurting from the recession and haven't had a raise in a while. Gov't should do the same.
60	3/15/2016	Do NOT tax me more to pay for trails. Managing erosion or ground water contamination - OK. Trails or beatification - NO!!!
61	3/15/2016	quit spending our taxpayers money to benefit the government employees
62	3/15/2016	NMC water district needs to more visably make its value know to the community.
63	3/15/2016	Grassroots media advertising to get the youth to help. If you need help on this please contact me. I already do this for a living. Sarah@softbums.com
64	3/15/2016	In an apartment. Don't want landlords giving this as a reason to raise rents
65	3/15/2016	Tierneys Woods Curve was resurfaced a few years ago, this fall a crew came through and cut open the cracks then covered the cracks with a tar type thing. It is peeling off and there are pieces and strips of that tar stuff all over the streets. It's really disgusting to think that is flowing into the watershed as it rains today. Street cleaning can't happen soon enough, and the fix it method for the street should be looked at from an environmental perspective.
66	3/15/2016	I wish we had access to FREE planning of helpful landscapes. We'll do the work. We'll pay for the plants and trees, but to just have some assistance in how to plant and where to plant without the additional cost of $5K for ONLY an idea would be helpful.
67	3/15/2016	There is significant erosion of the banks of nine mile creek in Edina (i.e. Walnut Ridge Park).
68	3/15/2016	Is it possible to intern for this Board?
69	3/14/2016	Thank you for allowing us to give our input on this issue. Having grown up on nine mile creek, it's a shame to see the condition that it's in now
70	3/14/2016	Also putting the trail in the middle of a wetland doesn't curb water quality. There will be more trash, noise and wildlife disturbance. Why not clean up our water sources before we run/bike thru them. There's currently nothing to look at. Money would be better spent on water quality than on bikers who aren't paying the additional money to support enhancements and maintenance of our natural environments.
71	3/14/2016	Keep the bike path area off of the creek!
72	3/14/2016	We have no lawn and use fertilizer sparingly for flowers.
73	3/14/2016	I can't wash my car on the grass because I hardly have any grass. I can't install a rain barrel because my roof drain lines already go into rain gardens. Same thing for directing the drain lines on to the lawn.
74	3/14/2016	Beside projects related to water quality, I think it is important to prevent/fight back invasive plants like buckthorn.
75	3/13/2016	I would see the role of the Watershed District to publicize the volunteer projects they support to allow us willing workers (retirees) to actually plant, shovel, weed, etc.
76	3/11/2016	Living in a townhouse limits some of things that I can control.
77	3/9/2016	I don't have a good understanding of question 14 and my response isn't necessarily rigid.
78	3/9/2016	we have tried to work with the City of Edina to try to clean the ponds adjacent to our home but have been told since they run into nine mile creek there is nothing that can be done.
79	3/8/2016	We are now living in a large senior housing complex so the last questions didn't apply to us in most cases.

Nine Mile Creek Watershed District Community Survey

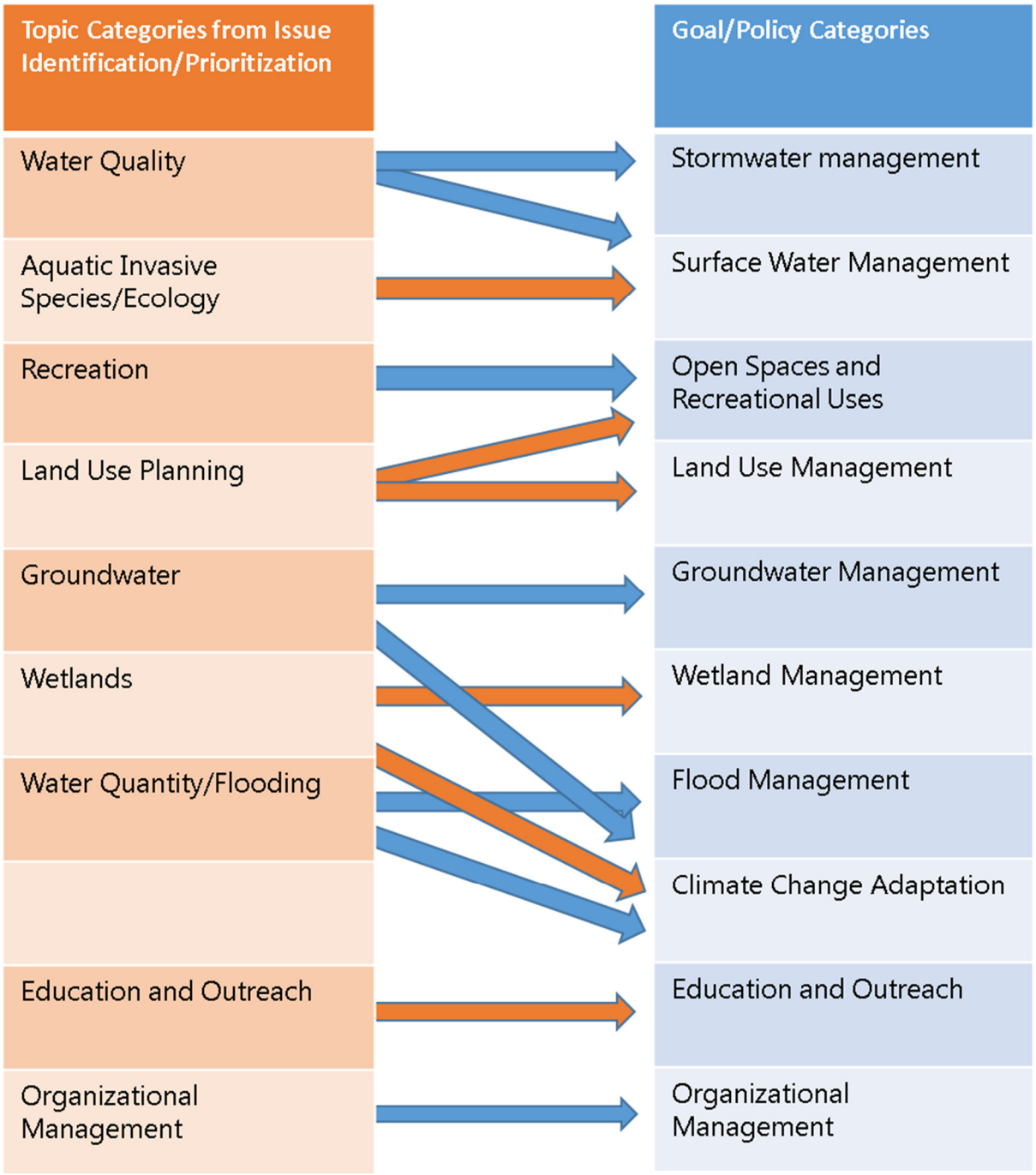
Question 17 Open Ended Responses

Do you have any other comments, questions, or concerns?		
Number	**Response Date**	**Comments**
80	3/8/2016	I am also very concerned about the chemicals that lawn care companies use on neighborhood lawns, that they spray on windy days and the smell goes everywhere. I have to take my toddler indoors some days, it is SO bad. There are laws for second hand smoke....why not laws against herbicides being breathed into our lungs?
81	3/8/2016	Need to be informed as to what concerns you have and what is happening
82	3/7/2016	Strongly encourage people to pick up trash in the streets that could get into the sewers. I can't believe the amount of junk I pick up while walking my dog.
83	3/7/2016	Your district is fully covered by MS4s. From a regulation standpoint, the NPDES general permits should largely have you covered. The best place to fill in is with TMDLs: take the lead on them, organize best practices training in relation to them, take on internal loading projects for waterbodies with intercommunity subwatersheds, partner with communities to put projects in, oversee subwatershed analysis to find the most cost effective projects. Try not to focus on the method of pollutant reduction (how a BMP functions) when making your choices for projects, but rather, what is most cost effective from a pounds reduction standpoint (sometimes big regional projects are better if not sexier). Get the word out about your organization better. Despite being within 2 blocks (ok, 2.5) of the creek itself, I can't think of one sign I have seen for your organization. They must be there, but I can't think of any. I also can't think of any organizations around me has have some sign or other indication that they have put in a project with your cost share funds. Your newsletter seems to indicate you have a lot of cool things going on, but how would I know that but for the fact that I am a water geek that sought out my watershed's website to sign up for their newsletter.
84	3/7/2016	Difficult to do the above things when you live in an apartment.
85	3/7/2016	Normandale Lake is covered with algae in the summer. It is very unsightly and smells when it gets hot/dry. We utilize the lake all year round with our small children and would like to see this improved. Thank you.
86	3/7/2016	Normandale Lake is a jewel of the Bloomington community and it looks horrible almost all of the ice-out days of the year
87	3/7/2016	Offer more aquatic activities at Normandale Lake (swimming, kayaking, etc.)
88	3/6/2016	Thanks for all you do for the district
89	3/6/2016	Bloomington recently approved the MN River Valley Strategic Plan. Identify opportunities once the natural resources review has been completed (2017) where the WD can fund structural and vegetative restorations that can impact the area near the outlet of NMC.
90	3/5/2016	HOW DOES THE SALT USED ON THE ROADS IN THE WINTER EFFECT THE WATER SHED?
91	3/5/2016	Yes, the aforementioned swimming pool water. We'd like to install a rain garden but think it may not work.
92	3/5/2016	People obsessed with 'perfect' grass!
93	3/3/2016	We live in a good watershed district.
94	2/26/2016	Keep up the good work!
95	2/20/2016	Thank you for all you do.
96	2/20/2016	I work in Bloomington
97	2/18/2016	From #18- ways to provide information: website information, printed newsletters mailed to your home, electronic newsletters, newspaper articles, provide materials to local cities and other public agencies, presentations to community and neighborhood groups
98	2/18/2016	From #1: Works in Bloomington From #18-ways to provide information: website information
99	2/18/2016	Other ways to provide information: Website information, Social media, printed newsletters mailed to your home

Appendix D

Relationship between topic categories from issue identification and prioritization and the goal/policy topic categories (Section 5)

Relationship between topic categories from issue identification and prioritization (Section 4) and the goal/policy topic categories (Section 5).



Appendix E

Nine Mile Creek Watershed District Rules adopted as amended December 20, 2023

NINE MILE CREEK WATERSHED DISTRICT
RULES

Adopted as amended December 20, 2023

Effective January 1, 2024

NINE MILE CREEK WATERSHED DISTRICT
BOARD OF MANAGERS

I, Chris-Ann Lauria, secretary of the Nine Mile Creek Watershed District Board of Managers, certify that the attached are true and correct copies of the rules of the Nine Mile Creek Watershed District, which were properly adopted by the board of managers on December 20, 2023.

_____ Date: 1/17/2024

Chris-Ann Lauria, secretary

STATE OF MINNESOTA)

) ss.

COUNTY OF HENNEPIN)

The foregoing instrument was acknowledged before me this 17 day of January, 2024, by Chris-Ann Lauria, as secretary of Nine Mile Creek Watershed District.

Michael John Eschenbacher Welch
Notary Public
Minnesota
My Commission Expires January 31, 2028

_____
Notary Public

TABLE OF CONTENTS

Definitions and Acronyms

The following definitions and acronyms apply to the District rules and accompanying guidance materials.

Definitions

Best management practices: Various structural and nonstructural measures taken to minimize negative effects on water resources and systems, such as ponding, street sweeping, filtration through a rain garden and infiltration, as documented in the Minnesota Pollution Control Agency's *Protecting Water Quality in Urban Areas* and the *Minnesota Stormwater Manual.*

Bioengineering: Various shoreline and streambank stabilization techniques using aquatic vegetation and native upland plants, along with techniques such as willow wattling, brush layering and willow-posts.

Existing conditions: Site conditions at the time of consideration of a permit application by the District, before any of the work for which a permit is sought has commenced, except that when impervious surfaces have been fully or partially removed from a previously developed site but no intervening use has been legally or practically established, "existing conditions" denotes the previously established developed use and condition of the site.

Fill: Any rock, soil, gravel, sand, debris, plant cuttings or other material placed onto land or into water.

Impervious surface: Any exposed ground surface that has been compacted or covered with a layer of material, or is likely to become compacted from expected use, such that it is or will be highly resistant to infiltration of rainwater and snowmelt.

Landlocked basin: A water basin that does not have an existing outlet establishing a controlled normal elevation.

Land-disturbing activity: Any alteration of the ground surface that could result, through the action of wind and/or water, in soil erosion, substantial compaction, or the movement of sediment into waters, wetlands, storm sewers, or adjacent property. Land-disturbing activity includes but is not limited to demolition of a structure or surface, soil stripping, clearing, grubbing, grading, excavating, filling and the storage of soil or earth materials.

Linear project: Construction or reconstruction of a public improvement in a linear corridor, or construction, repair or reconstruction of a utility or utilities in a linear corridor that is not a component of a larger contemporaneous development or redevelopment project.

Low floor: The lowest elevation of any floor of any structure, habitable or not.

100-year flood elevation: The surface elevation of a water body or constructed stormwater facility that has a 1 percent chance of being equaled or exceeded in any given year, as calculated using a model utilizing the most recent applicable precipitation frequency reference data (e.g., Atlas 14).

Protected wetland: A wetland protected by federal, state or local law.

Public waters: Water bodies designated pursuant to Minnesota Statutes section 103G.005, subdivision 15.

Public waters wetland: Wetlands designated pursuant to Minnesota Statutes section 103G.005, subdivision 15a.

Receiving water: The first of the following encountered by stormwater or snow melt flow from a site: Nine Mile Creek or a water body designated as a public water pursuant to Minnesota Statutes section 103G.005, subdivision 15.

Redevelopment: Any land-disturbing activity on an already-developed site or any substantial change to existing structures on a site.

Rehabilitation: Land-disturbing activities for a maintenance project that disturbs only existing impervious surface, does not disturb underlying soils or result in a change in the direction, peak rate, volume or water quality of runoff flows from the site, and may include the replacement of existing impervious surface, but not the addition of new impervious surface. Mill and overlay of paved surfaces constitute rehabilitation.

Retaining wall: Vertical or nearly vertical structures constructed of mortar-rubble masonry, hand-laid rock or stone, vertical timber pilings, horizontal timber planks with piling supports, sheet pilings, poured concrete, concrete blocks, or other durable materials and constructed approximately parallel to the shoreline.

Retention: The capacity to indefinitely or continuously keep runoff from leaving a site as surface flow.

Right-of-way: Delineated, legally defined property on which a public linear project is or will be located, including adjacent area necessary for safe operation of the road, sidewalk or trail.

Seven-county metropolitan area: The area comprised by Hennepin, Ramsey, Washington, Dakota, Anoka, Scott and Carver counties.

Shoreline: The lateral measurement along the contour of the ordinary high-water mark of a water basin and the area waterward therefrom.

Site: The location of activities that are the subject of a District permit and are under the control of the applicant.

Steep slope: Land with an average slope steeper than 3:1 (H:V).

Streambank: The lateral measurement along the top of the bank of the channel of a watercourse and area waterward therefrom.

Structure: Anything impervious that is constructed or placed on the ground and that is, or is intended, to remain in place for longer than a temporary period.

Subwatershed: The drainage area of the receiving water for a particular site, encompassed with a watershed.

Volume credits: Stormwater-volume retention capacity created through construction of best management practices providing greater retention than is required to secure approval of a particular permit application.

Water body: A watercourse or water basin.

Water basin: An enclosed natural depression with definable banks, capable of containing water.

Watercourse: A natural channel with definable beds and banks capable of conducting confined runoff from adjacent land.

Acronyms

BMP – best management practice
BWSR – Board of Water and Soil Resources
LGU – local government unit
MnRAM – Minnesota Routine Assessment Method for Evaluating Wetland Functions
MPCA – Minnesota Pollution Control Agency
NMCWD - Nine Mile Creek Watershed District
NGVD - national geodetic vertical datum
OHWL – ordinary high-water level
WCA – Wetland Conservation Act

1.0 Procedural Requirements

1.1 Policy

Any person undertaking an activity for which a permit is required by these rules must obtain the required permit prior to commencing the activity that is regulated by the District.

1.2 Application

An application must be submitted to the District to obtain a permit under these rules. The application must bear the original signature of the property owner(s) or a party authorized in writing by the property owner to apply. Applicants are strongly advised to contact the District and/or submit preliminary plans early in the project development process for nonbinding informal review for conformity with District policies and rules.

1.2.1 Each substantive District rule includes application and exhibit specifications that, along with this rule, apply to the submission of applications to the District, and will be utilized to make determinations of completeness under this rule. All permit applications must be signed by the property owner.

1.2.2 The District will not take action on an application unless the project has received at least preliminary required approval from the relevant city planning or regulatory office or body, if any is required.

1.2.3 Application forms and guidance materials may be obtained from the District office or downloaded from the District web site at www.ninemilecreek.org.

1.2.4 Emergency activity undertaken by a public entity immediately necessary to protect life or prevent substantial physical harm to persons or property may be the subject of an application submitted within 30 days of commencement of such work. Emergency activity must be timely brought into conformance with all applicable District standards and criteria.

1.3 Conditional approval

The District may conditionally approve an application, but will not issue the permit until all conditions to the approval are satisfied.

1.4 Permit assignment and renewal

Permit approval is valid for one year from the date the permit is approved, with or without conditions, unless specified otherwise or the permit is suspended or revoked. To renew or transfer approval of a permit, the permittee must notify the District in writing prior to the permit expiration date and provide an explanation for the renewal or transfer request. The District may impose different or additional conditions on a renewal or deny the renewal in the event of a material change in the work proposed, except that on the first renewal, a permit will not be subject to additional or different requirements solely because of a change in District rules. New or revised rule requirements will not be imposed on renewal of a permit where the

permittee has made substantial progress toward completion of the permitted work. If the activities subject to the permit have not substantially commenced, no more than one renewal may be granted. An applicant wishing to continue to pursue a project for which permit approval has expired must reapply for a permit from the District and pay applicable fees; rules in effect at the time of reapplication will apply.

A permittee may assign a permit to another party only upon approval of the District, which will be granted if:

a the proposed assignee agrees in writing to assume responsibility for compliance with all terms, conditions and obligations of the permit as issued;

b there are no pending violations of the permit or conditions of approval; and

c the proposed assignee has provided any required financial assurance necessary to secure performance of the permit.

The District may impose different or additional conditions on the transfer of a permit or deny the transfer if it finds that the proposed transferee has not demonstrated the ability to perform the work under the terms of the approval. Permit transfer does not extend the permit term.

1.5 Suspension or revocation

The District may suspend or revoke a permit issued under these rules wherever the permit is issued on the basis of incorrect information supplied to the District by the applicant, or if the preliminary and final subdivision approval received from a municipality or county is not consistent with the conditions of the permit.

2.0 Floodplain Management and Drainage Alterations

2.1 Policy

It is the policy of the Board of Managers to ensure the preservation of the natural function of floodplains as floodwater storage areas and to maintain no net loss of floodplain storage in order to accommodate 100-year flood storage volumes. The District will seek to maximize upstream storage and infiltration of floodwaters.

2.2 Regulation

A permit from the District is required for:

2.2.1 Any alteration or filling of land below the 100-year flood elevation of Nine Mile Creek or another water body, or any filling below the 100-year flood elevation of a constructed stormwater facility in the watershed, except no permit under this rule is required:

- a for installation of riprap to dissipate energy from the outflow into a water body, as long as the design and materials are consistent with the standards in NMCWD Rule 7.0 – Shoreline and Streambank Improvements;
- b for removing accumulated sediment from a water basin; or
- c for maintenance or in-kind replacement of existing public infrastructure that does not decrease floodplain storage volume.

2.2.2 Any alteration of surface water flows below the 100-year flood elevation of a water basin or watercourse by changing land contours, diverting or obstructing surface or channel flow, or creating a basin outlet.

2.3 Criteria for floodplain and drainage alterations

2.3.1 The low floor elevation of all new and reconstructed buildings, bridges and boardwalks must be constructed in accordance with the freeboard standards in NMCWD Stormwater Rule, subsection 4.3.3.

2.3.2 Placement of fill below the 100-year flood elevation is prohibited unless fully compensatory flood storage is provided within the floodplain:

- a at the same elevation +/- 1 foot for fill in the floodplain of a watercourse; or
- b at or below the same elevation for fill in the floodplain of a water basin or constructed stormwater facility.

Creation of floodplain storage capacity to offset fill must occur within the original permit term. If offsetting storage capacity will be provided off site, it must be created before any floodplain filling for the project will be allowed.

2.3.3 The District will issue a permit to alter surface flows only if it finds that the alteration is not reasonably likely to have a significant adverse impact on any upstream or downstream landowner and is not reasonably likely to have a significant adverse effect on flood risk, basin or channel stability,

groundwater hydrology, stream base-flow, water quality or aquatic or riparian habitat.

2.3.4 No structure may be placed, constructed or reconstructed and no new impervious surface may be constructed within 50 feet of the centerline of any water course, except that this provision does not apply to:

a Bridges, culverts and other structures and associated impervious surface regulated under Rule 6.0;

b Trails 10 feet wide or less, designed primarily for nonmotorized use.

2.4 Required information and exhibits

The following exhibits must accompany the permit application. Exhibits must be submitted in an electronic format acceptable to the District:

2.4.1 Site plan showing property lines, delineation of the work area, existing elevation contours of the work area, ordinary high water level or normal water elevation and 100-year flood elevations. All elevations must be reduced to NGVD (1929 datum).

2.4.2 Grading plan showing any proposed elevation changes.

2.4.3 Preliminary plat of any proposed land development.

2.4.4 Determination by a licensed professional engineer or qualified hydrologist of the 100-year flood elevation(s) for the site before and after the project.

2.4.5 Computation by a licensed professional engineer of cut, fill and change in water storage capacity resulting from proposed grading.

2.4.6 Erosion-control plan.

2.4.7 Soil boring results, if requested by the NMCWD engineer.

2.4.8 Documentation that drainage and flowage easements over all land and facilities below the 100-year flood elevation, if required by the municipality with jurisdiction, have been conveyed and recorded.

3.0 Wetlands Management

3.1 Policy

It is the policy of the Board of Managers to ensure the preservation of the natural resources, habitat, water treatment and water storage functions of wetlands. This rule is intended to:

3.1.1 Achieve no net loss in the extent, quality and ecological diversity of existing wetlands.

3.1.2 Preserve and increase native-vegetation buffers around wetlands in the Nine Mile Creek watershed.

3.1.3 Prevent direct and indirect impacts to wetlands and require replacement of wetlands affected by land-altering activities regulated by the District.

3.1.4 Maintain wetland integrity and prevent fragmentation of wetlands.

3.2 Regulation

3.2.1 Where the District is the local government unit implementing the Wetland Conservation Act, a permit from the District is required for any activity that results in the draining, excavation or filling of a wetland regulated by the Wetland Conservation Act. The Wetland Conservation Act, as may be amended, and its implementing rules, as may be amended, are incorporated into these rules.

3.2.2 The buffer provisions of section 3.4 of this rule and the stormwater-treatment provisions of section 3.5 of this rule apply to any project requiring a permit from the District under rules 2.0, 4.0, 6.0, 7.0, 8.0 and subsection 3.2.1 of this rule. In cases where the District is not the Wetland Conservation Act Local Government Unit, sections 3.4 and 3.5 nevertheless apply, pursuant to the District's watershed authority.

a Sections 3.4 and 3.5 do not apply to incidental wetlands or to wetlands that are disturbed by utility improvements or repairs that are the subject of a no-loss or utilities-exemption determination from the relevant LGU.

3.3 Replacement wetlands

3.3.1 Except for wetlands replaced through banking, replacement wetlands must be sited in the following order of priority:

a On site;

b Within the same subwatershed;

c In the Nine Mile Creek watershed;

d In the seven-county metropolitan area of the Minnesota River-Shakopee major surface water watershed (No. 33) (see Map, Appendix 3a);

e In the Minnesota River-Shakopee major surface water watershed (No. 33), but replacement wetlands of at least equal size to the affected wetland area must be sited within the seven-county metropolitan area of the Minnesota River-Shakopee major surface water watershed (No. 33).

3.3.2 Replacement wetlands must be sized at a ratio to the affected wetland of:
- a two-and-one-quarter-to-one (2.25:1) within the seven-county metropolitan area of the Minnesota River-Shakopee major surface water watershed (No. 33);
- b three-to-one (3:1) outside of the seven-county metropolitan area of the Minnesota River-Shakopee major surface water watershed (No.33), with at least one-to-one replacement within the seven-county metropolitan area of the Minnesota River-Shakopee major surface water watershed (No. 33);
- c nine-to-one (9:1), if the affected wetland is a high-quality wetland (see wetlands definitions in Appendix 3b), with at least one-to-one replacement within the seven-county metropolitan area of the Minnesota River-Shakopee major surface water watershed (No. 33).

3.3.3 Where more restrictive than sections 3.3.1 or 3.3.2, state rules will apply.

3.3.4 Minnesota Rule 8420.0544, as amended, when applicable, will supersede sections 3.3.1 and 3.3.2, for public transportation projects.

3.4 Wetland buffers

Any activity for which a permit is required under District rule 2.0, 4.0, 6.0, 7.0 or 8.0 or subsection 3.2.1 of this rule must provide buffer around the entirety of wetlands disturbed by the activity and on the portion of any wetlands downgradient from the activity, in accordance with the following criteria:

3.4.1 Subject to section 3.4.2, buffers must extend:
- a Average 60 feet from the edge of high-value[1] wetlands, minimum 30 feet;
- b Average 40 feet from the edge of medium-value wetlands, minimum 20 feet;
- c Average 20 feet from the edge of low-value wetlands, minimum 10 feet.

Buffer width averaging calculation will exclude any part of the buffer exceeding 200 percent of the buffer width as calculated in accordance with this paragraph.

3.4.2 Where a buffer encompasses all or part of a slope averaging 12 percent or greater over a distance of 50 feet or more upgradient of the wetland, calculated using a reasonably precise topographic surface model, the buffer must extend to the extent specified under section 3.4.1 or to the top of the slope, whichever is greater. An existing contour alteration or artificial structure on a slope constitutes a break in slope only if it will indefinitely dissipate upgradient velocity and trap upgradient pollutant loadings.

3.4.3 **Existing single-family residential properties:** Subsections 3.4.1 and 3.4.2 do not apply, and the exhibit requirements of section 3.6 do not apply, except that documentation of the extent and location of wetlands on the subject property must be submitted. When required on an existing single-family

[1] Wetland values will be determined in accordance with Appendix 3b, which is incorporated into and made a part of this rule.

home property, buffer must extend an average of 20 feet from the delineated edge of a wetland, minimum 10 feet. The buffer width averaging calculation will exclude any part of the buffer exceeding 40 feet in width.

a Where the District has documentation indicating the presence of wetland on a subject property, an applicant must substantiate the nonexistence of wetland via a determination of a qualified third-party or the District.

3.4.4 The buffer is only required on property owned by the applicant and that is the subject of the District permit, and is required where the wetland is either on or adjacent to the subject property.

3.4.5 A buffer must be indicated by permanent, free-standing markers at the buffer's upland edge, with a design and text approved by the District in writing. A marker must be placed along each lot line, with additional markers at an interval of no more than 200 feet. If a District permit is sought for a subdivision, the monumentation requirement will apply to each lot of record to be created. On public land or right-of-way, the monumentation requirement may be satisfied by the use of a marker flush to the ground or breakaway markers of durable material.

3.4.6 Wetland buffer areas created in compliance with this rule must be planted with native vegetation and maintained to retain natural resources and ecological value. Existing wetland buffer areas preserved in compliance with this rule must be managed in a naturalized condition to encourage growth of native vegetation and eliminate invasive species. Buffer vegetation must not be cultivated, cropped, pastured, mowed, fertilized, subject to the placement of mulch or yard waste, or otherwise disturbed, except for periodic cutting or burning that promotes the health of the buffer, actions to address disease or invasive species, mowing for purposes of public safety, temporary disturbance for placement or repair of buried utilities, or other actions to maintain or improve buffer quality, each as approved by the District in advance in writing or when implemented pursuant to a written agreement executed with the District. Pesticides and herbicides may be used in accordance with Minnesota Department of Agriculture rules and guidelines. No new structure or hard surface may be placed within a buffer. No fill, debris or other material may be excavated from or placed within a buffer. Boardwalks and trails designed for nonmotorized use and stormwater management facilities may be located within a buffer area upon approval of the District. Existing impervious surface that will not otherwise be disturbed need not be removed.

3.4.7 A buffer must be documented by a declaration or other document approved by the District, and recorded in the office of the county recorder or registrar. A buffer on public land or right-of-way may be documented in a written agreement executed with the District in lieu of a recorded document; the agreement must state that if the land containing the buffer is conveyed, the public body will require the buyer to comply with this subsection.

3.5 Stormwater treatment

Use of an existing or created wetland for stormwater treatment as part of a proposed development, redevelopment or other land-altering project regulated under District rules must comply with the following criteria:

3.5.1 Stormwater must be treated before discharge to a wetland.

a High-value wetlands cannot be used for stormwater management unless no other alternative is feasible. When permitted, any discharge to a high-value wetland must be treated to at least sixty percent (60%) annual removal efficiency for phosphorus and at least ninety percent (90%) annual removal efficiency for total suspended solids prior to discharge to the wetland.

3.6 Required information and exhibits

The following exhibits must accompany the permit application. Exhibits must be submitted in an electronic format acceptable to the District:

3.6.1 A wetland delineation, type determination and function and values assessment of pre- and post-disturbance wetland and replacement wetland using a methodology authorized under the Wetland Conservation Act. The delineation must be conducted by a wetland professional and supported by the following documentation:

a Identification of the delineation method used;

b Identification of presence or absence of normal circumstances or problem conditions;

c Basin classification using a Wetland Conservation Act-acceptable methodology;

d Wetland data sheets, or a report, for each sample site, referenced to the location shown on the delineation map. In each data sheet/report applicant must provide the reasoning for satisfying, or not satisfying each of the technical criteria and why the area is or is not a wetland;

e A delineation map showing the size, locations, configuration and boundaries of wetlands in relation to identifiable physical characteristics, such as roads, fence lines, waterways or other identifiable features;

f The location of all sample sites and stakes/flags must be accurately shown on the delineation map. Delineations submitted by applicants will normally be field-verified by District staff. Applicants must leave stakes in the field to aid review of the site. Wetland delineations should be performed during the normal growing season for this area of the State of Minnesota (April 15 - October 15). Delineations performed outside this time frame may or may not be permitted, depending on potential wetland impact in relation to the entire development or project.

3.6.2 Site plan showing:

a Property lines and corners and delineation of lands under ownership of the applicant.

b Existing and proposed elevation contours, including the existing runout elevation and flow capacity of the wetland outlet, and spoil disposal areas.
c Area of the wetland to be filled, drained or excavated.

3.6.3 A replacement plan, if required, outlining the steps followed for the sequencing process and including documentation supporting the proposed mitigation plan.

3.6.4 An erosion control plan complying with District Rule 5.0.

3.7 Exceptions

A District wetlands-management permit is not required:

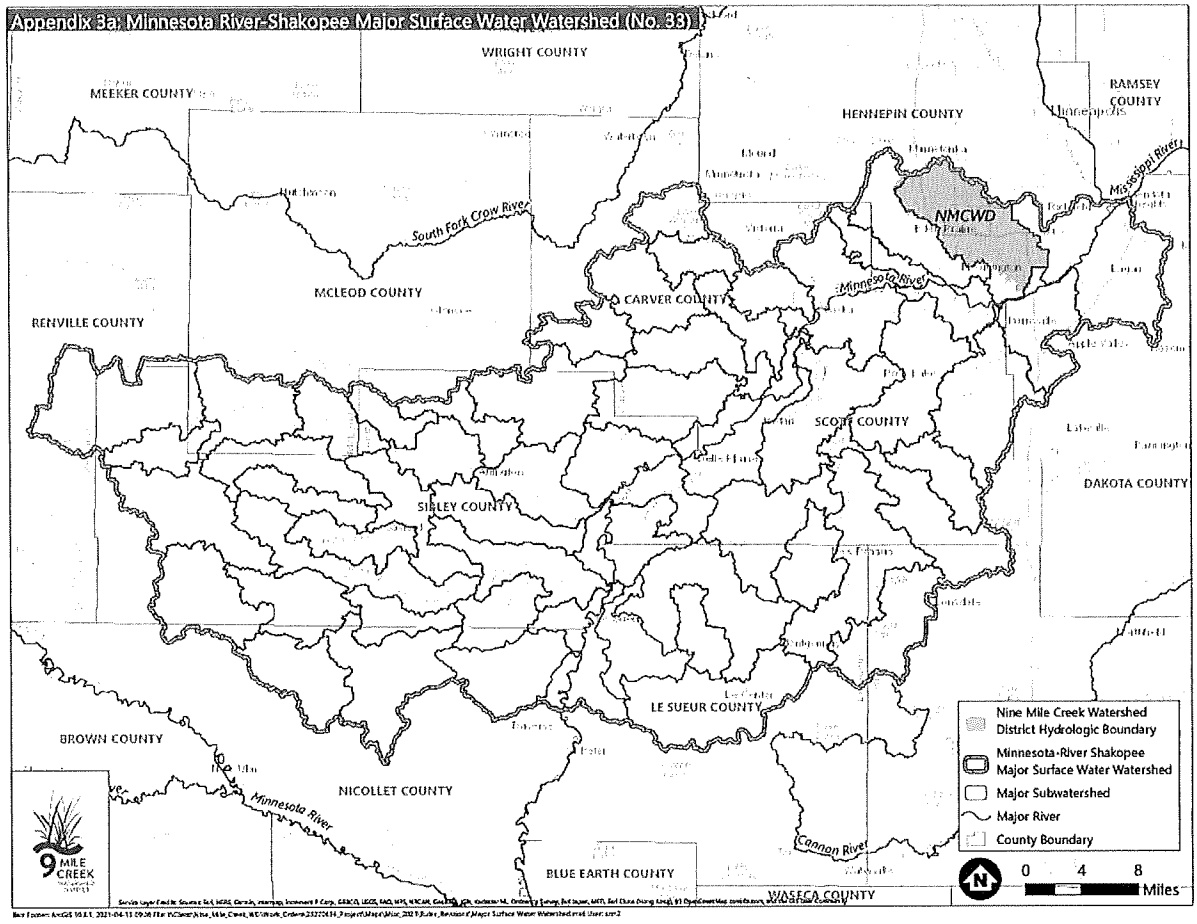
3.7.1 To create, restore or improve a wetland and/or buffer pursuant to a District-approved natural resources restoration management plan;

3.7.2 To plant native wetland or buffer vegetation;

3.7.3 To selectively remove or prune trees or vegetation that is diseased, noxious, invasive or otherwise hazardous.

3.7.4 To selectively prune trees to maintain health.

Appendix 3a: Minnesota River-Shakopee Major Surface Water Watershed (No. 33)



Appendix 3b: Wetlands definitions

High-value wetlands are those meeting one or more of the following rating levels, as determined by application of the current edition of the Minnesota Routine Assessment Method (MnRAM) or another wetlands-assessment method approved by the District. A wetland will not be rated a high-value wetland for purposes of application of Rule 3.0 – Wetlands Management merely because the wetland receives or is proposed to receive stormwater or snowmelt runoff.

Function or Value	Rating
Vegetative Diversity	Exceptional/High
Wildlife Habitat	Exceptional/High
Fish Habitat	Exceptional/High
Aesthetics/education/recreation/cultural AND Wildlife Habitat	Exceptional/High High/Medium
Stormwater Sensitivity AND Vegetative Diversity	Exceptional/High Medium or greater
Vegetative Diversity AND Maintenance of hydrologic regime	High/Medium High or greater

Medium-value wetlands are those that do not qualify as high value wetlands but that meet one or more of the following rating levels, as determined by application of the current edition of the Minnesota Routine Assessment Method or another wetlands-assessment method approved by the District.

Function or Value	Rating
Vegetative Diversity	Medium
Wildlife Habitat	Medium
Fish Habitat	Medium
Amphibian Habitat	Medium
Aesthetics/education/recreation/cultural AND Wildlife Habitat	Medium Low
Stormwater Sensitivity AND Vegetative Diversity	Medium Low
Vegetative Diversity AND Maintenance of Hydrologic Regime	Low Medium

Low-value wetlands are those do not qualify as high or medium value.

4.0 Stormwater Management

4.1 Policy

It is the policy of the District to regulate the management of stormwater runoff to:

4.1.1 Require that onsite and regional systems operate together to provide complete and effective runoff management, through the following principles:
- a Manage peak runoff rates to achieve rates equal to or below existing rates;
- b Manage runoff volume to achieve a net reduction from existing conditions;
- c Provide effective water quality treatment to remove sediment, pollutants and nutrients from stormwater and snowmelt before discharge to surface water bodies and wetlands; and
- d Provide for antidegradation of surface water bodies in the watershed.

4.1.2 Encourage designs that minimize impervious surface on a site.

4.1.3 Maximize opportunities to improve stormwater and snowmelt management presented by redevelopment of land.

4.1.4 Minimize impacts of chloride compounds on water resources by minimizing their use on roads, parking lots, sidewalks and other impervious surfaces.

4.2 Regulation

A permit from the District, incorporating an approved stormwater management plan, is required under this rule prior to the commencement of any activities to which this rule applies. The District may review a stormwater management plan at any point in the development of a regulated project and encourages project proposers to seek early review of plans by the District.

4.2.1 The requirements of this rule apply to:
- a Land-disturbing activities that will disturb 50 cubic yards or more of earth;
- b Land-disturbing activities that will disturb 5,000 square feet or more of surface area or vegetation; or
- c Subdivision of a property or properties into three or more residential lots.

4.2.2 Even if proposed land-disturbing activities fall into one or more of the categories in section 4.2.1, the requirements of this rule do not apply to:
- a Development, redevelopment or reconstruction on a single-family home site consistent with a subdivision, development or redevelopment plan implemented consistent and in accordance with an approved District permit, as long as applicable current District stormwater-management standards and requirements are achieved.
- b Rehabilitation, including mill and overlay, of paved surfaces.
- c Trails, sidewalks and retaining walls that do not exceed 10 feet in width and are bordered downgradient by a pervious area extending at least half the width of the trail, sidewalk or retaining wall.
- d Land-disturbing activities the NMCWD engineer determines will be

undertaken solely for the purposes of water-resources improvement or flood-damage reduction.

4.2.3 **Redevelopment**. For sites other than those subject to the linear (4.2.4) or single-family home (4.2.3a) provisions below, if proposed activity on a site will disturb more than 50 percent of the existing impervious surface on the site or will increase the imperviousness of the entire site by more than 50 percent, the stormwater criteria of section 4.3 will apply to the entire project site. Otherwise, the criteria of section 4.3 will apply only to the disturbed areas, replaced and net additional impervious surface on the project site. For purposes of this paragraph, disturbed areas are those where underlying soils are exposed in the course of redevelopment.

a **Redevelopment of single-family home properties.** For single-family home properties:

i If the proposed activity will increase total impervious surface by less than 50 percent or disturb less than 50 percent existing impervious areas, no demonstration of compliance with the criteria is required.

ii If the proposed activity will increase total impervious surface by 50 percent or more and will disturb 50 percent or more of the existing impervious surface on the site, the stormwater criteria will apply to the entire site.

4.2.4 **Linear projects**. A permit under this rule is required for a linear project that results in one acre or more of new and/or fully reconstructed impervious surface or that is part of contemporaneous and connected linear work that, in aggregate, creates one acre or more of new and/or fully reconstructed impervious surface area. A linear project for which a permit is required under this rule must provide stormwater management in accordance with subsection 4.3.3.

4.2.5 **Common scheme of development.** Activity subject to this rule on a site or adjacent sites under common or related ownership will be considered in the aggregate, and the requirements applicable to the activity under this rule will be determined with respect to all development and redevelopment that has occurred on the site or on adjacent sites under common or related ownership since the date this rule took effect (March 2008), except that development and redevelopment on single-family home properties is not subject to this subsection.

a For development or redevelopment under common or related ownership, compliance with the criteria of section 4.3 may be achieved through a shared stormwater management facility or facilities as long as the criteria are met for each contributing drainage area within the common or related ownership.

4.2.6 **Performance monitoring**. As a specific term in a permit, NMCWD may impose monitoring, performance evaluation, additional compliance measures or other requirements for the purposes of demonstrating that

performance standards are being met if the NMCWD engineer determines that the stormwater-management plan relies on insufficiently proven facilities.

4.3 Stormwater management standards

4.3.1 Except for sites qualifying as "restricted" under subsection 4.3.2, an applicant for a permit under this rule must demonstrate that the implementation of its stormwater management plan will:

a Provide for the retention onsite of 1.1 inches of runoff from the regulated impervious surface of the site;

i Where infiltration or filtration facilities, practices or systems are proposed, pretreatment of runoff must be provided.

ii Drawdown of water levels in infiltration and filtration facilities must be within 48 hours.

b Limit peak runoff flow rates to that from existing conditions for the 2-, 10- and 100-year frequency storm events using a nested 24-hour rainfall distribution for all collection points where stormwater discharge leaves the site; and

c Provide for at least 60 percent annual removal efficiency for total phosphorus and at least 90 percent annual removal efficiency for total suspended solids from site runoff.

i Onsite retention systems may be included in demonstrating compliance with the total suspended solids and total phosphorus removal requirements.

Where the NMCWD engineer concurs that existing site conditions make it infeasible for the applicant to meet the standards in paragraphs a and c through management of runoff from the regulated area of the site, runoff from an undisturbed area of the subject site that is and will remain in the same or a more intensive use and drains to the same receiving water(s) as the area to be disturbed may be retained and treated to meet the standards.

4.3.2 **Restricted sites.** Where the NMCWD engineer concurs that an applicant has demonstrated that the retention standard in paragraph 4.3.1a cannot practicably be met through a combination of onsite best management practices and relocation of project elements to address varying soil conditions and other site constraints, or that infiltration is reasonably likely to cause or exacerbate migration of underground contaminants, or that other conditions inherent to the site preclude retention to the standard in paragraph 4.3.1a, the applicant must provide rate control in accordance with the standard in paragraph 4.3.1b, and retention and water-quality protection in accordance with the following priority sequence:

a Retention of at least 0.55 inches of runoff from regulated impervious surface determined in accordance with the applicable provision of section 4.2 and stormwater treatment to the standard in paragraph 4.3.1c; or

b Retention of runoff onsite to the maximum extent practicable and stormwater treatment to the standard in paragraph 4.3.1c; or

c Off-site retention and treatment elsewhere within the Nine Mile Creek watershed or use of the NMCWD volume-banking program in section 4.4 to achieve the standards in paragraphs 4.3.1a and 4.3.1c.

4.3.3 **Linear projects.** For linear projects creating one acre or more of new impervious surface, the criteria of section 4.3.1 or 4.3.2, as applicable, apply to the net new impervious surface. For all other linear projects, an applicant must demonstrate that the implementation of its stormwater management plan will achieve rate control in accordance with subsection 4.3.1b and retain a volume of stormwater onsite that is the larger of either one inch times the new impervious surface or one-half inch times the sum of the new and the fully reconstructed impervious surface. If the required volume cannot be retained within the existing right-of-way, a reasonable attempt to obtain additional right-of-way or other rights to use adjacent land to manage stormwater must be demonstrated. Volume retention is not required if the necessary management facilities cannot be provided cost effectively. If additional right-of-way or other land-use rights cannot be obtained, the stormwater-management plan must provide rate control in accordance with subsection 4.3.1b and treatment of the required volume to the maximum extent practical prior to discharge from the site.

4.3.4 **Low-floor elevation.** All new and reconstructed buildings must be constructed such that the low floor is:

a At least two feet above the 100-year high water elevation or one foot above the natural overflow of a waterbody;

b At least two feet above the 100-year high water elevation of any open stormwater conveyance; and

c At least two feet above the 100-year high water elevation or one foot above the emergency overflow of a constructed facility.

In addition, a stormwater management facility must be constructed at an elevation that ensures that no adjacent habitable building will be brought into noncompliance with a standard in this subsection 4.3.3.

As an alternative to demonstrating compliance with the applicable freeboard requirement(s) above, an applicant may site a stormwater management facility relative to a new or reconstructed building (and vice versa) at a location set in accordance with Appendix 4a, "Low-Floor Elevation Assessment." Under any circumstances, all new and reconstructed buildings must be constructed such that no opening where surface flow can enter the structure is less than two feet above the 100-year high water elevation of an adjacent facility or waterbody.

d All buildings riparian to inundation areas or constructed or natural stormwater management facilities must be located and elevations must

be set according to Appendix 4a, "Low-Floor Elevation Assessment."

e **Landlocked basins.** Any new or reconstructed structure wholly or partially within a landlocked basin must be constructed such that its low-floor elevation is:

1 1 foot above the surface overflow of the basin, or

2 2 feet above the elevation resulting from two concurrent 100-year single rainfall events in a 24-hour period or a 100-year, 10-day snowmelt, whichever is higher.

3 The starting elevation of the basin prior to the runoff event must be established by one of the following:

A Existing ordinary high water elevation established by the Minnesota Department of Natural Resources;

B Annual water balance calculation approved by the District;

C Local observation well records, as approved by the District; or

D Mottled soil.

4.3.5 **Chloride management.** An applicant for a permit under this rule for land-disturbing activity on property other than single-family home sites must provide a plan for post-project management of chloride use on the site that includes, at a minimum:

a Designation of an individual authorized to implement the chloride-use plan; and

b Designation of a Minnesota Pollution Control Agency-certified salt applicator engaged in the implementation of the chloride-use plan for the site.

The chloride-management plan for a residential subdivision need not encompass the individual home properties within the subdivision.

4.3.6 **Maintenance.** Stormwater-management structures and facilities must be designed for maintenance access and properly maintained in perpetuity to assure that they continue to function as designed. Permit applicants must provide a maintenance and inspection plan that identifies and protects the design, capacity and functionality of onsite and offsite stormwater management facilities; specifies the methods, schedule and responsible parties for inspection and maintenance; provides for the inspection and maintenance in perpetuity of the facility, with documentation retained onsite and available to the District upon reasonable notice; and contains at a minimum the requirements in the District's standard maintenance declaration. For applications managing runoff through stormwater reuse, the maintenance plan must provide for the protection of greenspace to be irrigated or other land-use restrictions, as necessary, to ensure continuing treatment capacity. The plan must be recorded on the deed in a form acceptable to the District. A public entity assuming the maintenance obligation may do so by filing with the District an agreement signed by an official with authority.

4.3.7 Regional Stormwater Management

a General.

i. An applicant[2] may comply with the stormwater criteria for unrestricted sites in subsection 4.3.1 by providing equal or greater volume control, rate control or phosphorus and sediment control through a regional or subwatershed plan approved by the District. A regional plan must provide for an annual accounting to the District of treatment capacity created and utilized by projects or land-disturbing activities within the drainage and treatment area to which the plan pertains. District approval of a regional or subwatershed plan will be based on a determination that:

A The use of a regional facility/ies in place of onsite stormwater management is not reasonably likely to result in adverse impacts to local groundwater or natural resources located upstream of the regional facility/ies, including, for example, reduced water quality, altered wetland hydrology, changes to stream velocities or base flow, erosion or reduced groundwater recharge; and

B the plan incorporates onsite BMPs where necessary, to mitigate adverse impacts and provide local benefits not provided by the regional facility or facilities.

ii. Where an applicant demonstrates that it is not reasonably feasible to comply with the stormwater volume-retention requirements of subsection 4.3.1a for a defined region or subwatershed, the applicant(s) may submit a plan for stormwater management within the region that:

A Provides for compliance with the stormwater volume-retention criterion in 4.3.1a to the maximum extent practicable;

B provides for compliance with the rate-control and water-quality requirements in 4.3.1b and c;

C prevents degradation of downstream receiving water(s); and

D incorporates onsite BMPs where necessary, to mitigate adverse impacts and provide local benefits not provided by the regional facility or facilities.

The use of regional facilities in place of onsite stormwater management may not result in adverse impacts to local groundwater or natural resources located upstream of regional facilities, including, but not limited to, reduced water quality, altered wetland hydrology, changes to stream velocities or base flow, erosion, or reduced groundwater recharge.

[2] NMCWD anticipates that regional stormwater management plans will be submitted by cities on behalf of and with the authorization of landowners within a region, however applications for regional stormwater plan approval could also be submitted by coalitions of property owners.

b **Linear projects.** An applicant may comply with the stormwater criteria for linear projects in subsection 4.3.3 by providing equal or greater volume control, rate control or phosphorus and sediment control through a regional or subwatershed plan approved by NMCWD. A regional plan must provide for an annual accounting to NMCWD of treatment capacity created and utilized by projects or land-disturbing activities within the ROW to which the plan pertains. NMCWD approval of a regional or subwatershed plan will be based on a determination that:

i. The use of a regional facility/ies in place of onsite stormwater management is not reasonably likely to result in adverse impacts to local groundwater or natural resources located upstream of the regional facility/ies, including, for example, reduced water quality, altered wetland hydrology, changes to stream velocities or base flow, erosion or reduced groundwater recharge; and

ii the plan incorporates onsite BMPs where necessary, to mitigate adverse impacts and provide local benefits not provided by the regional facility or facilities.

4.4 Volume banking

The District has established and will maintain a bank of available runoff retention and water quality volume credits.

4.4.1 Volume reduction or runoff retention achieved onsite in excess of the requirement of paragraph 4.3.1a may be credited into the District's bank as volume credits for use on other projects within the District in accordance with paragraph 4.3.2c.

4.4.2 Stormwater-management facilities or practices relied upon to create volume credits must be included in the recorded permanent maintenance plan specified in subsection 4.3.5.

4.4.3 Volume credits may be utilized by permit applicants to meet the requirements of paragraphs 4.3.1a and 4.3.1c pursuant to paragraph 4.3.2c.

4.4.4 The District will maintain an inventory of all qualified volume credits accumulated and sold. Permit applicants are responsible for contacting a seller of volume credits and arranging the sale on terms established by the interested parties. The District will certify the sale through a form established by the District and completed by the buyer and seller of the volume credits.

4.4.5 If a project qualifies for use of volume credits but applicable volume credits are not available in the bank for the volume reduction required, the applicant must pay into the District's Stormwater Facilities Fund to cover the cost of implementing offsetting volume-reduction and water-quality projects elsewhere in the watershed. The required contribution rate will be set by the Board annually based on the cost of creation of the required retention capacity.

4.5 Required information and exhibits

The following exhibits must accompany the permit application. Exhibits must be submitted in an electronic format acceptable to the District:

4.5.1 A narrative explaining how options to minimize impervious area were evaluated during the development of the design for the project, the results of the evaluation of each and, for any techniques that were deemed infeasible, the reasoning for the determination.

4.5.2 Stormwater management system modeling in a form acceptable to the District and that utilizes the most recent applicable precipitation reference data (e.g., Atlas 14). For example, HydroCAD, SWMM, MIDS calculator, P8.

4.5.3 A site plan showing:

- a Property lines and delineation of lands under ownership of the applicant.
- b Existing and proposed elevation contours.
- c Identification of existing and proposed normal, and ordinary high and 100-year water elevations onsite.

4.5.4 A stormwater management plan including, at a minimum:

- a Proposed and existing stormwater facilities' location, alignment and elevation.
- b Delineation of existing wetlands, marshes, shoreland and/or floodplain areas onsite or to which any portion of the project site drains, except that where a project will not alter or change the hydrology of a wetland, the wetland need only be identified on the plan.
- c Geotechnical analysis including soil borings at all proposed stormwater management facility locations.
- d If infiltration of runoff is proposed, data must be submitted showing:
  - i No evidence of groundwater or redoximorphic soil conditions within 3 feet of the bottom of the facility, practice or system;
  - ii soil conditions within 5 feet of the bottom of any stormwater treatment facility, practice or system; and
  - iii if requested by the NMCWD engineer, site-specific infiltration capacity of soils at the of the bottom of the facility, practice or system.

  In addition, the NMCWD engineer may require submission of a phase I environmental site assessment and/or other documentation to facilitate analysis by the District of the suitability of the site for infiltration.
- e Construction plans and specifications for all proposed stormwater management facilities, including design details for outlet control structures.
- f Stormwater runoff volume and rate analyses for the 24-hour, 2-, 10- and 100-year critical events, existing and proposed conditions.
- g All hydrologic, water quality, and hydraulic computations completed to design the proposed stormwater management facilities.
- h Narrative addressing incorporation of retention BMPs.
- i Platting or easement documents showing sufficient drainage and ponding/flowage easements over hydrologic features such as floodplains,

storm sewers, ponds, ditches, swales, wetlands and waterways, if required by the municipality with jurisdiction.

j Documentation as to the status of the project's National Pollutant Discharge Elimination System stormwater permit, if applicable.

k If a stormwater harvest and reuse practice is proposed to meet applicable requirements, submission of:

i An analysis using a stormwater reuse calculator or equivalent methodology approved by the NMCWD engineer;

ii documentation of the adequacy of soils, storage capacity and delivery systems;

iii delineation of greenspace area to be irrigated, if applicable; and

iv a detailed irrigation or usage plan showing compliance with the District volume-retention requirements.

4.5.5 An applicant must demonstrate that it holds the legal rights necessary to discharge to any offsite stormwater facility or facilities used for compliance, and that the facility or facilities are subject to a maintenance document satisfying the requirements of subsection 4.3.5.

4.5.6 Upon completion of site work, a permittee must submit as-built drawings demonstrating that at the time of final stabilization, stormwater facilities conform to design specifications as approved by the District.

Appendix 4a: Low-Floor Elevation Assessment.
See p. 45.

5.0 Erosion and Sediment Control

5.1 Policy

It is the policy of the District to ensure management of land disturbances to:

5.1.1 Minimize erosion.

5.1.2 Alleviate identified erosion problems.

5.1.3 Minimize the duration and intensity of soil and cover disturbances.

5.1.4 Require local governments and developers to manage runoff effectively to minimize water quality impacts from new development, redevelopment and other land-disturbing activities.

5.1.5 Encourage Low Impact Development techniques and approaches.

5.1.6 Minimize compaction of soil from land-disturbing activities and encourage decompaction of soil compacted by land-disturbing activities.

5.2 Regulation

5.2.1 An erosion and sediment control permit must be obtained for any land-disturbing activities that will involve either of:

a excavation of 50 cubic yards or more of earth, or

b alteration or removal of 5,000 square feet or more of surface area or vegetation.

5.3 Criteria

5.3.1 Permit approval requires preparation of an erosion and sediment control plan that provides:

a protection of natural topography and soil conditions;

b temporary erosion and sediment control practices such as silt fencing, fiber logs, rock construction entrances, temporary seeding, erosion control blanketing using biodegradable materials and non-fixed joints, mulching, floatation silt curtains and other practices as specified by the District and consistent with the Minnesota Pollution Control Agency's "Protecting Water Quality in Urban Areas," as amended or updated, and the "Minnesota Stormwater Manual," as amended or updated;

c minimization of the disturbance intensity and duration, including phasing of site disturbance to minimize quantity of disturbed area at any one time;

d additional measures, such as hydraulic mulching and other practices as specified by the District, on slopes of 3:1 (H:V) or steeper to provide adequate stabilization;

e protection of stormwater facilities during construction;

f final site stabilization measures.

5.3.2 All construction site waste, such as discarded building materials, concrete truck washout, chemicals, litter and sanitary waste at the construction site will be properly managed and disposed of so they will not have an adverse

effect on water quality.

5.3.3 **Site stabilization**

a All temporary erosion and sediment control BMPs must be maintained until completion of construction and vegetation is established sufficiently to ensure stability of the site, as determined by the District.

b All temporary erosion and sediment control BMPs must be removed upon final stabilization.

c Soil surfaces disturbed or compacted during construction and remaining pervious upon completion of construction must be decompacted through soil amendment and/or ripping to a depth of 18 inches while taking care to avoid utilities, tree roots and other existing vegetation prior to final revegetation or other stabilization.

d All disturbed areas must be finally stabilized within 14 days of completion of land alteration.

5.3.4 **Inspection and maintenance**. The permit holder will be responsible for the inspection, maintenance and effectiveness of all erosion and sediment control facilities, features and techniques until final site stabilization. The permittee must, at a minimum, inspect, maintain and repair all disturbed surfaces and all erosion and sediment control facilities and soil stabilization measures every day work is performed on the site and at least weekly until land-disturbing activity has ceased. Thereafter, the permittee must perform these responsibilities at least weekly until vegetative cover is established. The permittee must maintain a log of activities under this section for inspection by the District on request. Between November 15 and snowmelt, and if site work ceases before completion for more than 14 consecutive days, the weekly inspection requirement of section 5.3.4 may be reduced to monthly if the site is managed such that:

a Exposed soils are stabilized with established vegetation, straw or mulch, matting, rock or other approved product such as rolled erosion control product. Seeding is encouraged, but is not alone sufficient.

b Temporary and permanent ponds and sediment traps are graded to capacity before spring snowmelt. This does not include infiltration/filtration facilities, which must be kept free of sediment until the site is fully stabilized.

c Sediment barriers are properly installed at necessary perimeter and sensitive locations.

d Slopes and grades are properly stabilized with approved methods. Rolled erosion control products must be used on steep slopes and where erosion conditions dictate.

e Stockpiled soils and other materials subject to erosion are protected by established vegetation, anchored straw or mulch, rolled erosion control product or other durable covering; a barrier prevents movement of eroded materials from the location.

f All construction entrances are properly stabilized.

g Snow management protects erosion and sediment control measures.

5.4 Required information and exhibits.

The following exhibits must accompany the permit application. Exhibits must be submitted in an electronic format acceptable to the District:

5.4.1 An application including:

a the name, address and telephone number(s) of all property owners;

b the name, address and telephone number(s) for all contractors undertaking land-disturbing activities as part of the proposed project;

c the signature of the property owner(s);

d a statement granting the District and its authorized representatives access to the site for inspection purposes;

e designation of an individual who will remain liable to the District for performance under this rule from the time the permitted activities commence until vegetative cover is established and the District has certified satisfaction with erosion and sediment control requirements.

5.4.2 An erosion and sediment-control plan including:

a topographic maps of existing and proposed conditions that clearly indicate all hydrologic features and areas where grading will expose soils to erosive conditions, as well as the flow direction of all runoff;

1 single-family home construction or reconstruction projects may comply with this provision by providing satellite imagery or an oblique map acceptable to the District;

b for all projects except construction or reconstruction of a single-family home, tabulation of the construction implementation schedule;

c name, address and phone number of the individual responsible for maintenance of all erosion and sediment control measures;

d clear identification of all temporary erosion and sediment control measures that will remain in place until vegetation is established;

e clear identification of all final erosion control measures and their locations;

f clear identification of staging areas, as applicable;

g delineation of any floodplain and/or wetland area changes;

h documentation as to the status of the project's National Pollutant Discharge Elimination System stormwater permit, if applicable.

6.0 Waterbody Crossings and Structures

6.1 Policy

It is the policy of the Board of Managers to discourage the use of beds and banks of waterbodies for the placement of bridges, utilities or other structures, and to protect the hydraulic capacity and floodplain of streams and drainage systems.

6.2 Regulation

No person may construct, improve, repair or remove a crossing in contact with or under, conduct horizontal drilling or directional boring under or remove a structure from the bed or bank of any waterbody in the District without first securing a permit from the District. Except that:

6.2.1 No NMCWD permit under this rule is required for activities conducted pursuant to a project-specific permit from the state Department of Natural Resources, but the NMCWD buffer requirements apply to activity that would otherwise require a NMCWD permit.

6.3 Criteria

6.3.1 Construction, improvement, repair or removal of a waterbody crossing in contact with the bed or bank of a waterbody:

- a Must retain adequate hydraulic capacity and assure no net increase in the flood stage of the pertinent waterbody;
- b Must retain adequate navigational capacity pursuant to any requirements of the waterbody's classification by the District;
- c Must not be reasonably likely to significantly adversely affect water quality, change the existing flowline/gradient, or cause increased scour, erosion or sedimentation;
- d Must provide post-project wildlife passage along each bank and riparian area by means that:
  - 1 account for wildlife that are native to the area or may be present; and
  - 2 conform to any requirements imposed by the District's classification of the waterbody; and
- e Must represent the 'minimal impact' solution to a specific need with respect to all other reasonable alternatives, based on analysis of at least two reasonable alternatives, one of which may be not undertaking the proposed work, except that in-kind replacement of utility crossings need not provide an alternatives analysis.

6.3.2 Projects involving directional boring or horizontal drilling must provide for minimum clearance of 3 feet below the bed of a waterbody and a minimum setback of 50 feet from any stream bank for pilot, entrance and exit holes.

6.3.3 Removal of structures or other waterway obstructions:

- a Must maintain the original cross-section and bed conditions to the greatest extent practicable;

b Must achieve complete removal of the structure, including any footings or pilings that impede navigation; and

c Must not involve the removal of a water-level control device.

6.3.4 Plans for the work must state that no activity affecting the bed of a protected water may be conducted between March 15 and June 15 on watercourses, or between April 1 and June 30 on all other public water waterbodies, to minimize impacts on fish spawning and migration.

6.3.5 A separate permit under District Rule 7.0 is not required for shoreline or streambank stabilization associated with a waterbody crossing or structure, but such stabilization must comply with the criteria 7.3.3c to e.

6.4 Required information and exhibits

The following exhibits must accompany the permit application. Exhibits must be submitted in an electronic format acceptable to the District:

6.4.1 Construction plans and specifications, certified by licensed professional engineer.

6.4.2 An analysis prepared by a licensed professional engineer or qualified hydrologist showing the effect of the project on hydraulic capacity and water quality.

6.4.3 An erosion control and site restoration plan.

6.5 Maintenance

Crossings in contact with the bed or bank of a waterbody must be maintained in good repair at all times to ensure continuing adequate hydraulic and navigational capacity; to assure no net increase in the flood stage; to prevent adverse effects to water quality, changes to the existing flowline/gradient, and increased scour, erosion or sedimentation; and to minimize the potential for obstruction of the waterbody. A declaration or other recordable document stating terms for maintenance of a crossing and approved by the District must be recorded. In lieu of recordation, a public permittee or a permittee without a property interest sufficient for recordation may assume the maintenance obligation by means of a written agreement with the District. The agreement must state that if the ownership of the structure is transferred, the public body will require the transferee to comply with this section.

7.0 Shoreline and Streambank Improvements

7.1 Policy

It is the policy of the Board of Managers to prevent erosion of shorelines and streambanks, and to foster the use of natural materials and bioengineering for the maintenance and restoration of shorelines.

7.2 Regulation

No person may install a shoreline or streambank improvement, including but not limited to riprap, a bioengineered installation or a retaining wall, on a public water without first securing a permit from the District. Except that no NMCWD permit under this rule is required for:

7.2.1 Activities conducted pursuant to a project-specific permit from the state Department of Natural Resources, but the NMCWD buffer requirements apply to activity that would otherwise require a NMCWD permit;

7.2.2 activities in incidental wetlands or for utility improvements or repairs that are the subject of a no-loss determination or utility exemption from the relevant LGU;

7.2.3 removing accumulated sediment from a water basin; or

7.2.4 planting of vegetation not intended to provide deep soil structure stability.

7.3 Criteria

7.3.1 An applicant for a shoreline alteration permit must demonstrate a need to prevent shoreline erosion or restore eroded shoreline or streambank.

a Placement of riprap for merely cosmetic purposes is prohibited.

7.3.2 An applicant must first consider maintenance or restoration of shoreline or streambank using bioengineering. If bioengineering cannot provide stabilization, a combination of riprap and bioengineering may be used to restore or maintain shoreline or streambank. If a combination of riprap and bioengineering cannot provide stabilization within a reasonable period, riprap may be used to restore or maintain shoreline or streambank.

a A retaining wall may not extend below the OHWL, except where:

1 there is a demonstrable need for a retaining wall in a public improvement project, and

2 the design of the retaining wall has been certified by a licensed professional engineer.

7.3.3 **Riprap**.

a Riprap to be used in shoreline erosion protection must be sized appropriately in relation to the erosion potential of the wave or current action of the particular water body, but in no case may the riprap rock average less than six inches in diameter or more than 30 inches in diameter. Riprap must be durable, natural stone and of a gradation that will result in a stable shoreline embankment. Stone, granular filter and

geotextile material must conform to standard Minnesota Department of Transportation specifications, except that neither limestone nor dolomite may be used for shoreline or stream bank riprap, but may be used at stormwater outfalls. All materials used must be free from organic material, soil, clay, debris, trash or any other material that may cause siltation or pollution.

b Riprap must be placed to conform to the natural alignment of the shoreline.

c A transitional layer consisting of graded gravel, at least six inches deep, and, where appropriate, a geotextile filter fabric must be placed between the existing shoreline and any riprap. The thickness of riprap layers should be at least 1.25 times the maximum stone diameter. Toe boulders, if used, must be at least 50 percent buried.

d Riprap must not cover emergent vegetation, unless authorized by a Department of Natural Resources permit.

e Riprap may extend no higher than the top of bank or two feet above the 100-year high water elevation, whichever is lower.

7.3.4 **All shorelines and streambanks.**

a The finished slope of any shoreline must not be steeper than 3:1 (horizontal to vertical), unless approved by the NMCWD engineer based on specific site conditions.

b Horizontal encroachment from a shoreline must be the minimal amount necessary to permanently stabilize the shoreline and must not unduly interfere with water flow or navigation. No riprap or filter material may be placed more than six feet waterward of the OHWL. Streambank riprap may not reduce the cross-sectional area of the channel or result in a stage increase of more than 0.01 feet at or upstream of the treatment.

c The design of any shoreline erosion protection must reflect the engineering properties of the underlying soils and any soil corrections or reinforcements necessary. The design must conform to engineering principles for dispersion of wave energy and resistance to deformation from ice pressures and movement, considering prevailing winds, fetch and other factors that induce wave energy.

7.4 Required information and exhibits

The following exhibits must accompany the permit application. Exhibits must be submitted in an electronic format acceptable to the District:

7.4.1 A site plan, showing:

a Conditions establishing, to the satisfaction of the District, existing erosion or the potential for erosion;

b the existing OHWL contour, existing shoreline or streambank, floodplain elevation and location of property lines;

c elevation contours of the upland within 15 feet of the OHWL and referenced to accepted datum; and

d plan view of locations and lineal footage of the proposed riprap.

The plan must show the location of an upland baseline parallel to the shoreline with stationing. The baseline must be staked in the field by the applicant and maintained in place until project completion. Baseline origin and terminus each must be referenced to three fixed features measured to the closest 0.05 foot, with measurements shown and described on the plan. Perpendicular offsets from the baseline to the OHWL must be measured and distances shown on the plan at 20-foot stations. The plan must be certified by a licensed professional engineer or licensed surveyor.

7.4.2 A construction plan and specifications, showing:

a A sequencing analysis in compliance with section 7.3.2;
b materials to be used, including the size(s) of any riprap to be used;
c cross section detailing the proposed riprap, if any, drawn to scale, with the horizontal and vertical scales noted on the drawing. The detail should show the finished riprap slope, transitional layer design and placement, distance lake-ward of the riprap placement and OHWL;
d description of the underlying soil materials; and
e material specifications for stone, filter material and geotextile fabric.

7.4.3 An erosion control and site restoration plan.

8.0 Sediment Removal

8.1 Policy

It is the policy of the Board of Managers to regulate the removal of sediment from public waters to mitigate the impacts of stormwater sediment transport and deposition.

8.2 Regulation

No person may remove sediment from the beds, banks or shores of any public water by any means without first securing a permit from the District. Except that:

8.2.1 No NMCWD permit under this rule is required for activities conducted pursuant to a project-specific permit from the state Department of Natural Resources, but the NMCWD buffer requirements apply to activity that would otherwise require a NMCWD permit.

8.3 Criteria

Sediment removal from the beds, banks or shores of any public water for navigation purposes must be demonstrated to be the minimal impact solution to achieve reasonable navigational access. Removal of accumulated sediment at stormwater outfalls may be permitted upon submittal of an application meeting the following criteria:

8.3.1 Removal of sediment must not alter the original alignment, slope or cross-section of the beds, banks or shores of any public water.

8.3.2 Any excavated materials storage or disposal sites must be identified and shown to be:

- a Not below the OHWL of a public water, public water wetland or wetland subject to the Wetland Conservation Act;
- b Not in floodplain; and
- c Not subject to erosion or likely to cause re-deposition of the sediment to an adjacent water body, stormwater facility or storm sewer.

8.3.3 Degradation or erosion of the banks or bed of the subject water body by entry of equipment must be avoided.

8.3.4 Where determined necessary by the District to protect water quality, a floatation silt curtain must be placed around the sediment-removal site and maintained for the duration of the project.

8.3.5 Plans for the work must state that no activity affecting the bed of a protected water may be conducted between March 15 and June 15 on watercourses, or between April 1 and June 30 on all other public water waterbodies, to minimize impacts on fish spawning and migration.

8.4 Required information and exhibits

The following exhibits must accompany the permit application. Exhibits must be submitted in an electronic format acceptable to the District:

8.4.1 A site plan, showing:
- a Delineation of the work area;
- b Property lines;
- c Ordinary high-water elevation; and
- d 100-year flood elevations.

8.4.2 Profile, cross sections and/or topographic contours (at intervals of no more than 1 foot) showing existing and proposed elevations and proposed side slopes in the work area.

8.4.3 In the case of projects using hydraulic means of sediment removal and onsite spoil containment, the applicant must provide:
- a Cross-section of the proposed dike;
- b Stage/storage volume relationship for the proposed spoil containment area;
- c Detail of any proposed outlet structure, showing size, description and invert elevation;
- d Stage/discharge relationship for any proposed outlet structure from the spoil containment area; and
- e Site plan showing the locations of any proposed outlet structure and emergency overflow from the spoil containment area.

8.4.4 A site plan showing the proposed location of floating silt curtain(s).

8.4.5 Supporting data:
- a Description and volume computation of material to be removed;
- b Description of equipment to be used;
- c Construction schedule;
- d Location map of spoil containment area;
- e Erosion control plan for containment area;
- f Restoration plan for any proposed permanent on-site spoil containment site showing final grades, removal of control structure, and a description of how and when the site will be restored, covered or revegetated after construction;
- g Detail of any proposed floating silt curtain including specifications.

8.5 Fast-track public project approval

A public entity may obtain a permit for removal of between 20 cubic yards or less of sediment from a public waterbody at a stormwater system outlet or similar structure on 48 hours' advance notice to the District, identifying the location of the removal. The removal must comply with all criteria in section 8.3.

9.0 Appropriation of Public Surface Waters

9.1 Policy

It is the policy of the Board of Managers to regulate the appropriation of public waters.

9.2 Regulation

A permit from the District is required to appropriate up to 10,000 gallons per day and up to 1,000,000 per year of water for a nonessential use from:

9.2.1 A public water basin or wetland within the District that is less than 500 acres in surface size; or

9.2.2 A protected watercourse that has a drainage area of less than 50 square miles.

9.3 Criteria

An appropriation of public water permitted under this rule must not lower the water level in the basin or watercourse to an extent that would deprive the public and riparian property owners of reasonable use of and access to the water. In addition, the appropriation must:

9.3.1 Be reasonable and practical with regard to alternative sources of water or methods available, including use of water appropriated during high flows and levels and stored for later use and the use of ground water, to attain the appropriate objective;

9.3.2 Include the utilization of water storage and reuse and conservation practices;

9.3.3 Be subject to restriction, at any time, to meet instream flow needs or protect basin water levels.

9.4 Required Information and Exhibits

An applicant for a permit under this rule must provide:

9.4.1 Written evidence of ownership, control of, or a license to use the land abutting the surface water source from which water will be appropriated.

9.4.2 A completed application showing:

a Applicant address;

b Applicant email address;

c Purpose of the requested appropriation;

d Source of water;

e Amount of water to be appropriated on a maximum daily, monthly and annual basis;

f Means, methods, and techniques of appropriation;

g Proposed pumping schedule, including rates, times and duration;

h Alternative sources of water considered and reasons why the proposed source was selected;

i Analysis of the hydraulic and hydrological effect of the proposed appropriation on levels and flows and anticipated impacts, if any, on

instream flow or lake level conditions to the extent that such facts are not already available to the District;

j Information on any water storage facilities and capabilities and any proposed reuse and conservation practices;

k A contingency plan or an agreement to accept no appropriation in the event of restrictions; and

l For an appropriation from a basin, proof that the applicant has notified all riparian landowners of the proposed appropriation and signed statements from as many riparian landowners as the applicant is able to obtain stating support of the proposed appropriation, along with an accounting of number of signatures of riparian owners the applicant is unable to obtain.

10.0 Variances and Exceptions

10.1 Variances

The Board of Managers may consider requests for variances from strict compliance with the requirements of a District rule. To grant a variance, the Board of Managers must find, based on demonstration by the applicant:

10.1.1 That because of unique conditions inherent to the subject property, which do not apply generally to other land or structures in the District, undue hardship on the applicant, not mere inconvenience, will result from strict application of the rule;

10.1.2 That the hardship was not created by the landowner, the landowner's agent or representative, or a contractor, and is unique to the property. Economic hardship alone may not serve as grounds for issuing a variance if any reasonable use of the property exists under the terms of the District rules;

10.1.3 That the activity for which the variance is sought will not materially adversely affect water resources, flood levels, drainage or the general welfare in the District; and

10.1.4 That there is no feasible and prudent alternative to the proposed activity requiring a variance.

10.2 Exceptions

The Board of Managers may approve an exception from a provision of the rules requiring a particular treatment or management strategy, or setting forth a design specification, if an applicant demonstrates that better natural resource protection or enhancement can be achieved by the project as proposed, with such further conditions as the Board of Managers may impose, than would strict compliance with the provision.

10.3 Violation

A violation of any condition of a permit approved with a variance constitutes grounds for termination of the variance.

11.0 Permit Fees

11.1 Policy

It is the determination of the Board of Managers that:

11.1.1 Charging a minimal permit application fee will increase public awareness of and compliance with District permitting requirements, and will reduce enforcement and inspection costs;

11.1.2 The public interest will benefit from inspection by District staff of certain large-scale projects in locations presenting particular risk to water resources to provide the Board of Managers with sufficient information to evaluate compliance with District rules and applicable law, and the District's annual tax levy should not be used to pay such costs; and

11.1.3 From time to time persons perform work requiring a permit from the District without a permit, and persons perform work in violation of an issued District permit. The Board of Managers determines that its costs of inspection and analysis in such cases will exceed such costs where the applicant has complied with District requirements. The Board of Managers further concludes that its annual tax levy should not be used to pay costs incurred because of a failure to meet District requirements but rather such costs should be recovered from the responsible parties.

11.2 Requirement

The District will charge applicants permit fees in accordance with a schedule that will be maintained and revised from time to time by resolution of the Board of Managers to ensure that permit fees cover the District's actual costs of administrating and enforcing permits and the actual costs related to field inspections of permitted projects, such as investigation of the area affected by the proposed activity, analysis of the proposed activity, services of a consultant and any required subsequent monitoring of the proposed activity. Costs of monitoring an activity authorized by permit may be charged and collected as necessary after issuance of the permit. The fee schedule may be obtained from the District office or the District's web site at http://www.ninemilecreek.org. A permit applicant must submit the required permit fee to the District at the time it submits the relevant permit application. The fee provided for in this Rule will not be charged to any agency of the United States or of any governmental unit or political subdivision of the State of Minnesota.

12.0 Financial Assurances

12.1 Policy

It is the policy of the District to protect and conserve the water resources of the District by requiring a bond or other financial performance assurance with a permit application to ensure adequate performance of the authorized activities and compliance with the District rules.

12.2 Requirement

The District may require a performance bond, letter of credit or other financial assurance in a form approved by the District for an activity regulated under these rules. A performance financial assurance will not be required of any agency of the United States or of any governmental unit or political subdivision of the State of Minnesota.

12.3 Criteria

Financial assurances required pursuant to this rule must be issued in compliance with the following criteria:

12.3.1 The financial assurance must be a performance bond, letter of credit, cash deposit or other form acceptable to the District, and a commercial financial assurance must be from an issuer licensed and doing business in Minnesota. Financial assurance templates may be obtained from the District web site (www.ninemilecreek.org) and also are available from the District office.

12.3.2 The financial assurance must be issued in favor of the District and conditioned upon the applicant's performance of the activities authorized in the permit in compliance with the terms and conditions of the permit and all applicable laws, including the District's rules, and payment when due of any fees or other charges authorized by law, including the District's rules. The financial assurance must state that in the event the conditions of the financial assurance are not met, the District may make a claim against it. In the event that the District makes a claim against a financial assurance, the full amount of the financial assurance required must be restored within 45 days.

12.3.3 The financial assurance must be effective for at least three years from the date of issuance and must contain a provision that it may not be canceled without at least thirty (30) days prior written notice to the District.

12.3.4 The financial assurance must be submitted by the permit applicant, but the financial assurance principal may be either the landowner or the individual or entity undertaking the proposed activity.

12.3.5 No financial assurance will be released except pursuant to the terms of section 12.4.

12.3.6 No interest will be paid on financial assurances held by the District.

12.3.7 The amounts of financial assurances required by the District will be set by the Board of Managers by resolution. The schedule of financial assurance

amounts will be maintained on the District website (www.ninemilecreek.org) and also will be available from the District office. Financial assurance amounts will be set as necessary to cover the following potential liabilities to the District:

a field inspection, monitoring and related fees authorized under Minnesota Statutes section 103D.345;
b the cost of maintaining and implementing erosion and sediment control and other protective measures required by the permit;
c the cost of planting and establishing buffer area;
d the cost of remedying damage resulting from noncompliance with the permit or for which the permittee is otherwise responsible.

12.3.8 When a cash escrow is to be provided to fulfill a District financial assurance requirement, the permittee/escrow provider will be required as a condition of permit issuance, transfer or renewal to enter into a cash escrow agreement with the District. Permit approval may be revoked for failure to comply with this requirement. A cash escrow agreement template will be maintained on the District website (www.ninemilecreek.org) and also will be available from the District office.

12.4 Financial Assurance Release

On written notification of completion of a project and submission of the chloride-management plan pursuant to subsection 4.3.4, if applicable, the District will inspect the project to determine if the project has been constructed in accordance with the terms of the permit and District rules. If the project is completed in accordance with the terms of the permit and District rules, the permittee has submitted any documentation or other records necessary to demonstrate and confirm that required facilities, features or systems have been constructed or installed and are functioning as designed and permitted, and there is no outstanding balance for unpaid permit fees, the District will release the financial assurance.

12.4.1 Final inspection compliance constituting grounds for financial assurance release includes, but is not limited to:

a demonstration by the permittee and confirmation by the District that the site has been vegetated and stabilized to prevent erosion and sedimentation per subsection 5.3.3 and that erosion and sedimentation controls have been removed;
b demonstration and confirmation that stormwater management features have been constructed or installed and are functioning as designed and permitted;
c payment of all outstanding fees to the District.

The District may return a portion of the financial assurance if it finds that the entire amount is no longer required to ensure compliance with the permit conditions and District rules. If the District has not inspected the project and made a determination about the project's compliance with the above criteria within 45 days of District

receipt of written notification of project completion, the financial assurance is deemed released unless the District notifies the permittee that final inspection compliance matters remain outstanding. In the event that a financial assurance is released through expiration of the time for confirmation of final inspection compliance, the District will provide a writing releasing the financial assurance if needed to meet the issuer's requirements.

13.0 Enforcement

13.1 Investigation of noncompliance

District staff and agents may enter and inspect a property in the watershed to determine whether a violation of one or more District rules, a permit or an order exists or whether land-disturbing activities have been undertaken in violation of District regulatory requirements.

13.2 Board hearing; administrative compliance order

A property owner or permittee will be provided with reasonable notice of a compliance hearing and an opportunity to be heard by the Board of Managers on a finding of probable violation and failure of the property owner to apply for a permit or a permittee to take necessary corrective steps. At the conclusion of a hearing, the District may issue a compliance order. A District compliance order may require a property owner to apply for an after-the-fact permit and/or effect corrective or restorative actions. A District compliance order may require that land-disturbing activities on the property cease until corrective or restorative actions take place.

13.3 District court enforcement

The Board of Managers may seek judicial enforcement of an order and recovery of associated legal costs and fees, as provided by Minnesota Statutes chapter 103D, through a civil or criminal action pursuant to Minnesota Statutes sections 103D.545 and 103D.551.

13.4 Liability for enforcement costs

The permittee or owner of a property that is the subject of District enforcement action will be liable for associated costs incurred by the District, including but not limited to the costs of inspection and monitoring of compliance, engineering and other technical analysis, legal fees and costs, and administrative expenses.

Appendix 4a: Low Floor Elevation Assessment

Overview of Lowest Floor Issue

There seems to be two reasons for establishing a minimum lowest floor elevation in the vicinity of a pond – to prevent flooding of the structure by surface water and to prevent seepage or damage from uplift pressures that could result from a rise in the water table elevation. The first reason (direct flooding) can easily be established with knowledge of the maximum flood elevation of a pond (or the 100-year elevation, if this is used) and ground surface topography. The second reason (a rise in the water table due to increased pond elevations) is not so straight forward. This second area is the subject of this memo.

When a formerly dry pond becomes wet (or when a wet pond's water elevation increases) due to a storm event, downward seepage of the ponded water begins. The rate of seepage through the bottom of the pond is dependent upon:

1) The elevation of the water surface above the pond bottom
2) The soil type at the bottom of the pond (i.e. the pond bottom's thickness and permeability)
3) The type of soil underneath the pond (e.g., clay, silt, sand, gravel)
4) The degree of saturation of the soils beneath the pond
5) The depth to the water table

In general, higher seepage through the bottom of the pond will occur when the water surface elevation is high, the pond's bottom sediments are thin and/or sandy, the soils underneath the pond are permeable (such as sand or gravel), the soils underneath the pond have a high moisture content (i.e, they are at field capacity or higher), and the water table is well below the bottom of the pond (i.e. the soils are freely draining).

Higher seepage rates through the bottom of the pond will cause the water table elevation to rise by creating a "mounding condition" below the pond. How high and how widespread the water table mound becomes are contributing factors to whether or not basements will be affected. *However, the single most important factor that will determine if seepage from a pond will cause wet basement problems is the depth to the water table, below the basement.*

The magnitude and extent of the groundwater mounding conditions is also contingent upon the aquifer's transmissivity (aquifer permeability multiplied by aquifer thickness), the specific yield of the aquifer materials, and the duration of the high water levels in the pond. In general, thicker aquifers with higher permeability will experience less mounding than thinner aquifers of lower permeability. Perched aquifers (i.e. groundwater zones less than about 10 feet that overlie extensive clay layers) typically experience the greatest amount of mounding.

Overview of Variance Evaluation Method

All of the combinations of settings, pond configurations, aquifer parameters, and distances from ponds cannot be anticipated beforehand in coming up with a method to quickly evaluate whether or not a variance to the minimum floor elevation ordinance should be considered. However, by making some generalities, the most commonly encountered situations can be evaluated. This is the approach taken here.

A groundwater flow model of a "typical" pond and aquifer setting was developed. Aquifer parameters and pond elevations were varied and the resulting water table mounding conditions were simulated. The following conditions were evaluated:

1. Pond elevation increases of 2 feet, 4 feet, and 6 feet above normal or dry conditions.
2. Depth to the water table (before flooding) of 3 feet (to represent conditions of 3 feet or less) and 10 feet (to represent conditions where the depth to the water table is greater than 3 feet). The purpose of simulating these two conditions is that with shallow water tables, the rate of infiltration is substantially reduced as the groundwater mound rises into the pond. For deeper aquifer conditions, the pond bottom is always above the water table and the depth to the water table has no bearing on the seepage rate.
3. Three aquifer conditions: clay or perched aquifers (transmissivities of 7 ft^2/day and specific yield values of 0.1); silt aquifers (transmissivity of 70 ft^2/day and specific yield values of 0.2) and sand and gravel aquifers (transmissivities of 2000 ft^2/day and specific yield values of 0.2).
4. Pond bottom sediment thickness of 1 feet and bottom sediment hydraulic conductivity of 1 ft/day.
5. Instantaneous occurrence of a flood condition in the pond, which lasts for 25 days, followed by instantaneous reduction to normal conditions. The purpose of using this condition is that the effects of aquifer storage (specific yield) are taken into account. A duration of 25 days was selected as being a reasonable time period of flood conditions.
6. Increases in the water table elevation were recorded at several distances between 5 feet and 200 feet from the pond. The maximum rise during the modeled period was selected for plotting.

The U.S. Geological Survey's groundwater modeling code, MODFLOW, was used for this analysis.

How to Determine if a Variance is Warranted

In order to determine if a proposed lowest floor elevation is acceptable, the following need to be known:

1. Depth to the water table and an estimation of the water table's seasonally high elevation.

2. Type of aquifer materials – e.g., clay, silt, sand, gravel
3. Information as to whether or not the water table is perched or is part of a deeper, thicker aquifer system.
4. An estimate of the flood elevation of the pond.
5. The distance of the proposed floor to the pond.

Depth to the water table and the type of aquifer material needs to be determined through the installation of soil borings. The other information should be estimated from other sources.

Once this information is obtained, the minimum depth to the water table from the bottom of the proposed floor slab can be determined from one of six plots, attached to this memorandum. Which of the six plots to use depends on the depth of the water table with respect to the pond's bottom and the type of aquifer material (e.g., clay, silt, sand, gravel). The following steps should be used:

1. Determine the closest distance of the proposed floor to the pond (if the pond size increases during flooding, the distance should be from the flooded perimeter of the pond to the proposed floor).
2. Using Plot 1, determine the minimum permissible depth to the water table for the specified distance from the pond. If the actual depth to the water table (see discussion below for determining this) is greater than the value on Plot 1, no further evaluation is necessary – the floor is sufficiently high with respect to the water table that the water table will not reach the bottom of the slab, regardless of the soil type or transmissivity. If the depth to the water table is less than the value from Plot 1, further evaluation is necessary.
3. If the soil type of the aquifer, below the water table, is mostly clay OR if the aquifer is perched (a continuous clay layer is less than 5 feet below the water table), Plot 2 must be used. The appropriate pond level increase (2, 4, or 6 feet) for flood conditions must be used in Plot 2 to find the minimum permissible depth to the water table. If the depth to the water table from Plot 2 is less than the actual depth to the water table, the proposed floor elevation is too low and must be raised to equal the value from Plot 2.
4. If the soil type of the aquifer is mostly silt AND the pond bottom is 3 feet or less above the water table, Plot 3 should be used.
5. If the soil type of the aquifer is mostly sand or gravel AND the pond bottom is 3 feet or less above the water table, Plot 4 should be used.
6. If the soil type of the aquifer is mostly silt AND the pond bottom is 3 feet or more above the water table, Plot 5 should be used.
7. If the soil type of the aquifer is mostly sand or gravel AND the pond bottom is 3 feet or more above the water table, Plot 6 should be used.

The values from the plots are guidelines, based on typical conditions. If the plots indicate the proposed floor elevation is too low, additional analyses and data collection could be pursued by the applicant. These additional analyses could include additional soil borings, long-term monitoring of piezometers, or more sophisticated modeling.

Determining Depth to the Water Table

If a variance to a lowest floor elevation ordinance is to be considered, the depth to the water table at the location in question must be known. Without this knowledge, there cannot be a technical basis for approving a variance. Furthermore, the applicant should demonstrate that the measured water-table elevation is both representative of conditions over the entire floor area and is representative of values typical for seasonally high conditions (e.g. spring conditions). A suggested requirement for collecting this information is the following:

1) A minimum of two soil borings shall be installed at or near the perimeter of the lowest floor. At least one of these borings shall be where the floor is closest to the nearest pond.

2) Soil borings shall extend to a depth of at least 7 feet below the water table. The borings shall be left open for a time sufficient to determine the stabilized water level in the borehole. The water level shall be measured with reference to a known bench mark that can relate the water table elevation to the proposed floor elevation. Soils at or immediately below the water table shall be sampled and texturally classified using an approved classification method.

Water levels measured during dry summer months or during the winter may be lower than water levels during the spring. The applicant should be required to make an effort to determine the likely amount of seasonal fluctuation in the water table in the area. Water level records from wells completed in the area could be used. If information is unavailable, the applicant should be required to add a value to the measured water table elevation. One suggestion would be to assume 25% of the total annual precipitation (29 inches), divided by the average effective porosity for non-cohesive soils (0.3), which is:

(29 inches/4) x (1 foot/12 inches)/0.3 = 2 feet

If the seasonally adjusted maximum water-table elevation is eight (8) feet or below the bottom of the slab of the lowest floor, it is unlikely that temporary flood conditions in the pond will cause the water table to rise to the level of the floor.[3]

Determining Soil Type at the Water Table

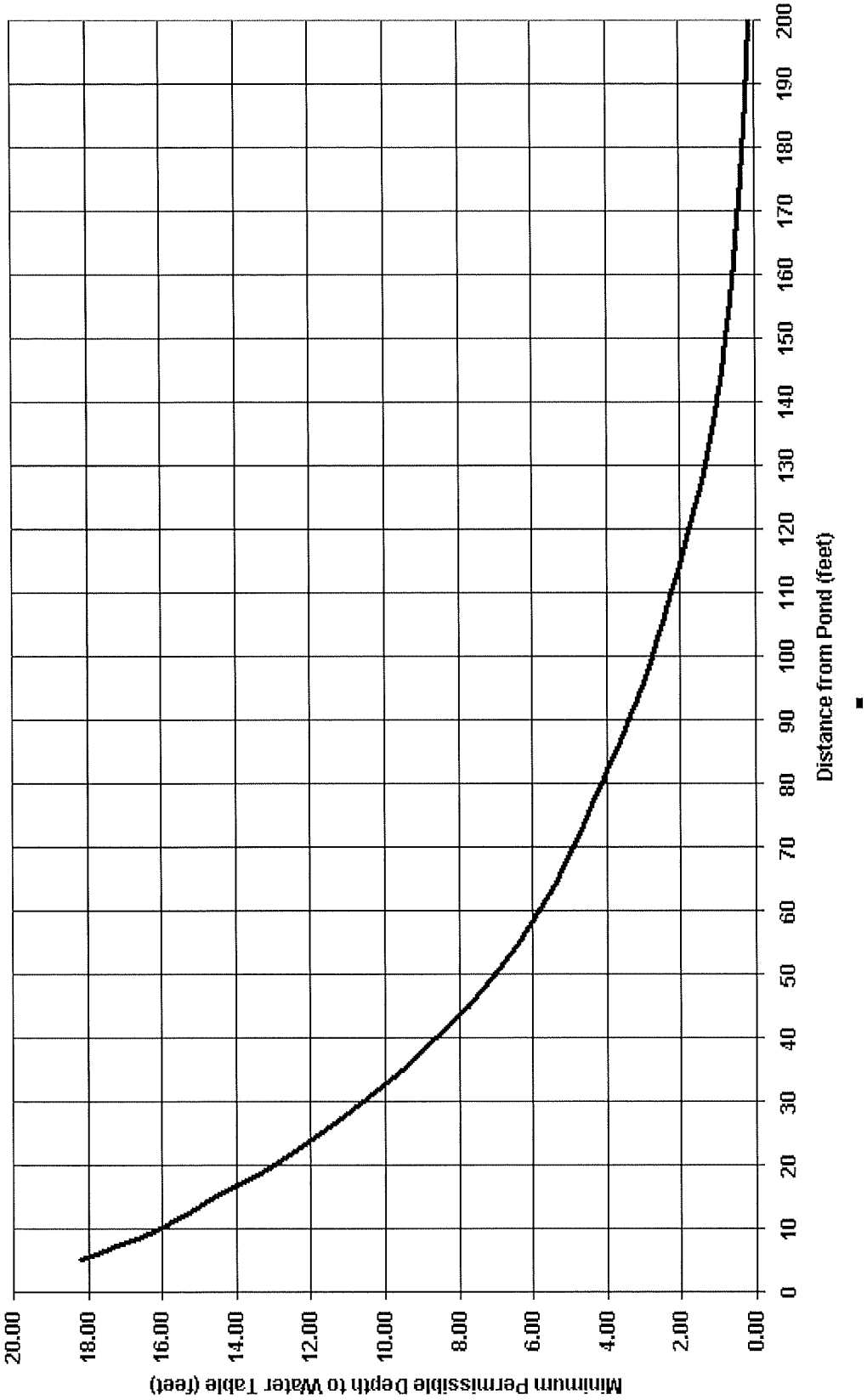
The textural classification from the soil borings will be necessary for determining the expected rise in the water table caused by an increase in pond elevation. At a minimum, the soil should be classified as one of the following:

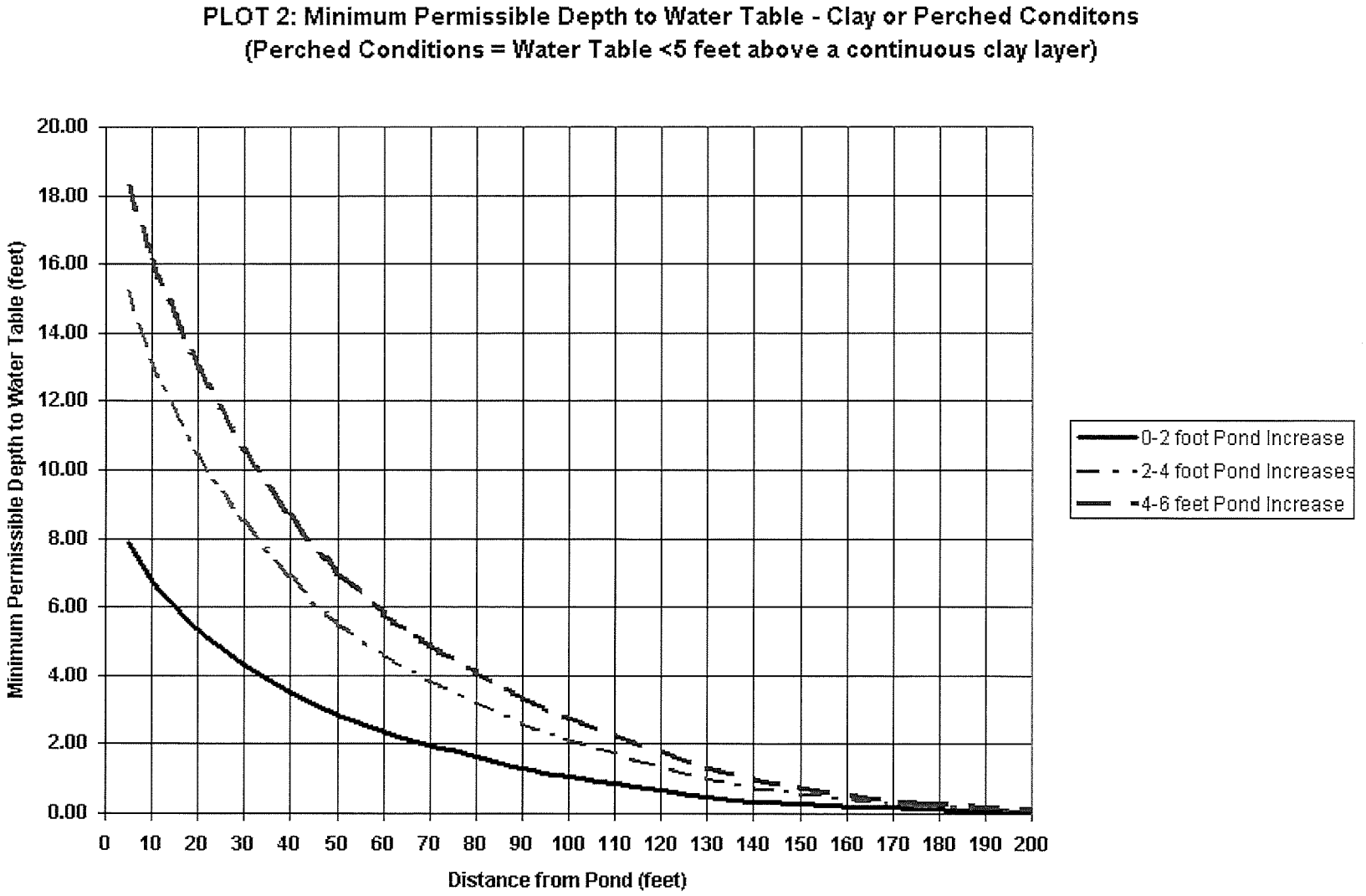
1) Sandy or gravely soils – consisting of predominantly sand or gravel, with minor amounts of silt and clay

[3] This assumes that the pond level begins to return to normal within about 30 days and the pond level's increase is not greater than 6 feet.

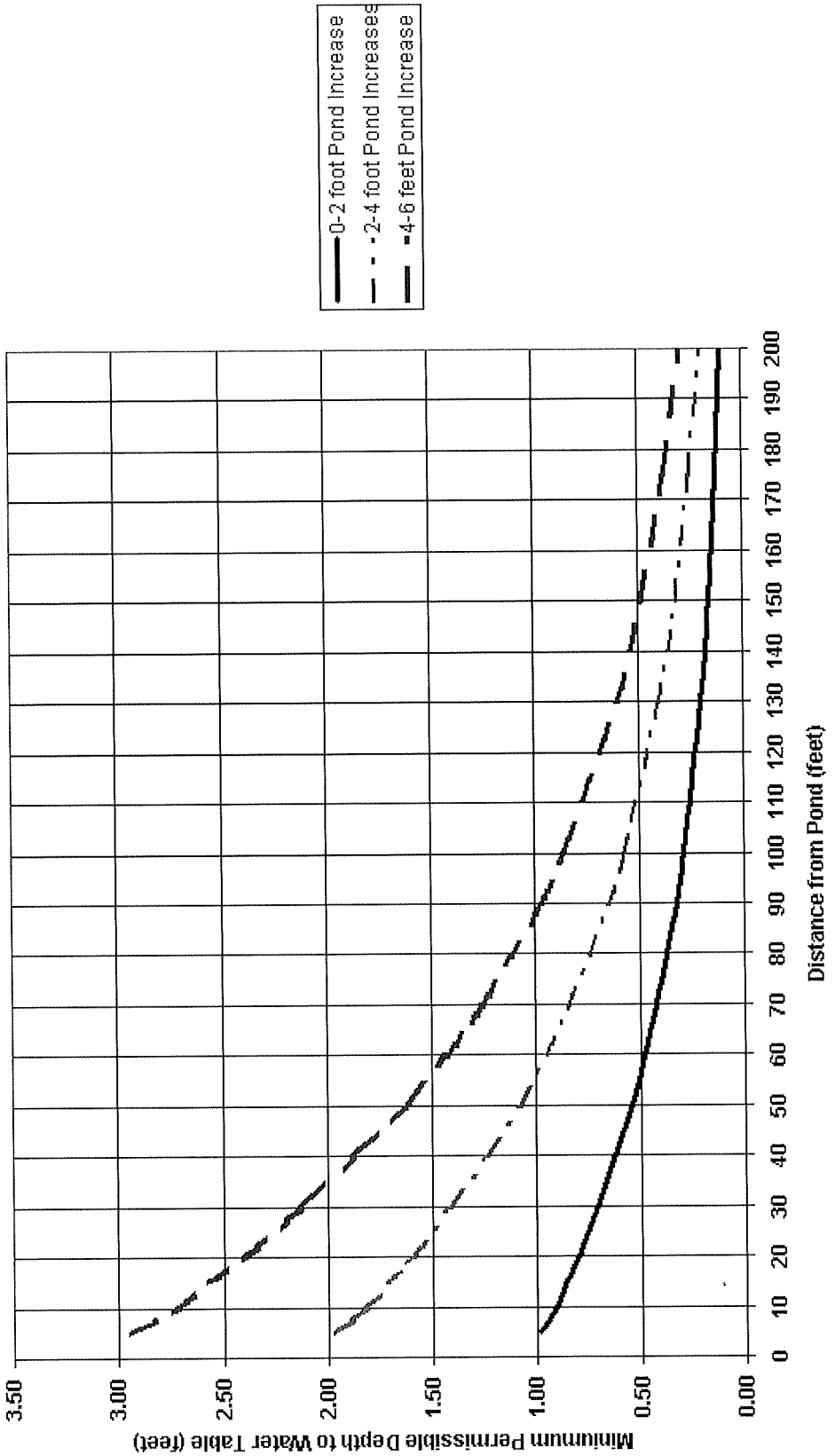
2) Silty soils – consisting predominantly of silt
3) Clayey soils – consisting predominantly of clay

PLOT 1: Minimum Depth to Water Table for No Further Evaluation

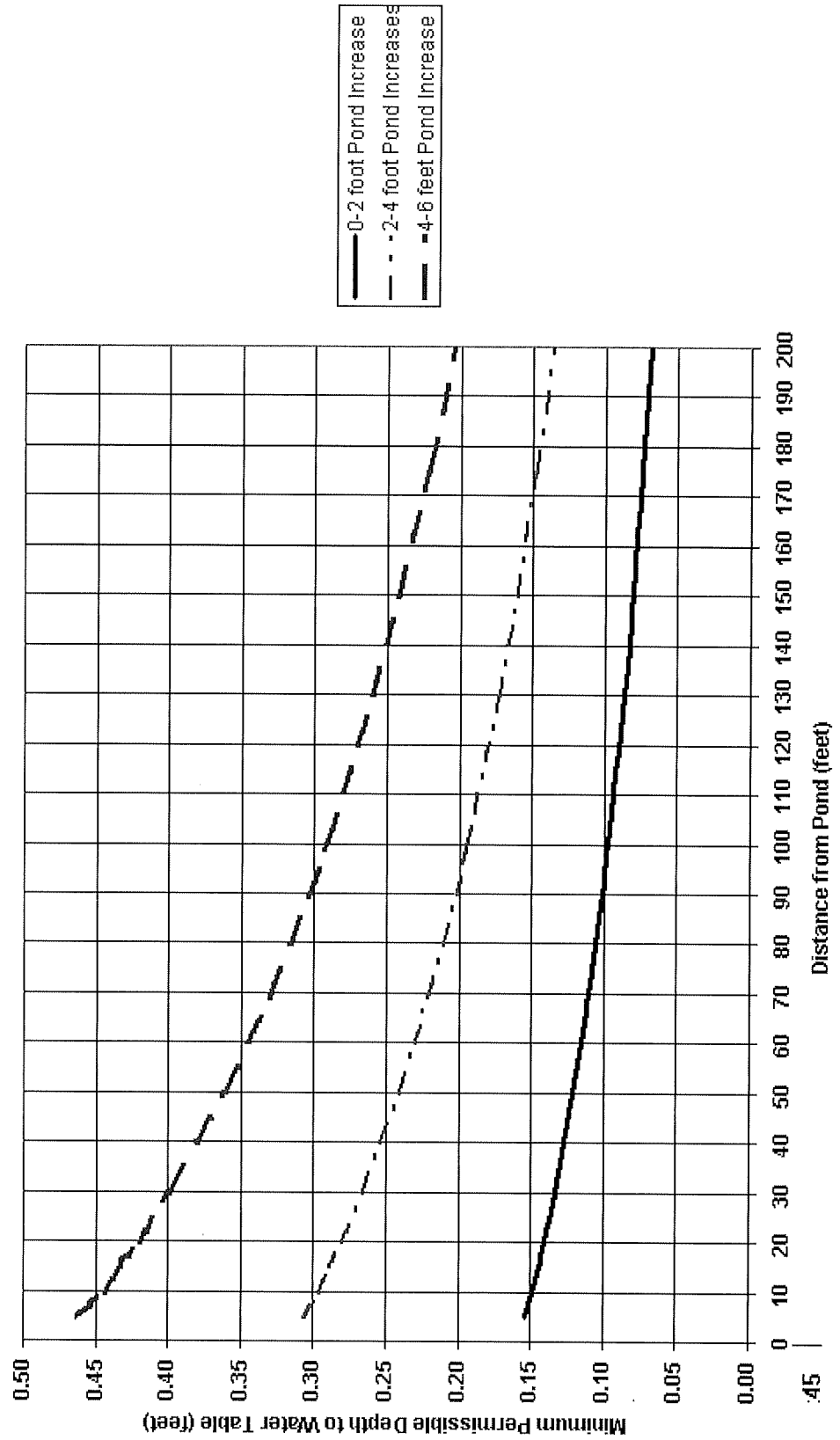


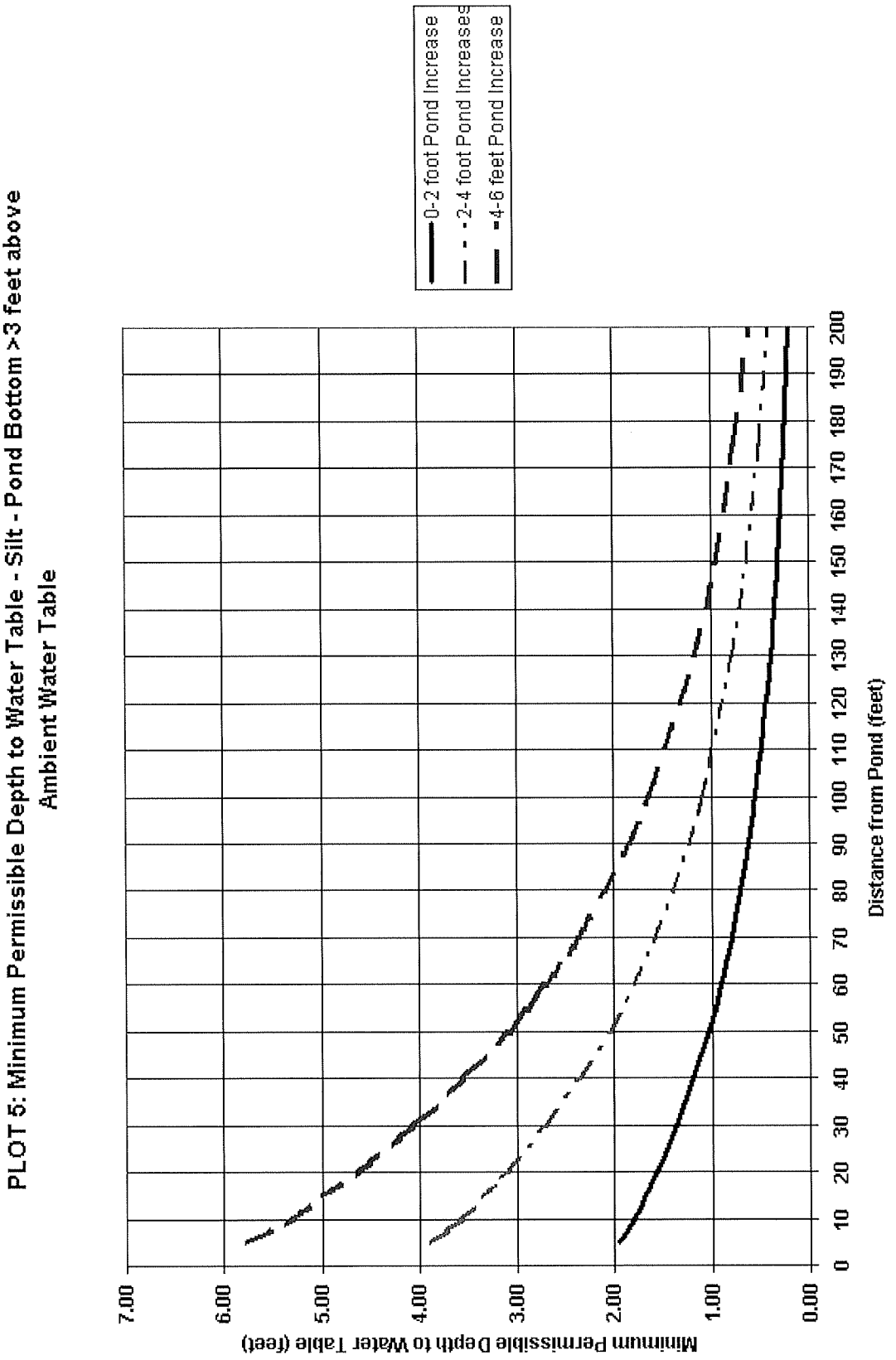

PLOT 2: Minimum Permissible Depth to Water Table - Clay or Perched Conditons
(Perched Conditions = Water Table <5 feet above a continuous clay layer)
Minimum Permissible Depth to Water Table (feet)
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200
Distance from Pond (feet)
0-2 foot Pond Increase
2-4 foot Pond Increases
4-6 feet Pond Increase

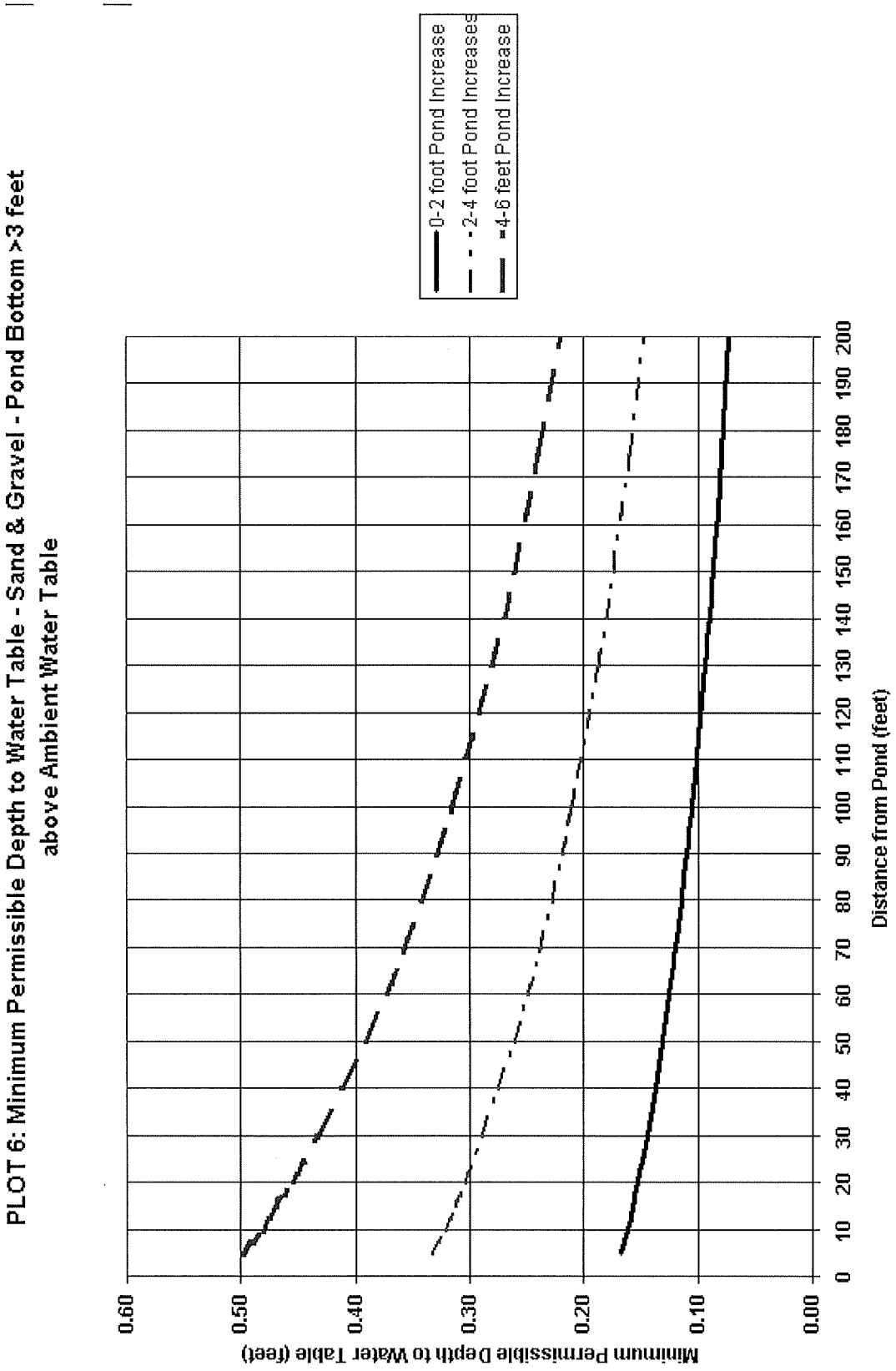
PLOT 3: Minimum Permissible Depth to Water Table - Silt - Pond Bottom <3 feet above Ambient Water Table



PLOT 4: Minimum Permissible Depth to Water Table - Sand & Gravel - Pond Bottom <3 feet above Ambient Water Table




PLOT 5: Minimum Permissible Depth to Water Table - Silt - Pond Bottom >3 feet above Ambient Water Table
0-2 foot Pond Increase
2-4 foot Pond Increases
4-6 feet Pond Increase
Minimum Permissible Depth to Water Table (feet)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Distance from Pond (feet)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200


PLOT 6: Minimum Permissible Depth to Water Table - Sand & Gravel - Pond Bottom >3 feet above Ambient Water Table
0-2 foot Pond Increase
2-4 foot Pond Increases
4-6 feet Pond Increase
Minimum Permissible Depth to Water Table (feet)
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Distance from Pond (feet)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200