

15.0 Issues and Implementation Program

This chapter describes the significant components of the City's CWRMP implementation program, including its NPDES Phase II MS4 permit, specific requirements of the NMCWD and MCWD, financial considerations, ordinance implementation and official controls, and implementation priorities. The implementation program is presented in [Table 15-3](#), which presents summary details of the implementation program, including a project description, cost estimate, potential funding sources, and proposed years of implementation.

15.1 Water Quality/NPDES Phase II MS4 General Permit

Under the federal 1987 Clean Water Act revision, discharges of pollutants into waters of the United States are prohibited without a permit under the National Pollutant Discharge Elimination System (NPDES) program. Traditionally, this program concentrated on discharges from industries and publicly owned treatment plants. In 1990, the EPA promulgated rules establishing Phase I of the NPDES Stormwater Program in an effort to reduce the water quality impact of stormwater drainage systems on receiving water bodies. Phase I of the program regulates stormwater runoff from municipal separate storm sewer systems (MS4s) generally serving populations of 100,000 or greater, construction activities disturbing five acres of land or greater, and various industrial activities.

In 1999, the Phase II Rule of the NPDES Stormwater Program extended the coverage of the NPDES program to operation of "small" MS4s in urbanized areas and operation of small construction sites. Through the use of NPDES permits, these operations are required to implement programs and practices to control polluted stormwater runoff. Because the City of Edina is located in an "urbanized area", as defined by the Bureau of the Census, it is covered under the Phase II NPDES Stormwater Program. Operators of Phase II small MS4s in Minnesota were required to apply for coverage under the Small Municipal Separate Storm Sewer Systems (MS4s) General Permit from the Minnesota Pollution Control Agency (MPCA) by March 10, 2003. This permit, which addresses how the City will regulate and improve stormwater discharges, requires MS4s to develop and implement a Storm Water Pollution Prevention Program (SWPPP).

15.1.1 NPDES Phase II MS4 Storm Water Pollution Prevention Program

The SWPPP outlines the appropriate best management practices (BMPs) for the City to control or reduce the pollutants in stormwater runoff to the maximum extent practicable. The City will accomplish this through the implementation of the BMPs outlined within its SWPPP. These BMPs will be a combination of education, maintenance, control techniques, system design and engineering methods, and other such provisions that are appropriate to meet the requirements of the NPDES Phase II permit. BMPs have been planned and implemented to address each of the six minimum control measures as outlined in the rules:

1. Public education and outreach on stormwater impacts.

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

The six minimum control measures are described in further detail in subsequent sections. The SWPPP BMP implementation program is incorporated into the City's overall stormwater implementation program presented in [Table 15-3](#).

15.1.1.1 Public Education and Outreach

Public education and outreach is a key component in a successful stormwater management program. An informed and knowledgeable community will lead to greater support and greater compliance with the City stormwater program, as the public becomes aware of the personal responsibilities expected of them as community members.

As required by the MPCA MS4 General Permit, the City has developed and is implementing a public education program to distribute information and conduct outreach activities regarding the impacts of stormwater discharges on water bodies, as discussed in [Section 3.8](#). The public education program must address each of the six control measures required by the General Permit. For each control measure, the City's education program identifies the audience involved, educational goals, activities used to reach activity goals, activity implementation plans, and available performance measures that can be used to determine success in reaching educational goals.

The public education program also includes working collaboratively with the local watershed districts in distributing educational materials and promoting/supporting outreach programs.

At least one public meeting is held every year prior to submittal of the SWPPP annual report. Notice of the meeting is distributed in a local newspaper and contains a reference to the SWPPP, the date, time, and location of the public information meeting; a description of the manner in which the public information meeting will be conducted; and the proper method to obtain a copy of the SWPPP.

Details regarding the measurable goals, implementation schedule, and responsible parties for the public education program can be found in the City of Edina's SWPPP ([Appendix A](#)).

15.1.1.2 Public Involvement and Public Participation

As required by the MPCA MS4 General Permit, the City of Edina will solicit public input on the adequacy of the SWPPP, including input from the annual public meeting addressing the annual report. Oral and written input from the public regarding the SWPPP will be sincerely considered and adjustments will be made where appropriate. The City will comply with applicable public notice

requirements of the General Permit when implementing the provisions of the SWPPP. The City also intends to incorporate public information on SWPPP issues into the City's website.

Details regarding the measurable goals, implementation schedule, and responsible parties for the public involvement and public participation requirements can be found in the City of Edina's SWPPP ([Appendix A](#)).

15.1.1.3 Illicit Discharge Detection and Elimination

Identification of stormwater pollutant sources includes identification of illicit pollutant discharges and nonpoint sources throughout the city. An illicit pollutant discharge is defined as a nonpermitted point source of pollutants that is discharged to the storm sewer system at a specific location. Illicit discharges can enter a storm sewer system directly (through wastewater piping mistakenly or deliberately connected to the storm drains) or indirectly (through infiltration from cracked/leaking sanitary systems, spills collected by drain outlets, or other contaminants such as paint or oil dumped directly into a storm drain).

To prevent the harmful effects of illicit discharges, a number of BMPs have been developed to implement and enforce a program to detect and eliminate illicit discharges into the municipal separate storm sewer system. The BMPs include:

Based on the requirements of the NPDES Phase II MS4 General Permit, the program must include the following components:

1. An annually-updated storm sewer system map showing the location of all City-owned storm sewer pipes (24-inch diameter or greater), outfalls, locations where discharge leaves the city, and water bodies.
2. Review of existing City ordinances relating to illicit discharges and develop/adopt an illicit discharge ordinance as necessary.
3. Expansion of the City's program to detect and reduce all forms of non-stormwater discharges and continuation of inspection for illicit discharge during the outfall and pond inspections.
4. Distribution of educational materials to residents and providing illicit discharge educational information or training to City staff at a minimum of once a year.

Details regarding the measurable goals, implementation schedule, and responsible parties for the public education program can be found in the City of Edina's SWPPP ([Appendix A](#))."

15.1.1.4 Construction Site Stormwater Runoff Control

Runoff management from construction sites is crucial in the effort to minimize the amount of sediment and other pollutants entering the water bodies within the city. Phase II of the NPDES

stormwater program requires reduction of stormwater pollutant discharges from construction activities that result in a land disturbance of greater than or equal to one acre.

The policies and design standards adopted by the City to control stormwater pollutant discharges from construction sites are detailed in the Water Quality Management Standards ([Section 3.2](#)) and the Erosion and Sediment Control ([Section 3.3](#)) sections.

In addition to the policies and BMPs previously discussed, a number of BMPs have been developed and will be implemented and enforced to reduce pollutants and storm water runoff from construction activities with land disturbances equal to or greater than one acre. These BMPs include:

1. Review of current permit stipulations/City codes relating to project specific erosion and sediment control and update as necessary.
2. Every applicant for a City permit to allow land disturbing activities must submit a project specific stormwater management plan (if applicable) and/or erosion control plan to the City.
3. Construction site operators must provide a phone number, website, and point of contact for the public to report storm water pollution issues. Staff procedures for stormwater non-compliance are defined in the SWPPP ([Appendix A](#)).
4. Construction site operators must conform to NPDES Phase II, watershed district, and City ordinances pertaining to erosion and sediment controls and waste controls.

For projects less than one acre, the Rules and Regulations of the Nine Mile Creek and Minnehaha Creek watershed districts are applicable.

Details regarding the measurable goals, implementation schedule, and responsible parties for the construction site stormwater runoff control requirements can be found in the City of Edina's SWPPP ([Appendix A](#)).

15.1.1.5 Post-Construction Stormwater Runoff Control

The Phase II NPDES Program requires small MS4s to develop, implement and enforce a program to reduce pollutants from new development or redevelopment areas having a land disturbance of greater than or equal to one acre.

The city of Edina has adopted the control policies and BMPs discussed in the Runoff Management and Flood Control ([Section 3.1](#)), Water Quality ([Section 3.2](#)), and the Erosion and Sediment Control ([Section 3.3](#)) sections to ensure pollutant reduction from new development and redevelopment areas. The City's policies and BMPs are enforced through issuance of permits through the City and the Nine Mile Creek and Minnehaha Creek watershed districts.

In addition to the control measures addressed in earlier sections, a program of BMPs has been prepared to address storm water runoff from new development and redevelopment projects that disturb equal to or greater than one acre. This program insures that controls are in place that would prevent or minimize water quality impacts from development activities. These BMPs include:

1. Continuing to use existing development review policies currently in place to address water quality, erosion control, and BMPs.
2. Evaluating all structural and non-structural BMPs during the plan review process for the potential of new and/or revised BMPs.
3. Actively looking for non-structural BMP opportunities where prudent and feasible.
4. Inspecting post-construction BMPs and evaluating inspection records for determining the corrective maintenance actions (if necessary) for the long-term operation of all storm water management facilities.

The City of Edina also addresses runoff problems with sound planning procedures. Land use and zoning ordinances promote improved water quality by guiding the growth and redevelopment of the community away from sensitive areas and by restricting certain types of growth to areas that can support it without compromising water quality. The City is currently in the process of updating their zoning ordinance.

Details regarding the measurable goals, implementation schedule, and responsible parties for the post-construction stormwater runoff control requirements can be found in the City of Edina's SWPPP ([Appendix A](#)).

15.1.1.6 Pollution Prevention and Good Housekeeping Methods

Pollution prevention and good housekeeping methods can ensure a reduction in the amount and type of pollution that is discharged into waterways from streets, parking lots, open spaces, and storage and vehicle maintenance areas. To take advantage of the benefits provided by pollution prevention practices, the Phase II Rule requires that the City develop and implement an operation and maintenance program has the ultimate goal of preventing or reducing pollutant runoff from municipal operations into the storm sewer system. The program must include employee training on incorporation of pollution prevention and good housekeeping techniques into municipal operations such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

To meet the requirements of the pollution prevention and good housekeeping for municipal operations, a number of BMPs have been developed. These BMPs include:

1. Annual inspection of 20% of the outfalls, sediment basins, and ponds within the City's storm sewer system.

2. Inspection and documentation of all structural pollution control devices a minimum of once per year.
3. Evaluating, annually inspecting, and modifying (if necessary) current BMPs in place on all exposed stockpiles, storage, and materials located within City-owned property.
4. Annually evaluating landscaping and lawn-care practices, which may include the use of fertilizers, pesticides, herbicides, lawn mowing, grass clipping collection, mulching and composting, and developing BMPs to reduce storm water pollution.
5. Annually reviewing practices and policies related to road salt applications. The City will consider alternative products, calibration of equipment, inspection of vehicles and staff training to reduce pollutants from road deicing activities.
6. Continuation of the current street sweeping program, identification of improvements, and implementation of changes to reduce storm water pollutants.

Details regarding the measurable goals, implementation schedule, and responsible parties for the pollution prevention and good housekeeping requirements can be found in the City of Edina's SWPPP ([Appendix A](#)).

15.1.2 Nondegradation Report

The City's nondegradation report was required by the MPCA to address modifications to the SWPPP for measures that may be necessary to meet the new, applicable requirements of the NPDES MS4 permit. These modifications cover discharge to wetlands and other special waters as applicable, and the nondegradation requirements for selected MS4s (30 permittees including the City of Edina), including the development of a loading assessment and nondegradation report. The *Nondegradation Report Submittal to the Minnesota Pollution Control Agency for Selected MS4 Permit Requirements* (Barr, 2007) is presented in the CWRMP as [Appendix B](#).

The City's loading assessment and nondegradation report assumes that future BMP implementation throughout the city would follow the most stringent standards of the two watershed management organizations. The NMCWD has adopted amended stormwater management rules (March 2008), but the MCWD is in the process of formal rule revisions. Because the MCWD is still in the process of revising their water quality treatment standards, the City assumed that the NMCWD volume retention standards (NMCWD, 2008) would be applied throughout the city in the future. Upon approval of the MCWD revised standards (if more stringent), the City will update its development review policies, standards and procedures, as cited in the SWPPP. This approach will ensure the following:

1. Receiving water quality should be improved for lakes, wetlands and creeks in Edina.
2. Channel erosion and creek morphology changes will be minimized.

3. Further protection will be provided for the physical and biological integrity of the creek and wetland corridors
4. Controlled bounce and duration of inundation in the City's wetlands and preservation of the functions and values for each type of wetland classification.

For projects that impact wetlands, and where the requirements of the Wetland Conservation Act (WCA) are not as comprehensive as the MPCA water quality standards, then the requirements of the NPDES permit require an LGU to make a determination that will also satisfy Minn. R. 7050.0186. The City of Edina will continue to defer LGU authority to the NMCWD and MCWD.

The City will revise its SWPPP to show where the vulnerable wellhead protection areas are within the city and to define the measures that will reduce the threat to drinking water to the maximum extent practicable. These measures will be developed in accordance with the guidance provided by the Minnesota Department of Health's Evaluating Proposed Stormwater Infiltration Projects in Vulnerable Wellhead Protection Areas (2007), and the MPCA's Minnesota Stormwater Manual (2005) regarding potential stormwater hotspots.

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

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

15.1.3 Impaired Waters and TMDL Issues

The federal Clean Water Act (CWA) requires states to adopt water quality standards to protect the nation's waters. Water quality standards designate beneficial uses for each waterbody and establish

criteria that must be met within the waterbody to maintain the water quality necessary to support its designated use(s). Section 303(d) of the CWA requires each state to identify and establish priority rankings for waters that do not meet the water quality standards. The list of impaired waters, or 303(d) list, is updated by the state every two years.

For impaired waterbodies, the CWA requires the development of a total maximum daily load (TMDL). 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, as well as a margin of safety. As a part of the allocation scheme a waste load allocation (WLA) is developed to determine allowable pollutant loadings from individual point sources (including loads from storm sewer networks), and a load allocation (LA) establishes allowable pollutant loadings from non-point sources and natural background levels in a waterbody.

The city's SWPPP also requires the City to complete a review of impaired waters, including identification of the impaired waters that are likely to be impacted by the City's stormwater discharge, identification of all potential stormwater discharges to impaired waters, delineation of the watershed areas that contribute to these discharges, and evaluation of the hydrology, land use and other characteristics of the watershed areas that may impact the impaired water as a results of a stormwater discharge. Based on this review, the City must determine whether changes to the City's SWPPP are warranted to reduce the impact from the City's stormwater discharge to each impaired water of concern. The City must incorporate the changes identified in the impaired waters review into the City's SWPPP.

Impaired waters located within the City of Edina, as identified by the MPCA's 2008 303(d) Impaired Waters List, include: Lake Cornelia, Lake Edina, Nine Mile Creek and Minnehaha Creek. These waterbodies are listed in [Table 15.1](#), along with the affected MPCA designated use, the pollutant or stressor that is not meeting the MPCA water quality criteria, and the MPCA target for starting and completing the TMDL process. It is likely that TMDLs will be completed to address these impairments, and load reductions will be assigned to the City, based on the TMDL results. This Water Resources Management Plan will likely need to be amended to incorporate future TMDL requirements. The TMDL requirements will also be incorporated into the City's NPDES Phase II MS4 permit.

Table 15.1 City of Edina Waters on MPCA's 303(d) Impaired Waters List

Reach/Waterbody	Description	Affected Use	Pollutant or Stressor	Target Dates for Starting/Completing TMDL
Lake Cornelia ¹		Aquatic Recreation	Nutrient/Eutrophication Biological Indicators	2012/2016
Lake Edina ²		Aquatic Recreation	Nutrient/Eutrophication Biological Indicators	2013/2017
Nine Mile Creek ³	Headwaters to Minnesota River	Aquatic Life	Fish Bioassessments	2005/2009
Nine Mile Creek ³	Headwaters to Minnesota River	Aquatic Life	Chloride	2005/2009
Nine Mile Creek ⁴	Headwaters to Minnesota River	Aquatic Life	Turbidity	2005/2009
Minnehaha Creek ⁵	Lake Minnetonka to Mississippi River	Aquatic Life	Fish Bioassessments	2007/2012
Minnehaha Creek ⁵	Lake Minnetonka to Mississippi River	Aquatic Recreation	Fecal Coliform	2007/2012
Minnehaha Creek ⁵	Lake Minnetonka to Mississippi River	Aquatic Life	Chloride	2007/2012
Minnehaha Creek ⁶	Lake Minnetonka to Mississippi River	Aquatic Life	Dissolved Oxygen	2009/2012
<p>¹ Draft 2010 303(d) list indicates a target start date of 2013 and completion date of 2018</p> <p>² Draft 2010 303(d) list indicates a target completion date of 2018</p> <p>³ Draft 2010 303(d) list indicates a target completion date of 2010</p> <p>⁴ Nine Mile Creek has been delisted for a turbidity impairment on the Draft 2010 303(d) List</p> <p>⁵ Draft 2010 303(d) list indicates a target start date of 2009</p> <p>⁶ Draft 2010 303(d) list includes a dissolved oxygen impairment for Minnehaha Creek (was not on the 2008 303(d) list.</p>				

15.1.3.1 Nine Mile Creek

Nine Mile Creek is currently on the 303(d) Impaired Waters List for several aquatic life impairments, including excess chloride, fish bioassessment, and turbidity. In 2007, the MPCA and NMCWD began development of a chloride TMDL for the creek, to be completed in 2010. The City of Edina will continue to participate in the stakeholder process for the chloride TMDL. The loading allocation and implementation plan that results from the TMDL will focus on reducing road salt application, where possible, and other BMPs to reduce the amount of salt that reaches the creek.

The Nine Mile Creek is also listed for a fish biota impairment. In 2009, the MPCA and NMCWD began development of a TMDL to address the biotic impairment. Stakeholder meetings have been held and the draft TMDL report is to be completed in early 2010.

In 2002, the Nine Mile Creek was listed for turbidity impairment. In 2008-2009, the NMCWD disputed the impairment, based on evaluation of historical turbidity data collected from various reaches of the creek. The MPCA has concurred that the creek is not impaired for turbidity, and the impairment has been removed in the 2010 draft 303(d) list.

15.1.3.2 Minnehaha Creek

Minnehaha Creek is currently on the 303(d) list for several impairments, including excess chloride, fecal coliform, and fish biota impairment. Lake Hiawatha, located on Minnehaha Creek downstream of the City of Edina, is also on the impaired waters list for excess nutrients and eutrophication biological indicators. The MPCA and MCWD initiated the TMDL development process in 2009 to address bacteria, nutrients and chloride in Minnehaha Creek and downstream Lake Hiawatha. The TMDL development process will also likely address the biological impairment for the creek. The City of Edina will continue to participate in the stakeholder process for the Minnehaha Creek/Lake Hiawatha TMDL.

The MPCA's draft 2010 303(d) list also includes an aquatic life impairment for Minnehaha Creek due to low dissolved oxygen levels.

15.1.3.3 Lake Cornelia

Lake Cornelia (North Basin) was included on the MPCA's 303(d) list in 2008 for excess nutrients and eutrophication biological indicators, with a targeted TMDL start date of 2012 and completion date of 2016. The MPCA's draft 2010 303(d) list extends the targeted TMDL start and completion dates to 2013 and 2018, respectively.

In 2004-2005, the NMCWD completed a Draft Use Attainability Analysis for Lake Cornelia, which is a scientific assessment of a water body's physical, chemical, and biological condition. The study included a water quality assessment and prescription of protective and/or remedial measures for the lake and its tributary watershed. In 2008-2009, the NMCWD collected additional data on the lake's water quality to verify the conclusions of the draft Use Attainability Analysis and evaluate several additional remedial measures to improve lake water quality. It is anticipated that the completed UAA will be used as a starting point for the TMDL development process in the future. The City of Edina will partner with the NMCWD in evaluating potential remedial measures for the lake and its watershed and implementing recommended BMPs to improve the quality of Lake Cornelia. The City of Edina will also participate in the stakeholder process for TMDL development.

15.1.3.4 Lake Edina

Lake Edina was included on the MPCA's 303(d) list in 2008 for excess nutrients and eutrophication biological indicators, with a targeted TMDL start date of 2013 and completion date of 2017. The MPCA's draft 2010 303(d) list extends the targeted TMDL completion date to 2018.

For the MPCA to list a water body (besides a river or creek) on the impaired waters list, it must meet the MPCA's definition of a "lake" and there must be sufficient data to determine if the lake is

impaired (see MPCA guidance manual, 2005). The City will work with the NMCWD to assess whether Lake Edina meets the MPCA's definition of a "lake". If it is determined that the waterbody does not meet the appropriate "lake" criteria, efforts will be made to remove this lake from the 303(d) list.

15.1.3.5 Other Downstream Waterbodies

There are also impaired lakes and streams outside the city that receive stormwater from Edina and will be the subject of TMDL studies, including Lake Hiawatha (discussed in [Section 15.1.3.2](#)), the Mississippi and Minnesota Rivers, and Lake Pepin. Lake Pepin is located downstream of the city via the Mississippi River. It is on the impaired waters list for excess nutrients, and a large-scale TMDL development effort is underway by the MPCA. Once the Lake Pepin TMDL is completed, it could impact the City of Edina, since the area tributary to Lake Pepin is the entire Mississippi River and Minnesota River basins upstream of the lake.

In addition to TMDLs for specific impaired waters, the MPCA has developed a statewide TMDL for mercury. Mercury in Minnesota fish comes almost entirely from atmospheric deposition, with approximately 90 percent originating outside of Minnesota (MPCA, 2004). Because the main source of mercury comes from outside the state and the atmospheric deposition of mercury is relatively uniform across the state, the TMDL for mercury is 11 kg/year for the entire state.

15.2 Specific MCWD Tasks/Issues

The Minnehaha Creek Watershed District (MCWD) Comprehensive Water Resources Management Plan (MCWD Plan) requires the City of Edina to address the following specific items as part of this CWRMP's implementation program.

15.2.1 Phosphorus Load Reduction

The MCWD Plan has identified required annual phosphorus loading reductions for each Local Governmental Unit (LGU) within the watershed in an effort to improve downstream water quality. The MCWD Plan requires that the City reduce its annual phosphorus load by 67 pounds and that the City include "strategies and specific steps for achievement of the prescribed loading reductions, including operational, land use, and capital improvements implemented since 2000, and those planned for the future" in its local water management plan.

The City of Edina has met its required phosphorus load reduction through implementation of capital improvements since 2000, including the Pamela Park Water Quality Improvement Project (annual reduction of 88 lbs) and installation of underground stormwater treatment structures and sump manholes as part of recent street reconstruction efforts (annual reduction of 8 lbs). These capital improvements, and the associated phosphorus load reductions, are discussed in more detail in the following sections.

In addition to these structural BMPs, there are a number of non-structural practices that the City of Edina has implemented to address surface water quality runoff, including implementing an annual street-sweeping routine (twice a year), and requiring the use of phosphorus-free fertilizers for lawns since 2004. The phosphorus loading reductions achieved through implementation of these practices have not been factored into the loading assessment and as a result, the past and future phosphorus loading reductions reported above can be considered conservative.

In addition to these non-structural practices, the City will continue to seek opportunities to reduce impervious surface area and implement infiltration and other BMPs as part of their street improvement and repair work. Based on current projections, the City expects to undertake several road improvement projects within the portion of the City that drains to Minnehaha Creek in the next 10 years. A map of the City's 2010-2019 anticipated local bituminous street reconstruction projects is included as [Appendix C](#). The City will seek to partner with the MCWD to explore opportunities for incorporating water quality improvement BMPs as part of the street reconstruction projects.

15.2.1.1 Pamela Park Water Quality Improvement Project

In 2001- 2002, the Pamela Park Water Quality Improvement Project was constructed to improve the water quality conditions of Pamela Lake and reduce the external phosphorus and sediment loads to the lake and to Minnehaha Creek. The capital improvement project, which was initiated by the City of Edina and completed in partnership with the MCWD, included construction of three stormwater ponds in the northern part of Pamela Park, construction of two stormwater treatment wetlands on the south side of Pamela Lake, and removal of accumulated sediment from open water areas of Pamela Lake.

The three stormwater ponds in the northern part of Pamela Park were constructed in series and treat stormwater runoff from a drainage area of approximately 304 acres. The drainage area is primarily single-family residential land use, but also includes approximately 41 acres of institutional land use (Edina Community Center/Normandale Elementary, Southview Middle School, and Concord School). Prior to construction of these stormwater ponds, runoff from much of this drainage area was discharged directly to Minnehaha Creek. Runoff from the remainder of the drainage area discharged to the wetland complex located upstream of Pamela Lake, which outlets to Minnehaha Creek via a concrete weir and culvert under 58th Street.

Two stormwater treatment wetlands were constructed on the south side of Pamela Lake at the locations of two major storm sewer outfalls to the lake. These wetlands, which were constructed at the edges of the pre-existing Lake Pamela wetland, provide pretreatment of stormwater prior to its discharge into the lake. The 132-acre drainage area to these treatment wetlands is primarily single-family residential land use.

In addition to construction of the stormwater ponds, the capital improvement project also included removal of accumulated sediment in Pamela Lake. Over the years, nutrient and sediment loads flowing directly into Pamela Lake from stormwater runoff had significantly reduced the water depths within the lake. As part of the project, much of the accumulated sediment was removed from the lake

to restore the lake to its 'original' conditions, improving lake water quality and habitat and increasing the water quality treatment achieved through sedimentation as stormwater passes through the lake to Minnehaha Creek.

A P8 water quality model was developed to assess the annual phosphorus removal achieved through construction of the stormwater ponds and treatment wetlands. The model was run for a twenty-year time period (1981-2001). Based on the modeling results, the average annual phosphorus removal achieved from construction of the stormwater ponds and treatment wetlands is approximately 90 pounds.

In 2005, portions of the Edina Community Center and adjacent school complex were redeveloped, which triggered the MCWD's stormwater treatment requirements. In lieu of constructing an onsite stormwater treatment pond, the MCWD allowed the school district to utilize the Pamela Park stormwater treatment ponds to meet their treatment requirements. The school redevelopment results in an additional six pounds of annual phosphorus loading to the Pamela Park stormwater ponds, of which approximately two pounds is removed prior to discharge to Minnehaha Creek. The MCWD has indicated that the City's required phosphorus load reduction cannot be attained through implementation of the MCWD stormwater rules. Therefore, the portion of the average annual phosphorus removal from the Pamela Park water quality improvement project attributed to the school redevelopment (two of the 90 lbs phosphorus removed annually) is not included as part of the City's required phosphorus load reduction. This results in an average annual phosphorus removal of 88 pounds due to construction of the Pamela Park stormwater ponds and treatment wetlands.

15.2.1.2 *Underground Stormwater Treatment Structures and Sump Manholes*

Since 2000, the City of Edina has completed several significant street reconstruction projects in the portion of the City that drains to Minnehaha Creek. As part of these projects, the City has upgraded the stormwater management system to include sump manholes and underground stormwater treatment structures, which reduce the amount of sediment and phosphorus that are discharged to downstream waterbodies. In total, fifteen sump manholes and twelve underground stormwater treatment structures have been installed since 2000 in the portion of the city that drains to Minnehaha Creek.

To estimate the amount of annual phosphorus removal achieved through installation of the sump manholes and underground stormwater treatment structures, the Sizing Hydrodynamic Separators and Manholes (SHSAM) model was utilized. SHSAM is a model developed by Barr Engineering in 2008-2009 to simulate the sediment removal from hydrodynamic separators and sump manholes, based on the laboratory research conducted by the St. Anthony Falls Laboratory (SAFL), University of Minnesota. The SHSAM model uses the manufacturer-specific performance functions developed by the SAFL, in conjunction with site-specific watershed parameters, local precipitation records, and sediment characteristics to estimate sediment removal performance (Mohseni, 2009). A relationship between phosphorus and suspended solids in stormwater runoff was developed to estimate the amount of phosphorus removal annually from the sump manholes and underground stormwater

treatment structures (Barr, 2009). Based on the modeling results, the fifteen sump manholes and twelve underground stormwater treatment structures result in an eight pound reduction in average annual phosphorus loading to Minnehaha Creek.

15.2.2 Landlocked Basins

The MCWD Plan identified two landlocked subwatershed units: one located in the northeast portion of the city (White Oaks area), and the other located west of T.H. 100 and north of Vernon Avenue (Interlachen area). The MCWD Plan requires that the City discuss and incorporate strategies to minimize new stormwater volumes and address any flooding issues in these areas. These areas are discussed in further detail below.

15.2.2.1 White Oaks Landlocked Area

The MCWD Plan identified a landlocked area located in the northeast portion of the city, generally south of Sunnyside Road and north of West 49th Street, east of Arden Avenue and west of France Avenue. To assess the flood potential in this landlocked area, the 100-year, 10-day snowmelt event was simulated in XP-SWMM, assuming impervious (frozen ground) conditions. Comparison of the modeling results with the City's 2-foot topographic information indicates that there is potential for the 100-year high water levels to impact structures in the following subwatersheds: MHN_1, MHN_49, MHN_12, MHN_65. To assess the potential for flooding, the City will complete a field survey to determine the low entry elevations of the potentially impacted structures and a detailed feasibility study to identify remedial measures, if necessary.

15.2.2.2 Interlachen Landlocked Area

The MCWD Plan identified a landlocked area located west of T.H. 100 and north of Vernon Avenue. This area, which encompasses subwatersheds EI_11, EI_12, EI_24, EI_13, and EI_19, currently drains to a wetland complex (EI_19) just south of Meadowbrook Golf Course. Two-foot topographic information for the area indicates that the natural overflow elevation between the landlocked wetland complex and the Meadowbrook Golf Course is approximately 885 feet M.S.L. Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Study for the City of Edina (FEMA, 1980), the 100-year flood level of Minnehaha Creek as it flows through the golf course is 892 feet M.S.L.

The maximum flood elevation that the City will allow in the wetland area (EI_19) is 888 feet M.S.L. To prevent the backflow of water from the Meadowbrook Golf Course to the wetland complex (EI_19), it is recommended that an embankment be constructed/raised between the wetland and the golf course to an elevation of at least 892 feet M.S.L. Upon raising the embankment, a pumped outlet will be required to keep the flood elevation below 888 feet M.S.L. The City should establish a management plan to address necessary pumping scenarios. Previous analyses for the area indicate a 1 cfs pumped outlet would be sufficient.

15.2.3 Flooding or Modeled High Water Locations

The MCWD Plan identified several locations in Edina where there are known or modeled flooding issues. These areas were evaluated and are discussed in further detail below.

15.2.3.1 Kresse Circle

The area near Kresse Circle in Northeast Edina drains to a land-locked basin located directly east of Maloney Avenue and north of the Interlachen Country Club parking lot (Subwatershed HO_19). This land-locked basin has a pumped outlet; stormwater discharge is conveyed northward via a forcemain into the Hopkins system, which appears to then flow east along Excelsior Boulevard and eventually into Minnehaha Creek. There is a natural overflow on the east side of the pond at an elevation of approximately 916 feet Mean Sea Level (M.S.L.); water will flow eastward into the Interlachen Country Club golf course. The City is not aware of any flooding issues at this location.

15.2.3.2 Minnehaha Creek at West 58th Street

Based on the most current Federal Emergency Management Agency (FEMA) Flood Insurance Study for the City of Edina (FEMA, 1980), the 100-year flood level of Minnehaha Creek just north of West 58th Street is approximately 861 ft M.S.L. At this elevation, the creek will overtop its banks north of West 58th Street and flow westward. The creek overtopping will result in inundation/ponding in subwatersheds MHS_81 (stormwater pond north of West 58th Street), LP_2 (including portions of West 58th Street), LP_25 (stormwater ponds south of West 58th Street), and portions of Pamela Park (including Lake Pamela and the wetland complex to the north of Lake Pamela, Subwatersheds LP_14 and LP_26).

To further evaluate the flooding in this area and the potential impact to nearby properties, the City will complete a stormwater analysis and detailed feasibility, if necessary. The City will seek to partner with the MCWD to address this potential flooding problem through the sharing of hydrologic and hydraulic modeling information and requesting funding assistance.

15.2.3.3 Utility Bridge in Arden Park

The MCWD Plan has identified a potential flooding issue at or near the utility bridge in Arden Park, located in Northeast Edina. The referenced bridge is a pedestrian bridge that crosses Minnehaha Creek just north of West 53rd Street. The City is not aware of any flooding problems in this area. Potential inundation of this bridge in a 100-year precipitation event is not critical, as it would not result in property damage to nearby homes nor pose a significant risk to public safety.

15.2.4 Flow Velocity and Erosion

The MCWD Plan identified three locations where the MCWD's modeling indicated existing and future high pipe peak flow velocities may require erosion control measures or energy dissipaters at inlets and outlets: Minnehaha Creek downstream of 50th Street, storm sewer discharge that enters Minnehaha Creek just north of Pamela Park, and the storm sewer outfall into the ditch that leads to Minnehaha Creek just north of Pamela Park. Per the MCWD Plan requirement, the City assessed the

need for erosion control at these locations. A visual observation field inspection was performed in the fall of 2009. At the time of inspection, stream flow was nonexistent, which made for ideal inspection conditions. Observations and recommendations for each site are summarized below.

15.2.4.1 Downstream of 50th Street

The City of Edina has recently completed a repair/improvement project of the 50th Street dam structure, including installation of a cable-concrete blanket below the spillway. Beyond the cable concrete, the channel bottom is well armored. South of 50th Street, the channel butts up against a high bank on the west side of the channel. There is moderate erosion on this bank; however it is heavily forested and very steep. The erosion appears to be occurring slowly and does not warrant the installation of countermeasures at this time.

Two drain tile outlets were also observed approximately 500 feet downstream of 50th Street on the west bank, near the bottom of the slope. These outlets are apparently private systems originating from the Edina Country Club. One of the lines is perched higher than the other and has a significant scour hole below it. This line may have been abandoned and replaced with the other observed line, but water was observed dripping from its end. The MCWD shall work with the Edina Country Club to verify whether this line is abandoned or not and repair the scour hole.

15.2.4.2 Storm Sewer Discharge North of Pamela Park

A 30-inch RCP discharges to a channel leading to Minnehaha Creek immediately north of West 58th Street. There is a moderate scour hole downstream of the culvert. The scour is approaching a fairly large cottonwood tree on the west bank, and it may be desirable to place some fieldstone riprap along this bank to prevent further undercutting. Otherwise, the channel is relatively free of erosion and appears to be quite stable.

15.2.4.3 Storm Sewer Outfall to Ditch North of Pamela Park

A 48-inch RCP storm sewer discharges to a ditch located approximately 300 feet north of West 58th Street. The ditch flows east to Minnehaha Creek; a weir is present directly downstream of the storm sewer outlet at the head of the ditch. The ditch has a mild slope and is filled with downed timber on the downstream end. Since there was very little flow during the observation, it is not clear whether the debris presents any problem during higher flows. Only minor, site specific erosion was observed in the channel and no action is recommended.

15.2.5 Potential Capital Projects and Other Issues

The MCWD Plan identified a potential capital improvement project in Edina to implement a stream restoration project on Reach 14 of Minnehaha Creek. This reach extends from France Avenue to 54th Avenue West. This project would include streambank stabilization, in-stream habitat enhancement, and buffer enhancement.

The MCWD has historically had jurisdiction and maintains responsibility over county ditches within its boundaries. County ditch #17, located in the far northeast portion of Edina (Morningside area) has been converted to local storm sewer and no longer performs its historical function and is used mainly as a local, inter-community stormwater conveyance. The MCWD is interested in transferring jurisdiction of Ditch #17 to the City. The City is not interested in transferring the jurisdiction of County Ditch #17 at this time. However, the City will seek to partner with the MCWD to address identified flooding problems related to this storm sewer system (see [Section 12.3.1.1](#) for additional details).

15.3 Specific NMCWD Tasks/Issues

15.3.1 Use Attainability Analyses

The NMCWD has developed Use Attainability Analyses (UAAs) for Mirror, Arrowhead, Indianhead, and Cornelia lakes. A UAA is an intensive, watershed-based lake study that diagnoses water quality problems and their causes and evaluates feasible alternative improvement measures. The UAAs for each of these lakes are described in further detail in the following sections.

15.3.1.1 *Mirror Lake Use Attainability Analysis*

In 2003-2004, the NMCWD completed the Draft Mirror Lake Use Attainability Analysis (Barr Engineering Co., 2004) based on water quality data collected from the lake in 2001. The watershed and in-lake modeling analyses indicated that the internal release of phosphorus accounts for the largest portion of annual phosphorus loading to Mirror Lake (approximately 50%), with watershed loading comprising approximately 45% and atmospheric deposition accounting for the remaining phosphorus loading.

In the summer of 2004, the NMCWD collected additional water quality data for Mirror Lake, and the watershed and in-lake modeling analyses were re-evaluated to verify the conclusions of the draft Use Attainability Analysis. The preliminary management recommendations from these efforts included implementation of BMPs in the Mirror Lake watershed, continued monitoring of aquatic plant populations and potential aquatic plant management to control Curlyleaf pondweed, and an in-lake application of alum (aluminum sulfate) to limit the internal phosphorus loading to the lake. The City of Edina will work with the NMCWD to further evaluate and implement the recommendations of the draft UAA as deemed appropriate.

15.3.1.2 *Arrowhead and Indianhead Lakes Use Attainability Analysis*

In 2004-2006, the NMCWD completed the Draft Arrowhead and Indianhead Lakes Use Attainability Analysis (Barr Engineering Co., 2006). The NMCWD's proposed management strategy for these lakes is to "protect", which means "to avoid significant degradation from point and nonpoint pollution sources and from wetland alterations, in order to maintain existing beneficial uses, aquatic and wetland habitats, and the level of water quality necessary to protect these uses in receiving waters".

The watershed and in-lake modeling analyses completed for Arrowhead Lake indicated that watershed loading is the largest source of phosphorus to the lake (approximately 75%), with internal phosphorus loading (likely due to die-back of Curlyleaf pondweed and the release of phosphorus from lake sediment) comprising approximately 20%, and atmospheric deposition accounting for the remaining phosphorus loading. The watershed and in-lake modeling analyses completed for Indianhead Lake indicated that watershed loading is the primary source of phosphorus to the lake; internal loading was not found to be a significant source of phosphorus to Indianhead Lake.

Preliminary management recommendations for these two lakes included continued periodic monitoring of aquatic plant populations to assess the growth of undesirable non-native species such as Eurasian watermilfoil and Curlyleaf pondweed. To reduce the internal phosphorus loading in Arrowhead Lake, Curlyleaf pondweed management was suggested. The City of Edina will work with the NMCWD to further evaluate and implement the recommendations of the draft UAA as deemed appropriate.

15.3.1.3 Lake Cornelia Use Attainability Analysis

In 2004-2006, the NMCWD completed the Draft Lake Cornelia Use Attainability Analysis (Barr Engineering Co., 2006). In 2008-2009, the NMCWD collected additional data on the lake's water quality to verify the conclusions of the draft Use Attainability Analysis and evaluate several additional remedial measures to improve lake water quality. It is anticipated that the completed UAA will be used as a starting point for the TMDL development process in the future. The City of Edina will partner with the NMCWD in evaluating potential remedial measures for the lake and its watershed and implementing recommended BMPs to improve the quality of Lake Cornelia. The City of Edina will also participate in the stakeholder process for TMDL development.

15.3.2 Water Quality Improvement Projects

In 2009 the City of Edina petitioned the NMCWD for assistance in planning, implementing, and funding various water quality improvements throughout the portion of the city in the Nine Mile Creek Watershed District. The petition includes, but is not limited to, streambed stabilization projects, off road multi-purpose trail accompanying the creek to the extent possible, creek corridor management, and improvements of lake water quality. The NMCWD passed a resolution accepting the City's petition, upon several conditions. The NMCWD engineer will be preparing a feasibility report in appropriate phases to reflect 1) streambank restoration, including streambank stabilization, removal of sediment deposits, deadfalls, and other debris, maintenance of Bredesen Park, and other measures to restore natural function, scenic values, and enhance public access, including ponds, storm sewer devices, or other improvements appropriate to achieving the NMCWD's water quality goals identified in their Water Management Plan (NMCWD Plan) or in a NMCWD Use Attainability Analysis (UAA), and 2) lake water quality improvements, through implementation of the NMCWD Use Attainability Analyses prepared for Edina, Arrowhead, Cornelia, Indianhead, and Mirror lakes, including ponds, storm sewer devices, or other improvements to the extent they are necessary to achieve the water quality goals identified in the NMCWD Plan or in a NMCWD UAA. The City of

Edina will continue to work with the NMCWD in development of the above mentioned feasibility analyses and in implementation of the resulting water quality improvement projects.

15.4 Financial Considerations

Implementation of the proposed regulatory controls, programs and improvements that are identified in the plan will have a financial impact on the City. To establish how significant this impact will be, a review of the means and ability of the City to fund these controls, programs, and improvements is necessary. [Table 15.2](#) lists potential sources of revenue for implementation of the water resources management efforts outlined in this plan.

Table 15.2 Potential Funding Sources for Plan Implementation

Description of Funding Sources	Revenue Generated
1. Revenue generated by City's Storm Water Utility	\$1,800,000/yr.
2. Special assessments for local improvements made under the authority granted by Minnesota Statutes Chapter 429	Variable depending on activities undertaken
3. Revenue generated by the Watershed Management Special Tax Districts provided for under Minnesota Statutes Chapter 473.882.	Variable depending on activities undertaken
4. For projects being completed by or in cooperation with the Nine Mile Creek and Minnehaha Creek Watershed Districts, project funds could be obtained from watershed district levies associated with their administrative funds, construction funds, preliminary funds, repair and maintenance funds or survey and data acquisition funds, as provided for in Minnesota Statutes Chapter 103D.905.	Variable depending on activities undertaken
5. Grant monies that may be secured from various local, regional, County, State, or Federal agencies. This would include MnDOT, MPCA, Metropolitan Council, the DNR, and others	Variable depending on activities undertaken
6. Other Sources: These may be other sources of funding for storm water activities such as tax increment financing, state aid, etc. The City will continue to explore additional revenue sources as they become available.	Variable
7. Tax abatement	

15.5 Plan Update and Amendment Procedure

It is the intention of the City to have this Comprehensive Water Resource Management Plan reviewed and approved by the Nine Mile Creek and Minnehaha Creek Watershed Districts. Once approved, no significant changes to this plan can be made without the approval of the proposed revisions by the watershed districts within the city that are affected by the change. Significant changes to the local plan shall be made known to the following parties:

- City Manager, Director of Public Works, and City Engineer
- Affected Watershed District within the City
- Metropolitan Council
- City Council

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

Minor changes to the Plan shall be defined as changes that do not modify the goals, policies, or commitments expressly defined in this plan by the City. Adjustment to subwatershed boundaries will be considered minor changes provided that the change will have no significant impact on the rate or quality in which storm water runoff is discharged from the city boundaries. Minor changes to this plan can be made by the staff at the City without outside review. It is the intention of the City that this Plan be updated by the year 2020 unless significant changes to the plan are deemed necessary prior to that date.

15.6 Regulatory Framework and Agency Responsibilities

Various units of government are involved in regulating water resource related activities including: the City of Edina, watershed management organizations, the Metropolitan Council, Hennepin County, the Minnesota Department of Natural Resources, the Minnesota Board of Water and Soil Resources, the Minnesota Pollution Control Agency, the Minnesota Department of Health, the Minnesota Environmental Quality Board, the US Corps of Engineers, and the Minnesota Department of Transportation.

15.6.1 City of Edina

The City of Edina manages stormwater to protect life, property, waterbodies within the city, and receiving waters outside the city. However, the City relies heavily on the Nine Mile Creek and Minnehaha Creek watershed districts for implementation of water resource protection rules and requirements. The City defers Local Governmental Unit (LGU) authority to the NMCWD and MCWD for floodplain management and drainage alterations, wetlands management, stormwater

management, erosion and sediment control, waterbody crossings and structures, shoreline and streambank improvements, and sediment removal.

The City of Edina also defers Local Governmental Unit (LGU) authority for the Wetland Conservation Act to the NMCWD and MCWD. This includes requiring and verifying that all projects impacting wetlands meet the requirements of the Minnesota Wetland Conservation Act. For projects in or around wetlands that do not trigger WCA regulation or NMCWD/MCWD involvement, the City is considering incorporating wetland management requirements into their zoning code, which is being updated in 2009-2010. The Board of Water and Soil Resources serves as both a state administrator of the programs associated with the WCA, as well as providing technical assistance to LGUs administering the WCA.

The City of Edina is required to meet the conditions of the NPDES Phase II MS4 General Permit and to implement its SWPPP. The City continues to actively engage the MPCA and others to keep its permit and implementation up-to-date with regard to technology and regulations.

The City utilizes its Development Review process to address stormwater management and ensure water resource protection within the city. Engineering staff review development and redevelopment proposals to ensure that the stormwater management policies and standards detailed in [Section 3.0](#) of this plan are met. Engineering staff also consult the City's Wellhead Protection Plan to ensure that development and redevelopment proposals are in line with the protective measures established for the City's sensitive groundwater resources.

Staff from the City's planning department review development and redevelopment proposals with the guidance of the City's long-range Comprehensive Plan and Zoning Ordinance. In addition to the incorporating the policies and design standards of this CWRMP, the *Edina Comprehensive Plan* (City of Edina, 2009) includes policies, principals, and guidelines that integrate water resources protection and management with land use planning. Among these include the City's land use policy to "grow and develop in a sustainable manner that will protect its high quality natural environment, promote energy efficiency and conservation of natural resources" and to "maintain the current open space and wetlands acreage and seek to expand it whenever possible". The Comprehensive Plan encourages reductions in impervious surfaces and associated stormwater runoff from redevelopment sites and parking lot design that promotes stormwater infiltration., and also encourages protection and improvement of urban forests, which provides stormwater management benefits, among others.

The City's zoning ordinance is used by staff in the planning department to guide development and redevelopment within the city. The zoning ordinance establishes required setbacks from naturally occurring lakes, ponds, and streams. In some cases, the buffer requirements of the watershed districts may be more stringent, upon which the watershed district requirements supersede. The City's zoning ordinance also addresses development within the floodplain districts of the city.

The City of Edina is basically fully developed; thus land alteration activities are primarily of a redevelopment nature. As the city redevelops, the City utilizes the policies of the Edina

Comprehensive Plan, the zoning ordinance, and this CWRMP to encourage low-impact site design. The City also relies on implementation of the rules and regulations of the Nine Mile Creek and Minnehaha Creek watershed districts to promote low-impact site design.

The City and its residents highly value the parks, open space, and natural resources throughout the city. Through their Comprehensive Plan, they have identified the preservation of natural resources and, where appropriate, restoration of natural resources to create an environment that promotes sustainable natural resources. The City plans to continue to work closely with the Nine Mile Creek and Minnehaha Creek watershed districts to coordinate and support future efforts to create, protect, and preserve wetland areas and restoration projects that improve shoreline stabilization, establish and maintain environmentally sound shoreline buffer zones and other water quality best practice projects (City of Edina, 2009).

The City of Edina currently owns and maintains approximately 350 acres of natural resource open space areas, which includes 148 acres along the Nine Mile Creek right-of-way and 23 acres along the Minnehaha Creek right-of-way. The City is basically fully developed, and is therefore no longer actively acquiring additional property to develop as park land or open space. However, the City plans to retain all of the current publicly owned park land and consider any additional property that may be offered in the future as potential additional park property. The City will also seek to acquire additional park and open space land as more private land may become available for public acquisition.

15.6.2 Watershed Management Organizations

The Metropolitan Surface Water Management Act (Chapter 509, Laws of 1982, Minnesota Statute Section 103B.201 to 103B.255 as amended) establishes requirements for watershed management organizations to prepare watershed management plans within the Twin Cities Metropolitan Area. The law requires these plans to focus on preserving and using natural water storage and retention systems to:

- Improve water quality.
- Prevent flooding and erosion from surface flows.
- Promote groundwater recharge.
- Protect and enhance fish and wildlife habitat and water recreation facilities.
- Reduce, to the greatest practical extent, the public capital expenditures necessary to control excessive volumes and rate of runoff and to improve water quality.
- Secure other benefits associated with proper management of surface water.

Edina lies within two major drainage areas. As a result two watershed management organizations cover Edina, each with its own governing body; the Minnehaha Creek Watershed District (MCWD) and the Nine Mile Creek Watershed District (NMCWD).

More information is available at: www.leg.state.mn.us/lg/statutes.asp

15.6.2.1 Minnehaha Creek Watershed District

The Minnehaha Creek Watershed District (MCWD) consists of 27 cities and 3 townships on the western edge of the Twin Cities area. The MCWD adopted their most recent watershed management plan (Minnehaha Creek Watershed District Comprehensive Water Resources Management Plan) on July 5, 2007.

The MCWD maintains a robust regulatory program that requires development and some redevelopment projects to treat and control the rate of stormwater discharge, using a variety of best management practices (BMPs). Development and water resource related projects must apply for and receive MCWD permits before work can begin.

The MCWD permitting program includes rules and permitting requirements for sediment and erosion control, stormwater management (including stormwater runoff volume reductions and water quality requirements), wetlands protection, shoreline improvements, floodplain alterations, and dredging.

Where lakes do not currently meet water quality goals, the MCWD uses three key strategies to achieve load reductions: 1) rules requiring removal of at least 50 percent of new phosphorus loads generated by new development on new permitted development and redevelopment; 2) management of volumes generated by that new development; and 3) a requirement for stormwater plan approval earlier in the development process.

In 2003 the MCWD completed a Functional Assessment of Wetlands that assigned wetlands in the watershed to a management classification based on existing conditions. The MCWD will consider amending its wetland regulatory program to manage wetlands on the basis of that classification.

The MCWD operates a Land Conservation Program that undertakes conservation activities ranging from assisting property owners in enrolling property in conservation programs to acquiring easements or fee title over high value resources. The MCWD Plan has identified Key Conservation Areas, which are priority areas in the watershed where the conservation of land will improve the characteristics of the aquatic ecosystem and the water quality locally and downstream.

The MCWD's designated Key Conservation Areas within Edina generally follow Minnehaha Creek, and fall mainly on park lands and riparian wetlands adjacent to the creek. [Figure 15-1](#) shows the portions of the MCWD's Key Conservation Areas within the city that intersect with City-owned property. The City will strive to protect and conserve the hydrologic and ecologic values of these areas and other natural areas in the city through implementation of their stormwater management

goals and policies (Section 3.0) and development/re-development review process. These resources will also be protected through implementation of the MCWD's rules and permitting program.

The MCWD operates a watershed-wide Strategic Education and Communications Program that provides general watershed education and outreach as well as targeted information. The program philosophy is that an informed and well-educated public and public base will better understand the benefits that water quality protection and improvement offers throughout the MCWD.

More information is available at the MCWD website: www.minnehahacreek.org.

15.6.2.2 Nine Mile Creek Watershed District

The NMCWD works cooperatively with other governmental bodies at the city, county and state level to maintain and enhance water quality, regulate stormwater runoff, and provide year-round recreation. The NMCWD also works with developers on any project that proposes to alter floodplains, wetlands, lakes or the creek itself. The NMCWD requires permits for these types of projects to ensure that land use changes do not negatively impact water quality and flood protection. The NMCWD's review of permits provides an opportunity for citizen input on water-related issues.

The NMCWD Watershed Management Plan was adopted in March 2007. Through their plan, the NMCWD pursues projects that improve water quality. These projects, like past flood control projects, will be conducted in full cooperation with municipalities.

The NMCWD permitting program includes rules and permitting requirements for sediment and erosion control, stormwater management (including stormwater runoff volume reductions), wetlands management, floodplain management, and water quality.

The NMCWD's permitting program is independent of permits that may be required by other governmental agencies. If a permit is required by the Minnesota Department of Natural Resources (DNR) for a project, the NMCWD reviews and provides comments to the DNR regarding the project. General Permitting authority has been given to the NMCWD by the DNR for projects related to shore protection, docks, road crossings and maintenance at storm sewer intakes and outfalls.

The formal review by the NMCWD typically is held at a regular Board of Managers meeting within one month from the approval of the project by the city council. NMCWD meetings are open to the public. At the meeting, Managers receive comments from the permit applicant and the general public regarding the project. After review of the application and all comments, the Board of Managers votes to approve, approve with modification, or deny the application on behalf of the NMCWD. If the project is approved by the NMCWD, correspondence is prepared summarizing the conditions of the NMCWD's approval. This correspondence and approved permit is usually sent to the permit applicant within two weeks of the Board of Managers' meeting date.

More information, including the NMCWD's most current rules and design criteria, are available at the NMCWD's website: <http://www.ninemilecreek.org/>

15.6.3 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 watershed 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 North Robert Street, St. Paul, MN 55101 (651-602-1000).

More information is available at the Met Council website: www.metrocouncil.org

15.6.4 Hennepin County

Hennepin County plays a role in groundwater protection and management, through implementation of its Ground Water Plan (1994). The county administers a well sealing cost share grant program and works with the cities in the county to implement the county's groundwater plan.

More information is available at the County website: www.co.hennepin.mn.us

15.6.5 Minnesota Department of Natural Resources

The DNR Division of Waters (Waters) manages water resources through a variety of programs in its Water Management Section, Surface Water and Hydrographics Section, and Ground Water and Climatology Section. DNR Waters administers the public waters work permit program, the water appropriation permit program, and the dam safety permit program. DNR Fisheries administers the aquatic plant management control permit program and other fishery related permits.

In addition to permit programs, the DNR 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. The DNR is involved in enforcement of the Wetland Conservation Act (WCA) and is responsible for identifying, protecting, and managing calcareous fens.

The DNR's public waters work permit program (Minnesota Statutes 103G) requires a DNR public waters permit for work below the DNR designated Ordinary High Water Level (OHWL) that will alter or diminish the course, current, or cross-section of any public waters or public waters wetlands, including lakes, wetlands and streams. For lakes and wetlands, the DNR'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 reclassify public waters and to make the administrative program more consistent with the WCA administrative program. 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 DNR regulates 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 must obtain a water appropriation permit from the DNR. Appropriation permits from the DNR are not required for domestic uses serving less than 25 persons for general residential purposes. The DNR is also responsible for mapping sensitive groundwater areas, conducting groundwater investigations, addressing well interference problems, and maintaining the observation well network.

More information is available at the DNR website: www.dnr.state.mn.us

15.6.6 Minnesota Board of Water and Soil Resources

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

More information is available at the BWSR website: www.bwsr.state.mn.us

15.6.7 Minnesota Pollution Control Agency (MPCA)

The MPCA administers the State Discharge System/National Pollutant Discharge Elimination System (NPDES) Permit program (point source discharges of wastewater), the NPDES General Stormwater Permit for Construction Activity, the NPDES General Industrial Stormwater Permit program, the NPDES Phase I and Phase II Storm Water Permit program, and the individual 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.

The Minnesota Pollution Control Agency (MPCA) administers and enforces laws relating to pollution of the state's waters, including groundwater. The MPCA monitors ambient groundwater quality, and administers septic system design and maintenance standards. The Tanks and Spills Section of the MPCA regulates the use, registration and site cleanup of underground and above ground storage tanks.

The MPCA is responsible for administering the programs regulating construction and reconstruction of individual sewage treatment systems (ISTS). The MPCA requires an inspection program for ISTS that meets MPCA standards. Minnesota Rules 7080 govern administration and enforcement of new and existing ISTS. Hennepin County's Ordinance 19 also sets standards for ISTS and adopts by reference Minnesota Rules 7080.

The MPCA no longer administers Section 401 of the Clean Water Act - Water Quality Certification program, which is primarily administered by the COE (see [Section 6.11.9](#) below). However, formal applications for 401 certification must still be sent to the MPCA.

More information is available at the MPCA website: www.pca.state.mn.us

15.6.8 Minnesota Department of Health

The MDH is the official state agency responsible for addressing all environmental health matters, including groundwater 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 preventing pollution of water supplies to ensure safe drinking water sources and limit 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 ground water 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 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 the recharge zones of public water supply wells.

In 1997, the Wellhead Protection Program rules (Minnesota Rules 4720.5100 to 4720.5590) went into effect. These rules require all public water suppliers that obtain their water from wells to prepare, enact, and enforce wellhead protection plans. The MDH prepared a prioritized ranking of all such suppliers in Minnesota. Regardless of the ranking, Rules 4720 require all public water suppliers to initiate wellhead protection measures for the inner wellhead management zone prior to June 1, 2003. If a city drills a new well and connects it to the distribution system, the city must begin development of a wellhead protection plan. Wellhead protection plans include: delineation of groundwater "capture" areas (wellhead protection areas), delineation of drinking water supply management areas (DWSMA), assessment of the water supply's susceptibility to contamination from activities on the land surface, and 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 Vulnerable Wellhead Protection Areas* (MDH, 2007).

See the Minnesota Department of Health website (<http://www.health.state.mn.us/divs/eh/water/index.html>) for more information about these programs.

15.6.9 Minnesota Environmental Quality Board (EQB)

The EQB administers the state's environmental review program, including Environmental Assessment Worksheets (EAW) and Environmental Impact Statements (EIS).

More information is available at the EQB website: www.eqb.state.mn.us

15.6.10 Minnesota Department of Transportation (Mn/DOT)

When NPDES Phase II became effective in 2003, Mn/DOT was required to apply for a NPDES permit to discharge stormwater from its right-of-way. As part of the NPDES Permit, Mn/DOT Metro District was required to develop and implement a Stormwater Pollution Prevention Program (SWPPP) to reduce the discharge of pollutants from our storm sewer system to the maximum extent practicable.

Within the Metro District there are 114 local government MS4s that are designated for the NPDES permit coverage under the Phase II stormwater program. It is the primary goal of Mn/DOT Metro to develop, and implement, its Phase II program consistent with these MS4s to ensure a uniform regulatory environment for the public. Any work done on, or affecting, Mn/DOT property must be approved by Mn/DOT.

More information is available at the Mn/DOT website: <http://www.dot.state.mn.us/>

15.6.11 U.S. Army Corps of Engineers (COE)

The COE administers the Section 10 of the Rivers and Harbors Act permit program, and the Section 404 permit program.

Section 404 Authorizations. 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 U.S. Army Corps of Engineers. 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 Corps of Engineers, the applications are typically posted for the U.S. Fish and Wildlife Service, the U.S. Forest Service, the U.S. EPA, and other federal agencies to review and provide comments on the application. The Corps of Engineers evaluates permit requests for the potential impact to various functions and values of the wetland.

Section 401 Water Quality Certifications. A Section 401 water quality certification may be granted if an applicant demonstrates that a 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 as Outstanding Resource Value Waters. The waters in this category have received this designation because of their exceptional value. These include such

groups as scientific and natural areas, wild, scenic and recreational river segments and calcareous fens.

More information is available at the COE website: www.usace.army.mil

15.7 Implementation Priorities

This CWRMP serves as a master plan for the City's water resources management and storm drainage system. The City will work with residents to implement structural (capital) improvements and non-structural programs to address existing water resource problems within the city and to prevent future problems from occurring. The implementation program identifies and prioritizes the programs and improvements, and provides cost estimates for budgeting purposes. [Table 15.3](#) presents the City's water resource-related implementation program for 2010-2019, which includes the City's non-structural (administration) programs and structural (capital) improvement program.

[Table 15.4](#) identifies numerous stormwater improvement projects that have been identified throughout the city based on the hydrologic and hydraulic analyses completed as part of the City's 2004 Comprehensive Water Resource Management Plan or more recent analyses. [Table 15.4](#) also identifies several potential pond upgrade projects to improve the effectiveness of the current stormwater system in removing stormwater pollutants such as phosphorus. These flood protection and water quality improvement projects have been prioritized (see [Table 15.4](#)). The City has identified funding in their Capital Improvement Program for such projects (see [Table 15.3](#)).

The City will review the potential projects in [Table 15.4](#) when developing their annual capital improvement program. However, stormwater management improvements will not be limited to what is included in [Table 15.4](#) and prioritization of studies and/or implementation projects will be dependent upon additional factors such as the City's street reconstruction schedule (see [Appendix C](#)) and the timeline of other roadway and utility improvement projects.

Table 15.3 Water Resources Implementation Program

Project Name / Location	Description	Proposed Improvement	Cost Estimate¹ (\$)	Proposed Year³	Funding Source
Plan Amendments	This Water Resources Management Plan may need to be amended periodically.	This plan will be amended as required.	As Required	As Required	SW Utility
Plan Update/Revision	This Water Resources Management Plan will expire in 2019 and need to be updated/revised to be consistent with WMO plans and policies and state and federal rules.	This Plan will be updated to maintain compliance with state and federal rules and WMO policies.	100,000	2018-2020	SW Utility
City-wide education and resident involvement program	Implement the City's Education Program including educational and outreach tasks called out in the City's SWPPP	Maintain the education program to educate residents about the Plan and about various water related issues.	10,000/yr	Ongoing	SW Utility
Illicit discharge detection and elimination	Continue implementation of the SWPPP Illicit discharge detection and elimination tasks	Inventory, mapping, inspection, enforcement and education.	City Staff	Ongoing	SW Utility
Develop Interactive GIS water resources web mapping tool	Development of a web-based mapping system for sharing water resource information with the interested public	Water resources information will be more easily accessible to interested public via the City's website.	11,000	2009-2010	SW Utility
Maintenance of Interactive GIS water resources web mapping tool	Annual updates and maintenance activities for interactive GIS web mapping tool, as needed.	Web mapping tool will have continued functionality and reflect most up-to-date information available.	3,000	Ongoing	SW Utility
Illicit discharge ordinance review	Review existing City ordinances and develop/adopt an illicit discharge ordinance, as necessary.	City ordinances consistent with illicit discharge requirements of NPDES Phase II MS4 General Permit	City Staff	Ongoing	SW Utility
Construction site stormwater runoff control	Maintain construction site stormwater runoff control program and SWPPP tasks	Plan review, inspection, enforcement and education	City Staff	Ongoing	SW Utility
Post construction stormwater management	Maintain the post construction stormwater management and SWPPP tasks	Design standards and review, education	City Staff	Ongoing	SW Utility
BMPs–Housekeeping, Street Sweeping, & Storm Drainage System Maintenance	Maintain the City's Pollution prevention – Good housekeeping practices and related SWPPP tasks including Street sweeping and system maintenance.	Street sweeping, structure clean-out, City facility operations and maintenance and training, inspections and recording with concentration of efforts in target areas.	City Staff	Ongoing	SW Utility
Storm Drainage System Inventory	Continue inventorying storm sewers, manholes, catch basins, etc.	Complete inventory. Tie inventory into the City's GIS and CityWorks system.	City Staff	Ongoing	SW Utility

Project Name / Location	Description	Proposed Improvement	Cost Estimate¹ (\$)	Proposed Year³	Funding Source
Updates to Hydrologic and Hydraulic Modeling	Annual updates to City's stormwater management system modeling to reflect infrastructure improvements	Current, up-to-date modeling results.	10,000/year		
Impaired Waters Tracking and Review	Monitor impaired waters list and respond with review and implementation as needed per the SWPPP.	The City will remain fully informed and responsive to impaired waters issues.	City Staff	Ongoing	SW Utility
Nondegradation Report Follow-up	City-wide loading assessment	Determine pollutant load reduction necessary for nondegradation of water bodies	5,000	TBD	SW Utility
Annual SWPPP update and meeting	Make any needed updates to the City's SWPPP and hold an annual public meeting to receive public input.	Involve residents in water resource issue development and implementation tasks.	City Staff	Ongoing	SW Utility
BMPs - Sedimentation Pond Maintenance	Sedimentation ponds require frequent cleaning and maintenance.	Develop and implement a program to inspect, clean and maintain sedimentation and water quality ponds and lakes.	2,800,000 / 10 years	Ongoing	SW Utility
Miscellaneous Drainage Improvements	Miscellaneous Drainage Improvements	Miscellaneous Drainage Improvements	23,000,000/ 10 years	Ongoing	SW Utility
Infiltration and Inflow reduction	Reduce the amount of infiltration and inflow to the sanitary sewer system	Reduce the amount of infiltration and inflow to the sanitary sewer system	200,000/year	Ongoing	SW Utility
Participation in Nine Mile Creek Chloride TMDL	Participate in stakeholder process for Nine Mile Creek Chloride TMDL		City Staff	2009-2010	SW Utility
Implementation of Nine Mile Creek Chloride TMDL	Implement the requirements of the Nine Mile Creek Chloride TMDL	To be determined	TBD	2010-2020	SW Utility/ NMCWD/ Grant Funding
Participation in Minnehaha Creek/Lake Hiawatha TMDL Development	Participate in stakeholder process for Minnehaha Creek/Lake Hiawatha TMDL development		City Staff	2009-2012	SW Utility
Implementation of Minnehaha Creek/Lake Hiawatha TMDL	Implement the requirements of the Minnehaha Creek/Lake Hiawatha TMDL loading allocation and implementation plan.	To be determined	TBD	2012-2020	SW Utility/ MCWD/ Grant Funding
Participation in the NMCWD Lake Cornelia Use Attainability Analysis (UAA) development	Partner with the NMCWD to evaluate potential remedial measures for improving the water quality of Lake Cornelia.		City Staff	2009-2010	SW Utility

Project Name / Location	Description	Proposed Improvement	Cost Estimate¹ (\$)	Proposed Year³	Funding Source
Participation in Lake Cornelia TMDL Development	Participate in stakeholder process for Lake Cornelia TMDL		City Staff	2013-2018	SW Utility
Implementation of recommendations from the NMCWD Lake Cornelia UAA and Lake Cornelia TMDL	Partner with the NMCWD to implement the recommended remedial measures to improve the water quality of Lake Cornelia	To be determined	TBD	2010-2020	SW Utility/ NMCWD/ Grant Funding
Participation in Lake Edina TMDL Development	Participate in stakeholder process for Lake Edina TMDL		City Staff	2013-2018	SW Utility
Implementation of Lake Edina TMDL	Implement the requirements of the Lake Edina TMDL loading allocation and implementation plan.	To be determined	TBD	2018-2020	SW Utility/ NMCWD/ Grant Funding
Implementation of recommendations from the Draft NMCWD Mirror Lake UAA	Partner with the NMCWD to implement recommended remedial measures to improve the water quality of Mirror Lake	To be determined	TBD		SW Utility/ NMCWD/ Grant Funding
Implementation of recommendations from the Draft NMCWD Arrowhead and Indianhead Lakes UAA	Partner with the NMCWD to implement recommended remedial measures to improve the water quality of Arrowhead and Indianhead Lakes	To be determined	TBD		SW Utility/ NMCWD/ Grant Funding
Minnehaha Creek Reach 14 Stream Restoration	Stream Improvement Project	Streambank stabilization, in-stream habitat enhancement, and buffer enhancement.			MCWD
Zoning Ordinance Revisions	Revise zoning ordinance to include wetland management aspects.		City Staff	2009-2010	SW Utility
Stormwater Management Ordinance Development	Develop and implement stormwater management ordinance reflecting the policies and design standards detailed in the CWRMP.		City Staff	2010-2012	SW Utility
1 TBD – To be determined					

Table 15.4 Potential Implementation Activities (including Capital Improvements)

Project Name/Location	Description	Proposed Improvement	Priority¹
<i>Nine Mile Creek-North</i>			
Subwatershed ML_19 (505, 509, 513 Tyler Ct)	Flooding problem	Upgrade to larger pipe.	C-40
Subwatershed HL_2 (Hawkes Drive)	Flooding problem	Construction of overflow swale between homes	C-41
Subwatershed HL_18 (5711 & 5717 Grove St)	Flooding problem	Upgrade to larger pipes	C-22
Subwatershed HL_25 (5516 & 5520 Dundee Rd)	Flooding problem	Perform detailed field survey. Additional pumping capacity may be required at lift station.	E-3
Subwatershed MD_22 (6009 Leslie Ln)	Flooding problem	Upgrade to larger pipes.	C-39
Subwatershed MD_28 (5316 Schaeffer Rd)	Flooding problem	Maintain road overflow and positive overflow swale.	C-18
Subwatersheds NMN_90, NMN_23 (Fountain Woods Apartments)	Flooding problem	Privately owned drainage system. Notify owners of flood potential.	E-2
Pond MD_3 (Bredesen Park, east of parking area)	Water Quality Improvement	Excavate to remove accumulated sediment.	C-12
Pond MD_15 (Sun Road)	Water Quality Improvement	Provide additional 0.3 acre-feet of dead storage volume.	C-10
Pond NMN_24 (Between Waterford Ct and Habitat Ct)	Water Quality Improvement	Increase pond depth.	C-7
Pond NMN_27 (Northeast of T.H. 62 & T.H. 169)	Water Quality Improvement	Provide additional 1.4 acre-feet of dead storage volume.	C-8
Pond NMN_49 (West of 5521 Malibu Drive)	Water Quality Improvement	Provide additional 0.2 acre-feet of dead storage volume.	C-11
<i>Nine Mile Creek- Central</i>			
Manhole 457 (6005 & 6009 Crescent Dr)	Flooding problem	Construction of a positive overflow channel.	C-38
Subwatershed IP_4 (Cherokee Trail & Gleason backyard depression area)	Flooding problem	Work with homeowners to evaluate construction of a low level outlet from landlocked depression.	C-37
Subwatershed NMC_80 (5339 West 64th St)	Flooding problem	Upgrade to larger pipes at Ridgeview Dr and Valley Ln.	C-36
Subwatersheds NMC_86, NMC_120 (Valley View Rd & Hillside Rd)	Flooding problem	Upgrade to larger pipe.	C-35
Subwatersheds NMC_71, NMC_103 (West 66th St & Naomi Dr)	Flooding problem	Provide additional outlet capacity from backyard depression area through gravity outlet system (1) or pumped outlet (2).	C-44
Subwatershed NMC_106 (6712, 6716, 6720 Ridgeview Dr)	Flooding problem	Installation of a gravity storm sewer system at backyard depression.	C-34

Subwatershed NMC_107 (6808, 6812, 6816, 6820 Ridgeview Dr)	Flooding problem	Installation of a gravity storm sewer system at backyard depression.	C-33
Lake Cornelia/Lake Edina/Adam's Hill			
Subwatersheds NC_62, NC_3 (Swimming Pool Pond/ North Lake Cornelia)	Flooding problem	Upgrade pipe and outlet structure.	C-31
Subwatershed NC_11 (6312, 6316, 6321, 6329 Tingdale Ave)	Flooding problem	No recommendation at this time. Further analysis required.	E-9
Subwatersheds NC_40, NC_26 (St. Johns/Ashcroft & West 64th St)	Flooding problem	Installation of additional pipe to drain T.H. 62 median ditch and prevent upstream flooding.	C-21
Subwatersheds NC_86, NC_97, NC_99 (Barrie Rd & Heritage Dr)	Flooding problem	No recommendation at this time. Reevaluation of T.H. 62 system will be required.	E-10
Subwatershed NC_88 (York Ave & West 64th St)	Flooding problem	Increase pump capacity. Adjust pump on/off elevations.	E-1
Subwatershed NC_132 (T.H. 62 at France Ave)	Flooding problem	No recommendation at this time. Reevaluation of T.H. 62 system will be required.	E-14
Subwatershed NC_135 (Parnell Ave & Valley View Rd)	Flooding problem	No recommendation at this time. Further analysis required.	E-13
Subwatersheds LE_53, LE_7, LE_10 (Hibiscus Ave)	Flooding problem	Construct positive overflow swale.	C-31
Pond LE_38 (West of Lake Edina)	Water Quality Improvement	Provide additional 1.4 acre-feet of dead storage volume within MnDOT right-of-way	C-9
Nine Mile Creek- South			
Subwatershed CL_51 (7001 & 7025 France Ave)	Flooding problem	No recommendation at this time.	E-11
Pond SP_1 (Border Basin - West of Minnesota Dr & West 77th St)	Water Quality Improvement	Provide additional 21.5 acre-feet of dead storage volume.	C-2
Subwatershed NMS_1 (Southwest quadrant of the T.H. 100 & West 77th St interchange)	Water Quality Improvement	Construct water quality basin.	C-1
Ponds NMS_72, NMS_74 (Fred Richards Golf Course)	Water Quality Improvement	Increase pond depths.	C-6
Pond NMS_76 (Fred Richards Golf Course)	Water Quality Improvement	Provide additional 2.5 acre-feet of dead storage volume.	C-4
Pond NMS_104 (Fred Richards Golf Course)	Water Quality Improvement	Provide additional 0.2 acre-feet of dead storage volume.	C-5
Nine Mile South Fork			

Subwatershed AH_31 (6309 Post Lane)	Flooding problem	Construction of two control structures to restrict flow through the existing storm sewer system.	C-42
Subwatershed NMSB_62 (Braemar Golf Course)	Flooding problem	No recommendation at this time. Further analysis required.	E-12
Subwatershed NMSB_70 (7009 & 7013 Sally Ln Backyard Depression Area)	Flooding problem	Perform detailed field survey. Positive overflow swale may be necessary.	E-7
Subwatersheds NMSB_83, NMSB_84 (Paiute Pass & Sally Ln)	Flooding problem	Perform detailed field survey. Positive overflow swale from backyard depression may be necessary.	E-8
Ponds NMSB_3, NMSB_2 (Braemar Golf Course)	Water Quality Improvement	Provide additional 1.2 acre-feet of dead storage volume.	C-13
Pond NMSB_7 (Braemar Golf Course)	Water Quality Improvement	Increase pond depth.	C-15
Pond NMSB_12 (Braemar Golf Course)	Water Quality Improvement	Regular maintenance.	C-3
Pond NMSB_85 (Braemar Golf Course)	Water Quality Improvement	Provide additional 1.2 acre-feet of dead storage volume.	C-16
Pond NMSB_86 (Braemar Golf Course)	Water Quality Improvement	Provide additional 0.15 acre-feet of dead storage volume.	C-14
Southwest Ponds			
Subwatershed SWP_14 (7411 Coventry Way)	Flooding problem	Installation of flapgate.	C-17
Subwatershed SWP_46 (7317 Cahill Road)	Flooding problem	No recommendation at this time. Further analysis required.	E-6
Subwatershed NM494_4 (7709 Stonewood Court)	Flooding problem	Upgrade to larger pipes.	C-43
Northeast Minnehaha Creek			
White Oaks Landlocked Area Flooding Analysis and Feasibility Study (if necessary)	Flooding problem	Complete stormwater analysis to determine potential flooding impacts of 100-year snowmelt event to structures surrounding the landlocked areas	E-16
Subwatershed MS_3 (4300, 4214, & 4212 Branson St)	Flooding problem	Install catchbasin in backyard depression and upgrade to larger pipe.	C-24
Subwatershed MS_7 (4140 & 4150 West 44th St)	Flooding problem	Provide additional storage capacity in backyard depression.	C-25
Subwatershed MS_17 (4308 France Ave)	Flooding problem	Work with homeowners to evaluate installation of gravity system to drain backyard depression area.	C-23
Subwatershed MS_40 (4000 West 42nd St and 4100, 4104, & 4108 France Ave)	Flooding problem	Implement recommendations of the 2006 Weber Park Pond Feasibility Study	C-45

<i>Southeast Minnehaha Creek</i>			
Complete stormwater analysis to determine potential flooding impacts of Minnehaha Creek overtopping just north of West 58 th Street.	Flooding problem	Complete stormwater analysis to determine potential flooding impacts of Minnehaha Creek overtopping just north of West 58 th Street.	E-15
Subwatershed LP_15 (6213 Ewing Ave)	Flooding problem	Upgrade to larger pipes.	C-26
Subwatershed LP_24 (5837, 5833, 5829, & 5825 South Chowen Ave)	Flooding problem	Installation of a catchbasin in backyard depression area.	C-27
Subwatershed LP_27 (Chowen Ave & West 60th St)	Flooding problem	Perform detailed survey/verification of storm sewer to verify pipe sizes, inverts, and low point of entry.	E-4
Subwatershed MHS_4 (3600 West Fuller St)	Flooding problem	Installation of a catchbasin in backyard depression and storm sewer along Beard Ave.	C-19
Subwatersheds MHS_24, MHS_66 (5609, 5605 Dalrymple Rd & 5610, 5612 St. Andrews Ave)	Flooding problem	Construct surface overflow swale (1) or upgrade to larger pipes (2).	C-29
Subwatershed MHS_79 (5605, 5609, 5613, 5617, 5621, 5625, & 5629 Beard Ave)	Flooding problem	Upgrade to larger pipes. Install catchbasin in alley.	C-20
Subwatershed MHS_89 (5840 & 5836 Ashcroft Ave)	Flooding problem	Work with homeowners to evaluate installation of catch basin from backyard depression.	C-28
Subwatershed ML_7 (5213 & 5217 Richwood Ave)	Flooding problem	Perform detailed field survey of wetland storage. Further analysis required.	E-5
Subwatershed ML_12 (5701 Dale Avenue)	Flooding problem	Upgrade to larger pipes.	C-30
<i>Northwest Minnehaha Creek</i>			
Interlachen Landlocked Area	Flooding problem	Construct/raise embankment between landlocked wetland and Meadowbrook Golf Course. Develop management plan for pumped outlet.	C-46
¹ C indicates a construction project, E indicates that an engineering study is required			

