

2.0 Introduction and Physical Setting

2.1 Plan Purposes

This plan provides the City of Edina with an overall comprehensive water resource management plan. The plan was developed to address current and future stormwater issues, especially those related to future development and redevelopment. The plan addresses stormwater runoff management and flood control, water quality management, and wetlands protection through establishment of stormwater planning policies and recommendations.

The first goal of this *Comprehensive Water Resource Management Plan* is to provide stormwater runoff management and flood control. Design criteria have been adopted to ensure that a proper level of service for stormwater management and level of protection from flooding, per the 1969 Floodplain Management Act, is provided to residents of the City. The established design criteria are discussed in [Section 3.1](#). The current storm sewer system throughout the city has been analyzed using computer models and recommendations to improve runoff management and flood control have been made. Discussion on the stormwater analyses and the resulting implementation recommendations is included in [Sections 4 through 14](#).

The second goal of the *Comprehensive Water Resource Management Plan* is to provide water quality management for the water bodies throughout the city. Water quality management policies and design standards have been established to protect the water quality of the waterbodies within the city. These policies and design criteria are discussed in [Section 3.2](#). A water quality model was used to simulate the generation and transport of pollutants through the waterbodies within the city. The model results were used to make recommendations for upgrades to water quality basins throughout the city to maintain and improve the pollutant removal efficiency from these basins. This analysis and the resulting implementation recommendations are discussed in [Sections 4 through 14](#).

The third goal of the *Comprehensive Water Resource Management Plan* is to provide wetland protection throughout the city. The City of Edina's goal is to achieve no net loss of wetlands, including acreage, functions, and values. To achieve this goal, policies have been established to protect the wetlands within the city. These policies are included in [Section 3.4](#). To provide a basis for wetland protection efforts, an inventory and assessment of all the wetlands within the city was completed. The wetland inventory and assessment identified wetland location, size, type, wetland classification, dominant wetland vegetation, function, and value for each wetland. General management recommendations are included based on the wetland sensitivity to stormwater degradation. The inventory and assessment is discussed in [Section 16](#).

This plan will assist the City of Edina in defining and implementing a comprehensive and environmentally sound system of surface water management. It is intended to be used as a tool to:

1. Plan for projects and other water management activities so as to correct existing problems and prevent foreseeable future problems from occurring.
2. Assist the City in considering water resource impacts resulting from variances to the City's long-range land use plan.
3. Enable the City to grow/redevelop in a systematic and orderly manner while protecting its vital water resources.

In order to accomplish these objectives, the plan considers a specific array of land uses within the city limits. If and when land uses change, this plan provides the means to (1) address the proposed changes; (2) determine the impact of the changes on the City's infrastructure, flooding, and natural resources; and (3) determine the actions needed within the proposed areas of land use change to prevent undesirable impacts.

2.2 Physical Setting

2.2.1 Drainage Patterns

The City of Edina covers an area of approximately 16 square miles. There are two stream systems that flow through the city: Nine Mile Creek and Minnehaha Creek. The northeast corner of the city drains to Minnehaha Creek, which enters the city limits northwest of West 44th Street and T.H. 100 and flows in a southeasterly direction through the city, exiting near West 54th Street and York Avenue. The southwest corner of the city drains to the South Fork of Nine Mile Creek through a series of storm sewer networks, ditches, and stormwater detention basins. The remainder of the city drains to the North Fork of Nine Mile Creek, which enters the Edina city limits in the northwest corner of the city near the intersection of T.H. 169 and Londonderry Road and meanders in a southeasterly direction through the city and exits the city limits near the intersection of T.H. 100 and Interstate 494.

For the purposes of this study, the city was divided into several major drainage areas based on drainage patterns. These drainage areas are depicted in [Figure 2.1](#) and listed below:

- Nine Mile Creek- North
- Nine Mile Creek- Central
- Lake Cornelia/Lake Edina/Adam's Hill Pond
- Nine Mile Creek- South
- Nine Mile South Fork
- Southwest Ponds

- T.H. 169 North
- Northeast Minnehaha Creek
- Southeast Minnehaha Creek
- Northwest Minnehaha Creek

Sections 5 through 14 discuss the drainage patterns within each of these drainage areas and describe the recommended stormwater system improvements for each area. In some cases, the drainage areas may include portions of adjoining cities, including Hopkins, Minnetonka, Eden Prairie, Bloomington, Richfield, and Minneapolis. The ten drainage basins listed above were subdivided into major watersheds and subwatersheds. Watershed divides were determined using air-flown 2-foot topographic data and, in some cases, field verified.

2.2.2 Land Use

The City of Edina is fully urbanized. Less than one percent of the developable area within the city, not including wetland, floodplain, or park land uses, remains available for development. The *Edina Comprehensive Plan* (Edina, 2009) provides additional information about the existing and projected land uses in the city.

2.2.3 Soils

The infiltration capacity of soils affects the amount of direct runoff resulting from rainfall. Soils with a higher infiltration rate have a lower runoff potential. Conversely, soils with low infiltration rates produce high runoff volumes and high peak runoff rates. According to the Hennepin County soil survey, the underlying soils in the City of Edina are predominantly classified as hydrologic soil group B, with moderate infiltration rates. The underlying soils in the south-central and southeast portions of the city are classified as hydrologic soil group A, characterized by high infiltration rates. The underlying soils surrounding the floodplain of Nine Mile Creek and Minnehaha Creek and around many of the natural wetlands within the city are classified as hydrologic soil group D, with very slow infiltration rates. [Figure 2.2](#) depicts the hydrologic soils group classification for soils within the City of Edina.

2.2.4 Topography

The topography of the city varies from relatively flat land along portions of Nine Mile Creek and Minnehaha Creek to very hilly land in the southwest portion of the city. Generally the topography throughout the city consists of moderately rolling hills. The elevations generally vary from 980 to 880 feet MSL at the divide between the Minnehaha Creek and Nine Mile Creek watersheds to elevations between 812 and 850 feet MSL where each creek exits the city.

The City of Edina has two-foot contour data coverage for the entire city; this information is available from the City Engineering Department.

2.2.5 Water Quality Monitoring

2.2.5.1 Lakes

Limited water quality data has been collected for the lakes within the City of Edina. In 1972, 1990, 2001, and 2004, the Nine Mile Creek Watershed District collected in-lake water quality data for Mirror Lake, which was used in support of the Draft NMCWD Mirror Lake Use Attainability Analysis (Barr, 2004). In 2004, the NMCWD also collected in-lake water quality data for Lake Cornelia (North and South), Arrowhead Lake and Indianhead Lake, for development of the Draft Lake Cornelia Use Attainability Analysis (Barr, 2006) and Draft Arrowhead and Indianhead Lakes Use Attainability Analysis (Barr, 2006). In 2008, the NMCWD collected in-lake water quality data for Lake Cornelia (North and South) and Lake Edina.

In addition to the lake monitoring data collected by the NMCWD, water quality data has also been collected for several lakes by citizen monitoring volunteers as part of the Metropolitan Council's Citizen-Assisted Monitoring Program (CAMP). The lakes within the City of Edina that have been monitored as part of CAMP include Pamela, Cornelia, Edina, and Harvey lakes. The locations of these lakes are shown in Figure 2.3.

A summary of the historic summer average total phosphorus concentrations for the monitored lakes in Edina is provided in Table 2.1. The summary reflects the data collected by both the NMCWD and the Metropolitan Council CAMP. As can be seen in the table, the available data is limited for most of the Edina lakes. It should be noted that lakes and ponds are dynamic, so that relatively infrequent sampling cannot provide a complete picture of the status of the water body in question. The situation is further complicated by the impossibility of inferring statistically significant trends from relatively few water quality sampling results. A minimum of about ten (summer average) data points is thought to be required to reliably identify a water quality trend.

2.2.5.2 Creeks

The NMCWD has two continuous flow monitoring stations within or near Edina; one along the North Fork of Nine Mile Creek at the Metro Boulevard crossing, and another along the South Fork of Nine Mile Creek at the 78th Street crossing, just south of the city boundary with Bloomington (Figure 2.3). The monitoring stations collect data on stream flow and several water quality parameters, including turbidity. The water quality monitoring data is available from the Nine Mile Creek Watershed District upon request.

The MCWD has a monitoring site just below the Browndale Dam on Minnehaha Creek that has been active since 1996. Continuous stream level data is collected both above and the below the dam to determine stream flows. Water quality samples are generally collected weekly at this site for total and soluble reactive phosphorus, bi-weekly for total suspended solids and monthly for total nitrogen and chloride during the months of April through October. E. coli is collected bi-weekly during the months of June, July and October, and weekly in August and September.

Table 2.1 Historic Summer-average Total Phosphorus Concentrations for Edina Lakes

Lake	Year	NMCWD Summer Average TP Concentration (June - September) (µg/L)	Metropolitan Council Summer Average TP Concentration (May - September) (µg/L)
North Lake Cornelia	2003	N / A	224 ⁵
	2004	164 ¹	N / A
	2005	N / A	156 ⁷
	2006	N / A	154 ⁸
	2007	N / A	216 ⁹
	2008	172 ⁴	N / A
	2009	N / A	113 ¹⁰
South Lake Cornelia	2004	190 ¹	N / A
	2008	173 ⁴	N / A
Mirror	1972	133 ²	N / A
	1990	99 ²	N / A
	2001	73 ²	N / A
	2004	119 ²	N / A
Arrowhead Lake	2004	72 ³	N / A
Indianhead Lake	2004	46 ³	N / A
Harvey Lake	2004	N / A	152 ⁶
Pamela Lake	2005	N / A	81 ⁷
Lake Edina	2004	N / A	106 ⁶
	2005	N / A	128 ⁷
	2008	121 ⁴	N / A

1 - Barr Engineering. 2006. Lake Cornelia Use Attainability Analysis (Draft). Prepared for Nine Mile Creek Watershed District
2 - Barr Engineering. 2004. Mirror Lake Use Attainability Analysis (Draft). Prepared for Nine Mile Creek Watershed District
3 - Barr Engineering. 2006. Arrowhead and Indianhead Lakes Use Attainability Analysis (Draft). Prepared for Nine Mile Creek Watershed District
4 - 2008 Nine Mile Creek Watershed District Water Quality Monitoring Program
5 - Metropolitan Council. 2004. Regional Report: A 2003 Study of the Water Quality of 140 Metropolitan Area Lakes
6 - Metropolitan Council. 2005. Regional Report: A 2004 Study of the Water Quality of 145 Metropolitan Area Lakes
7 - Metropolitan Council. 2006. Regional Report: A 2005 Study of the Water Quality of 172 Metropolitan Area Lakes
8 - Metropolitan Council. 2007. Regional Report: A 2006 Study of the Water Quality of 186 Metropolitan Area Lakes
9 - Metropolitan Council. 2008. Regional Report: A 2007 Study of the Water Quality of 176 Metropolitan Area Lakes
10 - Metropolitan Council. 2010. Preliminary 2009 Lake Cornelia CAMP Data

2.2.6 Parks & Recreation

Lakes, ponds, and creeks are often key attractions in public parks; examples within Edina include Rosland Park, Bredesen Park, Pamela Park, Utley Park and Centennial Lakes Park.

The City of Edina has numerous community parks, neighborhood parks, and other public open space recreational areas. Figure 2.4 shows the numerous parks and recreational areas within the City of Edina.

2.2.7 Public Utilities

Edina is completely within the Metropolitan Council's designated Metropolitan Urban Service Area (MUSA). The MUSA is the area in the seven county metro area in which the Metropolitan Council ensures that regional services and facilities are provided or planned. The City of Edina provides sanitary sewer and water service throughout the city.

2.2.8 Fish and Wildlife Habitat

The water bodies and open spaces interspersed throughout the city provide habitat for numerous fish and wildlife species, including birds, mammals, and reptiles. Ducks and geese are present in large numbers at lakes, wetlands, and open water areas. Vegetative cover in the undeveloped open areas support many mammalian species such as deer, raccoon, squirrels, fox, chipmunks, and rabbits. The wetlands in Edina provide habitat for a variety of aquatic species including snakes, turtles, and frogs.

The Mn DNR has completed fishery surveys of three lakes within the City of Edina. The most recent surveys were of Lake Cornelia in 2005 and Centennial Lake in 2006. Both of these lakes are part of the Mn DNR's Fishing in the Neighborhood (FIN) program. Lake Cornelia, Centennial Lake, and Indianhead Lake have been stocked by the Mn DNR in recent years. Arrowhead Lake was observed to be infested with the invasive aquatic plant Eurasian Watermilfoil; Minnehaha Creek was observed to be infested with invasive Eurasian Watermilfoil and Flowering Rush. Table 2.2 summarizes the available fishery survey, stocking, and aquatic invasive species information available for the water bodies within the City of Edina.

Table 2.2 Fishery and Aquatic Invasive Species Information

Water Resource	Fishery			Invasive Species	
	Survey Year	Stocking ¹	Dominant Fish Species	Invasive Species	Year Present
<i>Lakes</i>					
Lake Cornelia	2005	Bluegill: 2000-2009	Bluegill, Black Crappie, Carp	N / A	N / A
Arrowhead Lake	1995	Bluegill: 1994, Largemouth Bass	Black Bullhead, Green Sunfish	Eurasian Watermilfoil	1995
Centennial Lake	2006	Bluegill: 2001-2009, Largemouth Bass: 2002-2009, Northern Pike: 2007-2009	Black Bullhead, Green Sunfish	N / A	N / A
Indianhead Lake	N / A	Bass: 2008, Walleye: 2008	N / A	N / A	N / A
<i>Streams</i>					
Minnehaha Creek	N / A	N / A	N / A	Eurasian Watermilfoil , Flowering Rush	N / A

Source: MNDNR Lake Finder Website

¹ – Stocking reports available for 1998-2009 from the MNDNR Lake Finder Website

2.2.9 Unique Features & Scenic Areas

The DNR Natural Heritage Program and Nongame Wildlife Program maintain a database of rare plant or animal species and significant natural features. This database includes only one record of a rare or threatened species observance in Edina; a Blanding’s Turtle (*Emys Blandingii*) was observed in 1989 in the southeast portion of the City (see Figure 2.5). The Blanding’s Turtle was classified as a threatened species in Minnesota in 1984.

Other information was reviewed to determine whether other unique features area present in Edina. Based on this review, no Outstanding Resource Value Waters (Minnesota Rules 7050.0180), Designated Scientific and Natural Areas (Minn. Stat. 86A.05), State Wildlife Management Areas (Minn. Stat. 86A.05), or State Aquatic Management Areas (Minn. Stat 86A.05) are located within the City of Edina.

2.2.10 Pollutant Sources

Figure 2.6 shows the approximate locations of registered storage tanks, leak sites, hazardous waste generators, dump sites, Superfund sites, and MPCA Voluntary Investigation and Cleanup (VIC) sites, as obtained from the Hennepin County Department of Environmental Services. The Hennepin County Department of Environmental Services should be contacted for details about specific sites, since many of the sites have been cleaned up or are in the clean-up process.

2.2.10.1 Investigation and Cleanup Sites

The dump sites identified in Figure 2.6 include both unpermitted and permitted dump sites. Unpermitted dump sites are historic landfills that never held a valid permit from the MPCA. Generally, these dump sites existed prior to the MPCA's permitting program, which was initiated in 1967. Unpermitted dump sites were often old farm or municipal disposal sites that accepted household waste.

The MPCA VIC Program is a non-petroleum brownfield program that provides technical assistance and administrative or legal assurances for individuals or businesses seeking to investigate or clean-up contaminated property and to bring contaminated land back into productive use.

There is currently one MPCA Superfund Site within the City of Edina, also shown on Figure 2.6. This site is the Edina Well Field. In 2004, the City of Edina detected elevated levels of vinyl chloride in Municipal Well 7. Preliminary investigations found several Volatile Organic Compounds (VOCs) in nearby groundwater. The City has since discontinued use of Well 7. However, concerns that groundwater flow could lead to a larger regional problem remain. Further investigation and evaluation of potential clean-up options is ongoing. Additional information on this site can be obtained from the MPCA.

2.2.10.2 Tank Sites and Leak Sites

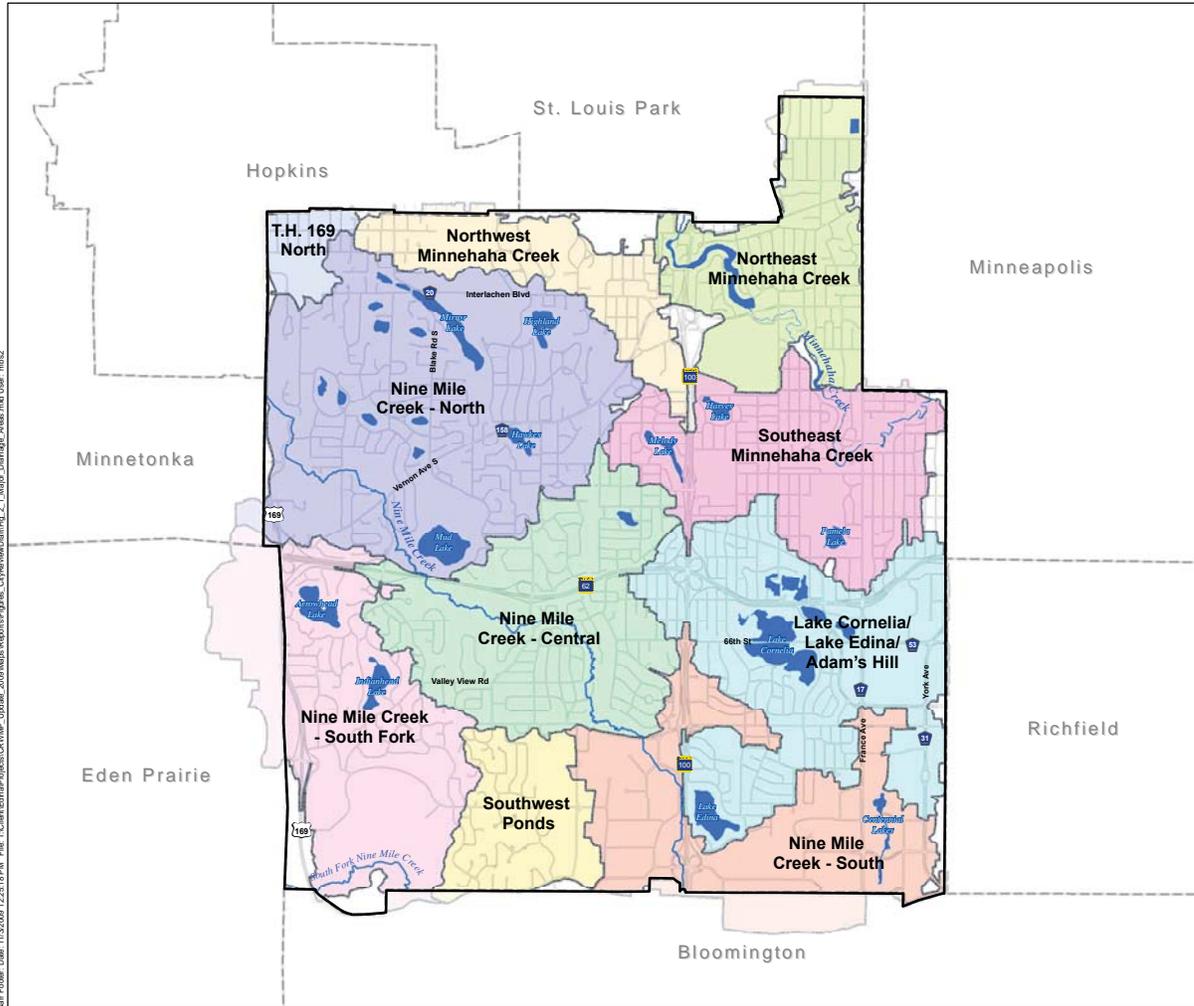
The tank sites identified in Figure 2.6 include registered petroleum tank facilities, both underground and above ground. Leak sites are locations where a release of petroleum products has occurred from a tank system. Leak sites can occur from aboveground or underground tank systems, or from spills at tank facilities. A leak can result from an accident or from activities that occurred over a long period of time. Many of the known leak sites shown on Figure 2.6 are related to releases from underground fuel oil tanks.

2.2.10.3 Individual Sewage Treatment Systems (ISTS)

If properly functioning, individual sewage treatment systems (ISTS) typically do not impact the water quality of surface or ground water resources. However, improperly functioning systems can negatively impact water resources and are a source of ground and surface water contamination. City records indicate that there are six known ISTS throughout the city.

2.2.11 Groundwater

The City of Edina operates two separate water systems: the Morningside water system and the Edina water system. The Morningside system is supplied with treated surface water from the City of Minneapolis; the City of Edina does not appropriate any surface water for its municipal water supply. The water supply for the Edina system is groundwater, obtained from 18 groundwater wells, ranging in depth from 450 to 1,100 feet. The City's current groundwater appropriation permit limits the City's groundwater pumping to 17,500 gallons per minute or 3,000,000,000 gallons per year.



- City of Edina Boundary
- Roads/Highways
- Creek/Stream
- Lake/Pond
- Major Drainage Area

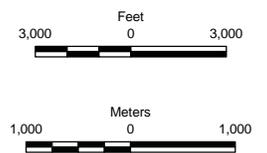
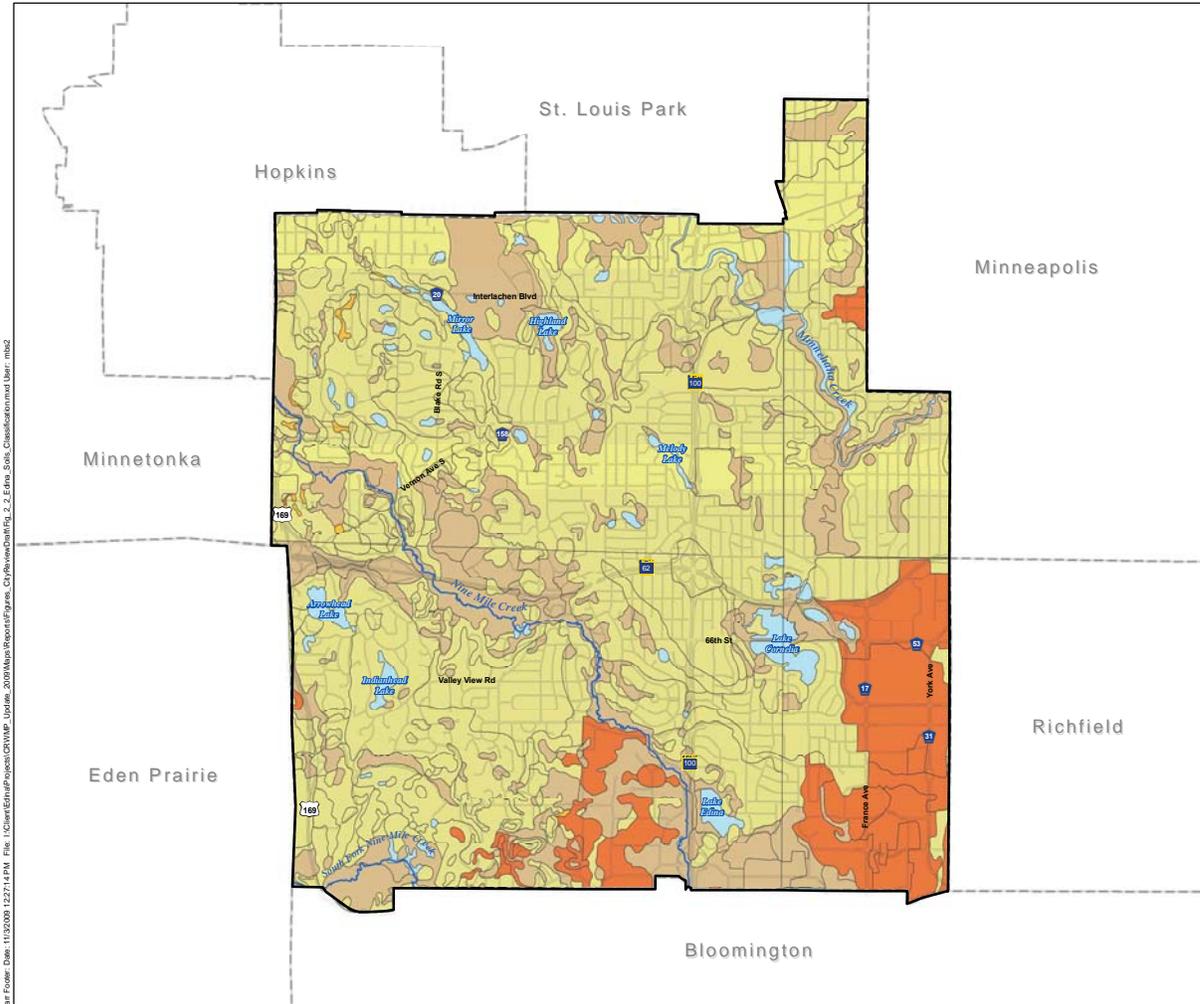


Figure 2.1

MAJOR DRAINAGE AREAS
 Comprehensive Water Resource
 Management Plan
 City of Edina, Minnesota
 2-9



City of Edina Boundary

Roads/Highways

Creek/Stream

Hydrologic Soil Groups

- A - High infiltration rates.
Low runoff Potential.
- B - Moderate infiltration rates.
Low to medium runoff potential.
- C - Slow infiltration rates.
Medium to high runoff potential.
- D - Very slow infiltration rates.
High runoff potential.
- Water

Soils Data Source: Hennepin County Soils GIS Database

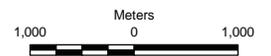
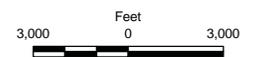
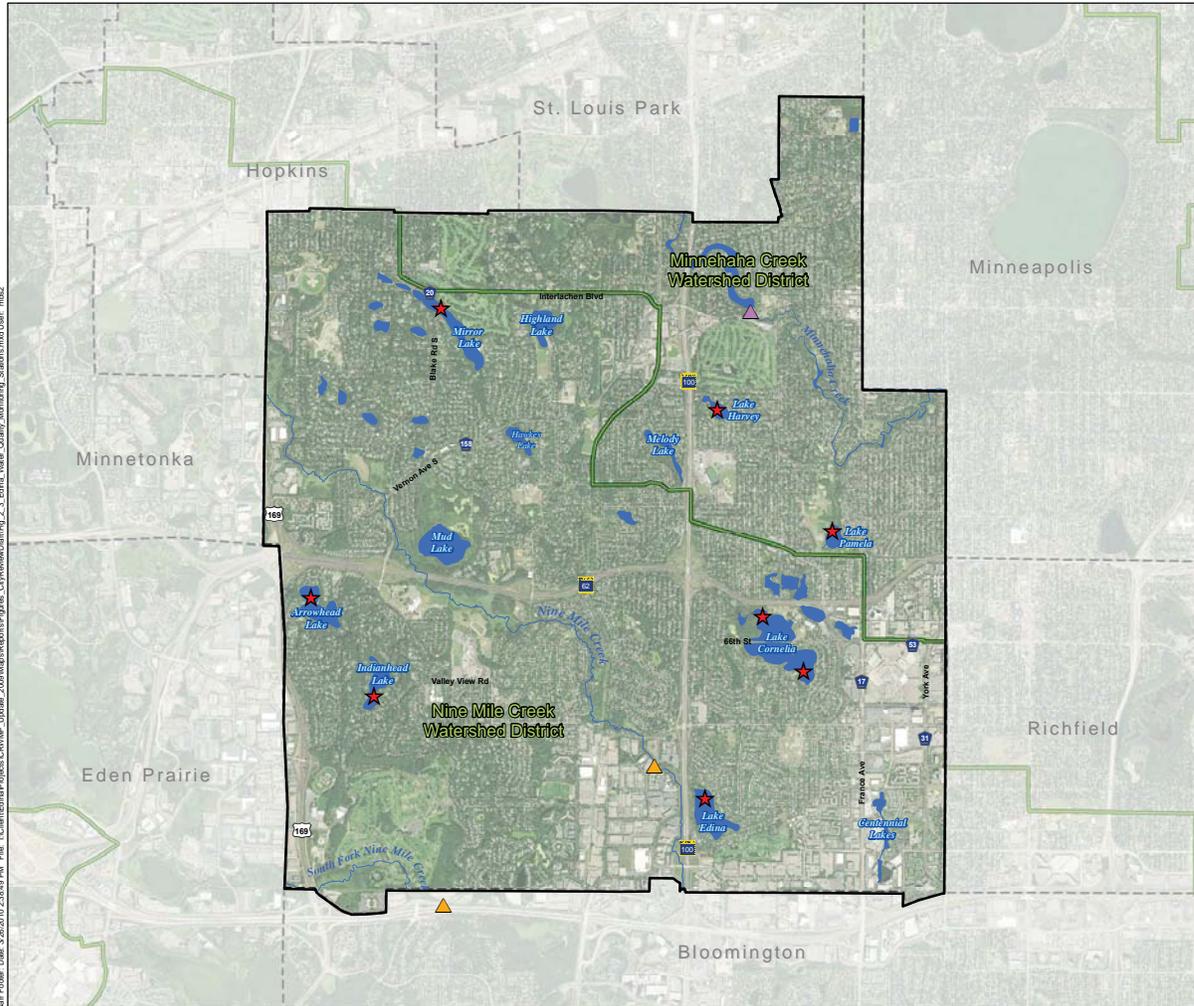


Figure 2.2

EDINA SOILS CLASSIFICATION
Comprehensive Water Resource
Management Plan
City of Edina, Minnesota
2-10



- ▲ MCWD Stream Monitoring Station
- ▲ NMCWD Stream Monitoring Stations
- ★ Lake Water Quality Sampling Locations
- Roads/Highways
- Creek/Stream
- Watershed District Boundary
- City of Edina Boundary

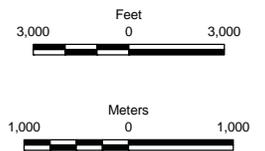
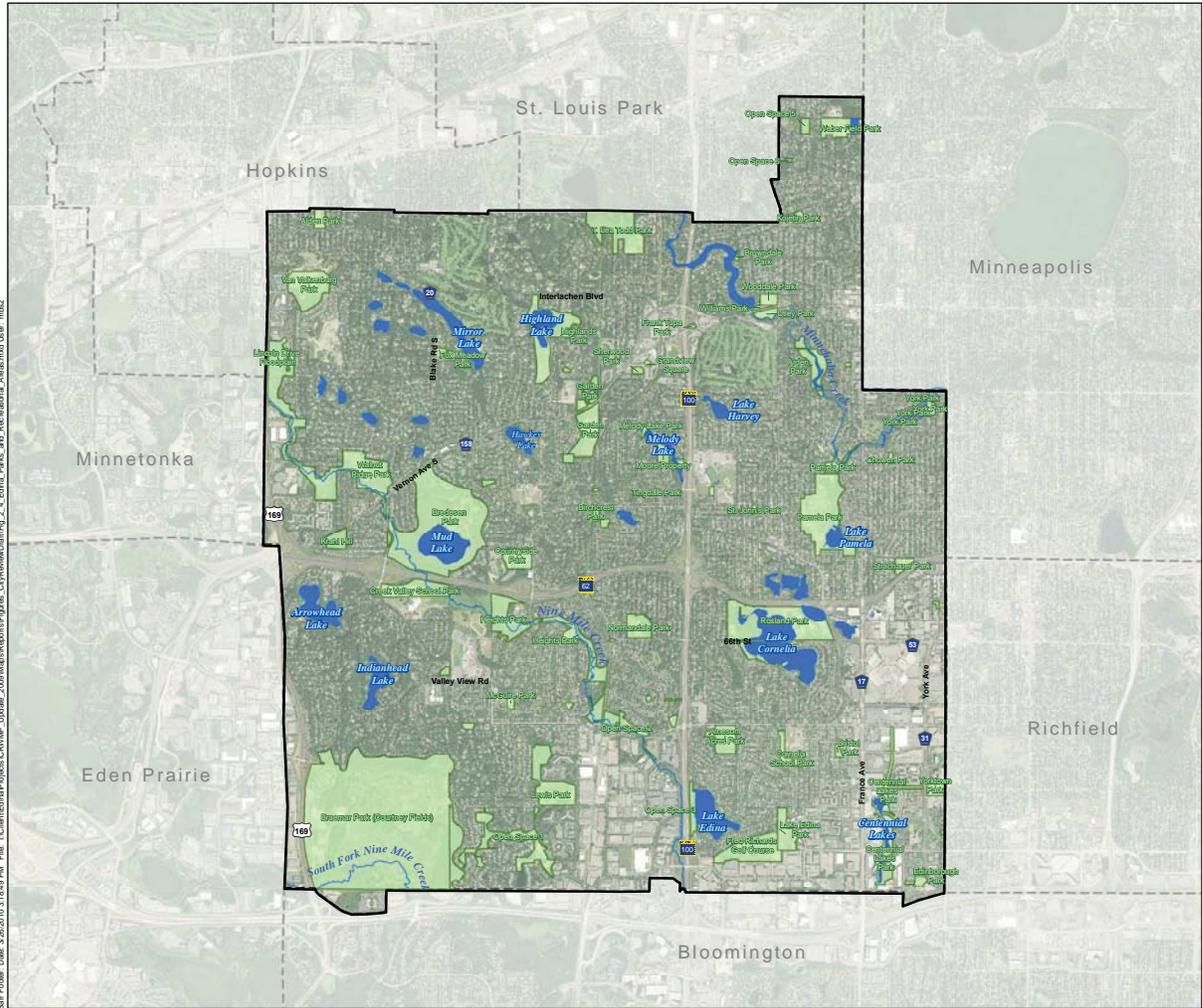


Figure 2.3

WATER QUALITY
 MONITORING STATIONS
 Comprehensive Water Resource
 Management Plan
 City of Edina, Minnesota
 2-11



-  Roads/Highways
-  Creek/Stream
-  Lake/Pond
-  Park/Recreational Area
-  City of Edina Boundary

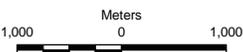
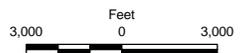
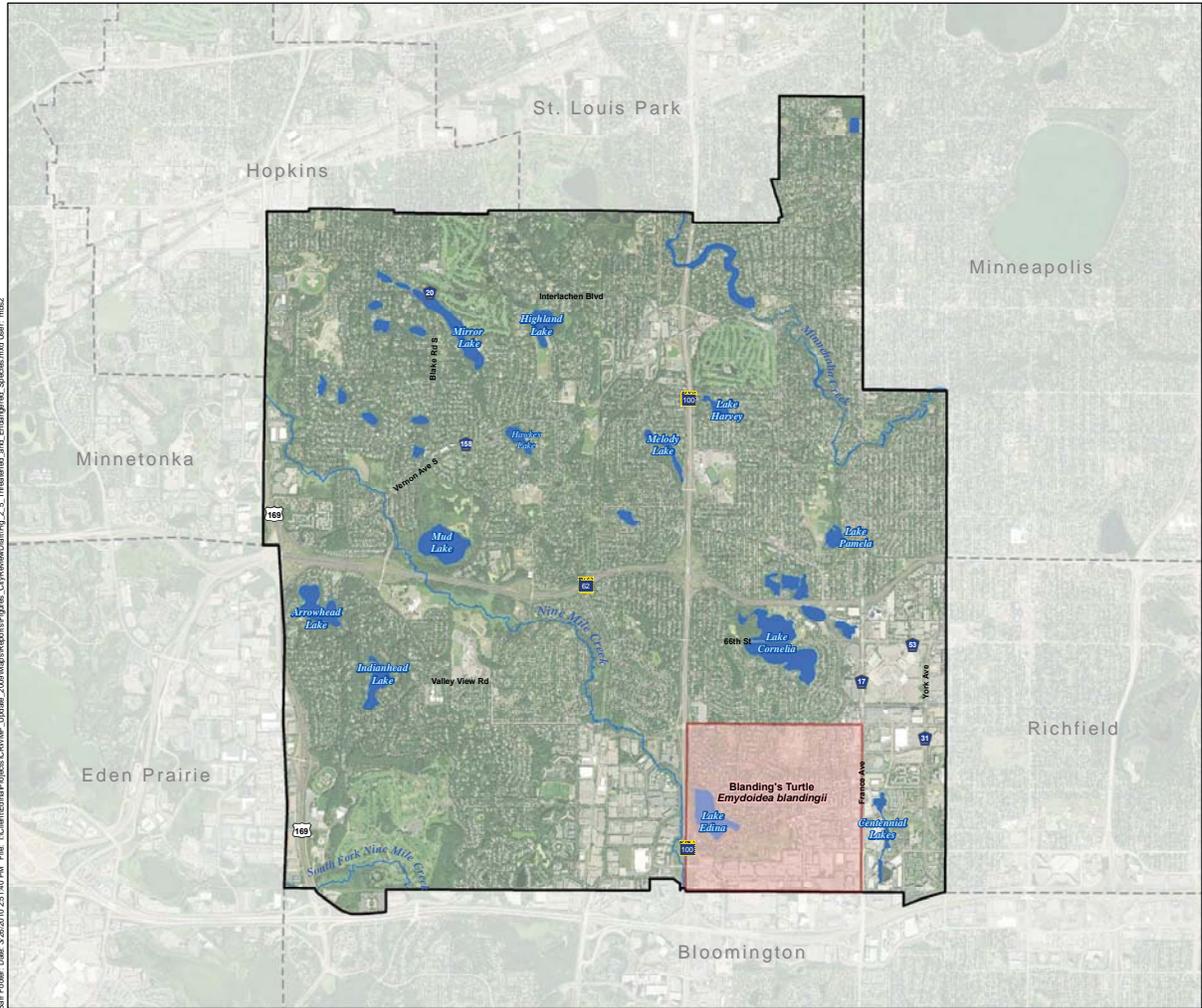


Figure 2.4
PARKS AND RECREATIONAL AREAS
 Comprehensive Water Resource
 Management Plan
 City of Edina, Minnesota
 2-12

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- State Threatened Species Location (masked)
- Roads/Highways
- Creek/Stream
- Lake/Pond
- City of Edina Boundary

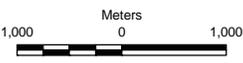
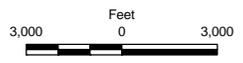
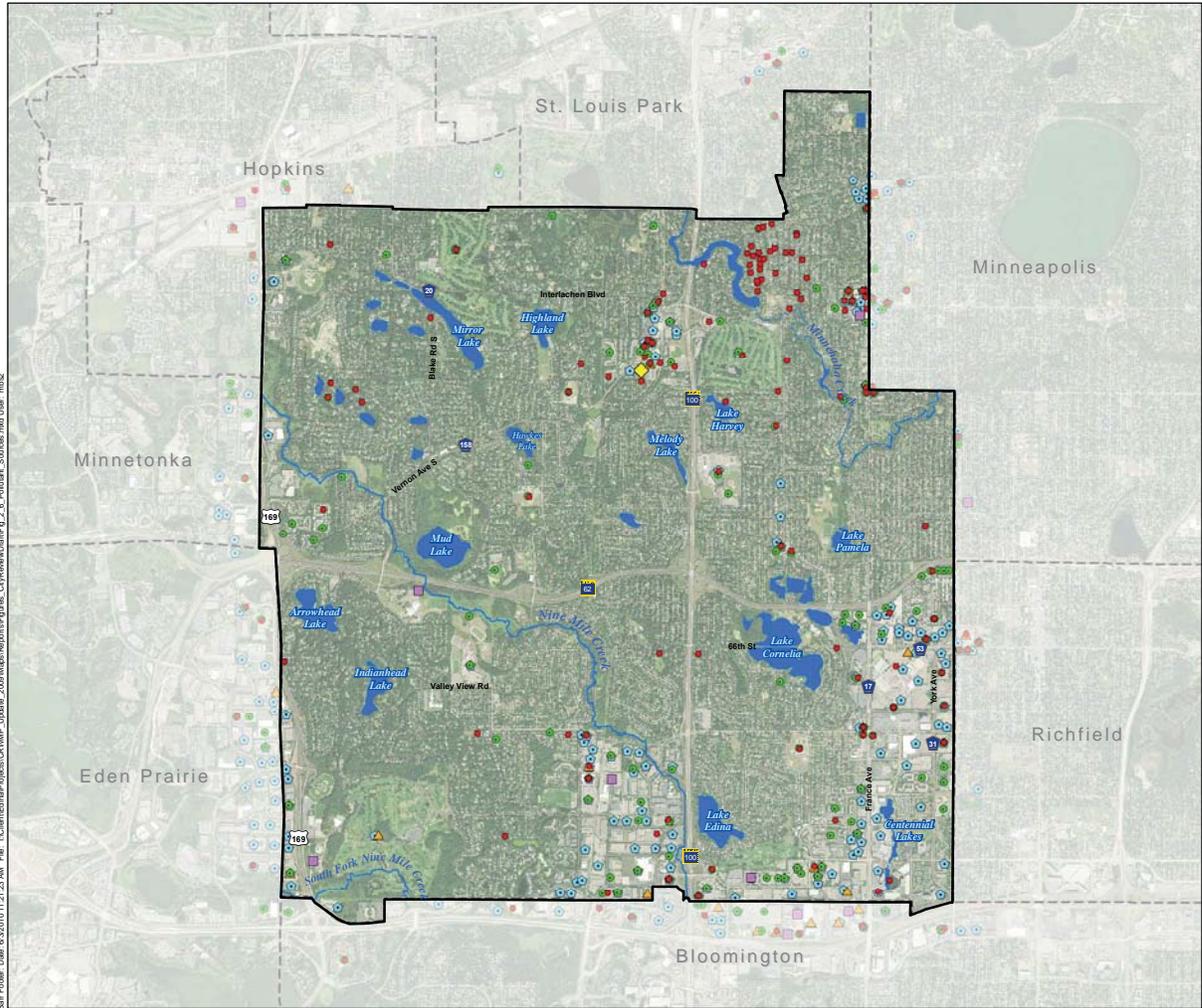


Figure 2.5

**THREATENED AND
 ENDANGERED SPECIES
 Comprehensive Water Resource
 Management Plan
 City of Edina, Minnesota
 2-13**

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- Dumps
- Leaking Underground Storage Tank Location
- Registered Tanks
- ▲ VIC Sites
- ◆ Hazardous Waste Generators
- ◆ MPCA Superfund Sites
- Roads/Highways
- ~ Creek/Stream
- Lake/Pond
- City of Edina Boundary

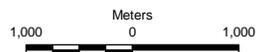
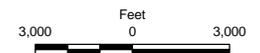


Figure 2.6

POLLUTANT SOURCES
 Comprehensive Water Resource
 Management Plan
 City of Edina, Minnesota
 2-14

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