

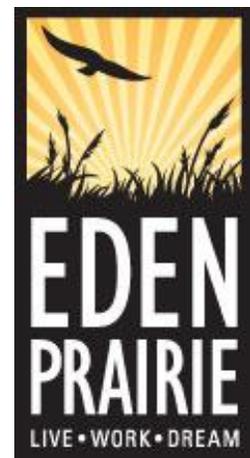
# Local Water Management Plan August 2016



## City of Eden Prairie, Minnesota

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# City of Eden Prairie, Minnesota

## Local Water Management Plan

Adopted August 16, 2016

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AIS	Aquatic Invasive Species
BMP	Best Management Practice
BWSR	Board of Water and Soil Resources
cfs	Cubic feet per second
cfu	Colony-forming unit
Chl- <i>a</i>	Chlorophyll- <i>a</i>
CIP	Capital Improvement Program
CWPMP	Comprehensive Wetland Protection and Management Plan
DNR	Department of Natural Resources
DO	Dissolved oxygen
ELC	Environmental Learning Center
EPA or USEPA	US Environmental Protection Agency
F-IBI	Index of Biotic Integrity for fish
JPA	Joint Powers Agreement
LA	Load allocation
LGU	Local Government Unit
LMRWD	Lower Minnesota River Watershed District
LWMP	Local Water Management Plan
MCM	Minimum Control Measure
mg/L	Milligrams per liter
Met Council	Metropolitan Council
M-IBI	Index of Biotic Integrity for macroinvertebrates
MOU	Memorandum of Understanding
MPCA	Minnesota Pollution Control Agency
MS4	Municipal Separate Storm Sewer System
NMCWD	Nine Mile Creek Watershed District
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetland Inventory
RPBCWD	Riley-Purgatory-Bluff Creek Watershed District
SD	Secchi depth or Secchi disc
SWPPP	Storm Water Pollution Prevention Program
TMDL	Total Maximum Daily Load
TP	Total phosphorus
TSS	Total suspended solids
UAA	Use Attainability Analysis
µg/L	Microgram per liter
WD	Watershed District
WLA	Wasteload allocation
WMO	Watershed Management Organization
WOMP	Watershed Outlet Monitoring Program

The City of Eden Prairie, Minnesota is located in southern Hennepin County (see Figure 1.1). It is bordered on the east by the Cities of Bloomington and Edina; on the north by Minnetonka; and on the west by Chanhassen. Its southern border is the Minnesota River. The City has land in five watersheds that are within three watershed districts: Riley-Purgatory-Bluff Creek; Nine Mile Creek; and the Lower Minnesota River Watershed Districts.

This Local Water Management Plan (LWMP) was prepared in conformance with Minnesota Statutes 103B.235 and Minnesota Rules 8410. This plan is intended to provide the City of Eden Prairie with information and direction in the administration and implementation of water resource management activities within the City during the period 2016-2025. It serves as a guide to projects, provides for effective allocation of resources, and sets forth a funding plan for projects and programs over the next 5 to 10 years.

A number of water resources-related problems, issues and requirements were identified in this planning process. These include:

- ▲ Some of the lakes and streams in the City do not meet the state’s water quality standards for recreation and aquatic life.
- ▲ The reissue of the State of Minnesota’s NPDES General Stormwater Permit in 2013 requires local governments such as Eden Prairie to adopt and enforce standards for development and redevelopment which limits stormwater runoff from sites over one acre in size.
- ▲ New or expanded maintenance and administrative responsibilities are required in the NPDES permit to control runoff and protect and improve water quality from municipal facilities.
- ▲ New invasive aquatic vegetation and aquatic invasive species have been identified in the City and in adjoining municipalities which will require new or expanded monitoring or maintenance.
- ▲ New and updated Watershed District Rules and Standards have been implemented that require City ordinance updates.

The LWMP updates the City’s goals and related policies to address the problems and issues that were evaluated for the updated LWMP. The goals are as follows:

- |                |  |
|----------------|--|
| <b>Goal 1.</b> | Work to achieve water quality standards in lakes, streams, and wetlands consistent with intended use and classification and State of Minnesota water quality standards.  |
| <b>Goal 2.</b> | Protect downstream water resources, reduce the potential for flooding, and minimize related public capital and maintenance expenditure necessary to control excessive volumes and rates of runoff and to mitigate erosion. |
| <b>Goal 3.</b> | Protect and/or restore wetlands to improve or maintain their functions and values in accordance with the Minnesota Wetland Conservation Act and the City’s Wetland Protection ordinance.                                   |
| <b>Goal 4.</b> | Work to prevent contamination of the aquifers, promote groundwater recharge and encourage water conservation practices.  |
| <b>Goal 5.</b> | Control or manage sediment discharge into surface water resources and drainage ways.   |
| <b>Goal 6.</b> | Support water recreation activities and fish and wildlife habitat by implementation of programs to maintain or improve water quality.  |
| <b>Goal 7.</b> | Increase public involvement and knowledge in management and protection of water resources.   |

### Implementation

This LWMP includes an Implementation Plan to help achieve those goals through capital projects, management programs, maintenance activities, and special studies.

*Capital Projects.* The Riley-Purgatory-Bluff Creek and Nine Mile Creek Watershed Districts have completed Use Attainability Assessments (UAAs) and/or Total Maximum Daily Load (TMDL) studies for many of the key waterbodies in the City. These studies have identified potential actions that could help protect or improve the water quality in and enjoyment of those waterbodies. The City evaluates partnership opportunities with the Districts to undertake priority projects as project plans develop. In addition, the City has been systematically surveying the condition of storm drainage system features. The condition assessments and water quality modeling have identified a number of potential improvement projects, and priority actions are included in the Implementation Plan.

The Implementation Plan also includes projects to install water quality Best Management Practices (BMPs) with street or other construction projects, and projects to reduce lake internal loading, such as alum treatments and rough fish and invasive aquatic vegetation management. Stream inventories have been updated and will be used to prioritize streambank stabilization and restoration projects.

*Management Programs.* The City operates several programs that directly or indirectly affect water resources, including a Public Education and Outreach program. A variety of social and traditional media are used to inform and educate citizens. City events, workshops and festivals provide additional opportunities for education.

The City has developed an Environmental Learning Center (ELC) to educate local residents about water quality and water conservation, sustainability, waste reduction, and environmental stewardship. The ELC includes an interactive activity center and laboratory for use by local school groups. Volunteers monitor water quality through the Citizen Assisted Lake Monitoring Program (CAMP) and the Wetland Health Evaluation Program (WHEP). Volunteers also work with the city on programs such as Adopt-A-Street and storm drain labeling.

The City implements other programs, including goose and invasive species management; lake monitoring and watercraft inspections. Stream water quality is also monitored at a Watershed Outlet Monitoring Program (WOMP) station at the outlet of Riley Creek through a partnership with the Met Council. The RPBCWD operates two additional WOMP stations on Purgatory Creek, one at Valley View Road and one at Pioneer Trail.

*Maintenance Activities.* The City undertakes a variety of maintenance actions, including actions required by its NPDES MS4 Permit. These include ongoing water body inventory and condition assessments, erosion control monitoring, street sweeping, stormwater system inspections and repairs, and a general education and outreach program.

*Special Studies.* The City has and will continue to participate in TMDL studies and UAA assessments, in partnership with the watershed districts. Other studies are undertaken as necessary, such as the recent “Eden Prairie Town Center Stormwater Management Guide” that identified opportunities for stormwater treatment as the area redevelops.

### Plan Updates

Section 8 of this Plan sets forth a process to update the LWMP in response to city operations, budget planning, work requirements or public requests. The Implementation Plan and Capital Improvement Program (CIP) will be reviewed and updated periodically by the City as needed based on new information or as new opportunities and requirements arise. At a minimum, the CIP will be updated biannually. Major issues that result in potential significant revisions to the LWMP will be forwarded to the Watershed Districts for discussion and review to determine if the LWMP will require a formal update.

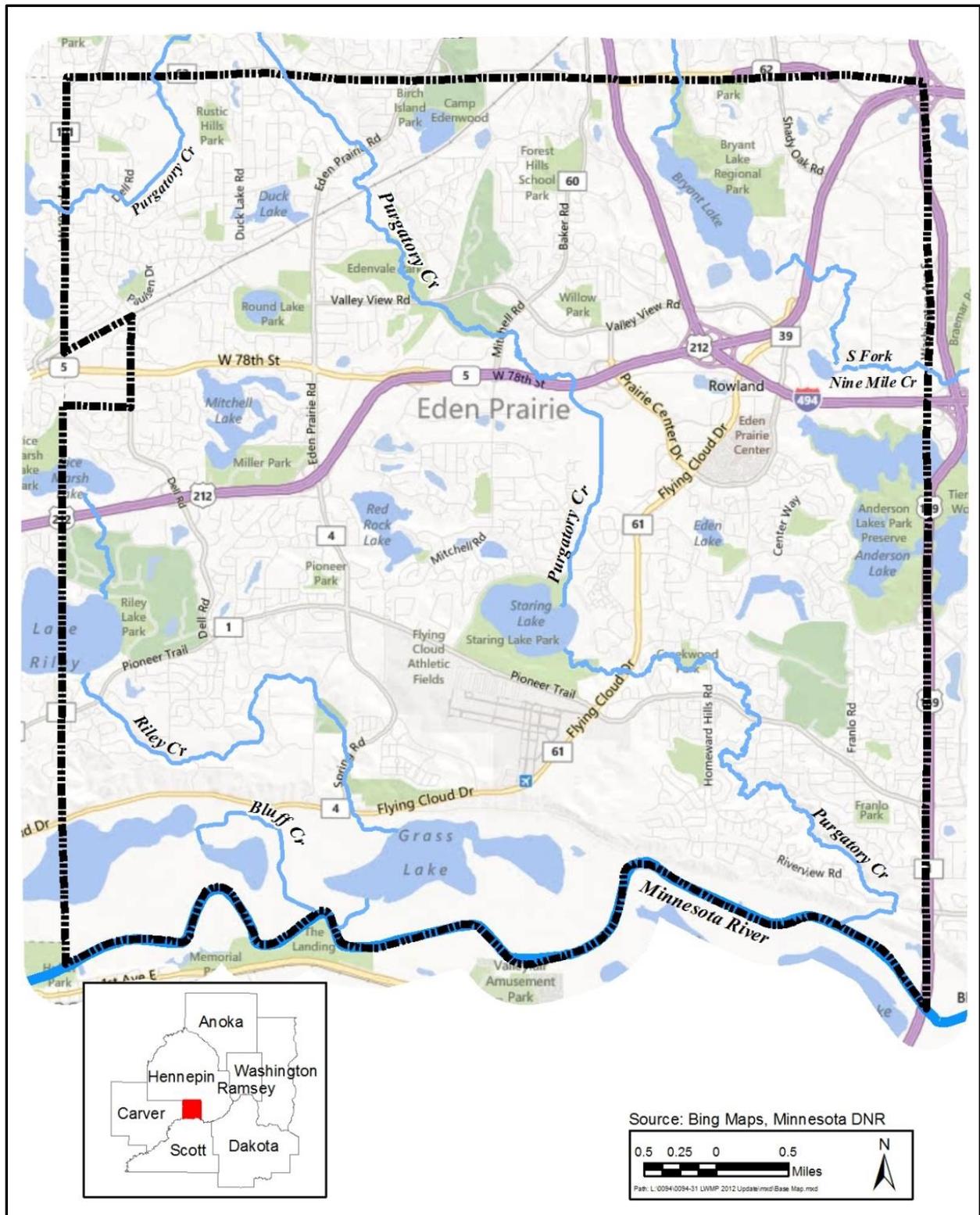


Figure ES.1.1. City of Eden Prairie location map.

# 1.0 Introduction

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## 1.1 PURPOSE

This Local Water Management Plan (LWMP) describes how the City of Eden Prairie will fulfill the requirements of Minnesota Statutes 103B.235 and Minnesota Rules 8410 in the management of the water resources within the City. It is a summary of the City's management goals and policies, and strategies, including a capital improvement program and review of local policies and ordinances. Minnesota Statutes 103B.231 establishes the purposes of storm water management planning in the Twin Cities Metropolitan Area as to:

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

Minnesota statutes and administrative rules also require that City water resources management be consistent with the goals and requirements of the three watershed districts having land within its borders: Nine Mile Creek Watershed Management District, Riley-Purgatory-Bluff Creek Watershed Management District, and Lower Minnesota River Watershed Management District.

## 1.2 RELATIONSHIP TO OTHER CITY PLANS

Two City plans that were previously stand-alone documents – the Local Drainage Plan and the Comprehensive Wetland Protection and Management Plan - have been incorporated into this LWMP. The LWMP is intended to comprehensively address surface water management. The Wellhead Protection Plan (WHPP), ground water supply planning, and the Stormwater Pollution Prevention Plan (SWPPP) are separate from the LWMP except as surface water management influences groundwater.

### 1.2.1 Local Drainage Plan Update

The Local Drainage Plan Update was completed in 1999, and included an update to the stormwater modeling initially prepared in 1970. The Local Drainage Plan was also updated in 2008 to incorporate a Nondegradation Assessment of the estimated changes in stormwater runoff volume, total suspended solids (TSS) and total phosphorus (TP) loading in the City of Eden Prairie since 1988, and to predict how land change expected to occur by 2020 would impact those parameters. Hydraulic and hydrologic modeling has been updated for this LWMP to reflect the latest land use data and information collected as part of the City's ongoing pond inventory program. The modeling and Local Drainage Plan are incorporated into this LWMP Update.

### 1.2.2 Comprehensive Wetland Protection and Management Plan

The Comprehensive Wetland Protection and Management Plan (CWPMP) was completed in 1999 and included an initial inventory of wetlands in the city, assessment of their functions and values, and classification of each as either Exceptional, High, Moderate, or Low functions. The CWPMP also was the basis for the City's Standards for Protection of Wetlands (Section 11.51 of the City Code). The inventory has been periodically updated since that time as projects are provided to the city for review. The inventory is maintained in a separate database and is incorporated into this LWMP by reference.

### **1.2.3 Storm Water Pollution Prevention Program**

Eden Prairie is regulated by the State of Minnesota's National Pollutant Discharge Elimination System (NPDES) General Stormwater Permit as a Municipal Separate Storm Sewer System (MS4). In accordance with that permit, the City developed a Storm Water Pollution Prevention Program (SWPPP) comprised of a series of Best Management Practices (BMPs) in six Minimum Control Measure (MCM) areas to prevent pollution and to manage and treat runoff discharged from the City into state waters. An annual report documents actions taken in the previous year, which is presented to the public for review, approved by the City Council, and submitted to the Minnesota Pollution Control Agency (MPCA) for approval.

In 2006 the City was one of 30 cities statewide selected by the MPCA to undertake a special Nondegradation Assessment as part of its NPDES permit. The purpose of the study was to assess changes in stormwater runoff volume, total suspended solids (TSS) and total phosphorus (TP) loading since 1988, and to predict how land change expected to 2020 would impact those parameters. The study found that while runoff volumes had increased, pollutant loading had decreased as a result of City and watershed district water quality treatment requirements.

A new General Permit became effective August 1, 2013. The City submitted an application for renewal of coverage under the permit, which was extended on April 3, 2014. The SWPPP was required to be updated for the new permit. Many of those SWPP actions are incorporated into this Plan.

## **1.3 RELATIONSHIP TO OTHER PLANS**

Several agencies manage programs or regulate activities for local stormwater or water resource management. The following sections summarize those relevant to local water management planning.

### **1.3.1 Metropolitan Council Water Resources Policy Plan**

The Met Council's Water Resources Management Policy Plan is a framework to integrate water resources management and protection with planning for the Metro region's growth. In 1995, the Metropolitan Land Planning Act was amended to require that each city and township's comprehensive plan include a local water management plan. These local plans need to be consistent with Minnesota Statutes 103B and Metropolitan Land Planning Act requirements. Local water management plans are reviewed by the Met Council as part of the local comprehensive planning process prior to approval by the WMO and adoption by the city or township.

In addition to the local stormwater plan elements required in statute and administrative rule, the Policy Plan expects communities to show that they are committed to the Met Council's goal of no adverse impact (nondegradation) for area water resources. Local plans should include actions such as ordinances requiring runoff water quality treatment, limiting the rates and volumes of runoff, adopting Best Management Practices for development and redevelopment, and wetland management planning. The Policy Plan places a special emphasis on nondegradation of lakes identified as Priority Lakes. The Met Council defines Priority Lakes as lakes of high regional recreational value that are at least 100 acres in size; supply drinking water; have very good water quality; or have exceptional significance for wildlife habitat. Eden Prairie has four lakes that have been defined as Priority Lakes by Met Council: Bryant, Mitchell, Riley, and Staring.

### **1.3.2 Minnesota River Basin Plan**

The Minnesota River flows southeast from its source at Big Stone Lake on the South Dakota border to Mankato then northeast to join the Mississippi River at Fort Snelling (about 335 total miles). It covers about 16,770 square miles, roughly 10 million acres. Thirteen major watersheds in Minnesota drain into the basin, which touches 37 counties. Eden Prairie is located in the Lower Minnesota River subbasin. The 2001 Minnesota River Basin Plan (MPCA 2001) lays out a framework for directing programs for improving water quality in the Minnesota River, its tributaries and other water bodies. Priority actions include reducing nutrient, sediment, and bacteria inputs to the River and improving the health of biologic communities.

## 1.4 RELATIONSHIP TO OTHER REGULATORY AGENCIES

The LWMP is intended to meet requirements outlined in Minnesota Rules 8410 and Minnesota Statutes 103B as well as provide a tool for day-to-day management of the City's water resources. The LWMP provides the following information, as required in the Minn. Statutes 103B.235.

- ▲ Existing and proposed physical environment and land use within the City
- ▲ Drainage areas and the volumes, rates, and paths of stormwater runoff
- ▲ Identification of stormwater storage areas
- ▲ Performance standards for water quality and water quantity protection
- ▲ Implementation program
- ▲ Capital improvement program

The Plan was also written with consideration of the needs, requirements and direction outlined in the following:

- ▲ Local Water Management Rules – Minn. Rules 8410
- ▲ Wetland Conservation Act – Minn. Rules 8420
- ▲ Minnesota Pollution Control Agency Water Quality Standards – Minn. Rules 7050
- ▲ U.S. Army Corps of Engineers Section 404 Clean Water Act
- ▲ Metropolitan Council Water Resources Policy Plan May 2005
- ▲ Riley-Purgatory-Bluff Creek Watershed District Water Management Plan - January 2011, Major Plan Amendment - April 2014, and Rules – November 2014
- ▲ Nine Mile Creek Watershed District Water Management Plan - March 2007
- ▲ Lower Minnesota River Watershed District Water Management Plan - December 2011
- ▲ Metropolitan Surface Water Management Act (Chapter 601, Laws of 1990)
- ▲ Use Attainability Analyses (UAAs) completed by the watershed districts for lakes and streams in the City
- ▲ Approved TMDLs for chloride impairment in Nine Mile Creek, and low dissolved oxygen in the Minnesota River

The watershed organizations and their respective jurisdictions within the City are shown on Figure 2.1. The LWMP is intended to satisfy the rules set forth in the current watershed management plans. The City will participate in upcoming revisions and evaluate any future watershed management plan amendments in relation to the LWMP and incorporate items as needed.

## 2.0 Regulatory Framework

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### 2.1 EDEN PRAIRIE ORDINANCES AND POLICIES

Protection of water resources has been a priority throughout the City's development history. Existing water resource related policies and local controls (City Code sections) include:

- ▲ Standards for Protection of Wetlands (Section 11.51)
- ▲ Shoreland Management (Section 11.50)
- ▲ Land Alteration, Tree Preservation, and Stormwater Management Regulations (Section 11.55)
- ▲ Sloped Ground Development and Regulation (Section 11.60)
- ▲ Flood Plains (Section 11.45)
- ▲ Maintenance of Vegetation (Native Plant Ordinance) (Section 9.71)
- ▲ Preservation of Wetland and Woodland Areas (Section 11.03(3)(G)(4)(i))
- ▲ Coal-Tar Based Sealant Products (Section 5.74)
- ▲ Stormwater Illicit Discharge and Connections (Section 5.75)
- ▲ Land Use Regulation Permits and Variances (Section 11.76)

These ordinances and policies have provided the City and the private development sector with the means to protect the City's natural resources through limiting wetland filling, establishing minimum setbacks, requiring steep slope and shoreline buffers, manage floodplain areas, and implementing best management practices to prevent pollution, manage stormwater runoff and protect water resources.

In 1994, the citizens of Eden Prairie approved a referendum to acquire and manage the best remaining native plant communities in the City. These areas have been designated conservation areas, for which management plans have been or are currently being developed.

### 2.2 STATE AGENCY REGULATORY FRAMEWORK

Several agencies manage programs or regulate activities for local stormwater or water resource management. The following sections summarize those relevant to local water management planning.

#### 2.2.1 Metropolitan Council (Met Council)

The Met Council's *Water Resources Management Policy Plan* includes a range of programs administered by various governmental and private agencies for management of water resources in the Metro area. Several of Met Council's programs of interest to cities include the following:

- ▲ Development of targeted watershed pollutant loads
- ▲ Review of watershed and local water plans and comprehensive plans for consistency with metropolitan goals and objectives
- ▲ Watershed Outlet Monitoring Program (WOMP)
- ▲ Citizens' Assisted Lake Monitoring Program (CAMP)
- ▲ Environmental Information Management System
- ▲ Regional Water Supply Plan for the Metropolitan Area

### **2.2.2 Minnesota Pollution Control Agency (MPCA)**

The MPCA administers several programs applicable to local storm water management planning. The MPCA monitors water quality, sets standards, and implements various controls. Following are two programs related to water quality.

- ▲ The MPCA manages the National Pollutant Discharge Elimination System (NPDES) Phase II permitting for small municipal separate storm sewer systems (MS4s) and construction and industrial discharge permitting
- ▲ The MPCA implements the Clean Water Act, requiring that states adopt water quality standards to protect waters of the state. The EPA and MPCA require preparation of Total Maximum Daily Load (TMDL) studies to identify the source of pollutants and plans for bringing the water resources into compliance. Several local lakes as well as Riley Creek, Nine Mile Creek and the Minnesota River have been listed on the MPCA's 303(d) list of impaired waters. Section 2.6 discusses the impaired waters issue in more detail.

### **2.2.3 Minnesota Department of Health (MDH)**

The Environmental Health Division of the MDH administers numerous programs of interest to local water management planning, including the following.

- ▲ Drinking water protection
- ▲ Wellhead protection
- ▲ Lake and fish monitoring (in partnership with DNR/MPCA)
- ▲ Environmental Health Services
- ▲ Health risk assessment, site assessment, and consultation
- ▲ Well management

The City worked with the MDH to develop and implement a Wellhead Protection Plan (WHPP).

### **2.2.4 Minnesota Department of Natural Resources (DNR)**

The DNR manages and protects the state's natural resources and operates numerous programs. The department provides technical assistance and information regarding best management practices, natural resource management, incorporating natural resource conservation in land use planning, and lakescaping.

The Fisheries Division monitors and improves fisheries within the state. It also promotes fishing opportunities and provides grants to assist in the construction of fishing piers. The Ecological and Water Resources (EWR) Division focuses on an overarching vision of "Healthy Watersheds throughout Minnesota." The EWR Division also provides the following services:

- ▲ Maintains an inventory of public waters
- ▲ Operates permit programs for working in public waters or for appropriating public waters
- ▲ Oversees the state's floodplain management program
- ▲ Provides local stewardship by coordinating the Mississippi River Critical Area, Mississippi National River & Recreation Area programs and the Shoreland Management program
- ▲ Collects, analyzes, and provides ecological information, including:
  - ▲ Location and management of rare resources (endangered and threatened species, critical habitats, high quality natural communities)
  - ▲ Management of harmful exotic species, fish and wildlife diseases, and negative environmental impacts of human development
  - ▲ Management and restoration of important ecological processes in river systems and key natural areas
  - ▲ Information about Minnesota's ecosystems and their significance to a sustainable quality of life

The DNR's webpage at [www.dnr.state.mn.us/lakefind/index.html](http://www.dnr.state.mn.us/lakefind/index.html) is LakeFinder, a DNR-supported tool that combines information from various DNR Divisions, as well as other state agencies, such as Minnesota Pollution

Control Agency (water quality) and Minnesota Department of Health (fish consumption). This tool contains data for more than 4,500 lakes and rivers throughout Minnesota.

The DNR also provides a variety of specialized programs oriented to property owners or neighborhood groups, such as the Aquatic Plant Management, Urban Fisheries and Fishing in the Neighborhood, Neighborhood Wilds, and Metro Greenways programs.

### 2.2.5 Watershed Districts

Watershed Management Organizations (WMOs) and Watershed Districts (WDs) are required by statute to prepare and administer water management plans that establish watershed-wide goals, policies, and regulations. Local governments are also required by statute to prepare and administer local water management plans that establish local goals, policies, and regulations regarding those water resources that are consistent with the watershed plans.

The City of Eden Prairie falls under the jurisdiction of three watershed districts (see Figure 2.1):

<u>Watershed District</u>	<u>Plan Adopted</u>	<u>Plan Amended</u>
Riley-Purgatory-Bluff Creek	January 2011	December 2013, April 2014
Nine Mile Creek	March 2007	
Lower Minnesota River	December 2011	June 2015

While many of the district requirements are similar, each has its own set of goals and priorities that do not match watershed to watershed or with the City. This LWMP was developed to acknowledge these jurisdictional criteria while also reflecting the priorities of the City of Eden Prairie.

## 2.3 WATER RESOURCE RELATED AGREEMENTS

Water resource-related agreements, such as Joint Powers Agreements (JPA) or Memorandums of Understanding (MOU), are typically entered into between agencies or entities with overlapping regulatory interests or geographic similarities. Currently, the City has a Cooperative Agreement dated November 1, 1993, amended February 2016, with the City of Edina relating to water, sanitary and storm sewer, street and traffic signals for their common boundary, generally described as the centerline of Washington Avenue. This includes a shared water system as well as the storm sewer located within the right-of-way for Washington Avenue. The City also has drinking water system interconnections and utility agreements with the cities of Bloomington, Chanhassen, Edina and Minnetonka.

The need for a JPA or MOU will be evaluated as part of the City's ongoing Wellhead Protection planning. No other Agreements are anticipated at this time.

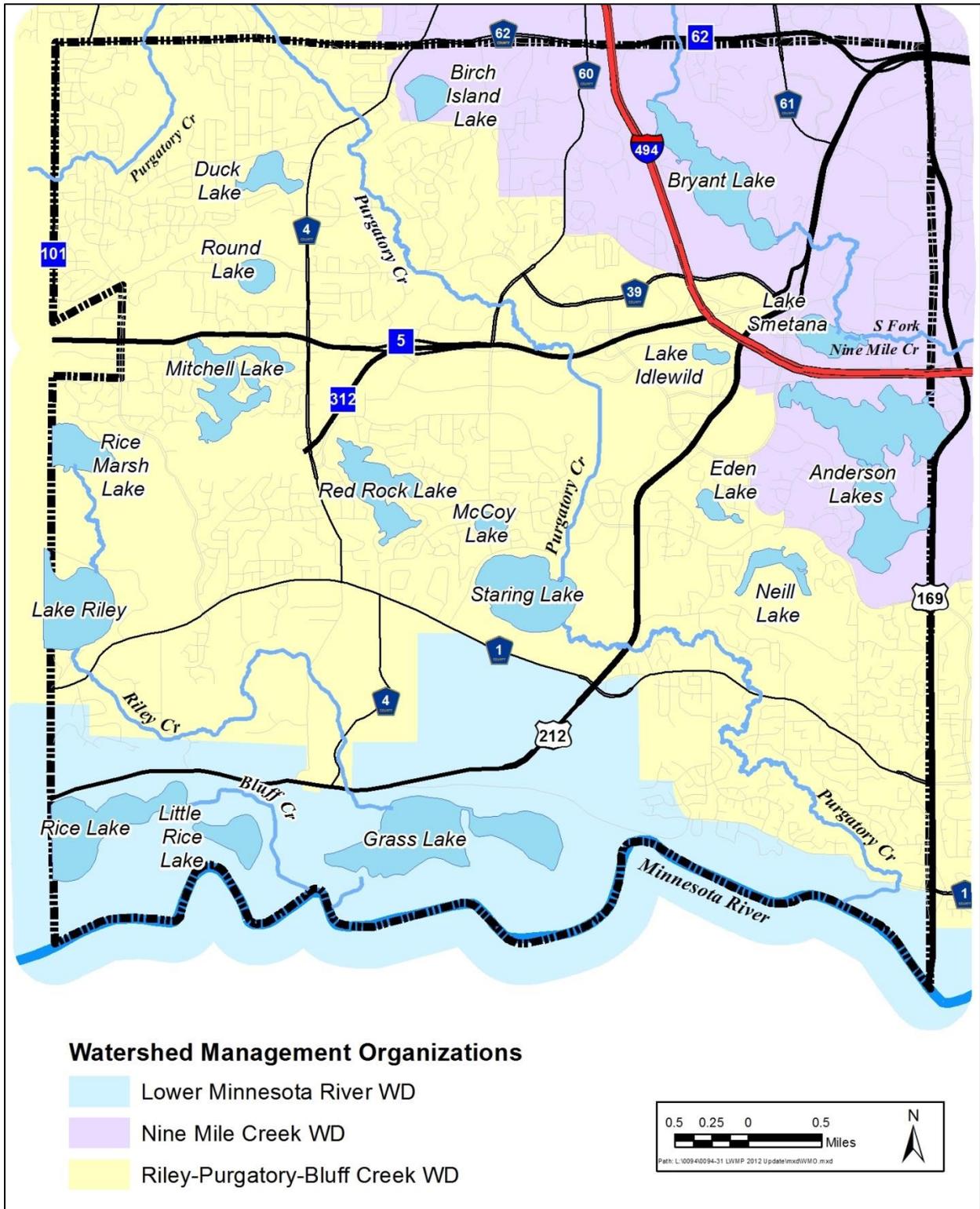


Figure 2.1. Watershed Management Organizations in the city of Eden Prairie.

Source: Minnesota DNR, MnDOT.

## 2.4 WETLAND CONSERVATION ACT

Within the Nine Mile Creek Watershed District the primary permitting responsibilities for the Wetland Conservation Act of 1991 (WCA) currently rests with the Watershed District. The City is the Local Governmental Unit (LGU) responsibilities in the Lower Minnesota River and Riley-Purgatory-Bluff Creek Watershed Districts. Wetland LGU responsibilities include:

- ▲ Review and approve wetland delineations and determinations
- ▲ Review and approve wetland exemption / no-loss applications
- ▲ Review and approve wetland replacement plan applications
- ▲ Coordinate Technical Evaluation Panel (TEP) meetings
- ▲ Send Notices of Application and Decision to the TEP
- ▲ Enforce wetland replacement monitoring requirements, review monitoring reports and certify replacement wetlands
- ▲ Work with DNR and Hennepin County to enforce WCA violations

## 2.5 RELATIONSHIP TO NPDES STORMWATER PERMIT

The City holds a permit from the MPCA to discharge stormwater into waters of the state through the MPCA's NPDES General Stormwater Permit. The permit specifies that the City must develop, receive MPCA approval of, and implement a Stormwater Pollution Prevention Plan (SWPPP) that addresses the following six minimum control measures established by the EPA:

1. Public education and outreach
2. Public participation/involvement
3. Illicit discharge detection and elimination
4. Construction site runoff control
5. Post-construction runoff control
6. Pollution prevention/good housekeeping during municipal operations

The City's previous SWPPP was approved in 2003 and amended in 2006. The State of Minnesota reauthorized the NPDES General Stormwater Permit effective August 1, 2013, and the City submitted a permit reapplication in December 2013. The new permit and SWPPP Document were approved on April 3, 2014. New and existing activities and policies to be included in the SWPPP are prescribed in the General Permit and SWPPP Document, and include many of the actions and policies set forth in this LWMP.

## 2.6 USE ATTAINABILITY ANALYSES/TMDLS

Lakes are an important feature in Eden Prairie and the ongoing maintenance and improvement of our water resources directly affects the full use of our lakes. NMCWD and RPBCWD have completed Use Attainability Analyses (UAAs) for most of the lakes in their Districts. The UAAs are scientific assessments of a water body's physical, chemical, and biological condition. The studies include water quality assessments and recommendations for protective and/or remedial measures for the studied lakes and their direct tributary watersheds. The results of these UAAs provide the City guidelines for water resource improvement projects for these water bodies.

Lakes that do not meet state water quality standards are listed as "Impaired" by the State of Minnesota. These lakes require additional analysis in the form of a Total Maximum Daily Load (TMDL) study. Waters that are impaired in Eden Prairie are listed in Table 2.1. Although the UAAs do provide background data that may be used towards preparation of a TMDL they do not meet MPCA criteria for a TMDL document. A TMDL is the maximum amount of a pollutant a waterbody can receive and still meet water quality standards. The TMDL study identifies the sources and magnitude of pollutant loading and establishes a numeric load reduction that must be made for each source. The results of each TMDL may lead to different conclusions than the UAAs.

**Table 2.1. Impaired Waters in Eden Prairie.**

Note: Based on the draft 2014 303(d) List.

Lake/Stream	DNR Lake # /Reach #	Affected Use	Pollutant
Bryant	27-0067	Aquatic consumption/recreation	Mercury FT <sup>1</sup> and Excess Nutrients
Mitchell	27-0070	Aquatic recreation	Excess Nutrients
Smetana	27-0073	Aquatic consumption	Mercury FT <sup>1</sup>
Red Rock	27-0076	Aquatic consumption/recreation	Mercury FT <sup>1</sup> and Excess Nutrients
Riley	10-0002	Aquatic consumption/recreation	Mercury FT <sup>1</sup> and Excess Nutrients
Round	27-0071	Aquatic consumption	Mercury FT <sup>1</sup>
Staring	27-0073	Aquatic consumption/recreation	Mercury FT <sup>1</sup> and Excess Nutrients
Nine Mile Creek <sup>3</sup>	07020012-518	Aquatic life	Fish IBI <sup>2</sup> and Chloride
Riley Creek	07020012-511	Aquatic life	Turbidity
Bluff Creek <sup>4</sup>	07020012-710	Aquatic life	Fish IBI <sup>2</sup> and Turbidity
Minnesota River	07020012-505 07020012-506	Aquatic consumption/life	Mercury FT <sup>1</sup> and WC <sup>1</sup> , PCB FT <sup>1</sup> , Turbidity, Dissolved Oxygen (Reach 505 only-DS of River Mile 22, approx. Riley Creek)

<sup>1</sup> "FT" means mercury or PCBs in fish tissue while "WC" means in the water column.

<sup>2</sup> Index of Biotic Integrity is a measure of the quantity and quality of aquatic life.

<sup>3</sup> The impaired reach is the main stem, which is downstream of Eden Prairie. The South Fork, which is not listed as impaired, flows through Eden Prairie and discharges into Nine Mile Creek.

<sup>4</sup> The impaired reach is upstream of Rice Lake. That part of Bluff Creek in Eden Prairie has no listed impairments and was excluded from the TMDL.

A statewide TMDL has been completed for the mercury impairments. A TMDL for the Nine Mile Creek chloride TMDL has been completed and approved by the EPA; however, the TMDL Implementation Plan has not yet been approved. A TMDL for the Nine Mile fish impairment is on hold until additional data is available to more conclusively identify the factors causing the impairment.

The table below summarizes the status of individual Lake UAAs. Lakes that are not on this list are either tributary to one of the lakes below and thus are included in that analysis, or they are classified as Natural Environment lakes for which no UAAs are proposed. More information about lake and stream conditions may be found in Section 3.5.

**Table 2.2. Lake Use Attainability Analyses (UAAs).**

Lake	Listed as Nutrient Impaired?	Completion Date
Anderson	No	2003
Birch Island	No	2000
Bryant	Yes	2003
Duck	No	2005
Mitchell	Yes	2002
Smetana	No	2003
Red Rock	Yes	2002
Rice Marsh	No	2016*
Riley	Yes	2016*
Round	No	1999
Staring	Yes	Not completed

\* PRBCWD is in the process of finalizing the UAA Update for Riley and Rice Marsh Lakes.

## 3.0 Water Resources Inventory

### 3.1 PHYSICAL ENVIRONMENT

The City of Eden Prairie lies in the south central edge of Hennepin County. The City encompasses nearly an entire township (35.2 square miles) and is bordered by Chanhassen to the west, Minnetonka to the north, Bloomington and Edina to the east, and the Minnesota River to the south.

#### 3.1.1 Geology and Soils

The bedrock underlying Eden Prairie is St. Peter sandstone in the northern third and Prairie du Chien Group dolostone in the south. The surficial geology is glacial outwash with areas of significant glacial till deposits in the central and northeastern sections of the City. The Hennepin County Geologic Atlas has more information regarding the geology and hydrogeology in Eden Prairie, and can be found online at [purl.umn.edu/58491](http://purl.umn.edu/58491).

The soils in Eden Prairie are generally well drained sandy loam to loam (Figure 3.1) and are well drained. However, in the alluvial landscape unit in the Minnesota River Valley along the southern edge of the City, floodplain soils are generally loams or silt loams and range from well to very poorly drained. The Hennepin County Soil Survey has more information regarding soil units within Eden Prairie, which can be viewed online at the Natural Resources Conservation Service's Web Soil Survey at [websoilsurvey.nrcs.usda.gov/app/HomePage.htm](http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm).

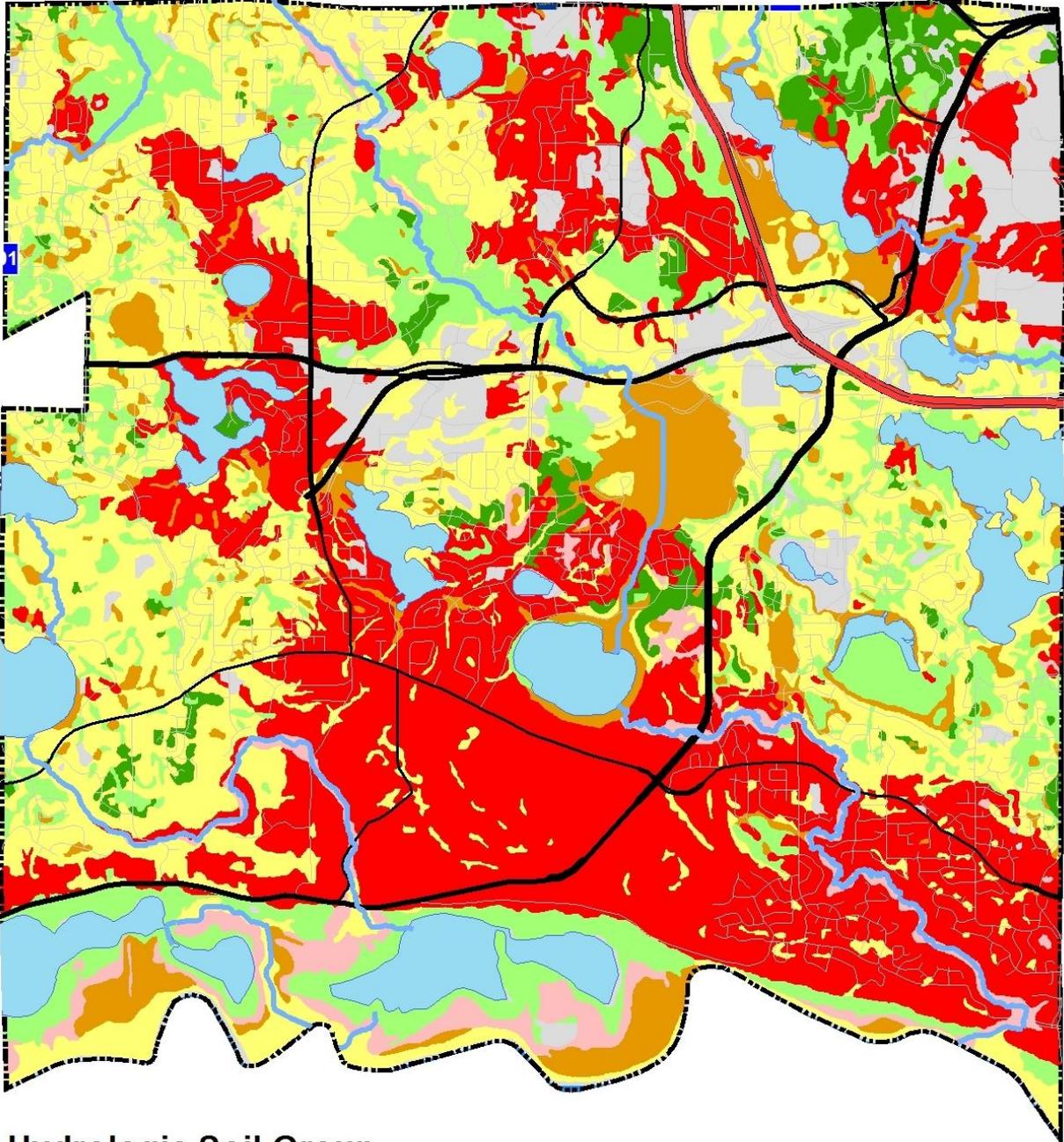
#### 3.1.2 Climate and Precipitation

The climate within the Minneapolis-St. Paul Metropolitan Area is humid continental climate with moderate precipitation, wide daily temperature variations, warm humid summers, and cold winters. The total average annual precipitation is approximately 31.2 inches (Table 3.1) while the annual snowfall average is approximately 54 inches, equivalent to approximately 5.4 inches of water precipitation.

**Table 3.1. Climate and precipitation data at Chanhassen, 1981-2010.**

Month	Average Temperature (°F)	Average Precipitation (inches)	Average Snowfall (inches)
January	14.3	0.87	10.3
February	19.1	0.94	9.7
March	31.3	1.78	10.8
April	46.5	3.00	3.4
May	58.0	3.66	0.0
June	67.6	4.02	0.0
July	72.0	3.59	0.0
August	69.9	4.14	0.0
September	60.7	3.43	0.0
October	47.8	2.51	0.4
November	32.7	1.97	5.4
December	18.1	1.25	13.9
<b>Annual Average</b>	<b>44.8</b>	<b>31.16</b>	<b>53.9</b>

Source: NOAA National Climatic Data Center.



**Hydrologic Soil Group**

- |   |  |
|---|--|
|  A - Sandy |  C - Sandy Clay Loam        |
|  A/D       |  C/D                        |
|  B - Loamy |  D - Clay                   |
|  B/D       |  Not rated or not available |

Source: NRCS SSURGO, Minnesota DNR

0.5 0.25 0 0.5 Miles

Path: L:\0094\0094-31 LVMP 2012 Update\mxd\Soils HSG.mxd



**Figure 3.1. City of Eden Prairie Hydrologic Soil Groups.**

Note: Dual hydrologic soil groups are given for certain wet soils that could be adequately drained. For soils with dual designations (e.g., A/D), the first letter applies to the drained and the second to the undrained condition. Source: USDA NRCS SSURGO.

### 3.2 BIOLOGICAL ENVIRONMENT

The City’s landscape has gone through many changes due to human activity. Pre-European settlement the area was part of the “Big Woods” ecoregion where oak woodland and maple-basswood forests were the dominant vegetation types. Upon settlement, much of the landscape was converted to agriculture and eventually urban and suburban development. The Minnesota River Valley is a dominant feature in the City and is home to significant natural communities, including remnants of the Big Woods, river bluffs, and wetland areas. Most of the significant natural communities identified in the Hennepin County Biological Survey are in areas under public ownership and have been preserved as managed conservation areas. Where significant communities are not publicly owned, the City continues to evaluate the possibility of acquisition.

Many of the City’s seventeen lakes are active fisheries. Appendix B details information about the lakes and their fish populations.

### 3.3 HUMAN ENVIRONMENT

#### 3.3.1 Land Use

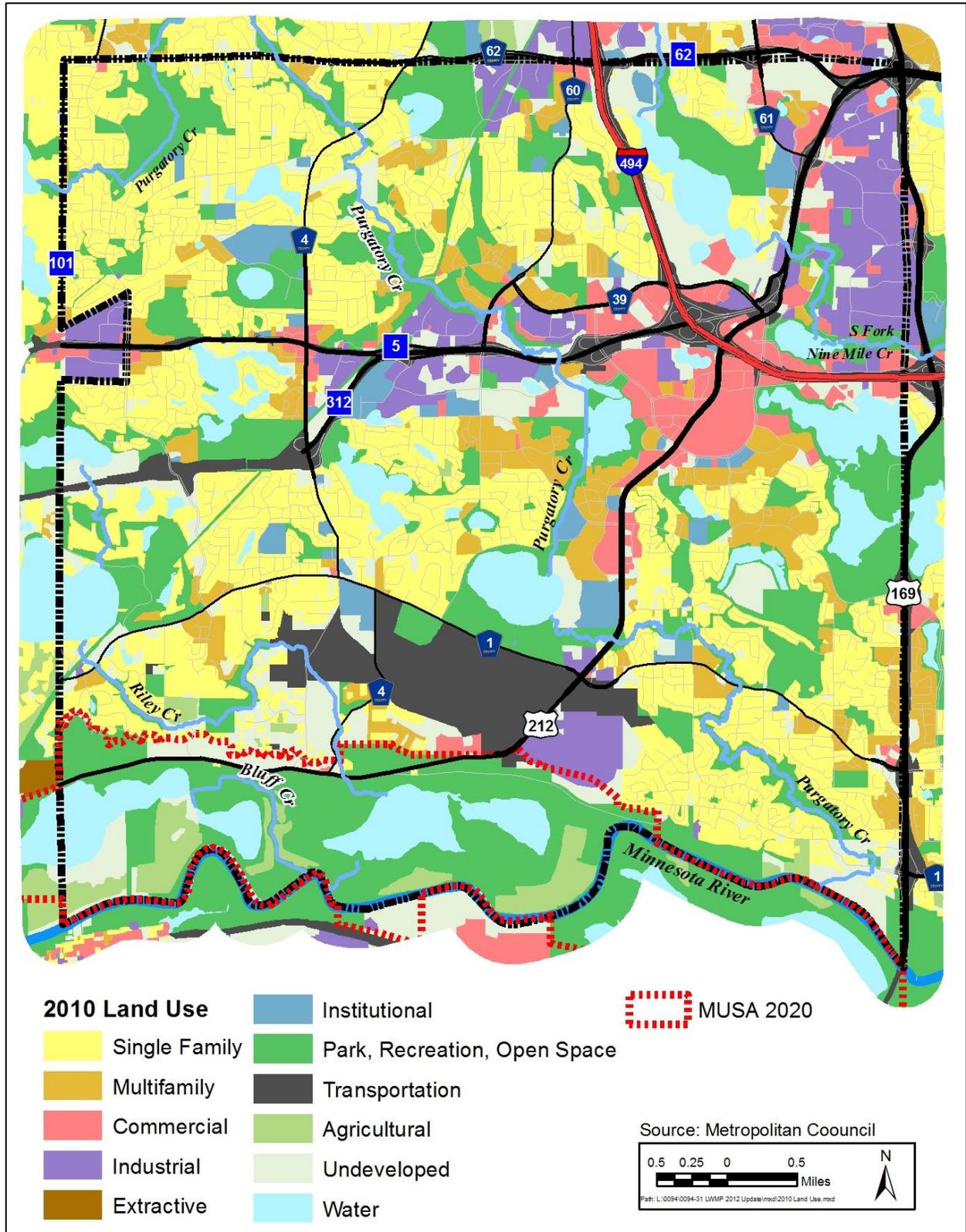
Figure 3.2 shows Eden Prairie’s 2010 land use from Metropolitan Council land use data. The City is over 80% developed, and has a regional commercial and industrial core surrounded by residential uses of various densities (see Table 3.2). While just less than ten percent is classified a vacant, only about 3% of the remaining vacant land City is actually developable. The Flying Cloud Airport and the Minnesota Valley Wildlife Refuge dominate the southern part of the City. Only the Minnesota Valley Wildlife Refuge and areas within the Minnesota River Bluffs in the southern part of the City are outside the Metropolitan Urban Services Area (MUSA).

Planning for the proposed Southwest Light Rail Transit line includes five stations in Eden Prairie which are anticipated to stimulate redevelopment and increase density. Figure 3.3 shows planned 2030 land use from the 2009 Comprehensive Guide Plan.

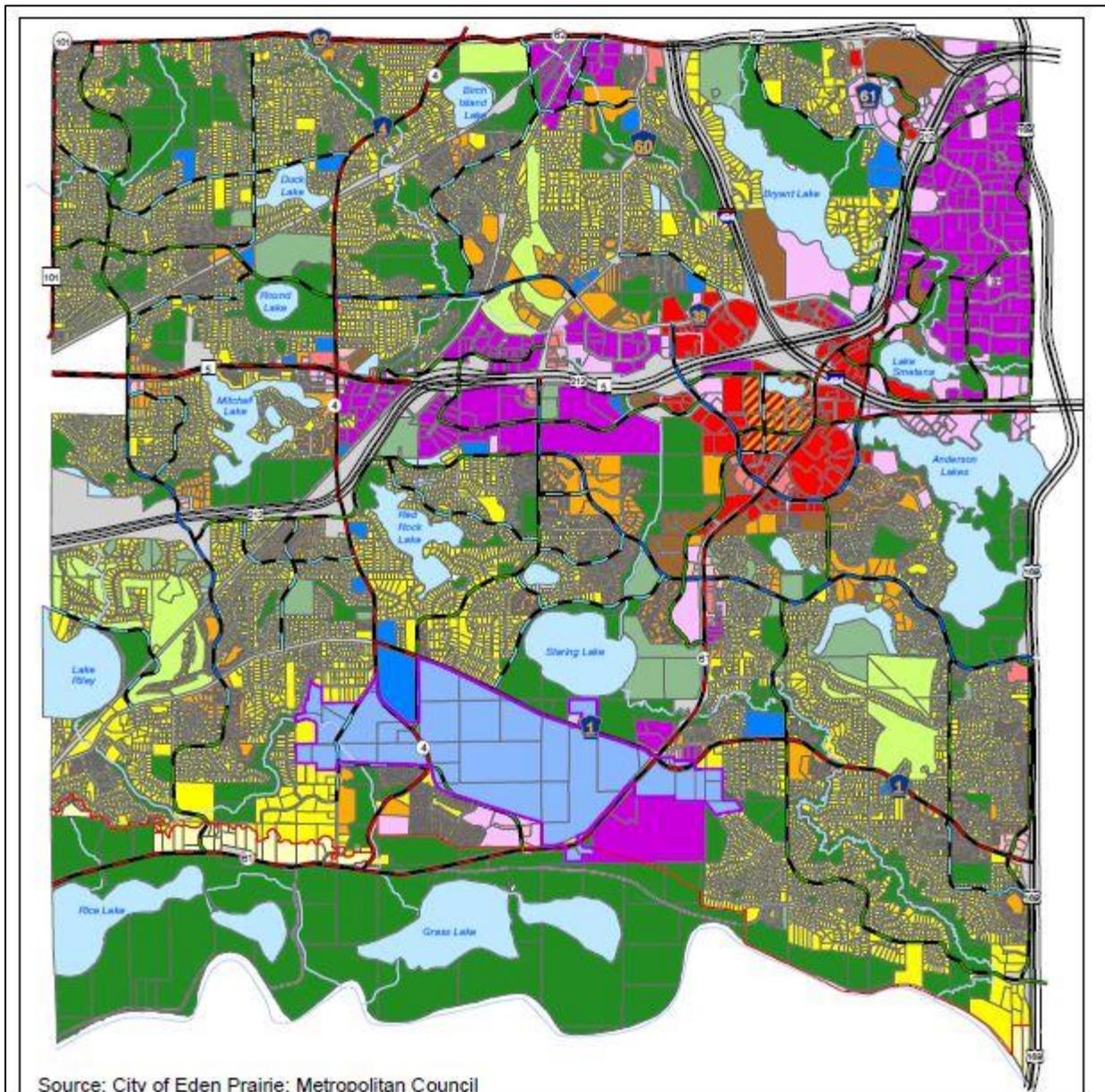
**Table 3.2. 2010 land use in the City of Eden Prairie.**

Land Use	Area (acres)	Area (%)
Single Family	7,620.1	33.8
Parks and Recreation	5,090.4	22.6
Undeveloped	2,245.1	9.9
Water	2,110.2	9.4
Industrial	1,232.1	5.5
Commercial	1,102.9	4.9
Highway	822.1	3.6
Airport	798.9	3.5
Institutional	554.6	2.5
Multi Family	509.1	2.3
Agricultural	426.5	1.9
<b>Total</b>	<b>23,915.6</b>	

Source: Metropolitan Council from city comprehensive plan and air photos.

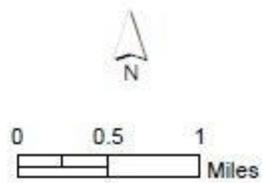


**Figure 3.2. Eden Prairie 2010 land use and 2020 MUSA limits.**  
 Source: Metropolitan Council, Minnesota DNR.



Source: City of Eden Prairie; Metropolitan Council

- |  |                         |                     |                    |
|--|-------------------------|---------------------|--------------------|
| Rural Residential .10 Units/Acre             | Industrial              | Public/Quasi-Public | Airport Property   |
| Low Density Residential 1-2.5 Units/Acre     | Neighborhood Commercial | Golf Course         | MUSA line          |
| Medium Density residential 2.5-10 Units/Acre | Community Commercial    | Church/ Cemetery    | Creeks             |
| High Density Residential 10-40 Units/Acre    | Regional Commercial     | Open Water          | Principal Arterial |
| Office                                       | Town Center             | Right-Of-Way        | A Minor Arterial   |
| Airport                                      | Park/Open Space         |                     | B Minor Arterial   |
|  |                         |                     | Major Collector    |
|  |                         |                     | Minor Collector    |



### LAND USE GUIDE PLAN MAP 2030

COMPREHENSIVE PLAN UPDATE 2008

October 20, 2009

Figure 3.2

Figure 3.3. Eden Prairie 2030 land use.

Source: City of Eden Prairie.

### 3.3.2 Parks, Open Space, Recreational Facilities

The 2003 Comprehensive Park and Open Space Plan was updated with the 2009 Comprehensive Guide Plan, and provides detailed information regarding parks and recreational facilities available within the City. Just over 29 percent of the land area of the City is comprised of parks, open space, and water surface. About half the park and open space acreage is designated as conservation area and generally includes large floodplain/wetland areas. Other conservation areas protect significant prairie, bluff, or wooded areas. The 2009 Guide Plan Update contains goals and policies reinforcing the City's commitment to protecting sensitive natural resources, and providing trails and corridor connections between significant natural areas and open spaces.

The City operates beaches at Riley Lake and Round Lake. Boat ramps are located at Mitchell, Riley, Round, Staring, Red Rock, and Smetana Lakes. The Park and Open Space Plan also provides for the continued preservation of conservation areas as well as an expansion of the recreational trail system. Acquisition of floodplain properties in the creek corridors as property becomes available is a priority, as is completion of acquisition and development of the Minnesota Valley Wildlife Refuge and Recreation Area. Approximately 2,000 acres of the Minnesota Valley Wildlife Refuge will be in Eden Prairie when acquisition is complete.

The Three Rivers Park District regional parks listed below are located in part or whole in Eden Prairie.

- ▲ The 170 acre Bryant Lake Regional Park, with recreational activities such as fishing, swimming, and boating available, is located on the north end of Bryant Lake.
- ▲ Hyland-Bush-Anderson Regional Park Reserve includes 318 acres in Eden Prairie. Activities are primarily passive enjoyment and include nature study and park programming.

The primary LWMP-related recreational concern is the improvement of water quality in the City's lakes to sustain or enhance their beneficial use and to preserve the general enjoyment of the City's water resources.

### 3.3.3 Pollutant Sources

The Flying Cloud Sanitary Landfill located across Trunk Highway 212 from Flying Cloud Airport is a privately-owned closed landfill on the Minnesota Permanent List of Priorities. It is currently being managed as part of the MPCA's closed landfill program and has a groundwater remediation system in place that can be operated if needed. The landfill also operates a landfill gas extraction system. There are no known additional feedlots or significant dumpsites in the City.

The Wellhead Protection Plan (WHPP) was completed in 2004 was updated in 2015. The WHPP evaluates and provides recommendations for monitoring and/or remediating potential pollutant sources such as dumpsites, leaking underground storage tank sites, Voluntary Investigation and Cleanup sites and others. Information on these sources can also be found by contacting the Minnesota Pollution Control Agency or the Environmental Protection Agency, or visiting the MPCA's What's in My Neighborhood website at [www.pca.state.mn.us/udgx680](http://www.pca.state.mn.us/udgx680).

Septic systems and operating or abandoned wells can also be a source of pollution. Eden Prairie had an estimated 185 septic systems as of January 2015. The MDH regulates new and abandoned wells and maintains a comprehensive list of the status of each. A plan for management of private wells and septic systems is also included in the City's WHPP.

## 3.4 WATERSHEDS

The Twin Cities Metropolitan Area is subdivided into 33 watersheds, each managed by a Watershed Management Organization (WMO). WMOs may be either Joint Powers consortia of cities or Watershed Districts, which are special units of government. The land in Eden Prairie is located within the jurisdictions of three Watershed Districts, (Figure 3.4 on Page 3-8 and in Table 3.3 below), each governed under Minnesota Statutes 103D.

**Table 3.3. Watershed districts within Eden Prairie.**

<b>Watershed District</b>	<b>Total Area (sq. miles)</b>	<b>Area in EP (sq. miles)</b>	<b>Percent of Eden Prairie</b>
Riley-Purgatory-Bluff Creek	47.1	21.8	62%
Nine Mile Creek	46.2	7.0	20%
Lower Minnesota River	75.9	6.3	18%

**3.4.1 Riley-Purgatory-Bluff Creek Watershed District**

The Riley-Purgatory-Bluff Creek Watershed District (RPBCWD) covers 32.7 square miles in Hennepin County and 14.4 square miles in Carver County. Portions of Eden Prairie, Minnetonka, Deephaven, Shorewood, Chanhassen, Bloomington, and Chaska are located in RPBCWD. Just over 60 percent of Eden Prairie, extending through the center of the City diagonally from the northwest to southeast, is within the RPBCWD.

There are three secondary watersheds within RPBCWD. These include Riley Creek, Purgatory Creek, and Bluff Creek. Ten Eden Prairie lakes are located within RPBCWD, including Duck, Round, Mitchell, Red Rock, McCoy, Staring, Neill, Idlewild, Rice Marsh, and Riley.

*Riley Creek Subwatershed.* Riley Creek drains a subwatershed of approximately 10 square miles: six square miles within Chanhassen and about four square miles in southwestern Eden Prairie. Half of that area in Eden Prairie drains to either Rice Marsh Lake or Lake Riley while the remaining half is directly tributary to Riley Creek. The subwatershed, like most of the City, has a large amount of natural storage that has been incorporated into the stormwater infrastructure. There are several high value wetlands in this subwatershed based on floral diversity and integrity. The area is expected to be fully developed by the year 2020.

*Purgatory Creek Subwatershed.* Purgatory Creek drains a total subwatershed of approximately 32 square miles in the cities of Chanhassen, Minnetonka, and Eden Prairie. Of that, about 17 square miles is within Eden Prairie, at the lower end of the subwatershed. The area is expected to be fully developed by the year 2020.

The subwatershed has abundant natural storage, not only from numerous wetland basins but also from the chain of lakes (Round, Mitchell, Red Rock, McCoy and Staring) located in the western part of the subwatershed. The subwatershed is an interesting contrast in that some of the more densely developed areas such as the Eden Prairie Shopping Center and surrounding commercial property are found in close proximity to large tracts of open space preserved and used for stormwater management.

*Bluff Creek Subwatershed.* A branch of Bluff Creek flows through Rice Lake to the Minnesota River within the Lower Minnesota River floodplain in Eden Prairie. This portion of Bluff Creek is within the jurisdiction of the Lower Minnesota River Watershed District. However, the main tributary area for Bluff Creek is within the City of Chanhassen.

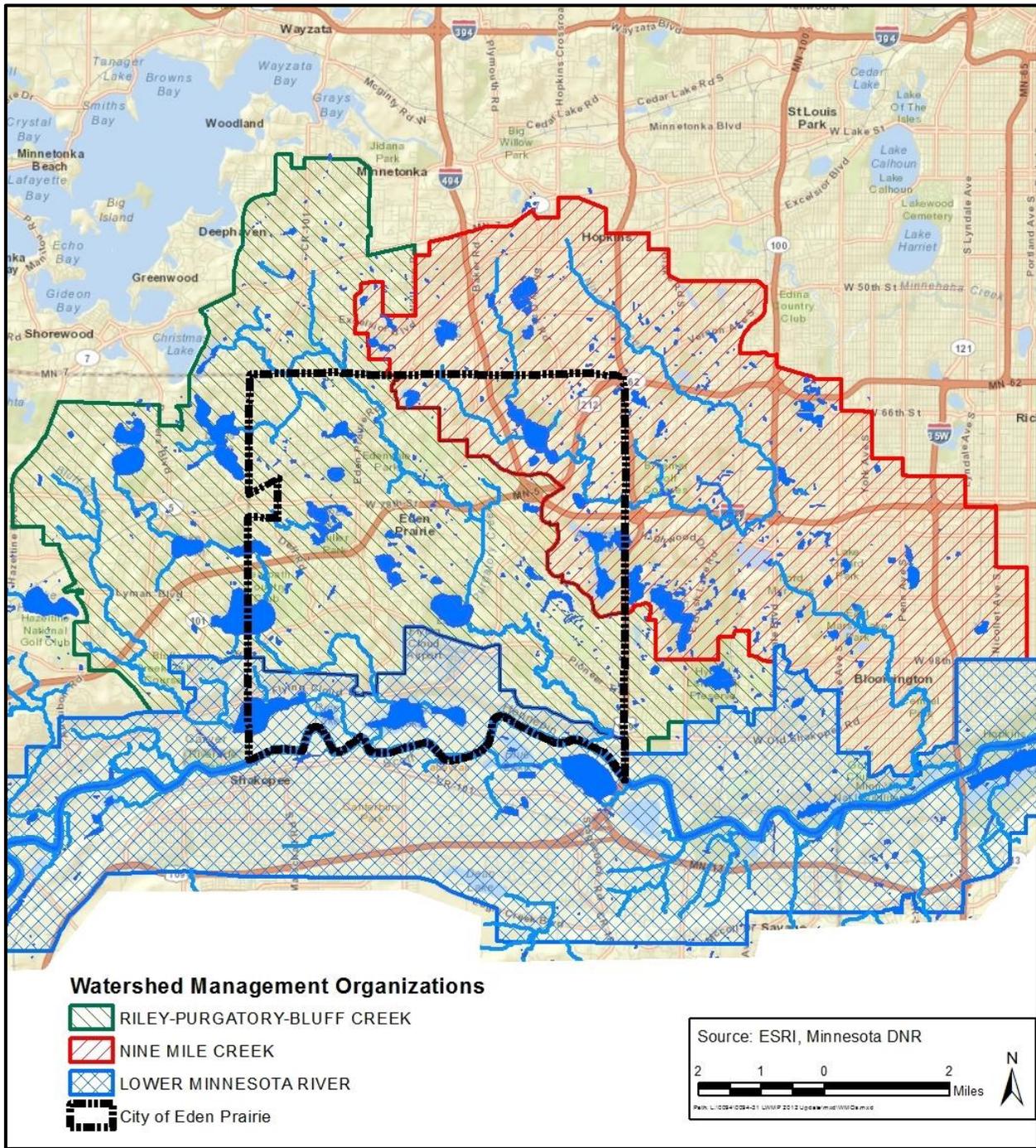


Figure 3.4. Watershed Management Organizations with land in Eden Prairie.  
 Source: Minnesota DNR.

### **3.4.2 Nine Mile Creek Watershed District**

The Nine Mile Creek Watershed District (NMCWD) encompasses approximately 50 square miles in southern Hennepin County and includes portions of Eden Prairie, Bloomington, Edina, Hopkins, Minnetonka, and Richfield.

Nine Mile Creek is about 15 miles in length from its headwater where it crosses County Road 3 in Hopkins to its mouth at the Minnesota River. The South Fork of Nine Mile Creek, which passes through northeastern Eden Prairie, is approximately 8.5 miles long. Birch Island, Bryant, Northwest Anderson, Southwest Anderson, and Smetana Lakes lie within the NMCWD.

Just less than 7 square miles of this watershed is located within the City of Eden Prairie. The watershed includes a large amount of the City's industrial base that has highly impervious surface areas. The watershed does not contain as many small natural storage basins/wetlands, but is instead characterized by a number of large shallow lake and wetland complexes. The industrial areas are connected with a network of storm sewers and have few noncontributing areas.

### **3.4.3 Lower Minnesota River Watershed District**

The Lower Minnesota River Watershed District (LMRWD) is located on the south side Eden Prairie and includes a large portion of the Flying Cloud Airport and areas south of the bluffs. The District boundaries encompass an area of 64 square miles within Carver, Hennepin, Dakota, Scott, and Ramsey Counties and include bluffs on both sides of the Minnesota River.

Both the quantity and quality of surface water resources throughout the LMRWD are closely tied to groundwater. The LMRWD includes Rice and Grass Lakes as well as the lower reaches of Bluff, Purgatory and Riley Creeks within the floodplain areas of Eden Prairie.

The water resources within Lower Minnesota River Watershed District are in the floodplain category and are to be managed primarily to enhance native habitat and preserve existing uses such as fishing, hiking, and biking. These lakes lie within areas zoned Park and Open Space.

Much of the land surrounding Rice Lake is within the Minnesota Valley Wildlife Refuge and is managed by the US Fish and Wildlife Service. Additional property acquisition within the floodplain area is expected long-term. The City's Park and Open Space Plan states that development within the floodplain should remain consistent with the National Wildlife Refuge and Recreation Area Comprehensive Park Plan.

## **3.5 SURFACE WATER**

Eden Prairie coordinates monitoring efforts with the watershed districts to ensure consistent monitoring of lakes and creeks for water quality, lake elevation, and streamflow. The City periodically contracts to complete water quality and aquatic vegetation monitoring on some of the lakes, and also sponsors volunteer lake monitoring through the Metropolitan Council's Citizen Assisted Monitoring Program (CAMP) and volunteer wetland biologic monitoring through Hennepin County Department of Environment and Energy's Wetland Health Evaluation Program (WHEP).

### **3.5.1 Lakes**

There are 16 lakes in Eden Prairie (Figure 3.5). One additional lake, Eden Lake, is classified by the DNR and Watershed District as a large, excavated wetland; however it functions as a shallow lake and is included in the list of lakes by the City. Grass Lake and Rice Lake are classified as Category 1 Floodplain Lakes by the LMRWD. Information regarding each lake is found in Appendix B.

Minnesota’s standards for lake water quality vary depending on the depth classification of the lake (Table 3.4). Shallow lakes are defined as 15 feet deep or less, or 80% or more of the lake area is shallow enough to support rooted aquatic plants. The lake number and shoreland classification, lake morphometry, and water quality data are shown in Table 3.5. More information about the lakes can be found online at the DNR’s LakeFinder website: [www.dnr.state.mn.us/lakefind/index.html](http://www.dnr.state.mn.us/lakefind/index.html).

**Table 3.4. Water quality standards for lakes in the North Central Hardwood Forest Ecoregion.**

Parameters	Shallow Lakes	Deep Lakes
Total Phosphorus (TP) (µg/L)	≤60	≤40
Chlorophyll- <i>a</i> (chl- <i>a</i> ) (µg/L)	≤20	≤14
Secchi Depth transparency (SD) (meters)	≥1.0	≥1.4

**Table 3.5. Characteristics of Eden Prairie lakes.**

Note: TP=total phosphorus; Chl-*a*=chlorophyll-*a*, a measure of algal density; and SD=Secchi depth or clarity.

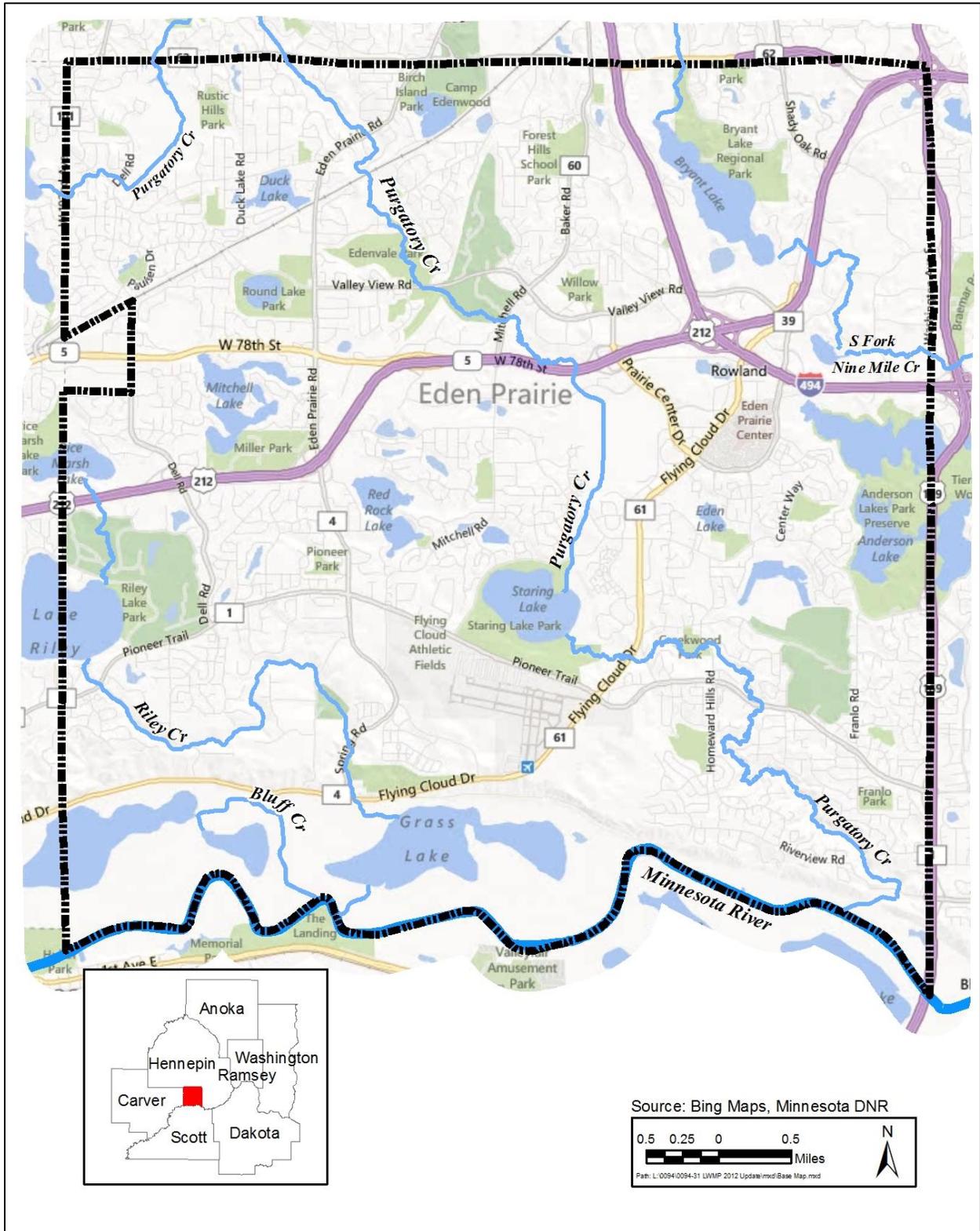
Lake	DNR ID#	Surface Area (ac)	Max Depth (ft)	Public Access	DNR Class <sup>1</sup>	10-year Summer Average			Depth Class
						TP (µg/L)	Chl- <i>a</i> (µg/L)	SD (m)	
Anderson NW	27-0062-01	138	10	No	NE	45	21	1.6	Shallow
Anderson SW	27-0062-03	80	9	No	NE	102	60	0.9	Shallow
Birch Island	27-0081	43	17	Canoe	RD	41	6	1.4	Shallow
Bryant	27-0067	177	45	Ramp	RD	39	20	2.2	Deep
Duck	27-0069	41	10	Yes <sup>2</sup>	RD	50	13	1.9	Shallow
Eden	27-1011W	17	--	No	N/A	185	74	0.6	Shallow
Grass	27-0080	467	3.5	No	NE	NA	NA	NA	Shallow
Idlewild	27-0074	15	9	No	RD	42	7	2.1	Shallow
McCoy	27-0077	10	--	No	NE	NA	NA	NA	Shallow
Mitchell	27-0070	112	16	Ramp	NE	65	28	1.3	Shallow
Neill	27-0079	34	10	No	NE	100	24	1.1	Shallow
Red Rock	27-0076	97	16	Ramp	RD	73	42	1.5	Shallow
Rice	27-0132	517	3	No	NE	NA	NA	NA	Shallow
Rice Marsh	10-0001	81	10	No	NE	108	16	1.7	Shallow
Riley	10-0002	297 <sup>3</sup>	49	Ramp	RD	39	23	2	Deep
Round	27-0071	32	37	Ramp	NE	45	17	2.0	Deep
Smetana	27-0073	51	12	Ramp	NE	99	6	1.5	Shallow
Staring	27-0078	155	16	DNR Ramp	RD	114	84	0.5	Shallow

<sup>1</sup> RD = Recreational Development; NE = Natural Environment, N/A = Not Applicable.

<sup>2</sup> Carry-on access only.

<sup>3</sup> 124 acres of Riley Lake are located in the City of Chanhassen.

Source: DNR LakeFinder, MPCA Environmental Quality Information System (EQIS), Blue Water Science.



**Figure 3.5. Lakes and streams in Eden Prairie.**  
 Source: Minnesota DNR.

### 3.5.2 Streams

Most of Eden Prairie is drained by Purgatory Creek (Figure 3.5), which bisects the City from the northwest to the southeast before discharging to the Minnesota River. The northeast quadrant of the City drains into the South Fork of Nine Mile Creek, which flows into Bloomington to the east and into Nine Mile Creek to the Minnesota River. The southwest quadrant of the City discharges into Riley Creek, which flows out of Rice Marsh Lake, through Lake Riley, and then southeast to Grass Lake in the Minnesota River floodplain. A small part of Eden Prairie, mostly area below the Minnesota River bluff, discharges into Bluff Creek.

**Table 3.6. Major streams in Eden Prairie.**

Stream Name	Length (mi)
Purgatory Creek	13.8
Riley Creek	5.2
South Fork Nine Mile Creek	2.6
Bluff Creek	1.4

*Stream Water Quality.* As noted in Table 2.1 in Section 2.6, the main stem of Nine Mile Creek is listed as an Impaired Water for excess chloride and impaired fish community. South Fork of Nine Mile Creek is not listed as impaired, but it is tributary to the main stem, and chloride conveyed by the South Fork’s streamflow contributes to the main stem’s impairment. Riley Creek is impaired by excessive turbidity.

RPBCWD monitors flow and water quality in Riley and Purgatory Creeks. 2014 monitoring data show that six of eight monitored reaches of Purgatory Creek exceeded the state standards for total phosphorus (TP) concentration and four had low concentrations of dissolved oxygen (DO). Two reaches exceeded the state standards for total suspended solids (TSS). Riley Creek within Eden Prairie also exceeded the TP standard in two of the three monitored reaches as well as the DO standard in one reach and the TSS standard in one reach. (RPBCWD 2014).

*Streambank Stability.* An ongoing concern for both Riley and Purgatory Creeks is streambank stability. Urban streams are often prone to erosion and bank failure when rain runs off impervious surfaces and through storm sewers to streams, causing water levels to rise quickly and flows to increase in velocity. This stress can result in bank failures that contribute excess sediment to the stream, can topple trees, and can threaten infrastructure.

The City has undertaken walking assessments of Riley and Purgatory Creeks, and identified existing erosion issues and their severity. Banks pins have been installed at several locations on Riley Creek to track the rate of streambank erosion; these are measured annually when the walking assessment is updated. The results have been summarized in a Technical Memo that is included in Appendix D.

The RPBCWD has developed a Creek Restoration Action Strategy (CRAS) plan for all three streams to prioritize reaches, sub-reaches, or sites, in need of stabilization and/or restoration. RPBCWD has identified seven categories determined to be important factors for project prioritization. These categories include:

- ▲ Infrastructure risk
- ▲ Erosion and channel stability
- ▲ Public education/access
- ▲ Ecological benefits
- ▲ Water quality
- ▲ Project cost
- ▲ Partnerships

Both the City’s walking assessments and the CRAS have identified similar locations on the two streams as high priority for stabilization and restoration. These assessments will assist the City in prioritizing future stream restoration projects and help to quantify benefits such as water quality or ecological benefits.

### 3.6 GROUNDWATER

Eden Prairie relies on groundwater for municipal water, currently operating fifteen wells drawing from the Prairie du Chien-Jordan aquifer. Groundwater is managed through the City's Wellhead Protection Plan (WHPP). That plan provides comprehensive guidance to protect wellhead areas from contamination while meeting the requirements of the Safe Drinking Water Act and the Minnesota Groundwater Protection Act. The WHPP details measures to protect the groundwater entering and flowing through the Wellhead Protection Area to protect the drinking water supply from contamination. The following items are included in the WHPP:

- ▲ A delineation of the Wellhead Protection Area (WHPA) and Drinking Water Supply Management Area (DWSMA) for the public water supply system using the most recent version of the Twin Cities Metropolitan Area Groundwater Flow Model. This has resulted in an expanded DWSMA that now extends into Minnetonka, Deephaven, Shorewood and Chanhassen.
- ▲ Identification of potential sources of contamination to the DWSMA, such as unsealed wells, Class V wells, and Underground Storage Tanks, and establish strategies and actions to manage risk and to minimize impacts to the DWSMA.
- ▲ A Spill Response Plan In coordination with other cities in the DWSMA.
- ▲ Information and guidelines and policies for the use of infiltration BMPs for stormwater management.

The Hennepin County Groundwater Protection Plan was completed in 1994 and approved by the Board of Water and Soil Resources (BWSR), but has not been adopted by the Hennepin County Board. As such, Hennepin County does not have what would be considered an approved Groundwater Protection Plan and is not a part of the LWMP review process.

### 3.7 FLOOD DATA

Information on 1-percent (1%) annual chance (100-year) flood levels and peak discharges of basins can be found in the HydroCAD model output in Appendix A. As noted below in Section 4.3 of this Plan, this modeling used the updated precipitation event depths published in the National Oceanic and Atmospheric Administration's (NOAA) Atlas 14. In addition, the Nine Mile and Riley-Purgatory-Bluff Creek Watershed Districts are in the process of updating their floodplain modeling using Atlas 14.

#### 3.7.1 Floodplain

The Federal Flood Insurance Program has delineated the floodplain in Eden Prairie and includes floodway and flood fringe areas inundated as a result of the 1-percent annual chance (100-year) flood. The 1-percent annual chance (100-year) floodplain, as defined by the Flood Insurance Program for flood insurance purposes, was detailed by a Flood Insurance Study. The resultant maps are on file at City Hall and with the DNR and are available from the Federal Emergency Management Agency (FEMA). Flood maps are also available online on the Hennepin County Natural Resources Interactive Map [gis.hennepin.us/naturalresources/map/default.aspx](https://gis.hennepin.us/naturalresources/map/default.aspx) or from FEMA at [msc.fema.gov/portal](https://msc.fema.gov/portal). FEMA has not yet updated the Flood Insurance Study and maps using Atlas 14 precipitation depths.

The Nine Mile Creek and Riley-Purgatory Bluff Watershed Districts have calculated 1-percent flood envelopes for each creek system. The City's floodplain ordinance requires that fill or excavation in the floodplain is subject to a permit from the appropriate watershed district. The ordinance further requires that applications for building permits or zoning or land use changes or extensions within the floodplain must be submitted to the appropriate watershed district for review prior to approval by the City.

#### 3.7.2 Localized Flooding Issues

In the 1970's the City completed a Local Drainage Plan to evaluate drainage and potential flooding issues within the City. This plan and subwatershed HydroCAD models were updated in 1999 and then again for this LWMP using

updated pond data and Atlas 14 precipitation depths. This modeling is not intended to determine floodplain or flood-prone locations; it is used to evaluate the capacity and adequacy of the drainage system. The updated models identified several locations where there may be the potential for ponds to overflow and result in localized flooding. These locations were reviewed by City engineering staff, which were not aware of any history of flooding during large rain events. It may be that these predicted overflows are just artifacts or limitations of the model or these may be locations that should be watched to verify past observations.

- ▲ The pond system east of Dell Road and south of Duck Lake Trail designated 07-12-A, 07-12-B, 07-12-C and 06-43-A may have the potential to overflow into the Evanston Road cul-de-sac west of Loralee Lane.
- ▲ The model indicates that basin 15-33-A may overflow into the parking lot to the northeast of the basin. Depending on grading and if/where catch basins are located property may be impacted. The pond is located near the intersection of Morgan Lane and Towers Lane, north of McCoy Lake.
- ▲ The model indicates that basins 14-23-A and 14-23-B may overflow into adjacent roads. Depending on how overloaded the storm sewer system is at the time, water may continue onto the property of the fitness building to the west. The ponds are located on the east side of Prairie Center Drive, north and south of Singletree Lane.

## 4.0 Assessment of Problems, Issues and Requirements

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### 4.1 STORMWATER POND INVENTORY AND ASSESSMENT

The City's stormwater system is comprised of storm sewer, open channels, and approximately 970 water bodies or basins (Figure 4.1). These include constructed ponds, stormwater wetlands, wetland mitigation areas, lakes, infiltration BMPs, drainage swales or ditches, and creek segments. Following NPDES requirements, the City inspects each water body that receives public drainage a minimum of once per NPDES permit cycle.

The Minnesota Pollution Control Agency (MPCA) required the City to start the BMP treatment effectiveness evaluation required in the 2013 NPDES permit starting in 2010. To complete this task, in 2010 the City developed a plan to complete the studies by lake watershed, and include constructed ponds, wetlands that receive stormwater, infiltration BMPs and ditches that receive public drainage.

This multi-phase pond inventory and assessment program will systematically evaluate the condition of the City's stormwater facilities, undertake sedimentation surveys, assess pollutant and sediment removal effectiveness and determine maintenance needs (see Figure 4.2). To date, the city has completed the field work for 5 phases in the following drainage areas:

- ▲ Phase I - Staring Lake (2010-2013)
- ▲ Phase II - Eden and Neill Lake (2011-2013)
- ▲ Phase III – Red Rock and Duck Lake (2012-2014)
- ▲ Phase IV - Riley Creek - drainage area south of Riley Lake from the western City limit to the western portion of Flying Cloud Airport (2013-2015, draft report submitted in December 2015)
- ▲ Phase V - Mitchell Lake (2014-15, draft report submitted in December 2015)

In each phase the inventoried basins are field surveyed and inspected, sediment accumulation is estimated, and maintenance needs are identified. Watersheds and pondsheds are delineated. For each surveyed lake, sediment cores and water samples are collected to help determine the watershed and lake phosphorus budgets. Watershed-wide P8 models and lake-response models are being created for each subwatershed and receiving water as the program progresses through the City.

The final step in each phase is to determine whether the existing basins provide an adequate amount of pollutant removal for the receiving waters, and if not, how much phosphorus load reduction would be necessary to meet state water quality standards. The P8 and lake response models are used to identify the effectiveness of potential projects such as basin cleanouts or enhancements or additional BMPs in the subwatershed.

Each phase is summarized in a Watershed Basin Inventory and Maintenance Assessment Report that sets forth key projects and maintenance activities, costs, and estimated pollutant load removals. Maintenance needs are prioritized by degree of sedimentation, proximity to public waters, location within the stormwater treatment system, potential water quality benefits, and budget available.

The pond inventory and assessment program will be ongoing activity over the next several years as drainage areas continue to be studied. A tentative schedule by drainage area is shown below. This schedule may be revised as circumstances provide and as the budget for this activity allows.

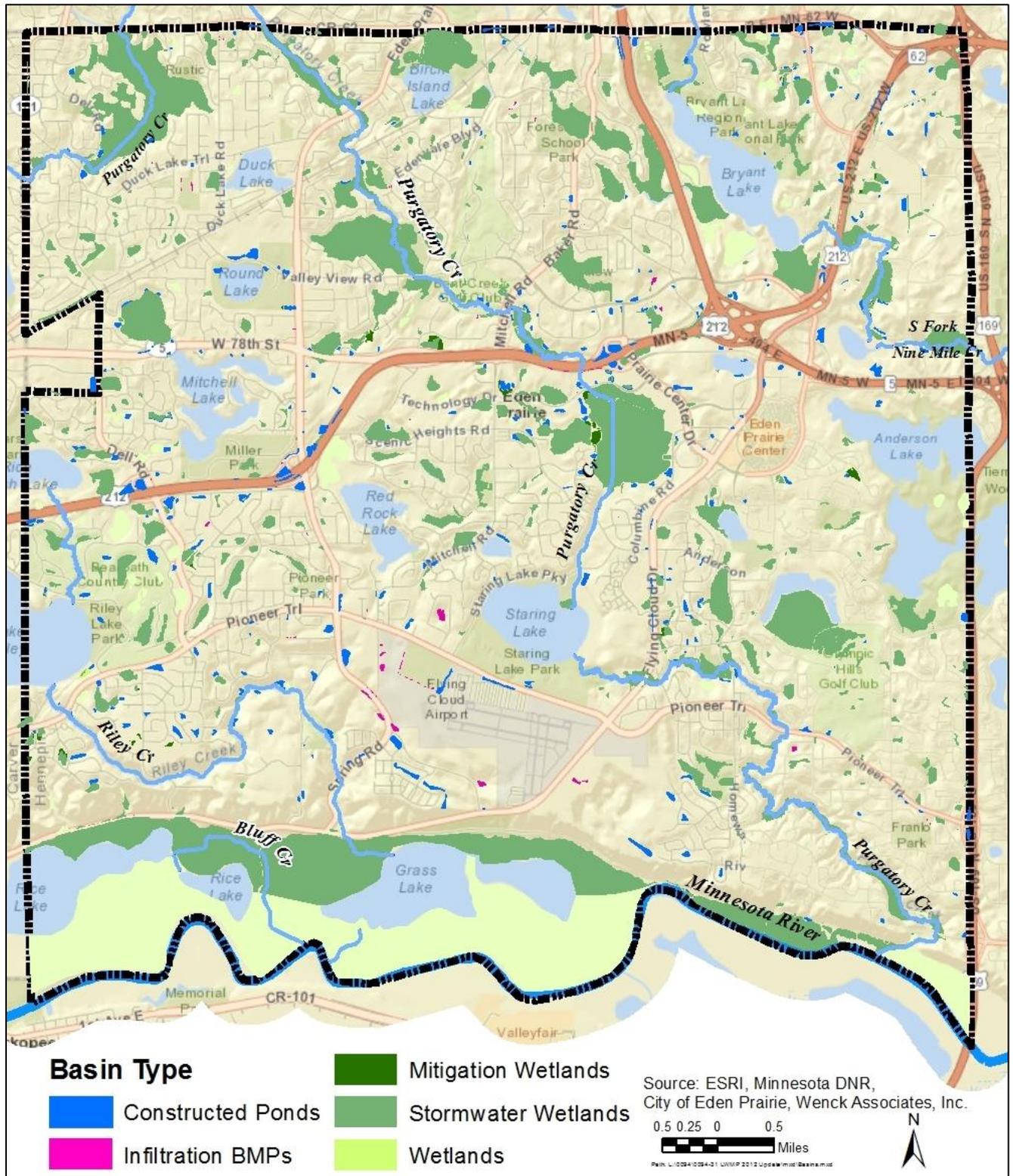
- ▲ Phase VI - Rice Marsh Lake ( 2016)
- ▲ Phase VII – Riley Lake (2017)
- ▲ Phase VII - Round Lake (2018)
- ▲ Phase VIII - Purgatory Creek drainage area downstream of Staring Lake (2019)
- ▲ Phase IX - Grass / Rice Lakes (2020-21)
- ▲ Phase X - Birch Island Lake (2022)
- ▲ Phase XI - Bryant Lake (2023)
- ▲ Phase XII - Lake Smetana (2024)
- ▲ Phase XIII - Anderson Lakes (2025)

For each phase of the program the City inventories all basins in the drainage area. Basins less than 0.25 acres in size and basins which do not receive public drainage are also excluded from further analysis, unless they are a key part of a drainage way. Basins are considered public if they meet one or more of the following conditions: located on City property, within City right-of-way, with a drainage and utility easement, or are private, MnDOT, or County basins but receive runoff from City right-of-way. Table 4.1 shows the number of basins initially identified and the number inventoried for each of the five completed phases of the program.

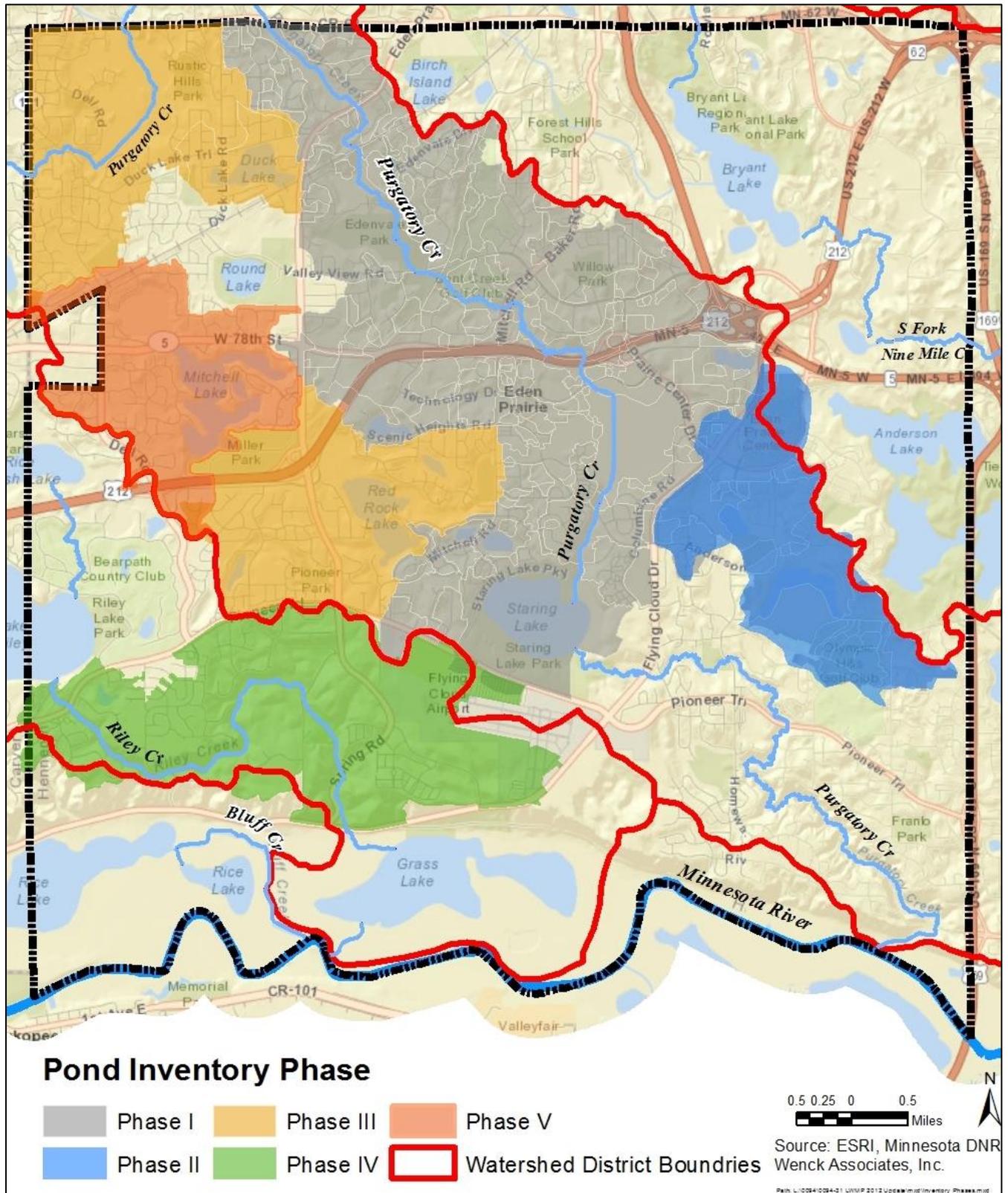
**Table 4.1. Basins for which an inventory and assessment have been completed through 2015.**

Type of Basin	City Total	Basin Inventory Phase										Total to Date	
		1		2		3		4		5		Identified	Inventoried
		Identified	Inventoried	Identified	Inventoried	Identified	Inventoried	Identified	Inventoried	Identified	Inventoried		
Constructed Ponds	342	90	66	10	8	36	18	37	28	18	18	191	138
Infiltration BMPs	62	2	1	0	0	0	0	11	8	4	4	17	13
Mitigated Wetlands	30	7	7	0	0	0	0	5	5	0	0	12	12
Stormwater Wetlands	440	115	83	17	16	5	5	17	12	16	16	170	132
Wetlands	144	22	14	6	3	59	54	14	10	5	5	106	86
<b>Total</b>	<b>1,018</b>	<b>236</b>	<b>171</b>	<b>33</b>	<b>27</b>	<b>100</b>	<b>77</b>	<b>84</b>	<b>63</b>	<b>43</b>	<b>43</b>	<b>496</b>	<b>381</b>
Lakes	16	1	1	2	2	2	2	0	0	1	1	6	6

Source: Wenck Associates, Inc.



**Figure 4.1. Inventoried stormwater system basins as of 2015.**  
 Source: Minnesota DNR, City of Eden Prairie, Wenck Associates, Inc.



**Figure 4.2. Pond Inventory Program phases as of 2015.**  
 Source: Minnesota DNR, Wenck Associates, Inc.

## 4.2 WETLAND INVENTORY

Functions and values assessments were completed on 537 water bodies in Eden Prairie in 1997 using the Minnesota Routine Assessment Method (MnRAM) Version 1.0. These included 478 wetlands, 15 lakes, and 44 stormwater basins. This assessment included establishing nine high-quality wetlands of various types across the City to be used as functions and values references. Results of those assessments were published in the Comprehensive Wetland Protection and Management Plan (Peterson Environmental 1999), and are incorporated into this Plan by reference. The database of waterbodies continues to be updated. The basin inventory currently includes 144 wetlands, 440 stormwater wetlands, 30 mitigation wetlands, and 16 lakes (Table 4.1).

The functional level of each wetland is assessed on the following functions. The City has classified each wetland as Exceptional Quality, High Quality, Moderate Quality, and Low Quality based on its floral diversity and integrity metric score.

- |                                  |                                    |  |
|----------------------------------|------------------------------------|--|
| ▲ Floral diversity and integrity | ▲ Fish habitat                     | ▲ Groundwater interaction                      |
| ▲ Wildlife habitat               | ▲ Shoreline protection             | ▲ Commercial uses                              |
| ▲ Water quality protection       | ▲ Flood and stormwater attenuation | ▲ Recreation/aesthetics/ education and science |

The City's wetland management standards are set forth in Section 11.51 of the City Code, "Standards for the Protection of Wetlands." Developments containing or abutting wetlands are required by the Wetland Protection Ordinance to meet a number of requirements. Such developments must submit an updated MnRAM assessment and wetland delineation to determine the most current classification and extent of any wetlands present. The ordinance stipulates minimum structure setbacks and wetland buffer widths based on that wetland classification, and sets forth standards for restoration or mitigation of impacts to wetlands.

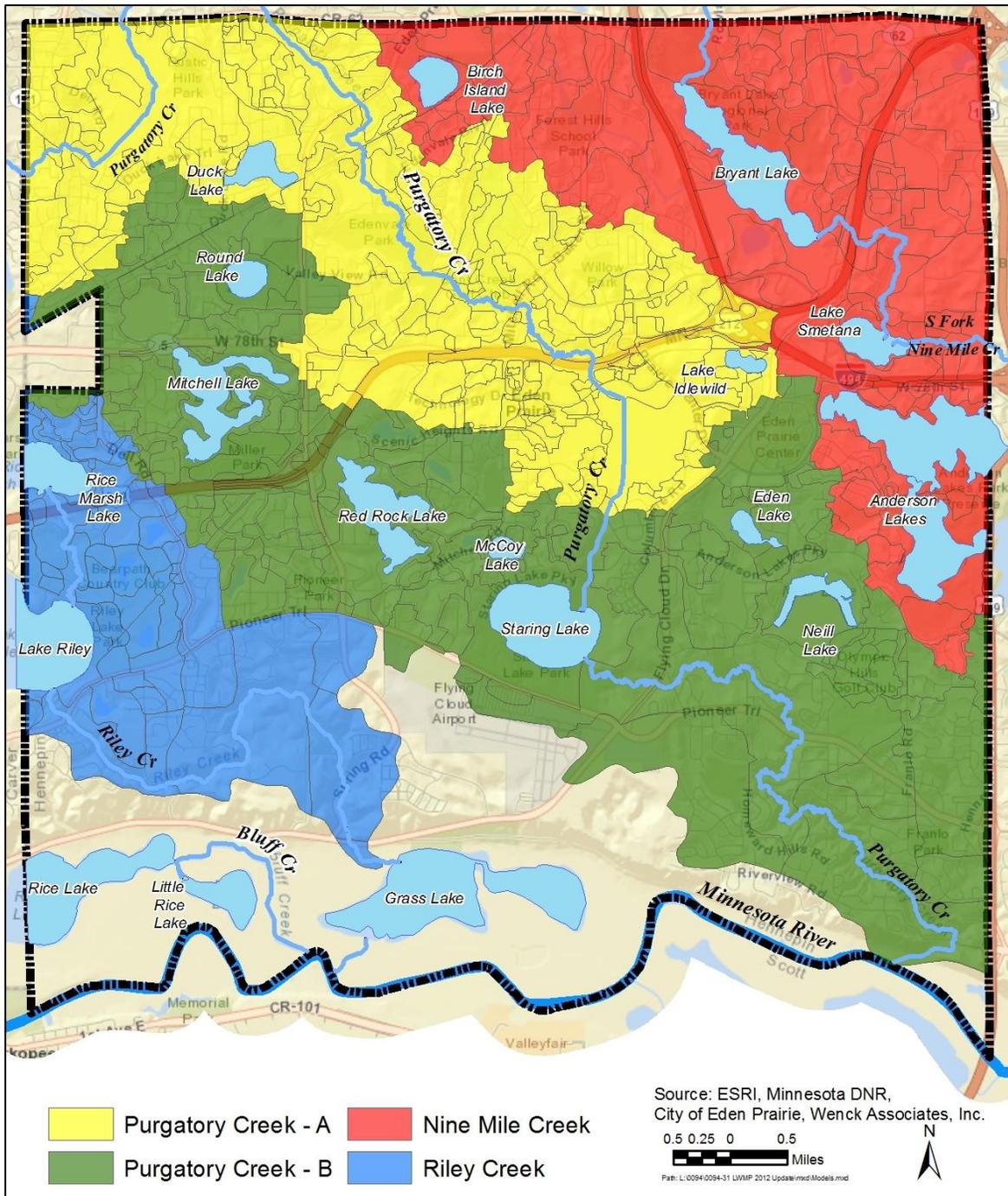
## 4.3 HYDROLOGIC MODELING

As part of this Plan, the HydroCAD hydrologic and hydraulic models for the City were updated to include the most recent watershed and basin information and the newly-redefined 100-year Atlas 14 precipitation event. In 2014, the National Weather Service Hydrometeorological Design Studies Center released NOAA Atlas 14, Volume 8, detailing updated precipitation frequency estimates. The new estimates are based on improvements in three primary areas: denser precipitation data networks with a longer period of record, advanced statistical techniques, and new techniques for spatial interpolation and mapping. Atlas 14 improves the accuracy of the precipitation frequency estimates, and supersedes older references, including the commonly-used Technical Paper 40, which was published in 1961.

There are four individual HydroCAD models for the City - the Riley Creek Watershed, Purgatory Creek Watershed – Part A, Purgatory Creek Watershed – Part B, and Nine Mile Creek Watershed (Figure 4.3). Due to its size and the large amount of input data, the Purgatory Creek model was split into two smaller models, identified as A and B, and linked together.

The purpose of performing this modeling is for planning-level assessments. The models were not calibrated to actual runoff and flows, and are not intended to be flood studies. Watershed and basin information was compiled from the completed Basin Inventory Phases 1, 2 and 3, and the Nondegradation studies.

Model output is quite lengthy and is available electronically. The models and output files are incorporated into this Plan as Appendix A.



**Figure 4.3. Eden Prairie HydroCAD models.**  
 Source: Minnesota DNR, City of Eden Prairie, Wenck Associates, Inc.

#### 4.4 PROBLEMS, ISSUES AND REQUIREMENTS IDENTIFICATION

Local water management problems, issues and requirements were identified by reviewing:

- ▲ Statutory requirements for Local Water Management Plans
- ▲ Water body inventories
- ▲ Comprehensive Wetland Protection and Management Plan
- ▲ Lake inventory data
- ▲ Input solicited from the public, the Conservation Commission, City staff, and state and local agency staff

**Table 4.2 summarizes those problems, issues and requirements by category. After the problems, issues, and requirements were identified staff and the Conservation Commission collaborated to identify goals and policies and to prioritize potential solutions to help the City of Eden Prairie accomplish the goals of this Plan.**

Table 6.2 later in this Plan shows how the actions in the Implementation Plan address each of these problems and issues.

**Table 4.2. Identified problems, issues and requirements.**

<b>Category</b>	<b>Identified Problem, Issue or Requirement</b>
Water Quality Conditions	<ul style="list-style-type: none"> <li>• Lakes and streams in the City are listed on the Clean Water Act Section 303(d) TMDL List of Impaired Waters.</li> <li>• Ongoing stormwater system maintenance needed to protect and improve surface waters, ensure system integrity, and fulfill NPDES permit obligations.</li> </ul>
Regulatory Requirements and Operational Policies	<ul style="list-style-type: none"> <li>• Limited budget available to implement NPDES Phase II Permit requirements requires prioritization of resources.</li> <li>• Atlas 14 updated precipitation frequency data is available for review, incorporation into the City’s review procedures and adoption. Both Nine Mile Creek and Riley-Purgatory-Bluff Creek watershed Districts are updating their hydrologic and hydraulic models to use Atlas 14 data.</li> <li>• Approaches such as Minimal Impact Development Standards (MIDS) and Integrated Management Practices, which are approaches to storm water management that mimic a site’s natural hydrology as the landscape is developed, are available to reduce the cost of controlling runoff and protecting and improving water quality.</li> <li>• The City’s 2013 NPDES permit and SWPPP Document required ordinance revisions and updates to the City’s operating program requirements.</li> <li>• City goals, policies and ordinances to help protect natural resources will need review and refinement for consistency with NPDES and Riley-Purgatory-Bluff Creek, Nine Mile Creek and Lower Minnesota WD requirements.</li> </ul>
Water-Based Recreation Needs	<ul style="list-style-type: none"> <li>• Water quality should be protected or improved as needed to protect or manage recreational opportunities while maintaining water quality goals.</li> <li>• As water quality and clarity improves, aquatic vegetation management may be needed to reduce invasive species, encourage beneficial vegetation, and allow recreational usage.</li> <li>• Control of aquatic invasive species (AIS) is a continuing concern.</li> </ul>
Maintenance Requirements	<ul style="list-style-type: none"> <li>• Pond maintenance and repair needs have been and will be identified during the basin inventory and maintenance assessments, including items such as creation or restoration of storage capacity, repair of erosion issues, and addition of alternative stormwater treatment techniques.</li> <li>• Street sweeping, sump manhole cleaning, and regular stormwater facility inspections are necessary on an ongoing basis to help reduce nonpoint source pollutant loads.</li> </ul>
Education and Outreach	<ul style="list-style-type: none"> <li>• Education and outreach efforts could be expanded and new educational opportunities added for targeted groups as needs are identified.</li> </ul>
Financial Resources	<ul style="list-style-type: none"> <li>• Financial resources are limited, requiring that projects be prioritized.</li> </ul>
Groundwater Protection	<ul style="list-style-type: none"> <li>• The LWMP and SWPP should be coordinated with the Wellhead Protection Program so that policies that encourage infiltration and groundwater recharge are consistent with the policies to protect groundwater recharge areas.</li> </ul>
Collaboration Opportunities	<ul style="list-style-type: none"> <li>• There are opportunities for collaboration with other agencies such as the watershed districts, Hennepin County, the Three Rivers Regional Park District, and state agencies to leverage expertise and resources to finance and construct improvements.</li> </ul>

## 5.0 Goals and Policies

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This section of the Plan outlines goals and policies guiding surface water management in the City of Eden Prairie.

### 5.1 GOALS AND POLICIES

#### *Water Quality*

**Goal 1. Work to achieve water quality standards in lakes, streams, and wetlands consistent with intended use and classification and State of Minnesota water quality standards.**

- Policy 1.1. Require that development and redevelopment projects demonstrate no net increase in the annual mass of total suspended solids (TSS) or total phosphorous (TP) leaving the site compared to pre-development conditions.
- Policy 1.2. Require the use of green infrastructure techniques such as Minimal Impact Design Standards (MIDS) during development review through a Green Infrastructure Analysis to meet infiltration and reduce pollutant and nutrient loading to water resources where feasible.
- Policy 1.3. Work in partnership with the Watershed Districts, DNR, adjacent property owners, and other interested parties to restore creeks, creek banks, and gullies for health, safety and ecological integrity, using bioengineering for stabilization projects where feasible.
- Policy 1.4. Lead by example by incorporating pollution prevention and water quality treatment BMPs in City projects.
- Policy 1.5. Set an example for citizens and property owners by managing City-owned properties in accordance with appropriate BMPs.

#### *Water Quantity*

**Goal 2. Protect downstream water resources, reduce the potential for flooding, and minimize related public capital and maintenance expenditure necessary to control excessive volumes and rates of runoff and to mitigate erosion**

- Policy 2.1. Manage floodplain activities in accordance with all City, state, and federal regulations.
- Policy 2.2. Require that stormwater ponds be designed to accommodate not less than a critical duration event with a 1-percent chance of occurrence in any given year (100-year return frequency storm).
- Policy 2.3. Require that new storm sewer systems be designed to accommodate a critical duration event of not less than a 10-percent chance of occurrence in any given year (10-year return frequency storm).
- Policy 2.4. Require that new or redeveloped structures adjacent to landlocked basins with no outlets be constructed with a lowest floor elevation at least 2 feet above the flood elevation of two consecutive (back-to-back) 1-percent chance (100-year) return frequency storm events.
- Policy 2.5. Require compensatory storage equal to the storage losses resulting from floodplain fill in the regulatory floodplain.

- Policy 2.6. Require that the minimum building elevation (lowest floor elevation) for all structures must be two feet above the established 100-year water level.
- Policy 2.7. Require that development and redevelopment projects demonstrate no net increase in the annual runoff water volume from the site compared to pre-development conditions.
- Policy 2.8. Require a Green Infrastructure Analysis to provide reduction of impervious surface area and disconnection of impervious surfaces during development review to reduce runoff and pollutant and nutrient loading to water resources.
- Policy 2.9. Provide information, educational opportunities and rebate programs for residents to provide guidance and opportunities for installation of infiltration BMPs such as rain gardens or shoreline restoration to reduce runoff from existing impervious surface.

*Wetland Protection*

**Goal 3. Protect and/or restore wetlands to improve or maintain their functions and values in accordance with the Minnesota Wetland Conservation Act and the City’s Wetland Protection ordinance.**

- Policy 3.1. Continue to act as the responsible Local Government Unit (LGU) for administration of the Minnesota Wetland Conservation Act (WCA) for project sites that have wetlands in the Lower Minnesota River and Riley-Purgatory-Bluff Creek Watershed Districts.
- Policy 3.2. Administer wetland protection and mitigation in accordance with the Minnesota Wetland Conservation Act, as amended, and the City’s Wetland Protection ordinance.
- Policy 3.3. Maintain and periodically update the wetland inventory data and the wetland management classifications provided in this plan as new information is collected.
- Policy 3.4. Continue to require the establishment and maintenance of buffers around wetlands as set forth in the City’s Wetland Protection ordinance and as outlined in Watershed District standards and rules.

*Groundwater Goals*

**Goal 4. Work to prevent contamination of the aquifers, promote groundwater recharge and encourage water conservation practices.**

- Policy 4.1. Continue implementation of the Wellhead Protection Plan.
- Policy 4.2. Cooperate with the Minnesota Department of Health (MDH), Hennepin County, the Department of Natural Resources, and other agencies to periodically assess the vulnerability of groundwater used for drinking water supplies.
- Policy 4.3. Require infiltration of stormwater and resulting groundwater recharge where it is feasible and does not pose a threat to groundwater quality, in accordance with the Minnesota Department of Health’s Evaluating Proposed Storm Water Infiltration Projects in Vulnerable Wellhead Protection Areas and the City’s NPDES MS4 Stormwater Permit requirements.
- Policy 4.4. Require proper well abandonment.
- Policy 4.5. Provide education activities, incentive programs and demonstration projects that promote water conservation to achieve an average residential usage of 75 gallons per capita per day or less.

### *Erosion and Sediment Management*

#### **Goal 5. Control or manage sediment discharge into surface water resources and drainage ways.**

- Policy 5.1. Require erosion and sediment control training for staff that are responsible for inspecting erosion control on City and Private construction projects.
- Policy 5.2. Require management of stormwater runoff and erosion or sedimentation for any land-disturbing project.
- Policy 5.3. Continue implementation of the City's Land Alteration, Tree Preservation and Stormwater Management Regulations and appropriate enforcement procedures and actions.
- Policy 5.4. Require the use of BMPs for erosion and sediment control as specified in the Minnesota Stormwater Manual (MPCA, 2005), as may be amended, and watershed district requirements.

### *Recreation, Fish, and Wildlife*

#### **Goal 6. Support water recreation activities and fish and wildlife habitat by implementation of programs to maintain or improve water quality.**

- Policy 6.1. Preserve vegetative buffers around wetlands and riparian areas to provide habitat for wildlife.
- Policy 6.2. Balance water recreational activities with water quality, habitat and Aquatic Invasive Species (AIS) issues.
- Policy 6.3. Explore new opportunities to integrate surface water based recreation activities and wildlife interests within wildlife corridors.
- Policy 6.4. Enhance recreational opportunities and access to the creek corridor.
- Policy 6.5. Maintain the natural beauty, accessibility and wildlife habitat for the creek corridors.
- Policy 6.6. Support programs for monitoring and managing exotic and invasive species.
- Policy 6.7. Manage the spread of AIS through programs such as watercraft inspection programs, harvesting, herbicide treatments of invasive species, and water quality and vegetation monitoring. The annual program will be coordinated with the Watershed Districts.
- Policy 6.8. Design and construct lake outlets to provide a barrier to upstream migration of rough fish, and evaluate and maintain existing barriers as needed in coordination with the Watershed Districts.

### *Education and Public Involvement*

#### **Goal 7. Increase public involvement and knowledge in management and protection of water resources.**

- Policy 7.1. Involve and educate the residents of the City in water resource related issues.
- Policy 7.2. Offer programs, educational opportunities and information that facilitate or provide a better understanding of water resource issues in the City, region, and state.
- Policy 7.3. Increase public involvement in management of water resources through volunteer opportunities such as Adopt-A-Street, CAMP, or WHEP.
- Policy 7.4. Conduct a public involvement process when considering public policies impacting water and natural resources.
- Policy 7.5. Maintain existing model interpretive sites for the public and seek opportunities for new model sites for water quality or native habitat establishment.
- Policy 7.6. Seek opportunities to educate and work with local businesses towards improving water quality.

## 5.2 RELATIONSHIP TO OTHER AGENCIES' GOALS AND POLICIES

The recommendations set forth in this Plan were developed to be consistent with local, regional, state, and federal rules, goals and policies including:

- ▲ Local Water Management Rules Chapter 8410
- ▲ Wetland Conservation Act and Minnesota Rules Chapter 8420
- ▲ Minnesota Pollution Control Agency Water Quality Standards Chapter 7050
- ▲ U.S. Army Corps of Engineers Section 404 Clean Water Act
- ▲ Riley Purgatory Bluff Creek Watershed District Water Management Plan
- ▲ Nine Mile Creek Watershed District Water Management Plan
- ▲ Lower Minnesota River Watershed District Water Management Plan
- ▲ Metropolitan Council Water Resources Management Policy Plan
- ▲ DNR's *Strategic Conservation Agenda 2009-2013*
- ▲ MPCA's 2013 Nonpoint Source Management Program Plan
- ▲ Minnesota River Basin Plan 2001
- ▲ Metropolitan Council's Regional Park Policy Plan

# 6.0 Implementation Plan

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## 6.1 IMPLEMENTATION PLAN PRIORITIZATION

A priority system was developed to reflect the City’s responsibility to protect the health, safety, and general welfare of the environment and its citizens by addressing problems and issues specific to the City. The following factors were considered during development of Implementation Plan.

- ▲ Corrective actions required.
- ▲ Steps needed to alleviate or prevent future water management problems.
- ▲ Educational programs currently provided by the City and where they need supplementation.
- ▲ Existing goals and policies as well as changes needed to reflect upcoming regulatory needs and requirements.
- ▲ Programs currently in place or required in the future to monitor and evaluate the effectiveness of the water management programs or policies enacted.
- ▲ Watershed District Use Attainability Analysis (UAA) results.
- ▲ Funding availability.
- ▲ Overall water management concerns within the City.
- ▲ Requirements of the NPDES Phase II permit
- ▲ Expected MIDS policies and implementation actions
- ▲ Completed, pending or expected TMDLs and implementation activities

## 6.2 PERMITTING AND ENFORCEMENT

Numerous local, state, and federal agencies regulate water resources. However, the primary regulators are the City of Eden Prairie; the three watershed districts within Eden Prairie; the Minnesota Department of Natural Resources; and the Minnesota Pollution Control Agency.

### 6.2.1 Current Ordinances

As listed in Section 2.1, Eden Prairie has enacted numerous policies and ordinances regulating and managing water resources. Ordinances require the dedication of easements to protect wetlands, ponds, buffers, native vegetation, etc. and allow for placement of a drainage and utility easement for when a private drainage facility is connected to a public drainage system. Developers are required to execute development agreements specifying parties responsible for ongoing maintenance of stormwater facilities. City Code requirements also provide the authority of the City to order work and assess the cost of maintenance if not satisfactorily provided by the responsible party.

The City currently manages and regulates the following activities:

- ▲ Floodplain regulation (Section 11.45), which establishes a Regulatory Flood Elevation two feet above the 1-percent (100-year) flood elevation and prohibits fill in the floodplain
- ▲ Shoreland Management standards (Section 11.50), which establish development requirements, regulate shoreline alterations and disturbances, identify steep slopes and bluff impact zones, and establish a permitting program.

- ▲ Standards for the Protection of Wetlands (Section 11.51), including setback and buffer strip requirements. Special permitting requirements are also established for land within the Lower Minnesota River and Riley-Purgatory-Bluff Creek Watershed Districts, for which Eden Prairie is LGU.
- ▲ Land Alteration, Tree Preservation, and Stormwater Management Regulations (Section 11.55) regulating the alteration of the landscape, trees, or vegetation; establishing standards to minimize impact and replacement requirements; and regulating construction site erosion and sediment control.
- ▲ Sloped Ground Development and Regulation (Section 11.60) standards prohibiting development on steep slopes that may increase erosion or jeopardize the natural character of the land.

### **6.2.2 NPDES Permit Implementation Requirements**

As required by its NPDES Phase II Stormwater Permit, the City is updating its Plan to meet new Storm Water Pollution Prevention Program (SWPPP) requirements. Annual activities are detailed in the City's Annual Report and reviewed at an annual public meeting prior to submittal of the annual report to the City Council and MPCA. More information about the SWPPP can be found in the Living Green section of the City's Website ([edenprairie.org/community/living-green](http://edenprairie.org/community/living-green)).

The water resources staff of the Engineering Division maintains databases and ArcGIS mapping of stormwater and wetland information. These sources summarize pertinent management information about constructed ponds, wetlands, and other water resources in the City. The information provided for the stormwater ponding systems includes physical condition, watershed acreages, basin sizes, and other as-built information where available. This information is being collected and updated on an ongoing basis as part of the NPDES Phase II permit requirements.

The State's General Permit was reissued effective August 1, 2013, and the City has been issued a reauthorized permit. The City's SWPPP application identified a number of BMPs that the City needs to initiate or update. The 2013 permit also required revisions to the City's ordinances regarding stormwater management, namely adopting more stringent standards to reduce phosphorus and total suspended sediment in stormwater runoff, and limiting stormwater runoff volume for sites that are greater than 1 acre in size, or sites that are less than one acre but are part of a larger common plan of development or sale. The new requirements are set forth in Table 6.1 and are discussed in Section 6.2.4 below.

### **6.2.3 Watershed District Requirements**

Wetland Conservation Act (WCA) administration will remain with the Nine Mile Creek Watershed District within its boundaries in Eden Prairie. The City will continue to administer WCA on lands within the Riley-Purgatory-Bluff Creek and Lower Minnesota River Watershed District boundaries in the City.

Land-alteration activities that meet certain thresholds within the Nine Mile Creek or Riley-Purgatory-Bluff Creek Watershed Districts must obtain a permit from the appropriate Watershed District and provide for stormwater management, sediment and erosion control, floodplain management and drainage alternations, buffers on water resources, wetlands protection, waterbody crossings and structures, shoreline and streambank improvements, sediment removal and/or appropriation of public surface water or groundwater in accordance with the appropriate and applicable District requirements. Applications within the Lower Minnesota River Watershed District must meet the Stormwater Management Standards provided in the LMRWD's Water Management Plan.

In the event that the City, in the future, elects to exercise sole regulatory authority over activities subject to one or more watershed district rules, the City will amend this LWMP plan to specify the regulatory subject(s) for which it intends to exercise authority. This plan amendment would provide for a process whereby City ordinances addressing the selected subjects would be amended on an ongoing basis to ensure protection of water resources consistent with the thresholds and standards set by the relevant watershed district, and to provide for a process for the City to obtain approval of the relevant watershed district for any proposed activity requiring a variance from an adopted ordinance pertaining to a regulatory subject covered by watershed district rule(s). The City will

submit this plan amendment to the relevant watershed districts for review and approval in accordance with Minnesota Statutes section 103B.235. If this plan amendment is adopted, the City would update its ordinances within one year of receiving notice from the watershed district that it has significantly revised its rules or regulatory standards.

Table 6.1 compares the current Eden Prairie ordinances to the NPDES stormwater permit requirements and the watershed districts' rules and standards.

**Table 6.1. Watershed district standards compared to current Eden Prairie ordinances.**

	<b>Current Eden Prairie Ordinance</b>	<b>NPDES Stormwater Permit Requirements</b>	<b>Nine Mile Creek WD</b>	<b>Riley- Purgatory–Bluff Creek WD</b>	<b>Lower Minnesota River WD</b>
Threshold: new development	Land disturbance of greater than or equal to one acre, including projects of less than one acre that are part of a larger common plan of development or sale.	Disturb >1 acre of land, or part of common development >1 acre	a. Land-disturbing activities that will disturb 50 cubic yards or more of earth; b. Land-disturbing activities that will disturb 5,000 square feet or more of surface area or vegetation; or c. Subdivision of a parcel into three or more residential lots.	a. Land-disturbing activities that will disturb 50 cubic yards or more of earth; b. Land-disturbing activities that will disturb 5,000 square feet or more of surface area or vegetation; or c. Subdivision of a parcel into three or more residential lots.	Disturb >1 acre of land
Threshold: redevelopment	Land disturbance of greater than or equal to one acre, including projects of less than one acre that are part of a larger common plan of development or sale.	Disturb >1 acre of land, or part of common development >1 acre	Same as above, except where redevelopment of more than 50% of site or that increases impervious by more than 50%, applies to entire site; less than 50% of site, applies only to disturbed area/new impervious	Same as above except: where redevelopment of more than 50% of site or that increases impervious by more than 50%, applies to entire site; less than 50% of site, applies only to disturbed area/new impervious	Disturb >1 acre of land
Threshold: grading and erosion control	Movement of more than 100 CY of earth; removal of more than 10% of Significant Trees; any destruction or disruption of vegetation covering an area equal to or greater than 10% of any Land.	Disturb >1 acre of land, or part of common development >1 acre	a. Land-disturbing activities that will disturb 50 cubic yards or more of earth, b. Land-disturbing activities that will disturb 5,000 square feet or more of surface area or vegetation	a. Land-disturbing activities that will disturb 50 cubic yards or more of earth, b. Land-disturbing activities that will disturb 5,000 square feet or more of surface area or vegetation	As required by the General Permit for Construction
Water quality	No net increase in TP or TSS annual load (new development); Decrease in TP and TSS annual load (redevelopment).	No net increase in TP or TSS annual load (new development); Decrease in TP and TSS annual load (redevelopment)	Treatment of 2.5" runoff to remove 60% TP and 90% TSS (can count volume mgmt. toward total)	Provide for at least 60% removal of TP and 90% removal of TSS from all runoff from impervious surface	Treatment as required by the General Permit for Construction; NURP pond designs apply
Rate control	Must evaluate capacity to attenuate flows as part of SWPPP and incorporate if capable via a NURP pond	No specific requirement	No increase over 2-, 10-, and 100-year rates	No increase over 2-, 10-, and 100-year rates	No increase over 1-or 2-, 10-, or 100-year rates

	<b>Current Eden Prairie Ordinance</b>	<b>NPDES Stormwater Permit Requirements</b>	<b>Nine Mile Creek WD</b>	<b>Riley- Purgatory–Bluff Creek WD</b>	<b>Lower Minnesota River WD</b>
Infiltration	1" runoff from new impervious surface	No net increase in annual runoff volume (new development); Decrease in annual runoff volume (redevelopment) to the Maximum Extent Practicable	1" runoff from all impervious surface of the parcel	1.1" abstraction from all impervious surface	0.5" runoff from new impervious surface
Wetland buffer	<p>a. Average 60 feet from edge of exceptional value wetlands, minimum 40 feet;</p> <p>b. Average 60 feet from edge of high value wetlands, minimum 30 feet;</p> <p>c. Average 40 feet from edge of moderate value wetlands, minimum 20 feet;</p> <p>d. Average 20 feet from edge of low value wetlands, minimum 10 feet</p> <p>A structure setback of 15 to 25 feet is also required, depending on the value classification.</p>	No specific requirement	<p>a. Average 60 feet from the edge of high value wetlands, minimum 30 feet;</p> <p>b. Average 40 feet from the edge of medium value wetlands, minimum 20 feet;</p> <p>c. Average 20 feet from the edge of low value wetlands, minimum 10 feet.</p>	<p>a. 20 to 80 feet from wetlands, depending on mgmt. class;</p> <p>b. 50 feet from a water basin;</p> <p>c. 50 feet from the centerline of a public waters watercourse;</p> <p>d. 30 feet from any watercourse within the defined High Risk Erosion Area</p>	<p>a. &lt;2 acres, 25' minimum;</p> <p>b. &gt;2 acres, 25' minimum, average 50'</p>
Linear projects	Disturb >1 acre of land; may be excepted from some or all infiltration requirement if lack sufficient right of way	Disturb >1 acre of land; may be excepted from some or all infiltration requirement if lack sufficient right of way	Projects creating >1 acre new impervious surface	If project creates more than 5,000 square feet of new or additional impervious surface.	No specific requirement

	<b>Current Eden Prairie Ordinance</b>	<b>NPDES Stormwater Permit Requirements</b>	<b>Nine Mile Creek WD</b>	<b>Riley- Purgatory–Bluff Creek WD</b>	<b>Lower Minnesota River WD</b>
Variances	Variances procedures are defined in City Code Section 11.76 Subd. 1 and shall only be granted when the applicant establishes that there are practical difficulties in complying with city code, the variances are in harmony with purposes of code and are consistent with Comprehensive plan. Economic considerations alone do not constitute practical difficulties.	N/A	May approve variance or exception if the variance will not materially adversely affect water resources, flood levels, drainage or the general welfare, or if an applicant demonstrates that better natural resource protection or enhancement can be achieved by the project as proposed than would strict compliance with the provision.	Defines a procedure to evaluate variances and exceptions, and generally may approve if the variance will not materially adversely affect water resources, flood levels, drainage or the general welfare, or if an applicant demonstrates that better natural resource protection or enhancement can be achieved by the project as proposed than would strict compliance with the provision.	No Variance Procedure provided
Other	N/A	N/A	N/A	At least six inches of topsoil or organic matter must be spread and incorporated into the underlying soil wherever topsoil has been removed.	N/A
Other	N/A	N/A	N/A	Soil surfaces disturbed or compacted during construction must be decompacted through soil amendment and/or ripping to a depth of 18 inches (8 inches for single family homes)	N/A

#### 6.2.4 Ordinance Revisions

The City will adopt ordinance revisions as needed to meet and/or balance NPDES and Watershed District requirements. This would include modifications such as the following:

- ▲ Update definitions and references where needed subject to the City’s MS4 Permit requirements.
- ▲ Revise the Shoreland Management requirements to provide consistency with Watershed District Rules and Standards.
- ▲ Revise the Standards for the Protection of Wetlands to provide consistency with Watershed District Rules and Standards.

The City will begin review of the City Code Sections 11.50, 11.51 and 11.55 starting in 2016 to update these sections to provide consistency with the appropriate watershed district rules and standards.

### 6.3 IMPLEMENTATION PROGRAMS AND PROJECTS

#### 6.3.1 Education and Outreach

The City recognizes that a critical element in reaching the long-term goals developed for this LWMP is public education on the goals and policies established in this Plan. The City uses various media outlets such as local news articles, City newsletters (Life in the Prairie and Living Green), Facebook, and the City of Eden Prairie Living Green website ([edenprairie.org/community/living-green](http://edenprairie.org/community/living-green)) to educate citizens on water quality and water conservation programs. This could include updates on current actions the City is taking to monitor or improve stormwater systems, information about opportunities to improve water quality through workshops or forums, volunteer opportunities, or rebates. City events and festivals provide additional opportunities for education. High priority topics are periodically identified for emphasis, and may include topics such as:

- |                                       |   |
|---------------------------------------|---|
| ▲ Water resource management           | ▲ Wildlife habitat                              |
| ▲ Groundwater protection              | ▲ Litter control                                |
| ▲ Wetlands                            | ▲ Pet waste control                             |
| ▲ Native plant establishment          | ▲ Leaf and grass clipping management            |
| ▲ Wetland, lake and pond buffers      | ▲ Lawn chemical and phosphorus fertilizer usage |
| ▲ Aquatic invasive species management | ▲ Ice control / winter chemical usage           |

The City has developed an Environmental Learning Center, located at the Water Treatment Plant, to educate students on water quality and conservation, sustainability, waste reduction, and environmental stewardship. The ELC is an interactive activity center and laboratory for use by local school groups that focuses on water conservation and stormwater pollution prevention education. Tours of the City’s water treatment plant are often incorporated into the educational experience.

Adults and youth can also participate in outreach activities such as:

- ▲ Storm drain labelling
- ▲ Wetland Health Evaluation Program (WHEP)
- ▲ Park cleanup events
- ▲ Citizen Assisted Lake Monitoring program (CAMP)
- ▲ Adopt-A-Street / Adopt-a-Storm Drain programs.

The City Council relies on a citizen Conservation Commission to provide input and advice on topics such as stormwater, water quality, water conservation, environmental education, recycling and solid waste management. The City recognizes the value of coordination and collaboration with other agencies, and will continue these relationships and will utilize collaborative resources such as WaterShed Partners, Let’s Keep it Clean, and the Minnesota Stormwater Coalition to maximize resources and message impacts.

Education programming includes training for City staff on various water resources management topics. The Local Water Management Plan budget in Appendix C includes a budget for Water Resources and Stormwater Pollution Prevention Education.

### **6.3.2 Maintenance and Operations**

The City periodically updates and revises its Stormwater Inventory Inspection and Maintenance Plan. This Plan includes both activities necessary to meet NPDES Phase II permit obligations as well as general operations and maintenance activities. These include:

- ▲ Stormwater pond inspections.
- ▲ Street and parking lot sweeping.
- ▲ Catch basin inspection, cleaning, and repair.
- ▲ Sump catch basin inspection, cleaning, and repair.
- ▲ Sediment removal as needed.
- ▲ Televising, jetting, and repair of storm sewers and culverts.
- ▲ Treatment effectiveness evaluation.
- ▲ Illicit discharge detection and elimination.

Eden Prairie also maintains up to date GIS shapefiles containing information about water bodies, stormwater facilities, and stormwater infrastructure. The City is developing a program to link maintenance records with GIS records to create a dynamic information system.

### **6.3.3 Capital Projects**

The budget in Appendix C details a Capital Improvement Program (CIP). The Use Attainability Analyses (UAAs) completed by the Nine Mile Creek and Riley-Purgatory-Bluff Creek Watershed Districts and Total Maximum Daily Load (TMDL) studies have identified potential actions that could help protect and improve the water quality in and enjoyment of studied waterbodies. The Watershed Basin Inventory and Maintenance Assessment reports, the Town Center Stormwater Management Guide, annual stormwater pond inventories and the water quality modeling completed by the City have identified a number of pond maintenance and other projects that the City could use to help restore or enhance the effectiveness of the stormwater system, lakes and creek. Funding for priority projects has been included in the CIP.

The CIP also includes projects to install water quality Best Management Practices (BMPs) as part of routine street or other construction projects. These projects are intended to maximize the amount of nutrient and sediment removal of stormwater prior to being discharged into the lakes, streams, and wetlands in the community.

Finally, the CIP includes capital projects to reduce lake internal loading, such as alum treatments, rough fish management, and invasive aquatic vegetation management. Stream inventories have been updated and were used to prioritize streambank stabilization and restoration projects for the Implementation Plan.

This CIP is regularly reviewed and updated, and projects are added or re-prioritized as more or better information is available or as new problems or opportunities arise.

## **6.4 ADDRESSING IDENTIFIED PROBLEMS AND ISSUES**

**As noted earlier in Table 4.2 of this Plan, the planning process revealed a number of problems and issues.**

Table 6.2 repeats those by category, and describes how each was addressed in this Plan.

**Table 6.2. Implementation actions addressing identified problems and issues.**

Category	Identified Problems and Issues	Identified Solutions
Water Quality Conditions	Lakes and streams in the City are listed on the Clean Water Act Section 303(d) TMDL List of Impaired Waters.	The CIP includes, and periodically will be updated to include, pollutant load and runoff volume reduction projects to address listed impairments and NPDES permit requirements.
	Ongoing stormwater system maintenance needed to protect and improve surface waters, ensure system integrity, and fulfill NPDES permit obligations.	Stormwater system maintenance needs are identified and managed through practices such as annual stormwater inspections, facility inspections, street sweeping, manhole cleaning, and capital projects such as targeted pond cleanouts, road maintenance, and facility improvements.
Regulatory Requirements and Operational Policies	Limited budget available to implement NPDES Phase II Permit requirements requires prioritization of resources.	The budget in Appendix C prioritizes operating programs and projects to address both regulatory and operational needs and water resource improvements based on current information.
	Atlas 14 updated precipitation frequency data is available for review, incorporation into the City’s review procedures and adoption.	The City and watershed districts (except LMRWD) require stormwater modeling work to use Atlas 14 precipitation depths and nested distributions.
	Approaches such as Minimal Impact Development and Integrated Management Practices are available to reduce the cost of controlling runoff and protecting and improving water quality.	The City will continue to work with developers to incorporate these standards into new development and redevelopment projects through the Green Infrastructure Analysis requirement in City Code.
	The City’s 2013 NPDES permit and SWPPP Update mandate required ordinance revisions and operating program enhancements.	City Code was revised to incorporate volume management and water quality requirements for sites larger than one acre in accordance with the City’s MS4 permit requirements.
	City goals, policies and ordinances to help protect natural resources may need review and refinement for consistency with NPDES and Riley-Purgatory-Bluff Creek, Nine Mile Creek and Lower Minnesota WD requirements.	The City currently has ordinances in place protecting steep slopes, shorelands, wetlands, and tree canopy. The City will incorporate comments made by the Watershed Districts regarding city code sections for wetland, stormwater and shoreland management starting in March 2016 to be in conformance with the District’s Watershed Plans.
Water-Based Recreation Needs	Water quality should be protected or improved to protect or manage recreational opportunities while maintaining water quality goals.	This Plan includes a number of capital projects and maintenance programs intended to improve water quality to better support fishing, swimming and boating.
	As water quality and clarity improves, aquatic vegetation management is necessary to reduce invasive species, encourage beneficial vegetation and allow recreational usage.	The City will continue to work with the DNR, Hennepin County and the local watershed districts to undertake actions such as the use of alum, harvesting or herbicides to control invasive vegetation and encourage beneficial vegetation and native habitat.

Category	Identified Problems and Issues	Identified Solutions
	Control of aquatic invasive species (AIS) is of growing concern.	The City will continue to work with the DNR, Three Rivers Park District, Metropolitan Council, Hennepin County and the watershed districts to undertake actions such as watercraft inspections, biocontrol, fish restocking, or other similar activities.
Maintenance Requirements	Pond maintenance and repair requirements have been and will continue to be identified during the basin inventory and assessments, including items such as creation or restoration of storage capacity, repair of erosion issues, and addition of alternative stormwater treatment techniques.	The City will continue to systematically inventory and assess the condition of public stormwater infrastructure, such as infiltration basins, stormwater wetlands and constructed stormwater ponds. The CIP includes and will periodically be updated to include projects identified in the stormwater inventory and inspections.
	Street sweeping, sump manhole cleaning, and regular stormwater inspections are necessary on an ongoing basis to help reduce nonpoint source pollutant loads.	The maintenance program includes provisions for regular and special street sweeping; inspection and maintenance of sump manholes and catch basins; basin inspections and repairs; illicit discharge detection; and erosion control.
Education and Outreach	Education and outreach efforts could be expanded and new educational opportunities added for targeted groups as needs are identified.	Education and outreach efforts will be continued for programs such as the Environmental Learning Center; written and electronic communications through the City website, newsletters and social media; opportunities for participation by citizen volunteers such as the Wetland Health Evaluation Program (WHEP) and the Citizen Assisted Monitoring Program (CAMP) for lakes; and annual workshops or participation in local events.
Financial Resources	Financial resources are limited, requiring that projects be prioritized.	The budget in Appendix C prioritizes operating programs and projects to address both regulatory and operational needs and water resource improvements. The City will continue to leverage available funding by collaborating with partners and seeking grant funding. The rate schedule will be evaluated and adjusted periodically, taking into consideration both project needs and budget requirements.
Groundwater Protection	The LWMP and SWPP should be coordinated with the Wellhead Protection Program so that policies that encourage infiltration and groundwater recharge are consistent with the policies to protect groundwater recharge areas	Infiltration requirements are to be integrated with Wellhead Protection requirements to protect groundwater quality.
Collaboration Opportunities	There are opportunities for collaboration with other agencies such as the watershed districts, Hennepin County, the Three Rivers Regional Park District, and state agencies to leverage expertise and resources to finance and construct improvements.	The City will continue to collaborate with the watershed districts and other relevant agencies to identify and complete capital projects.

## 7.0 Funding Considerations

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The City will fund the Implementation Program (IP) through a combination of funding sources. The primary source of funds will be Stormwater Utility Fees. The types of activities included in the IP can be categorized as operations and maintenance; programs and special studies; and capital projects. Operations and maintenance and most of the proposed programs and special studies would be funded by the Stormwater Utility, the General Fund, or the Water Surcharge Fund. For capital projects, other sources of funding may be available to supplement Stormwater Utility Funds, such as: matching funds from the watershed districts, contributions from other agencies for cooperative projects, or grant funds.

### 7.1 STORMWATER UTILITY FEES

The City's Stormwater Utility revenue is generated by fees according to land use (Table 7.1). In 2015 this fee rose to a total of about \$1.86 million. The stormwater utility fee will be the primary funding source for the Implementation Plan. The budget in Appendix C shows the estimated expenditures and revenues from this source, based on preliminary discussions of potential rate increases through 2020.

**Table 7.1. Eden Prairie Stormwater Utility rates for 2016.**

Land Use	Quarterly Rate
	2016
Single family (per lot)	\$10.20
Multi-Family (per acre)	\$101.25
Industrial (per acre)	\$101.25
Commercial/Office (per acre)	\$129.30
Institutions (per acre)	\$114.75
Parks/Open Space/Golf (per acre)	\$14.10
Undeveloped Lands (each)	\$33.75
Airport/Landfill (per acre)	\$25.20

### 7.2 WATERSHED DISTRICT FUNDING

Some projects are eligible for cost share by the watershed districts. Each district has in place cost-sharing policies and a procedure to determine the watershed-wide benefit of improvements petitioned for by the cities. Some of the projects proposed for construction have been approved by the watershed district for funding consideration. Projects and programs in the IP in subsequent years must be brought forward by the City to the watershed district for individual consideration.

### 7.3 OTHER FUNDING SOURCES

A number of grant opportunities are available that might supplement City funding which should be evaluated as projects are scheduled. The City has obtained Clean Water Fund grants from the Legacy Amendment, and that will continue to be a source of potential funding. The Department of Natural Resources maintains a number of relevant grant programs. Most of these grants require a 25-50 percent match. The MPCA also administers several grant and loan programs, although these are targeted to water resource studies and TMDL studies. The availability of funds will be evaluated as project needs arise.

## 8.0 Plan Updates

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The Eden Prairie Local Water Management Plan extends from 2016 to 2025. However, this document is intended to be a planning tool that will adapt to changing needs and requirements in management practices and financial resources. For example, the Implementation Plan will be reviewed and updated as needed and the financial analysis will be reviewed annually and updated as the City's annual CIP and project needs are evaluated and completed.

### 8.1 WATERSHED DISTRICT PLAN AMENDMENTS

Section 6.2.3 sets forth a process to amend this Plan in the event that the City, in the future, elects to exercise sole regulatory authority over activities subject to one or more watershed district rules. In all other cases, revisions to this Plan required by Watershed District Plan Amendments will be addressed in accordance with Minn. Stat. 103B.235 and Minn. Rules 8410.0160 Subp.6.

### 8.2 PUBLIC REQUESTS

Any person either residing in or operating a business within the City may request an update to the LWMP. Requests must be submitted in writing to the City Manager. The request shall outline the need for the revision as well as any materials the City may need to consider before making its decision. City staff shall review the request and determine whether the request is warranted. Staff shall consider the following options:

- ▲ Reject the request as unwarranted.
- ▲ Accept the request as a routine issue. Routine issues will be addressed individually as a routine update under Section 8.1.2.
- ▲ Accept the request as a major issue. The request and the need for a public hearing will be evaluated by City staff and scheduled with the City Council and Watershed Districts for review and consideration. Examples of the types of requests that may require a public hearing and update to the Local Water Management Plan include:
  - Adoption of more stringent official controls,
  - Proposals to discontinue programs, or
  - Actions that would change the Goals of the LWMP.

After review and/or public hearing before the City Council, the request will be approved or denied. If a Plan Update is required as a result the request will be referred to the appropriate watershed district or other agency for comment and approval and a process to update the LWMP will be initiated. Major issues would only become effective upon completion of the Watershed District, Metropolitan Council and City Council review and approval process.

### 8.3 ROUTINE UPDATES

City staff will review development changes, budget amendment requirements, capital improvement projects, water management-related issues, and NPDES regulatory changes on an annual basis. Routine updates include wetland review results, budget changes, changes in education and outreach programming, basin repair issues, stormwater pond creation or expansions, and databases updates.

## 9.0 Planning Process

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The City initiated work on this Plan update in 2012. A kick-off meeting with the Watershed Districts was held on December 12, 2012. At this meeting the District representatives described their requirements for the Plan and what they would like to see the City focus on in the coming ten years.

The City's Conservation Commission acted as the Citizen's Advisory Committee for this Plan update. An initial discussion was held with the Conservation Commission on March 12, 2013. That discussion included an overview of the requirements for Local Plans, and introduction to the problems and issues the Plan would address. The City's current ordinances related to water resources management were compared to the requirements of the watershed districts and to the reauthorized State of Minnesota General Stormwater Permit and Construction Permit at the Commission's October 8, 2013 meeting. It was noted that revisions were necessary to the City's code of ordinances to bring them in to conformance with the General Stormwater Permit requirements.

The proposed Goals and Policies were reviewed by the Conservation Commission at its November 12, 2013 meeting. On May 12, 2015 the Commission discussed the implementation plan components and was provided an overview of the ordinance revisions that were proposed to meet new requirements for stormwater management.

City staff provided a status update at a City Council workshop on February 17, 2015. This update included a summary of the Local Water Management Plan update as well as the new stormwater permit requirements. The Planning Commission also received this update at its March 9, 2015 meeting.

A public hearing for the draft LWMP was held on June 16, 2015. Public comments were received between June 11 and June 26, 2015. Comments were incorporated into the Draft LWMP prior to submittal to the watershed districts and Metropolitan Council for review. The Review Draft was distributed on July 17, 2015 with a comment period through September 21, 2015. A request for an extension of the comment period was received and the comment period was extended through November 2, 2015.

A City Council workshop was held on November 17, 2015 to review the comments and to provide staff with direction on completing the LWMP. Comments received from the watershed districts were incorporated into the LWMP. A summary of the comments received and the responses provided are in Appendix E.

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- Balaban, N.H. 1989. Geologic Atlas: Hennepin County, Minnesota. University of Minnesota, County Atlas Series, Atlas C-4.
- Barr. 2007. Lake Riley Outlet Improvements and Riley Creek Lower Valley Stabilization Feasibility Study.
- Blue Water Science. 2011. Lake Monitoring Results for Birch Island, Neill, Red Rock, and Smetana Eden Prairie, Minnesota, 2010.
- Blue Water Science. 2011b. Lake Monitoring Results for Neill Lake, Eden Prairie, Minnesota, 2010
- Blue Water Science. 2011c. Water Quality and Aquatic Plant Surveys for Smetana Lake, Eden Prairie, Minnesota, 2010.
- Blue Water Science. 2012. Lake and Pond Monitoring Results for Eden Prairie, Minnesota, 2011.
- Blue Water Science. 2012b. Water Quality and Aquatic Plant Surveys for Neill Lake, Eden Prairie, Minnesota, 2011.
- Blue Water Science. 2012c. Water Quality and Aquatic Plant Surveys for Smetana Lake, Eden Prairie, Minnesota, 2011.
- Blue Water Science. 2013. Lake and Pond Monitoring Results for Eden Prairie, Minnesota, 2012.
- Lower Minnesota River Watershed District. 2011. Third Generation Watershed Management Plan. [www.watersheddistrict.org/plan.html](http://www.watersheddistrict.org/plan.html)
- Minnesota Department of Natural Resources. 2014. Lakefinder. [www.dnr.state.mn.us/lakefind/index.html](http://www.dnr.state.mn.us/lakefind/index.html)
- Minnesota Pollution Control Agency. Environmental Data Access. 2014. Surface Water Data. [www.pca.state.mn.us/index.php/data/surface-water.html](http://www.pca.state.mn.us/index.php/data/surface-water.html)
- Minnesota State Climatology Office. 2014. Historical Climate Data Retrieval. [climate.umn.edu/doc/historical.htm](http://climate.umn.edu/doc/historical.htm)
- Minnesota Stormwater Manual. 2005. [www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/stormwater-management/minnesotas-stormwater-manual.html](http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/stormwater-management/minnesotas-stormwater-manual.html)
- Nine Mile Creek Watershed District. 2009. Watershed Management Plan. [www.ninemilecreek.org/Reports/wmp.asp](http://www.ninemilecreek.org/Reports/wmp.asp)
- NOAA National Climatic Data Center. 2014. 1981-2010 Normals Data Access. [www.ncdc.noaa.gov/land-based-station-data/climate-normals/1981-2010-normals-data](http://www.ncdc.noaa.gov/land-based-station-data/climate-normals/1981-2010-normals-data)
- Peterson Environmental Consulting. 1999. City of Eden Prairie Comprehensive Wetland Protection and Management Plan.
- Riley Purgatory Bluff Creek Watershed District. 2011. Water Management Plan. [www.rpbcwd.org/resources/wmp/](http://www.rpbcwd.org/resources/wmp/)
- Riley-Purgatory-Bluff Creek Watershed District. 2014. Lakes and Creeks 2014 Annual Report.
- USDA NRCS. 2014. Soil Survey Geographic (SSURGO) Data Base. [www.lib.ncsu.edu/gis/nrcs.html](http://www.lib.ncsu.edu/gis/nrcs.html)
- Wenck Associates. 2013. Staring Lake Watershed Basin Inventory and Maintenance Assessment.
- Wenck Associates. 2013. Eden and Neill Lakes Watershed Basin Inventory and Maintenance Assessment.
- Wenck Associates. 2014. Duck and Red Rock Lake Watersheds Basin Inventory and Maintenance Assessment.
- Wenck Associates. 2014. Eden Prairie Town Center Stormwater Management Guide.
- Wenck Associates. 2014. 2014 Riley Creek Erosion Monitoring Technical Memorandum.

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## **Appendix A**

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HydroCAD Modelling Results  
This technical document is available separately

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## **Appendix B**

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### Lakes Information

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# Eden Prairie Lake Data

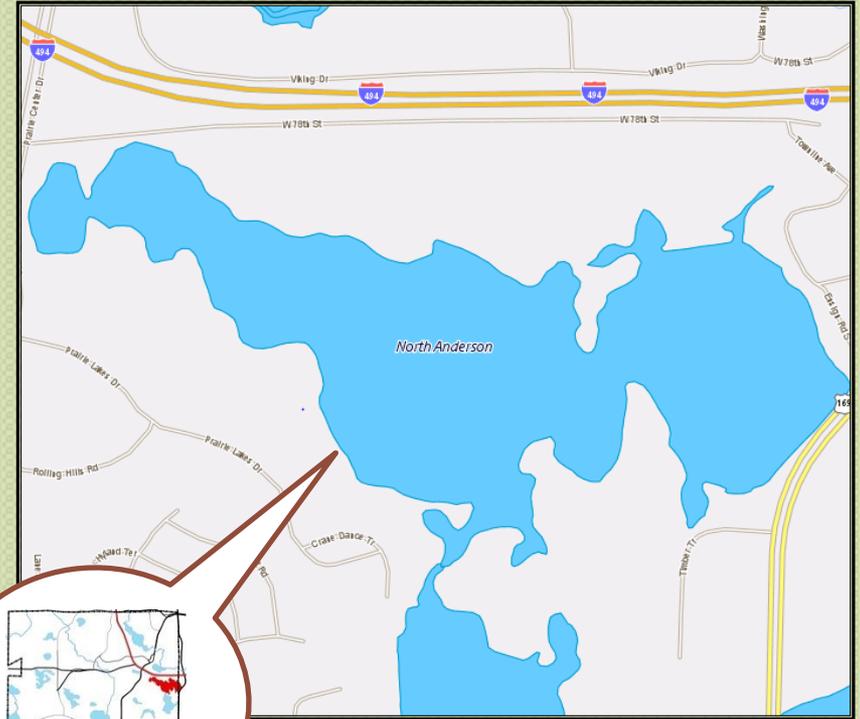
	Anderson Lake - Northwest	Anderson Lake - Southwest	Birch Island Lake	Bryant Lake	Duck Lake	Grass Lake	Lake Eden	Lake Idlewild	McCoy Lake	Mitchell Lake	Neill Lake	Red Rock Lake	Rice Lake	Rice Marsh Lake	Riley Lake	Round Lake	Smetana Lake	Staring Lake
<b>General Lake Information</b>																		
City Water Body ID #	13-42-A	13-31-A	04-13-B	02-23-A	05-34-A	33-11-A	23-21-B	14-21-A	21-14-A	17-22-A	23-41-A	16-33-A	31-11-A	18-32-B	19-32-A	08-31-A	12-34-A	22-32-A
DNR ID #	27-0062-01 P	27-0062-03 P	27-0081 P	27-0067 P	27-0069 P	27-0080 P	27-1011 W	27-0074 P	27-0077 P	27-0070 P	27-0079 P	27-0076 P	27-0132 P	10-0001 P	10-0002 P	27-0071 P	27-0073 P	27-0078 P
Watershed District	Nine Mile Creek	Nine Mile Creek	Nine Mile Creek	Nine Mile Creek	Riley - Purgatory - Bluff Creek	Lower Minnesota River	Riley - Purgatory - Bluff Creek	Lower Minnesota River	Riley - Purgatory - Bluff Creek	Riley - Purgatory - Bluff Creek	Riley - Purgatory - Bluff Creek	Nine Mile Creek	Riley - Purgatory - Bluff Creek					
Ordinary High Water Level (feet)		839		852.6	915.3	697.1		856	824.5	871.5		840.5	699.2	877	865.3	880.8	835.2	815.3
Drainage basin area	452	278	543	1991	211			703		301		462		853	1763	444	929	615
Lake Area (acres) (open water)	138	80	43	177	41	467	17	15	10	112	34	97	517	81	286	32	51	164
Drainage Basin to Lake Area Ratio	3	3	13	11	5			47		3		5		11	6	14	18	4
Maximum Depth (feet)	10	9	14	45	10	3.5		9		16	10	16	3	10	49	37	12	14
Littoral Area (acres)	138	80	43	64	41	467		15		109	34	91	517	81	110	23	51	146
<b>DNR Fish Management Information</b>																		
Primary	BLG	BLG	NOP	NOP, Carp	NOP, Carp			BLB		WHS, BLB, BLG		BLG, BLB		NOP (spawning)	NOP	NOP	NOP	NOP, Carp
Secondary		LMB	BLG	BLG, BLC	BLB			BLG				LMB		-	BLG, Carp	BLG, Carp	BLG	BLB
Winter Kill Status (Yes / No)	Yes	Yes	Yes	No	Yes			No		No		No		Yes	No	No	Yes	Yes
DNR Shoreland Classification	Natural Environment	Natural Environment	Recreational Development	Recreational Development	Recreational Development	Natural Environment	Unspecified	Unspecified	Unspecified	Natural Environment	Unspecified	Recreational Development	Natural Environment	Natural Environment	Recreational Development	Recreational Development	Natural Environment	Recreational Development
DNR Fish Management Classification	Unspecified	Unspecified	30	24	40	Unspecified	Unspecified	Unspecified	Unspecified	42	Unspecified	42	Unspecified	42	24	30	40	43
<b>Fishery Information</b>																		
Public Access Information	None	None	Canoe	Ramp (Henn Parks)	Carry On	None	None	None	None	Ramp	None	Ramp	None	None	Ramp	Ramp	Ramp	DNR Ramp
Northern Pike (NOP)			Yes	Yes				No				Yes			Yes	No	Yes	Yes
Sunfish (SUN, GSF, GRS, BLG)	BLG	BLG	SUN	BLG, GRS	BLG			BLG, GRS, GSF		GRS, BLG, GSF		BLG, GRS			GRS, BLG, GSF	BLG, GSF, GRS	BLG	BLG, GRS, GSF
Bass (SMB, LMB)				LMB	LMB			LMB		LMB		LMB			LMB	LMB	LMB	LMB
White Crappie (WHC)								No		Yes						No		
Black Crappie (BLC)				Yes	Yes			Yes		Yes		Yes			Yes	Yes	Yes	Yes
Yellow Perch (YEP)				Yes				No				Yes			Yes	Yes	Yes	Yes
Walleye (WAE)								No		Yes					Yes	Yes		
Other Species Identified (See Key)		BLB	BLB	Carp, TME				BLC, BLB, BRB, WHS		BLB		BLB, WHS			BLB, WHS	TME, BLB	YEP	YEP, WHS, BLB, BRB, Carp
Public Park Access Information	County	County	City	County	None	None	City	None	City	City	City trail	City Conservation Area	USFWS	City	City	City	City	City
<b>Water Quality Information</b>																		
Years Water Quality Data 2003-2013	6	6	3	7	3	None	1	None	None	8	2	4 + 4 SD Only	None	4	9	4	3	6
Trophic State Index (TSI chl)	60	71	47	60	58		73			64	62	67		58	62	60	48	71
Secchi Depth (meters / feet)	1.6 / 5.2	0.9 / 2.9	1.4 / 4.6	2.2 / 7.2	1.8 / 5.9		0.6 / 2.0			1.3 / 4.3	1.1 / 3.7	1.5 / 4.9		1.7 / 5.6	1.6 / 5.2	1.7 / 5.6	1.5 / 4.9	0.5 / 1.6
Average Summer Phosphorus (ppb)	45	102	41	39	56		185			68	100	73		108	38	46	99	105
Average Summer Chlorophyll (ppb)	21	60	6	20	16		74			30	24	42		16	24	20	6	61
Abundant Aquatic Plants (Yes / No)	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exotic Aquatic plants (Yes / No)	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

BLC - Black Crappie WHC - White Crappie SUN - Sunfish species BLG - Blue Gill GSF - Pumpkinseed Sunfish LMB - Largemouth Bass SMB - Smallmouth Bass NOP - Northern Pike WAE - Walleye BLB - Black Bullhead BRB - Brown Bullhead TME - Tiger Muskellunge YEP - Yellow Perch WHS - White Sucker

# Anderson Lake North

## LAKE DATA

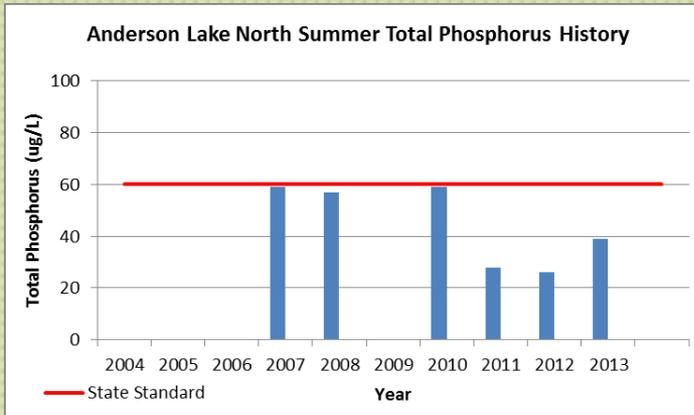
Eden Prairie Basin I.D. #	13-42-A
DNR I.D. #	27-0062-01
DNR Classification	Natural Environment
Lake Area (acres)	138
Littoral Area (acres)	138
Tributary Area (acres)	452
Maximum Depth (feet)	10
Depth Class	Shallow
Recreation	Aesthetics
Fishery	Bluegill
Public Access	None – boating, fishing, swimming, snowmobiling, etc. prohibited



DNR Recreation Compass

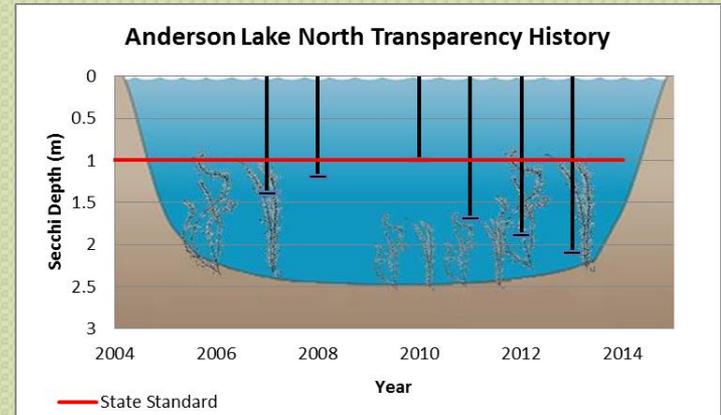
*Anderson Lake is protected by City Ordinance as a nature preserve*

Anderson Lake North Summer Total Phosphorus History

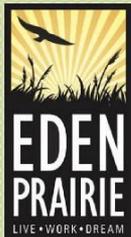


State water quality standard for Total Phosphorus (TP) is  $\leq 60 \mu\text{g/L}$  (ppb)

Anderson Lake North Transparency History



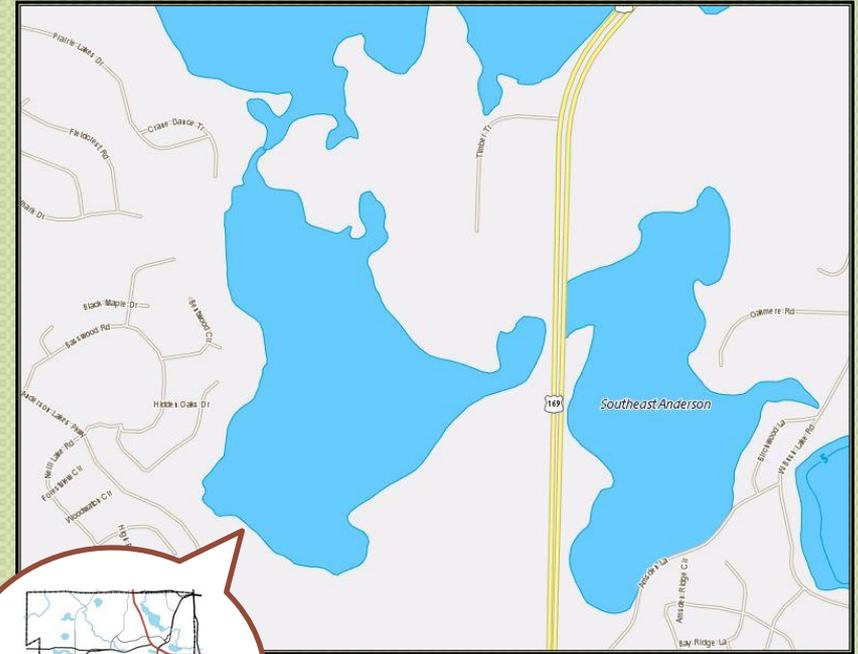
State water quality standard for clarity (Secchi Depth, SD) is  $\geq 1.0$  meter



# Anderson Lake Southwest

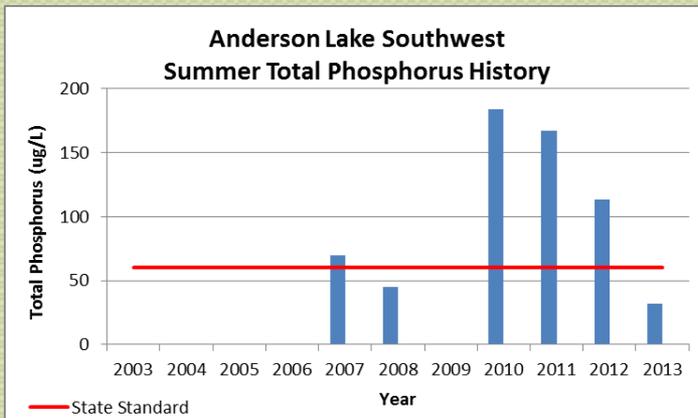
## LAKE DATA

Eden Prairie Basin I.D. #	13-31-A
DNR I.D. #	27-0062-01
DNR Classification	Natural Environment
Lake Area (acres)	80
Littoral Area (acres)	80
Tributary Area (acres)	278
Maximum Depth (feet)	9
Depth Class	Shallow
Recreation	Aesthetics
Fishery	Bluegill
Public Access	None – boating, fishing, swimming, snowmobiling, etc. prohibited

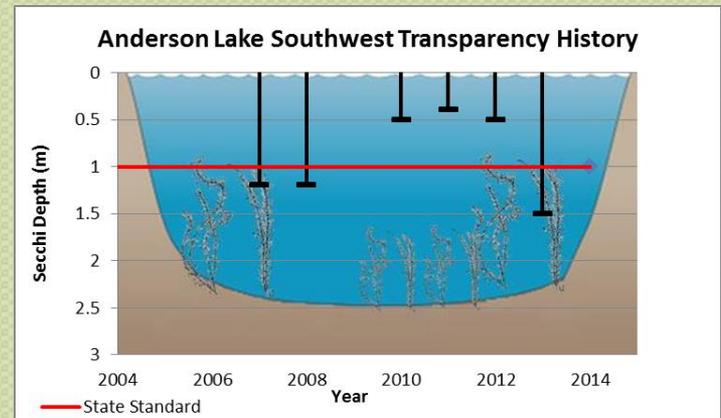


DNR Recreation Compass

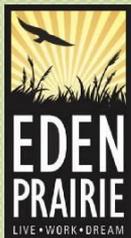
*Anderson Lake is protected by City Ordinance as a nature preserve*



State water quality standard for Total Phosphorus (TP) is  $\leq 60 \mu\text{g/L}$  (ppb)



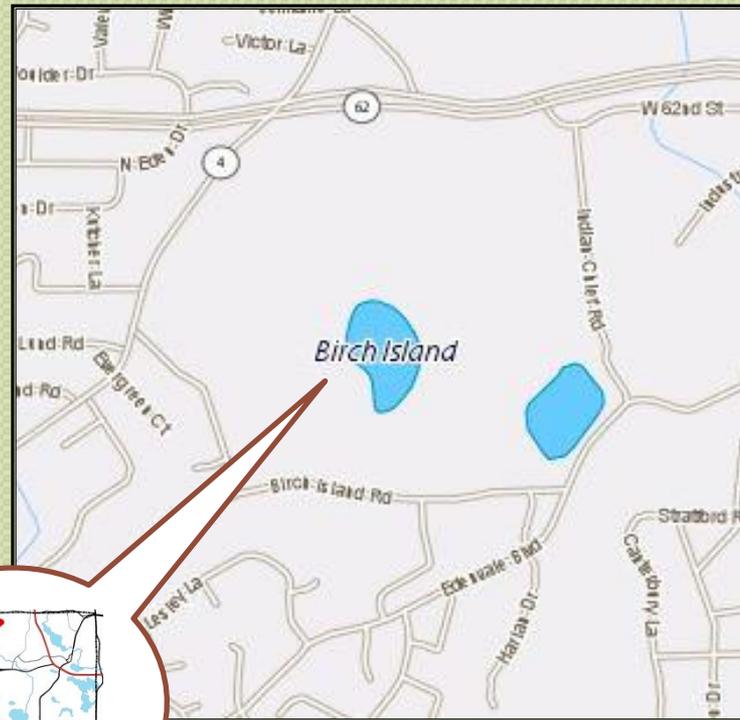
State water quality standard for clarity (Secchi Depth, SD) is  $\geq 1.0$  meter



# Birch Island Lake

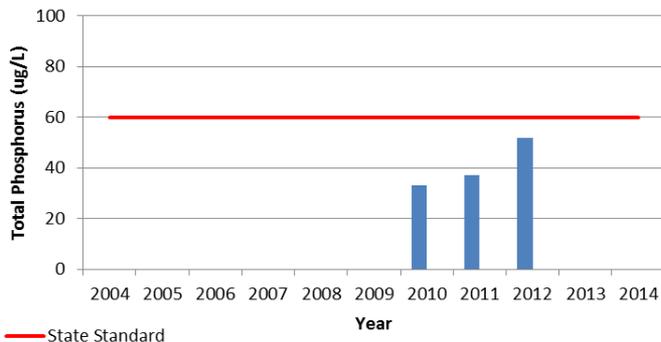
## LAKE DATA

Eden Prairie Basin I.D. #	04-13-B
DNR I.D. #	27-0081
DNR Classification	Recreational Development
Lake Area (acres)	43
Littoral Area (acres)	43
Tributary Area (acres)	543
Maximum Depth (feet)	14
Depth Class	Shallow
Recreation	Aesthetics
Fishery	Unknown
Public Access	None



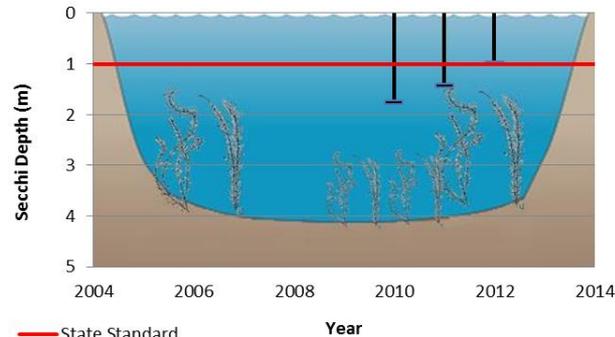
DNR Recreation Compass

### Birch Island Lake Summer Total Phosphorus History



State water quality standard for Total Phosphorus (TP) is  $\leq 60 \mu\text{g/L}$  (ppb)

### Birch Island Lake Transparency History



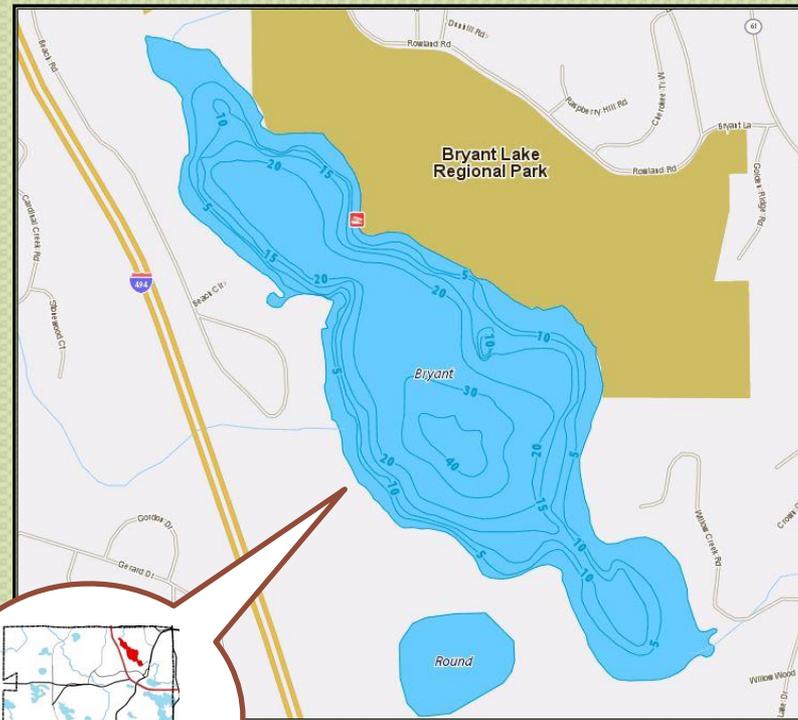
State water quality standard for clarity (Secchi Depth, SD) is  $\geq 1.0$  meter



# Bryant Lake

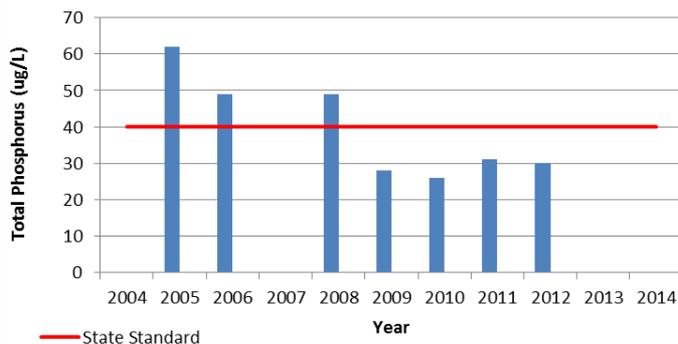
## LAKE DATA

Eden Prairie Basin I.D. #	02-23-A
DNR I.D. #	27-0067
DNR Classification	Recreational Development
Lake Area (acres)	177
Littoral Area (acres)	64
Tributary Area (acres)	1,991
Maximum Depth (feet)	45
Depth Class	Deep
Recreation	Swimming, boating, fishing
Fishery	Muskellunge walleye
Public Access	Ramp, northeast side of lake
Restrictions	15 mph speed limit noon – 6 pm Sundays in summer; all tow boats must include both a driver and observer



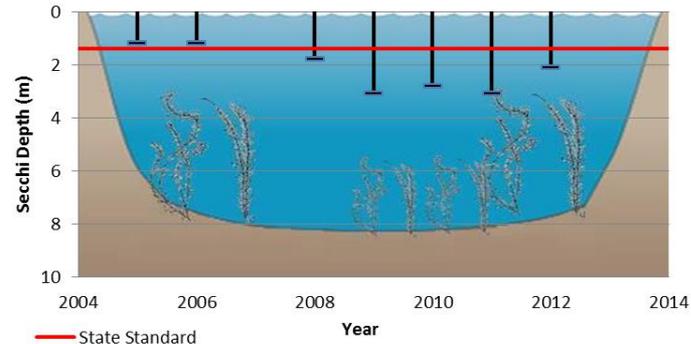
DNR Recreation Compass

### Bryant Lake Summer Total Phosphorus History



State water quality standard for Total Phosphorus (TP) is  $\leq 40 \mu\text{g/L}$  (ppb)

### Bryant Lake Transparency History

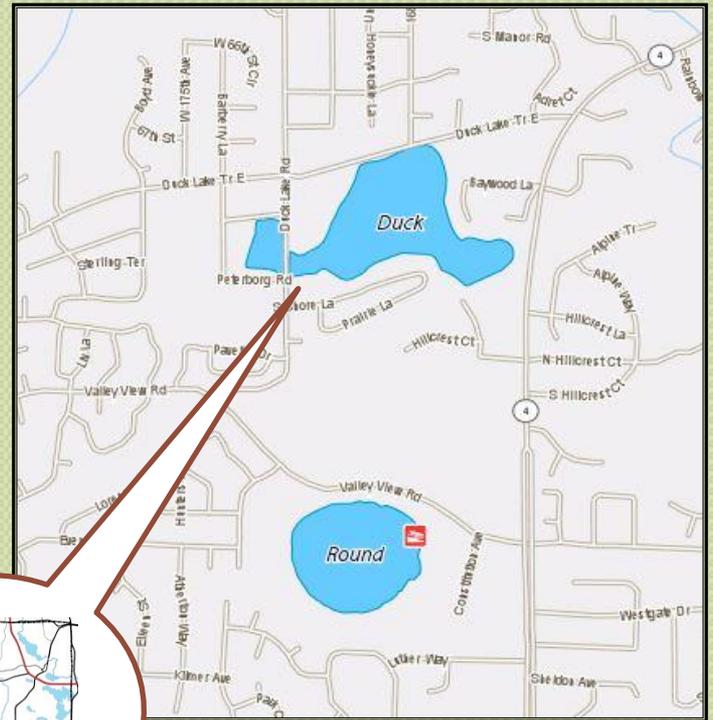


State water quality standard for clarity (Secchi Depth, SD) is  $\geq 1.4$  meter

# Duck Lake

## LAKE DATA

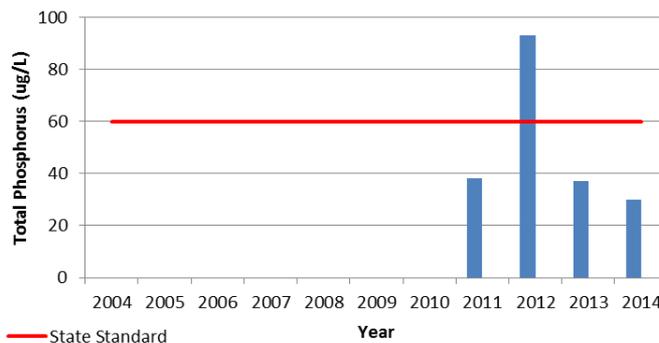
Eden Prairie Basin I.D. #	05-34-A
DNR I.D. #	27-0069
DNR Classification	Recreational Development
Lake Area (acres)	41
Littoral Area (acres)	41
Tributary Area (acres)	211
Maximum Depth (feet)	10
Depth Class	Shallow
Recreation	Aesthetics, fishing
Fishery	Bluegill, largemouth bass
Public Access	Carry-in
Restrictions	No motorized access



DNR Recreation Compass

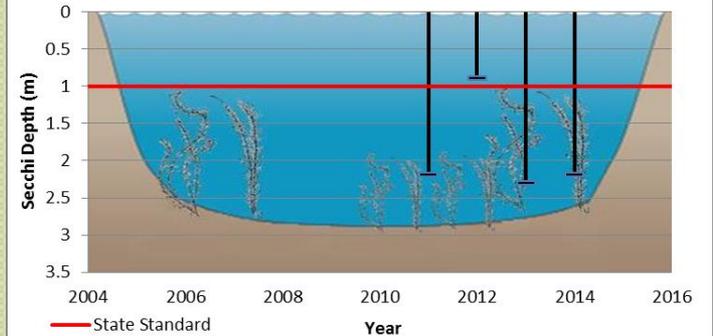


### Duck Lake Summer Total Phosphorus History



State water quality standard for Total Phosphorus (TP) is  $\leq 60 \mu\text{g/L}$  (ppb)

### Duck Lake Transparency History

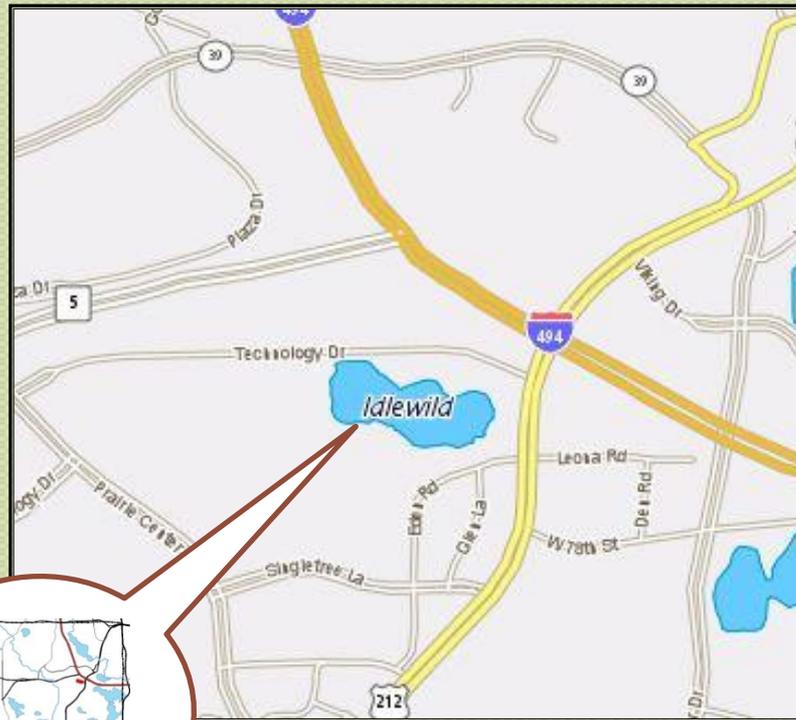


State water quality standard for clarity (Secchi Depth, SD) is  $\geq 1.0$  meter

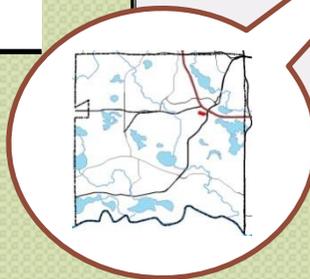
# Idlewild Lake

## LAKE DATA

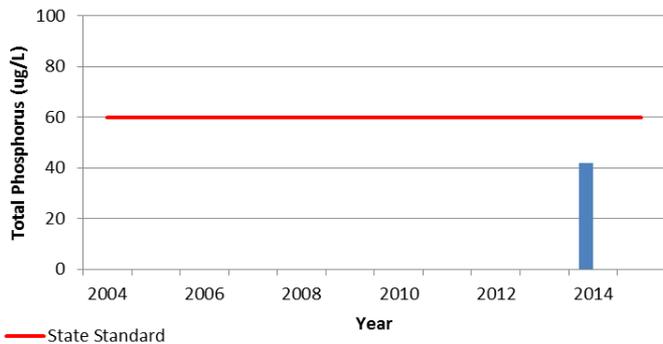
Eden Prairie Basin I.D. #	14-21-A
DNR I.D. #	27-0074
DNR Classification	N/A
Lake Area (acres)	15
Littoral Area (acres)	15
Tributary Area (acres)	703
Maximum Depth (feet)	9
Depth Class	Shallow
Recreation	Aesthetics
Fishery	Bluegill, sunfish
Public Access	None



DNR Recreation Compass

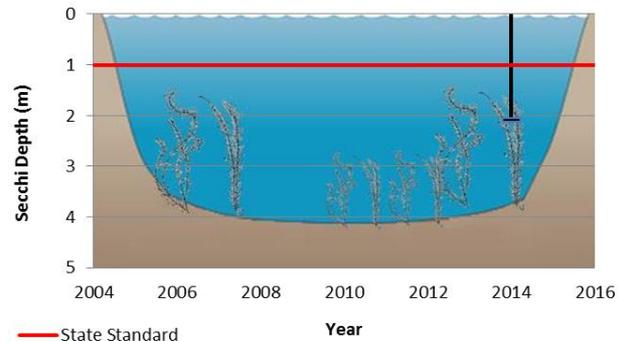


### Lake Idlewild Summer Total Phosphorus History



State water quality standard for Total Phosphorus (TP) is  $\leq 60 \mu\text{g/L}$  (ppb)

### Lake Idlewild Transparency History



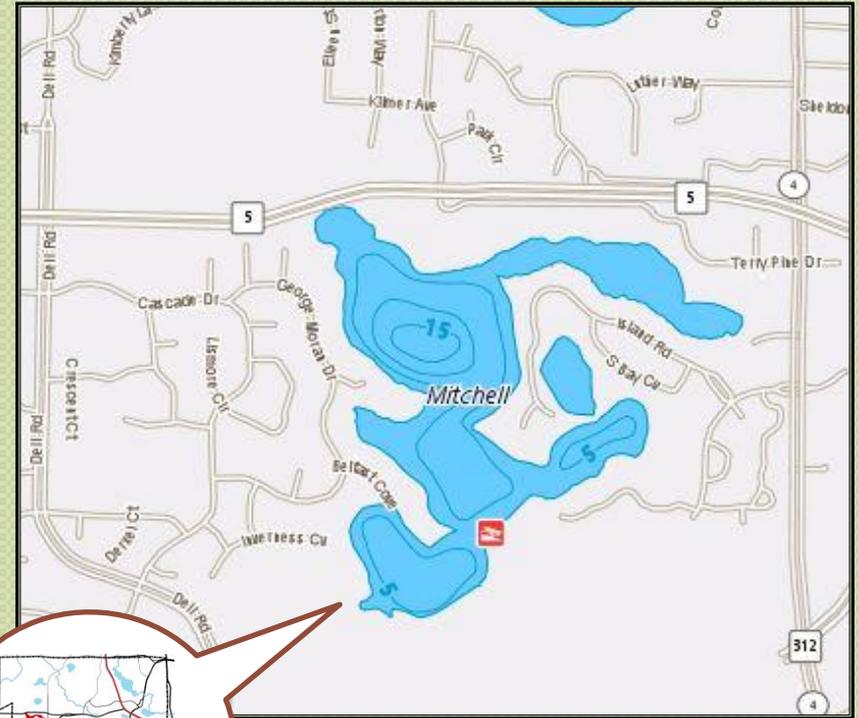
State water quality standard for clarity (Secchi Depth, SD) is  $\geq 1.0$  meter



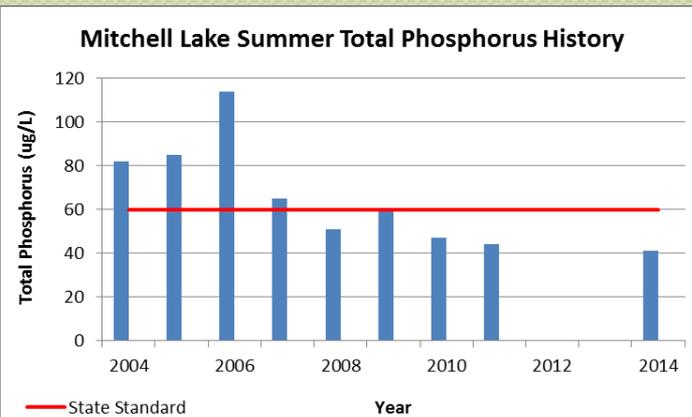
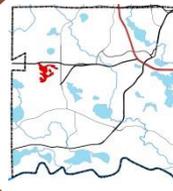
# Mitchell Lake

## LAKE DATA

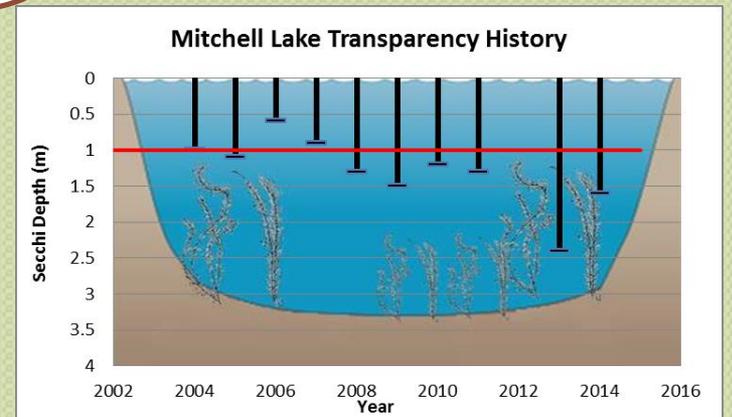
Eden Prairie Basin I.D. #	17-22-A
DNR I.D. #	27-0070
DNR Classification	Natural Environment
Lake Area (acres)	112
Littoral Area (acres)	109
Tributary Area (acres)	301
Maximum Depth (feet)	16
Depth Class	Shallow
Recreation	Boating, fishing pier
Fishery	Bluegill, largemouth bass, walleye
Public Access	Ramp, southeast side
Invasive Species	Curly-leaf pondweed, Eurasian watermilfoil
Restrictions	Motorized watercraft limited to 10 HP or less



DNR Recreation Compass



State water quality standard for Total Phosphorus (TP) is  $\leq 60 \mu\text{g/L}$  (ppb)



State water quality standard for clarity (Secchi Depth, SD) is  $\geq 1.0$  meter

# Red Rock Lake

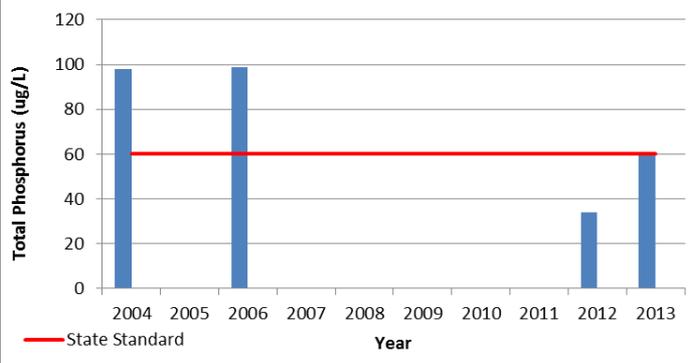
## LAKE DATA

Eden Prairie Basin I.D. #	16-33-A
DNR I.D. #	27-0076
DNR Classification	Recreational Development
Lake Area (acres)	97
Littoral Area (acres)	91
Tributary Area (acres)	462
Maximum Depth (feet)	16
Depth Class	Shallow
Recreation	Boating
Fishery	Bluegill, yellow perch, pike
Public Access	Ramp, southeast side
Invasive Species	Curly-leaf pondweed
Restrictions	Motorized watercraft limited to 10 HP or less



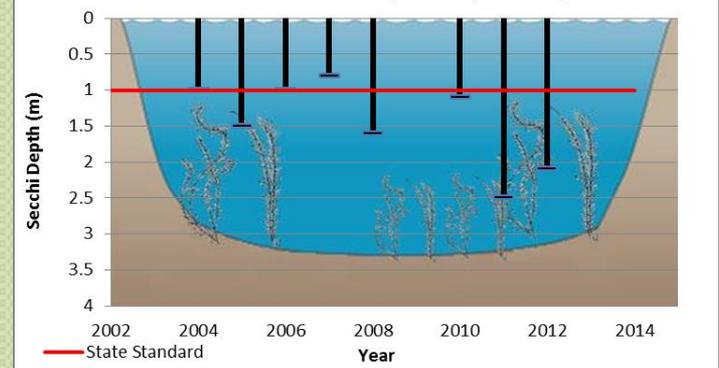
DNR Recreation Compass

### Red Rock Lake Summer Total Phosphorus History



State water quality standard for Total Phosphorus (TP) is  $\leq 60 \mu\text{g/L}$  (ppb)

### Red Rock Lake Transparency History



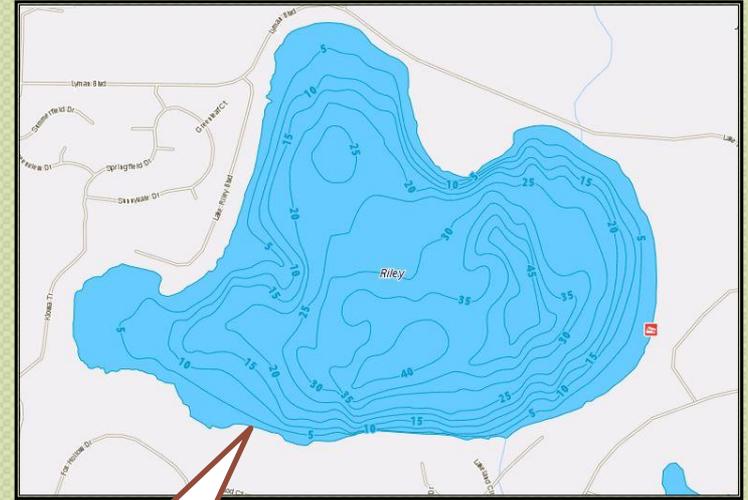
State water quality standard for clarity (Secchi Depth, SD) is  $\geq 1.0$  meter



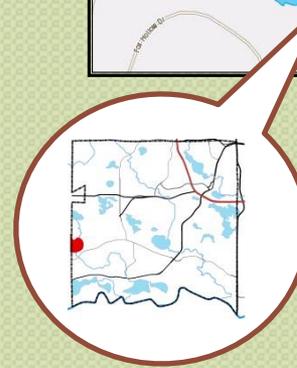
# Riley Lake

## LAKE DATA

Eden Prairie Basin I.D. #	19-32-A
DNR I.D. #	10-0002
DNR Classification	Recreational Development
Lake Area (acres)	286
Littoral Area (acres)	110
Tributary Area (acres)	1763
Maximum Depth (feet)	49
Depth Class	Deep
Recreation	Beach, boating, fishing pier
Fishery	Walleye, bluegill, yellow perch
Public Access	Ramp, east side of lake
Invasive Species	Curly-leaf pondweed, Eurasian watermilfoil, common carp
Restrictions	Slow, no-wake zone adjacent to Riley Lake Park; designated water skier pick up and drop off point

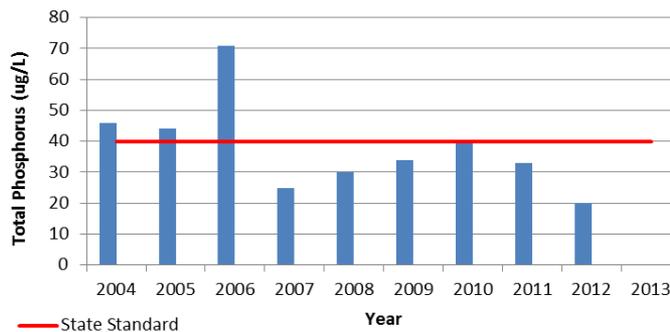


DNR Recreation Compass



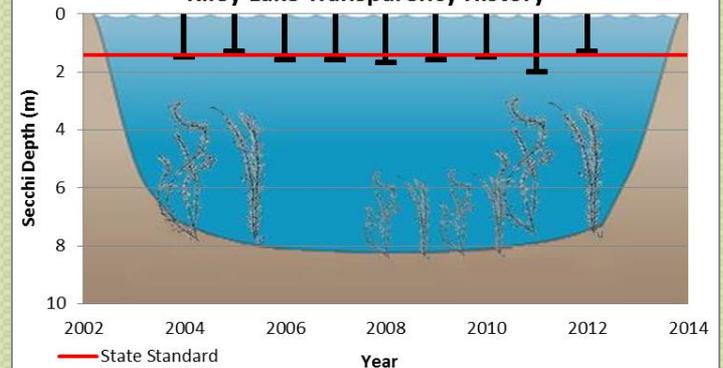
*162 acres of Riley Lake are in Eden Prairie while 124 acres lie within Chanhassen*

### Lake Riley Summer Total Phosphorus History



State water quality standard for Total Phosphorus (TP) is  $\leq 40 \mu\text{g/L}$  (ppb)

### Riley Lake Transparency History

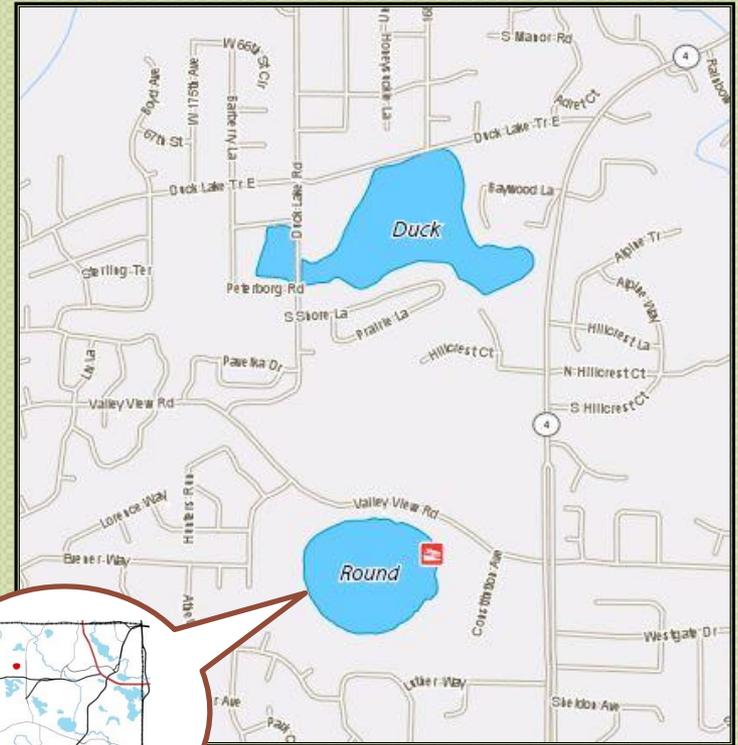


State water quality standard for clarity (Secchi Depth, SD) is  $\geq 1.4$  meter

# Round Lake

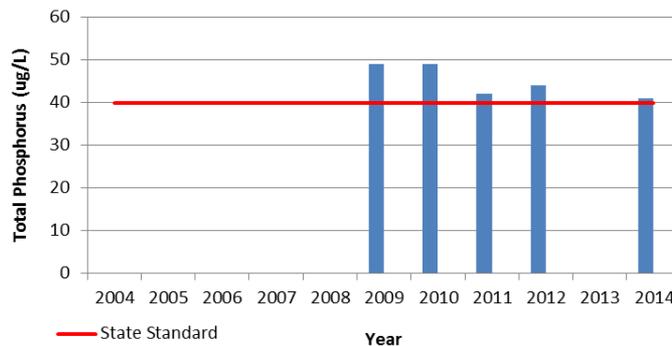
## LAKE DATA

Eden Prairie Basin I.D. #	08-31-A
DNR I.D. #	27-0071
DNR Classification	Recreational Development
Lake Area (acres)	32
Littoral Area (acres)	23
Tributary Area (acres)	444
Maximum Depth (feet)	37
Depth Class	Deep
Recreation	Beach, boating, fishing pier
Fishery	Bluegill, largemouth bass
Public Access	Ramp, east side of lake
Invasive Species	Curly-leaf pondweed, Eurasian watermilfoil, Brittle naiad, Chinese & banded mystery snail
Restrictions	Motorized boats must use electric motors, except law enforcement and City excursion boats



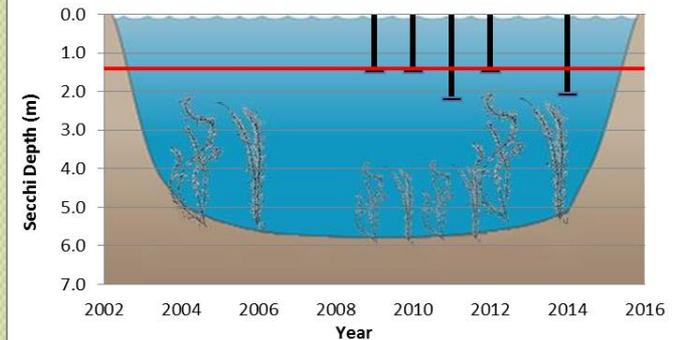
DNR Recreation Compass

### Round Lake Summer Total Phosphorus History



State water quality standard for Total Phosphorus (TP) is  $\leq 40 \mu\text{g/L}$  (ppb)

### Round Lake Historic Secchi Depth



State water quality standard for clarity (Secchi Depth, SD) is  $\geq 1.4$  meter

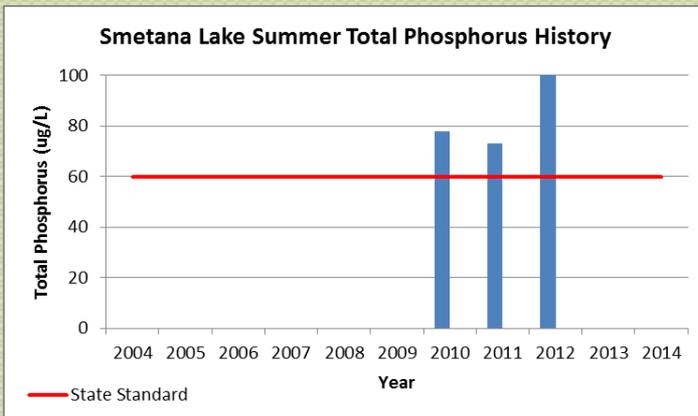
# Lake Smetana

## LAKE DATA

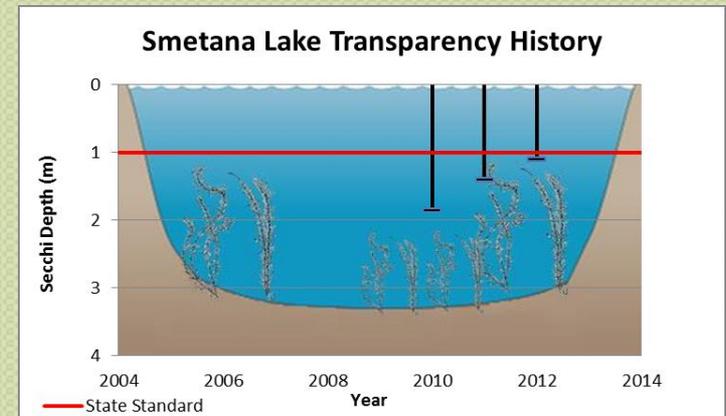
Eden Prairie Basin I.D. #	12-34-A
DNR I.D. #	27-0073
DNR Classification	Natural Environment
Lake Area (acres)	51
Littoral Area (acres)	51
Tributary Area (acres)	929
Maximum Depth (feet)	12
Depth Class	Shallow
Recreation	Boating, fishing
Fishery	Bluegill, northern pike
Public Access	Ramp, northeast side of lake
Invasive Species	Curly-leaf pondweed
Restrictions	Motorized boats must use electric motors, except law enforcement and City excursion boats



DNR Recreation Compass



State water quality standard for Total Phosphorus (TP) is  $\leq 60 \mu\text{g/L}$  (ppb)

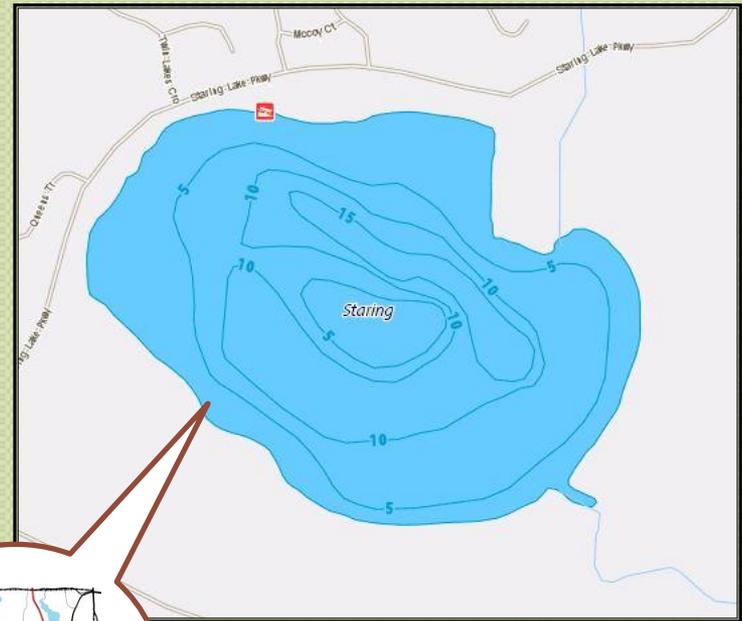


State water quality standard for clarity (Secchi Depth, SD) is  $\geq 1.0$  meter

# Staring Lake

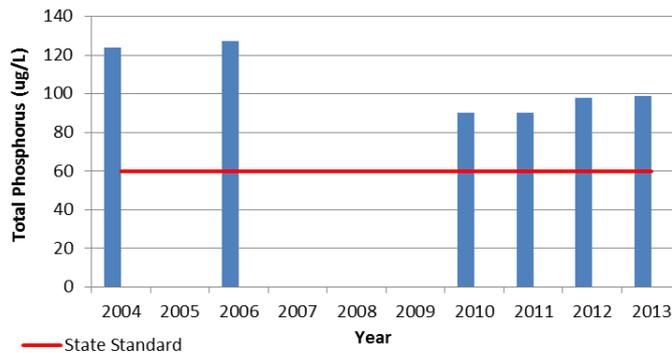
## LAKE DATA

Eden Prairie Basin I.D. #	22-32-A
DNR I.D. #	27-0078
DNR Classification	Recreational Development
Lake Area (acres)	164
Littoral Area (acres)	146
Tributary Area (acres)	615
Maximum Depth (feet)	14
Depth Class	Shallow
Recreation	Boating, fishing pier
Fishery	Bluegill, black crappie
Public Access	Ramp, north side of lake
Invasive Species	Curly-leaf pondweed, common carp



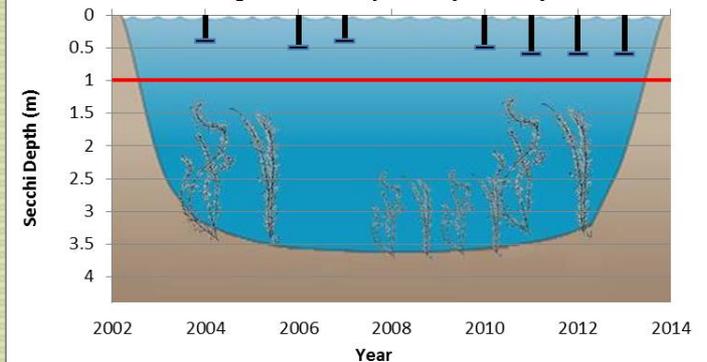
DNR Recreation Compass

### Staring Lake Summer Total Phosphorus History



State water quality standard for Total Phosphorus (TP) is  $\leq 60 \mu\text{g/L}$  (ppb)

### Staring Lake Transparency History



State water quality standard for clarity (Secchi Depth, SD) is  $\geq 1.0$  meter

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## **Appendix C**

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Budget and Capital Improvement Program (CIP)

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**LWMP 2016 - 2026 BUDGET**

PROJECT	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Project Totals	COMMENTS
<b>CAPITAL IMPROVEMENT PROJECTS</b>													
<b>MISC. CIP PROJECTS</b>													
Creek and River Stabilization and Improvement Projects	\$35,000	\$150,000	\$150,000	\$150,000	\$150,000	\$150,000	\$175,000	\$225,000	\$450,000	\$350,000	\$350,000	\$2,335,000	Future bank stabilization, stormwater system improvements, or volume control projects identified in the Local Water Management Plan, stormwater system inventory or future TMDLs.
Facilities Water Quality Improvement Projects	\$85,000			\$35,000	\$100,000			\$275,000				\$495,000	Stormwater system improvement projects as identified in the City's Facilities Inventory and Maintenance Plan.
General road drainage improvements / stormwater system upgrades	\$50,000	\$75,000	\$75,000	\$150,000	\$200,000	\$200,000	\$275,000	\$400,000	\$200,000	\$325,000	\$350,000	\$2,300,000	For stormwater system improvements to meet NPDES and Watershed District requirements during road maintenance or repair projects.
General Stormwater Repairs and Maintenance	\$303,000	\$250,000	\$250,000	\$400,000	\$425,000	\$450,000	\$475,000	\$500,000	\$525,000	\$550,000	\$575,000	\$4,703,000	For miscellaneous projects not currently identified as a specific project, including repair and maintenance materials, equipment rentals, etc.
Round Lake Water Quality Improvement Project				\$25,000								\$25,000	Water quality improvement projects for Round Lake, including a second alum treatment for water clarity.
Street Sweeper / Heavy Equipment Purchase and Replacement		\$55,000	\$285,000									\$340,000	Replacement of street sweepers, purchase of bobcat compact track loader, or other equipment as needed.
Sunnybrook Road / Frances Lane Pond Improvement Project (Pond 23-33-A)	\$75,000											\$75,000	To evaluate and repair the ponding system along Sunnybrook and Francis Lanes, includes dredging of ponds.
Town Center / Singletree Lane / Eden Prairie Mall Stormwater System Improvements				\$50,000	\$250,000	\$175,000	\$200,000		\$50,000			\$725,000	Stormwater management and water quality improvement projects identified in the Town Center and Eden Prairie Center stormwater studies.
Water Quality Improvement Projects		\$100,000	\$50,000	\$175,000	\$150,000	\$225,000	\$225,000	\$300,000	\$375,000	\$425,000	\$425,000	\$2,450,000	Water quality improvement projects such as those identified in the stormwater inventory and effectiveness reports, such as pond dredging, infiltration enhancements, pond expansions or other water quality improvement projects not currently identified.
<b>ENGINEERING CIP PROJECTS</b>													
Transportation Improvement Projects		\$430,000	\$755,000	\$525,000	\$150,000	\$350,000	\$200,000		\$450,000	\$100,000	\$500,000	\$3,460,000	For stormwater system improvements to meet NPDES and Watershed District requirements during road construction projects.
Inflow and Infiltration Projects		\$175,000	\$125,000	\$50,000		\$50,000		\$50,000		\$50,000		\$500,000	Residential drainage improvement programs associated with an Inflow and Infiltration Project or sump pump collection program.
<b>Total - Capital Improvement Expenses</b>	<b>\$548,000</b>	<b>\$1,235,000</b>	<b>\$1,690,000</b>	<b>\$1,560,000</b>	<b>\$1,425,000</b>	<b>\$1,600,000</b>	<b>\$1,550,000</b>	<b>\$1,750,000</b>	<b>\$2,050,000</b>	<b>\$1,800,000</b>	<b>\$2,200,000</b>	<b>\$17,408,000</b>	
<b>NON-CAPITAL IMPROVEMENT PROJECTS</b>													
Aquatic Invasive Species Control	\$73,500	\$73,500	\$73,500	\$75,000	\$75,000	\$75,000	\$80,000	\$80,000	\$80,000	\$85,000	\$85,000	\$855,500	To be used for watercraft inspections, lake harvesting, biocontrol, fish re-stocking, alum treatments or other similar lake management activities.
General Water Quality Improvement Expenses - Non-capital	\$42,000	\$43,500	\$43,500	\$44,000	\$45,000	\$45,500	\$46,500	\$47,000	\$47,000	\$49,000	\$49,000	\$502,000	Miscellaneous expenses not related to capital projects such as education, uniforms, legal fees, cellphones, mileage, small tools or equipment, repairs, lift station power, etc.).
General Water Quality Improvement Expenses - Staff	\$330,000	\$335,000	\$340,000	\$345,000	\$350,000	\$355,000	\$360,000	\$375,000	\$380,000	\$385,000	\$390,000	\$3,945,000	City staff time, including benefits, spent on developing, designing, constructing, monitoring and maintaining city water quality improvement projects.
General Water Quality Improvement Expenses - Interdepartmental User Fees	\$105,000	\$105,000	\$105,000	\$105,000	\$110,000	\$110,000	\$110,000	\$125,000	\$125,000	\$125,000	\$125,000	\$1,250,000	Interdepartmental user fees for items such as information technology, fleets, workman's compensation insurance, and property insurance.
Goose Control / Management	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$110,000	Management of the goose population within public parks and other impacted properties for water quality improvement.
Lift Station / Drainage Area Study		\$50,000										\$50,000	To identify ways to improve the system operation of the Old Wagon Trail Lift Station.
NPDES - Program Costs	\$32,000	\$32,000	\$37,500	\$38,500	\$44,000	\$44,000	\$49,500	\$49,500	\$55,000	\$55,000	\$55,000	\$492,000	Miscellaneous items such as database management, engineering advice, miscellaneous testing and analysis, Stormwater Plan updates, Water Management Plan updates, or other miscellaneous projects and requirements as needed.
NPDES - Education and Outreach Programs	\$11,000	\$12,000	\$12,500	\$13,000	\$13,500	\$13,500	\$14,000	\$14,500	\$15,000	\$15,000	\$15,000	\$149,000	NPDES education and outreach for the public. Includes workshops, forums, annual meetings, Citizen Assisted Monitoring Program (CAMP), Wetland Health Evaluation Program (WHEP), and other public education programs or opportunities.
NPDES - Stormwater System Inspection, Inventory and Treatment Effectiveness Assessment	\$35,000	\$75,000	\$20,000	\$100,000	\$25,000	\$125,000	\$25,000	\$100,000	\$25,000	\$100,000	\$25,000	\$655,000	Watershed assessment, inventory and treatment effectiveness evaluation for subwatershed areas to determine maintenance needs and projects.
Street Sweeping	\$20,000	\$25,000	\$25,000	\$25,000	\$25,000	\$30,000	\$30,000	\$30,000	\$35,000	\$35,000	\$35,000	\$315,000	General street sweeping costs such as contractor costs or miscellaneous supplies.
Water Management Plan Updates					\$50,000	\$50,000		\$20,000				\$120,000	Costs for updating Water Management Plans for the NPDES MS4 Permit Program and for the Comprehensive Guide Plan. Includes surface water, stormwater, groundwater and wetland planning measures.
Water Quality Program Rebates	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$17,500	\$17,500	\$20,000	\$20,000	\$20,000	\$185,000	For native plantings, raingardens, shoreland restoration or permeable surface projects that qualify for water quality improvement rebates.
Water Quality Monitoring (WOMP) Station	\$15,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$215,000	To track water quality within the Riley Creek watershed in cooperation with the Metropolitan Council and Riley Purgatory Bluff Creek Watershed District.
Water Quality Monitoring and Assessments	\$25,000	\$35,000	\$35,000	\$40,000	\$40,000	\$40,000	\$45,000	\$45,000	\$45,000	\$50,000	\$50,000	\$450,000	For lake, pond and creek monitoring for water quality analysis, stability evaluations and assessments.
Wetland and Stormwater Project Maintenance	\$15,000	\$15,000	\$17,500	\$17,500	\$20,000	\$20,000	\$25,000	\$25,000	\$30,000	\$30,000	\$30,000	\$245,000	City wetland mitigation or stormwater management projects, including monitoring, maintenance and repairs.
<b>Total - Non-Capital Expenses</b>	<b>\$728,500</b>	<b>\$846,000</b>	<b>\$754,500</b>	<b>\$848,000</b>	<b>\$842,500</b>	<b>\$953,000</b>	<b>\$832,500</b>	<b>\$958,500</b>	<b>\$887,000</b>	<b>\$979,000</b>	<b>\$909,000</b>	<b>\$9,538,500</b>	
<b>GRAND TOTAL - ANNUAL EXPENSES</b>	<b>\$1,276,500</b>	<b>\$2,081,000</b>	<b>\$2,444,500</b>	<b>\$2,408,000</b>	<b>\$2,267,500</b>	<b>\$2,553,000</b>	<b>\$2,382,500</b>	<b>\$2,708,500</b>	<b>\$2,937,000</b>	<b>\$2,779,000</b>	<b>\$3,109,000</b>	<b>\$26,946,500</b>	

**Environmental Education Fund - 7003**

<b><u>Item Description</u></b>	<b><u>Billing Code</u></b>	<b><u>2008</u></b>	<b><u>2009</u></b>	<b><u>2010</u></b>	<b><u>2011</u></b>	<b><u>2012</u></b>	<b><u>2013</u></b>	<b><u>2014</u></b>
Wages No Benefits	6101 / 6106 / 6170	\$13,000	\$13,000	\$15,000	\$15,000	\$13,456	\$13,011	\$13,511
Operating Supplies	6203	\$300	\$300	\$300	\$300	\$350	\$1,000	\$850
Video & Photo Supplies	6207	\$200	\$200	\$200	\$200	\$150	\$500	\$150
Dues & Subscriptions, mileage, conferences, etc.	6313 / 6323 / 6322	\$50	\$50	\$50	\$50	\$50	\$125	\$125
Other Contracted Services	6351	\$8,500	\$8,500	\$6,500	\$6,500	\$8,500	\$18,800	\$13,400
Advertising	6352 / 6309 / 6311	\$500	\$500	\$500	\$500	\$600	\$450	\$450
Rentals	6356	\$350	\$350	\$350	\$350	\$0	\$0	\$0
Software	6602	\$1,000	\$1,000	\$1,000	\$1,000	\$100	\$100	\$100
Computers	6603	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,000	\$1,400
Miscellaneous	7103	\$100	\$100	\$100	\$100	\$14	\$14	\$14
Appliance Rebates	7105	\$14,500	\$14,500	\$14,500	\$14,500	\$17,500	\$40,000	\$45,000
<b><i>B.U. 7003 Total</i></b>		<b>\$40,000</b>	<b>\$40,000</b>	<b>\$40,000</b>	<b>\$40,000</b>	<b>\$42,220</b>	<b>\$75,000</b>	<b>\$75,000</b>

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## **Appendix D**

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### Stream Assessment Technical Memo

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# Technical Memo



Responsive partner.  
Exceptional outcomes.

**To:** Leslie Stovring, Environmental Coordinator  
City of Eden Prairie, MN

**From:** Diane Spector  
Jeff Strom  
Lucius Jonett

**Date:** June 4, 2015

**Subject:** Riley and Purgatory Creeks Assessment

---

In 2013 and 2014 Wenck Associates, Inc. performed walking assessments of Purgatory Creek and Lower Riley Creek to update findings of previous assessments, identify areas of erosion and their severity and where there was change since the previous assessment, estimate the rate of bank loss, and identify and prioritize potential projects. Eroded areas on Purgatory Creek were classified as Slight, Moderate, or Severe based on existing condition, change since the previous visit, and estimated rate of recession. Stream restoration projects were developed to address clusters of erosion features, prioritizing features classified as Severe that appear to be still active. Other areas with identified erosion problems that do not appear to be active are a lower priority and can be completed as time and resources are available.

## **Purgatory Creek Assessment**

Purgatory Creek was assessed in 2006 as part of the Nondegradation Study completed for the City's NPDES permit. In 2013, the most severe areas were re-surveyed to evaluate any change in condition and to identify any new areas of erosion. The 2013 erosion assessment primarily evaluated the stream channel and streambank up to the bankfull elevation, and bank slope above bankfull that could negatively impact stability and the ability of the stream to pass the bankfull flows. (Figures D-1, D-2, and D-3.)

Many of the erosion features noted in the 2006 assessment, including some that were considered Severe or Moderate, appear to be minimally changed from the conditions documented then, with previously exposed faces experiencing revegetation. This suggests that those features were created by specific events rather than ongoing instability. Based on an examination of historic aerial photos and field conditions for much of its length, Lower Purgatory Creek is actively moving within a meander belt. A meander forms when flow erodes the outside bends of a stream and deposits silt in the inner bends, creating a sinuous stream. The zone on the stream valley floor within which this occurs is called the meander belt. Many of the Purgatory Creek erosion features appear to have been created when the

stream reached the outer edge of the belt and trees on the slope or the top of the bank were undermined and felled. Tree thinning and removal of leaning trees at the edge of the meander belt and allowing the bank slope and top to revegetate with long-rooted native vegetation should be an ongoing management activity.

However, some features appear to have experienced recession since 2006. For example, Figure D-4 shows site 513 from the 2006 assessment, which was called out as feature P16 in the 2013 assessment. The tree outlined in yellow on the 2006 photo is obviously set back from the bank edge, while the photo from 2013 shows it to be now right on the edge.

Seventeen erosion features that appear to have changed in condition from 2006 in Lower Purgatory Creek stood out in the assessment, including features of moderate to severe erosion. In addition to being unstable, this erosion contributes an estimated 56 tons of excess sediment, and an estimated 11 pounds of total phosphorus (Table D-1) to the stream.

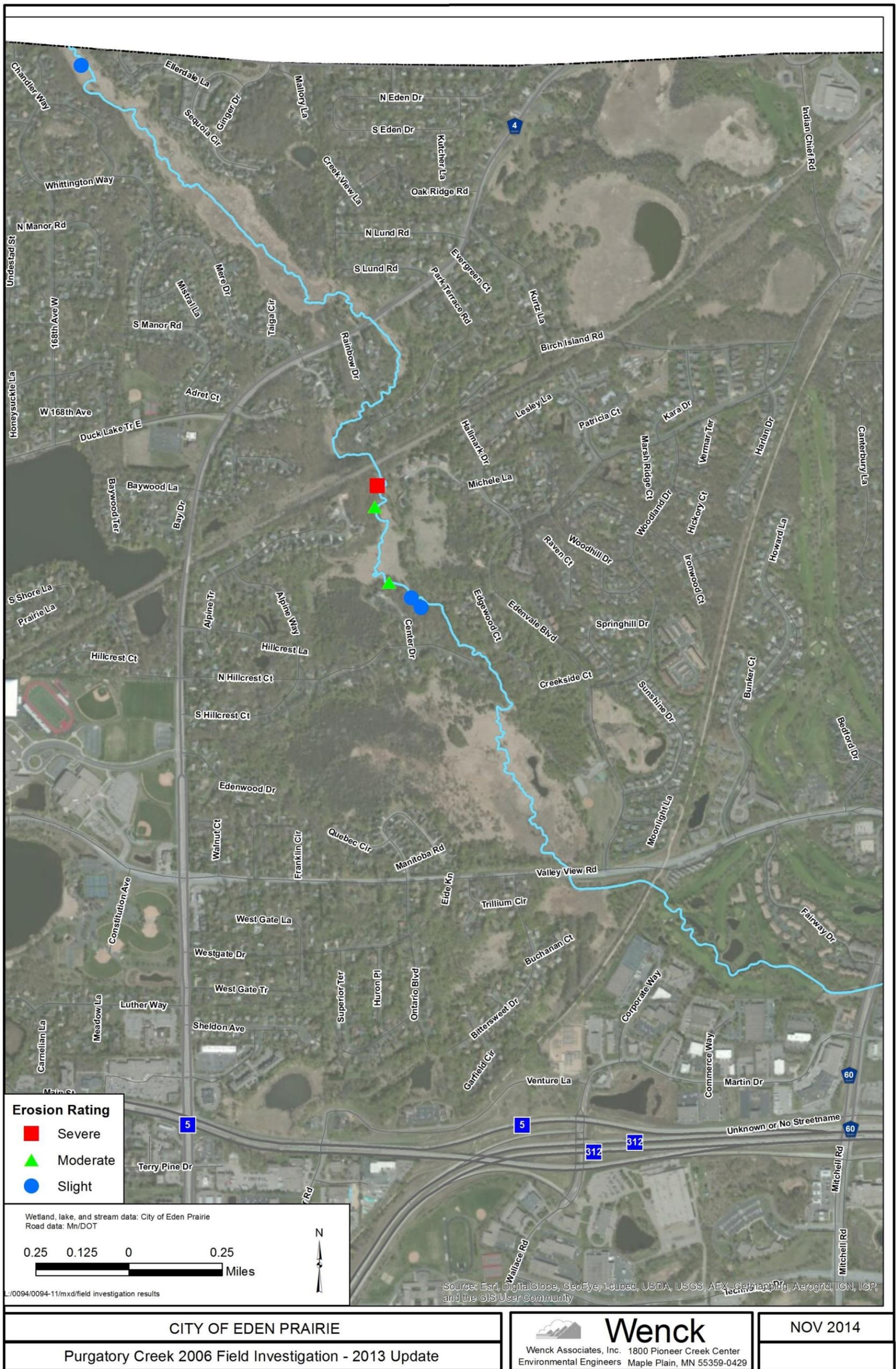
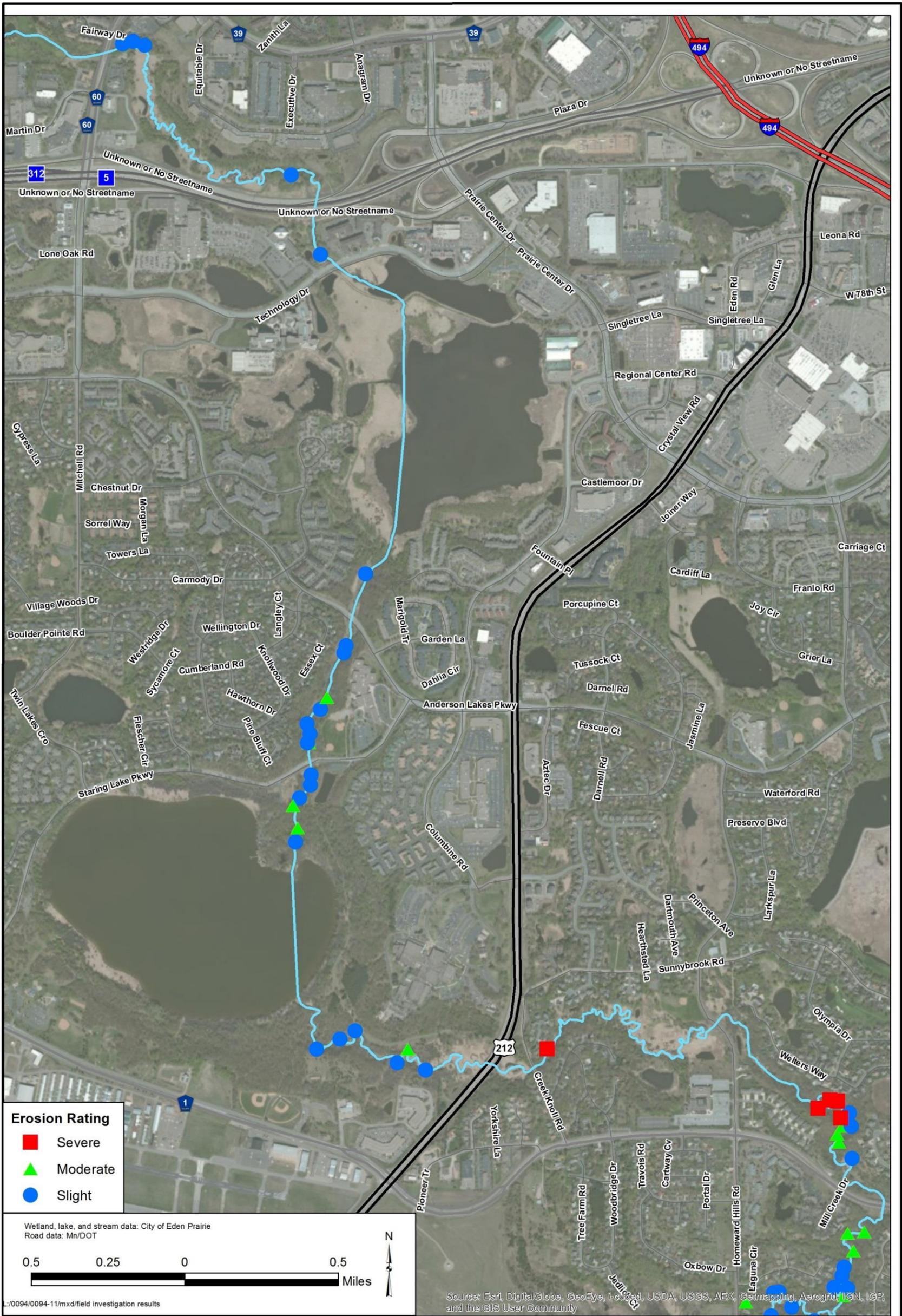


Figure D-1. Erosion features in Upper Purgatory Creek.



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Purgatory Creek 2013 Field Investigation Update: Middle

**Wenck**

Wenck Associates, Inc. 1800 Pioneer Creek Center  
Environmental Engineers Maple Plain, MN 55359-0429

NOV 2014



Figure D-3. Erosion features in Lower Purgatory Creek.



Fall 2006 - Location #513



Fall 2013 - Location #513

Figure D-4. Site P16 in 2006 and 2013.

**Table 1. Estimated soil loss, Lower Purgatory Creek.**

ID	Condition Assessment	Length (ft)	Height (ft)	Recession Rate (ft/yr)	Volume per Year (ft <sup>3</sup> )	Restoration Steps Recommended
P1	Severe	NA	NA	NA	NA	Self-healing. Minimal stabilization action needed.
P2	Slight	20	1	0.01	0.2	No stabilization action needed. Could clean out debris and trash.
P3	Severe	50	12	0.05	30	Tree & shrub thinning, add boulder toe, regrade bank and revegetate with native seed.
P4	Slight	25	4	0.06	6	Tree & shrub thinning, regrade the bank and revegetate with native seed.
P5	Slight	30	2	0.01	0.6	Minimal stabilization action needed, reseed as necessary and add riprap over the seep area.
P6	Moderate	240	6	0.05	72	Tree & shrub thinning, revegetate with native seed.
P7	Slight	40	4	0.06	9.6	Tree & shrub thinning, boulder toe, regrade the bank and revegetate with native seed.
P8	Slight	80	4	0.06	19.2	Tree & shrub thinning, regrade the bank and revegetate with native seed.
P9	Moderate	100	6	0.05	30	Tree & shrub thinning, revegetate with native seed.
P10	Severe	80	8	0.2	128	Relocate the channel. Tree & shrub thinning, regrade the bank and revegetate with native seed.
P11	Severe	60	8	0.2	96	Relocate the channel. Tree & shrub thinning, regrade the bank and revegetate with native seed.
P12	Slight	NA	NA	NA	NA	Could not find in 2013 to update 2006 condition. Based on historic photo, tree and shrub thinning and revegetate with native seed.
P13	Moderate	60	6	0.01	3.6	Tree thinning, reuse as rootwads where possible, add boulder toe, regrade bank and revegetate with native seed.
P14	Moderate	40	7	0.00	0	Minimal stabilization action needed. Reseed as necessary.
P15	Slight	100	10	0.10	100	Tree thinning, regrade the bank and revegetate with native seed.
P16	Moderate	100	10	0.50	500	Tree thinning, reuse as rootwads where possible, add boulder toe, regrade bank and revegetate with native seed.
P17	Severe	80	8	0.20	128	Tree & shrub thinning, reuse where rootwads where possible, add boulder toe, regrade bank and revegetate with native seed.
					1,123.20	ft <sup>3</sup>

Sandy Loam Soil

100 pounds per cubic foot  
 112,320 pounds/year of sediment  
 56 tons/year of sediment  
 Assumed phosphorus concentration in sediment 100 mg/kg  
 11 lbs/year of phosphorous

Note: See Figure D-5 for site locations.

## **Purgatory Creek Priority Projects**

Two clusters of eroded areas were identified as priorities for stabilization. Equipment access to the Creek can be difficult and costly, so it is more cost-effective to cluster the stabilization sites into groups rather than individual, smaller projects. Group 1, which encompasses sites P2 through P11; and Group 2, which encompasses P12 through P17. These are shown on Figure D-5 and described below and shown in the photos below. Figure D-6 shows that several of these sites have degraded since 2006, while a few have improved through growth of stabilizing vegetation. These sites are good candidates for grant funding and/or partnership with the Watershed District to accomplish stream stabilization and sediment and nutrient load reductions.

Other sections of Purgatory Creek are not called out specifically for restoration, but based on general observation these areas would all benefit from tree and shrub management. Of particular concern are the leaners and sweepers: trees leaning over the stream, and large branches sweeping over the stream. Also of concern are trees with exposed roots on the bank in danger of falling into the stream and causing a barrier to flow or uprooting the bank and causing a new erosion feature. These areas would be good candidates for grant applications to have Conservation Corps of Minnesota crews clear designated vegetation, relocate the downed material to areas outside of the floodplain (keeping nutrients onsite) and oversee the cleared areas to reestablish native grass ground cover.

### *Purgatory Creek – Group #1*

Group 1 projects were identified and grouped together due to their proximity to the existing trails in the Lower Purgatory Creek Conservation Area, with construction access possible by utilizing the trails coming off the Wild Heron Point cul-de-sac and Antlers Ridge. Tree and shrub thinning, adding boulder toe protection in key areas, reshaping stream banks and revegetation of cleared and disturbed areas are recommended. Because of the long distance for construction access, there is a high upfront cost for mobilization, tree clearing and preparation for construction access. Figure D-7 shows this area in more detail. The estimated cost of this project is \$160,000, with more detail provided below in Table D-2.

### *Purgatory Creek – Group #2*

Group 2 projects were identified and grouped together because there are no existing trails and site access will be entirely from Purgatory Creek. There is a private residence and driveway off of Riverview Road that would have to be negotiated for a temporary construction easement. Without that access, the cost of this project would increase substantially as access would have to be similar to Group 1, and include the stream segment between Group #1 and Group #2. Tree and shrub thinning, adding boulder toe protection in key areas, reshaping stream banks and revegetation of cleared and disturbed areas are recommended. Figure D-8 shows this area in more detail. The estimated cost of this project is \$110,000, not including any easement costs. More detail is provided below in Table D-3.



Site P3



Site P4



Site P9



Site P10-P11



Site P10-P11



Site P7



Site P12



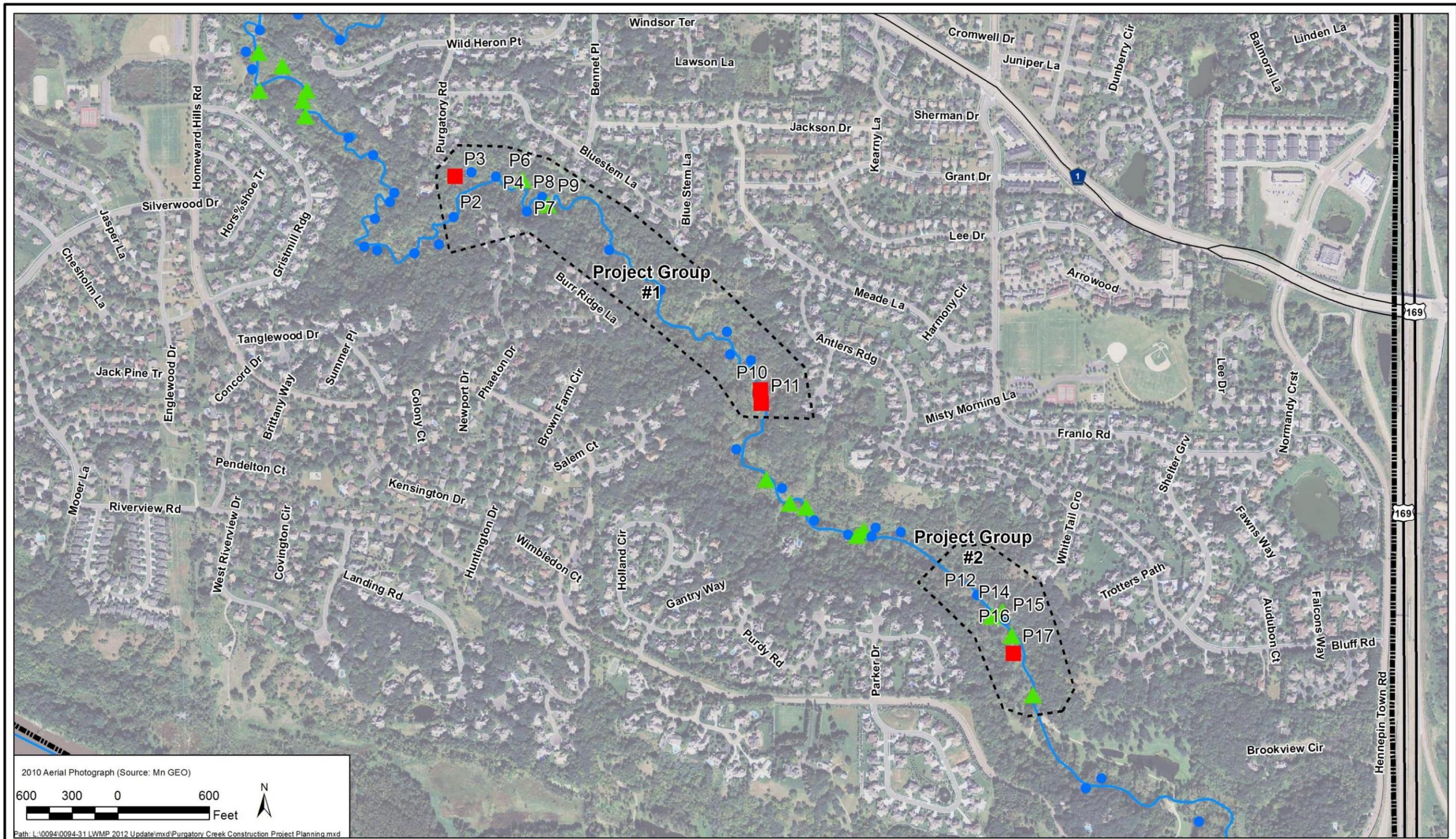
Site P13



Site P17



Site P14



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Purgatory Creek - Construction Project Planning

  
 Engineers - Scientists  
 Business Professionals  
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 1-800-472-2232

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Figure D-5. Lower Purgatory Creek priority project areas.

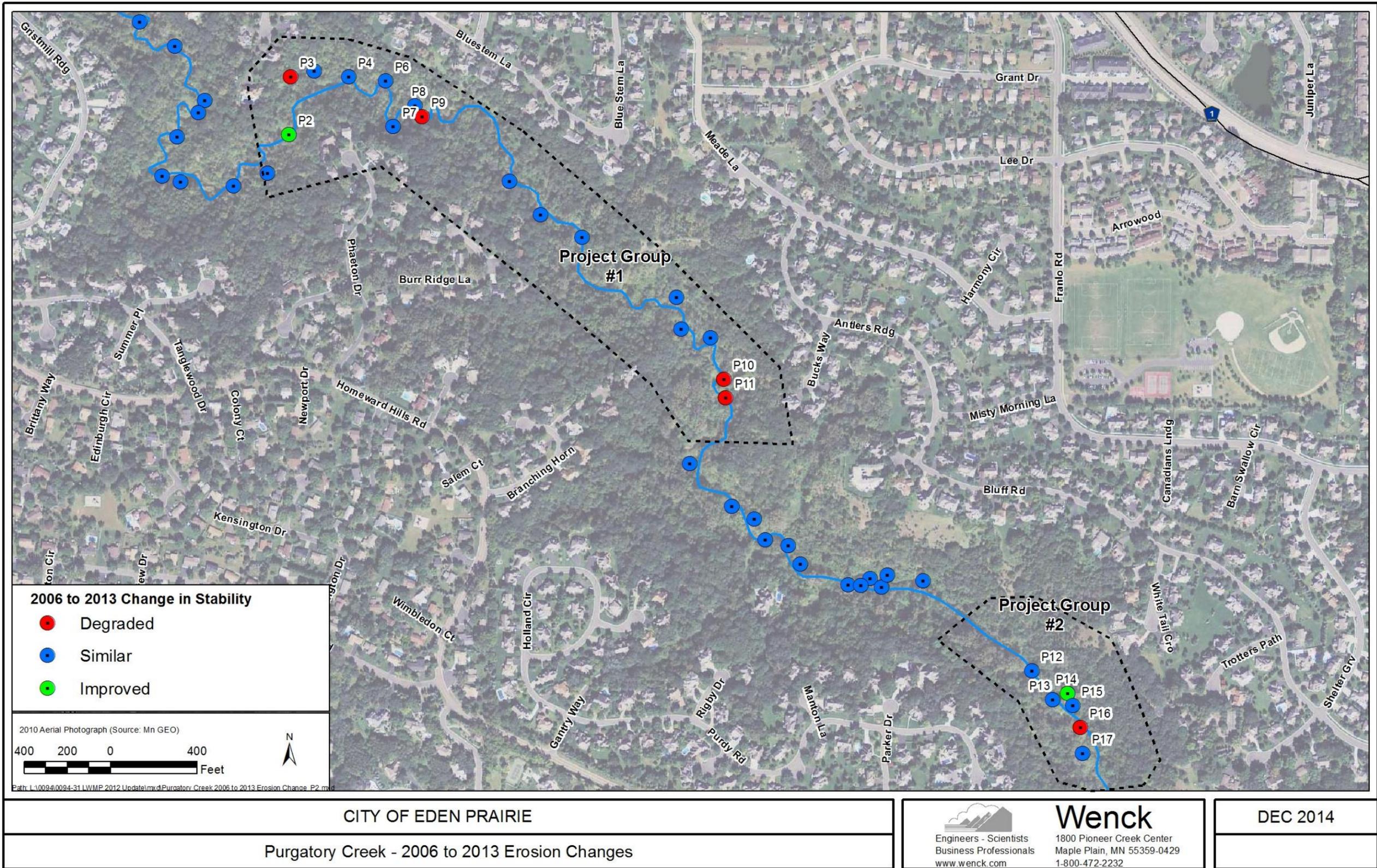


Figure D- 6. Apparent change in stability between 2006 and 2013.

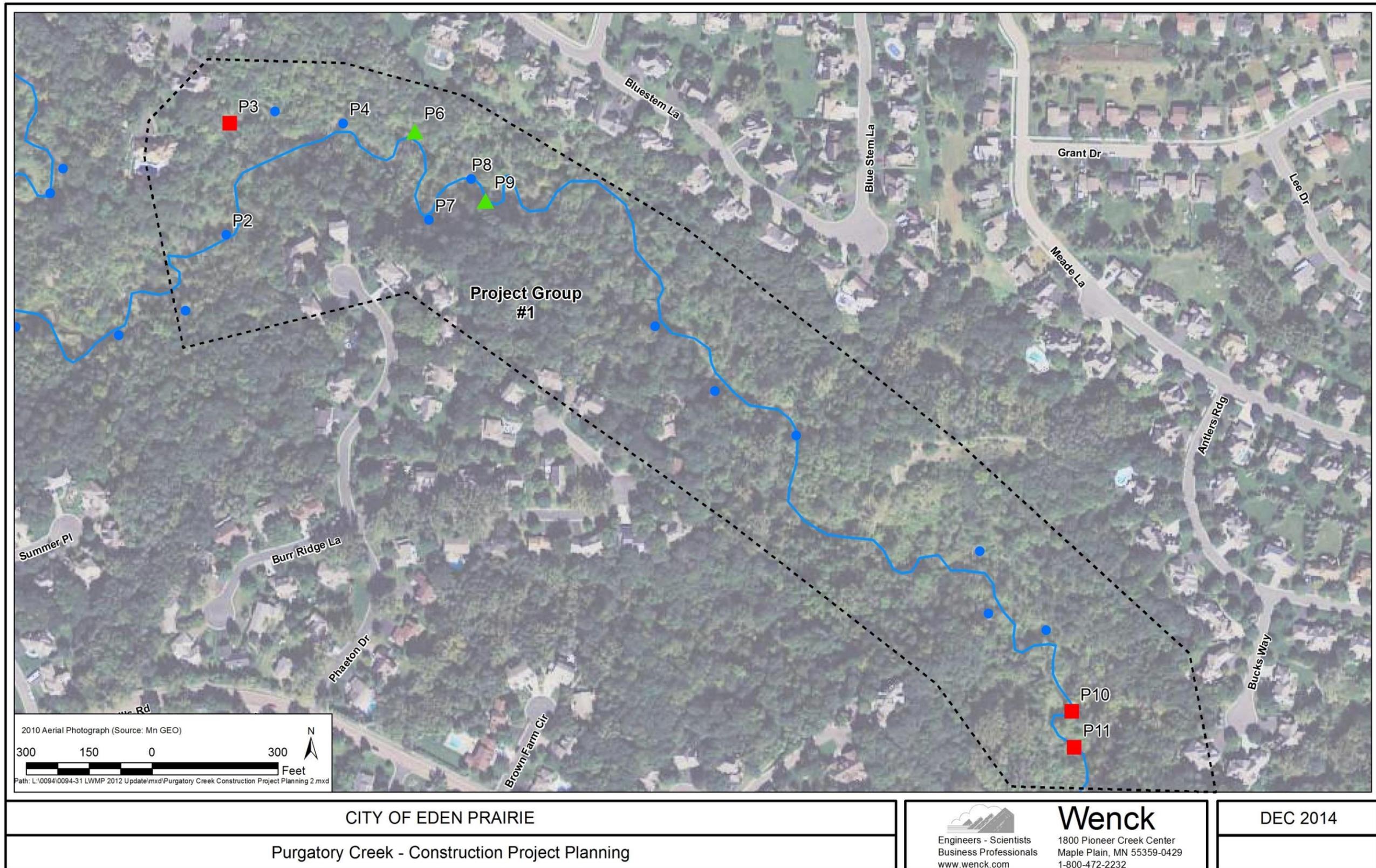
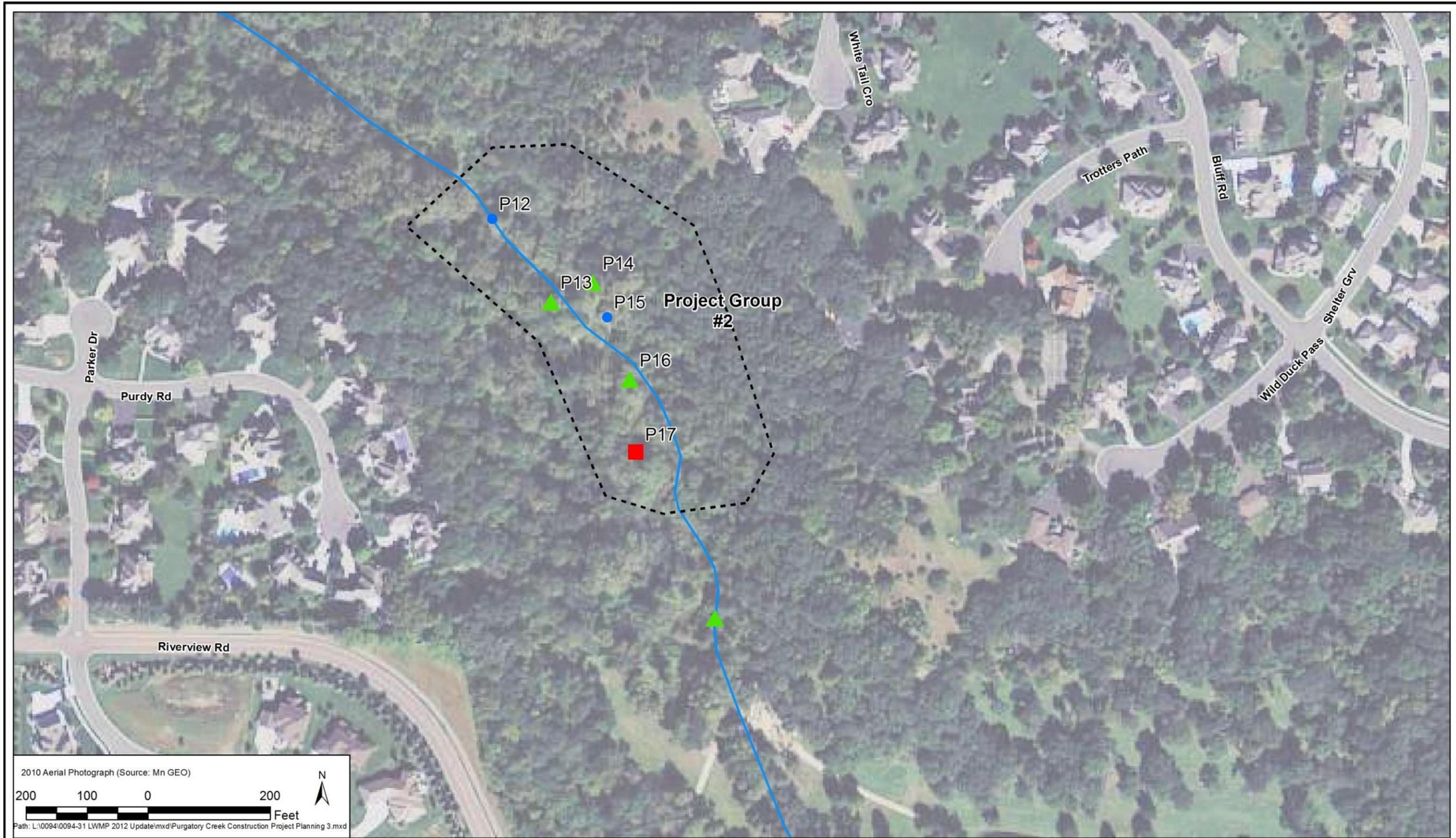


Figure D-7. Lower Purgatory Creek project group 1.



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Purgatory Creek - Construction Project Planning

  
 Engineers - Scientists  
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Figure D-8. Lower Purgatory Creek project area 2.

**Table D-2. Restoration Construction Estimate For Purgatory Creek Restoration - Group 1.**

Bid Item	Description	Units	Quantity	Unit Price	Total Price
1	Mobilization - Demobilization (10% Due to Access)	LS	1	\$15,000.00	\$15,000.00
2	Temporary Erosion Control	LS	1	\$7,500.00	\$7,500.00
3	Temporary Rock Construction Entrance**	LS	0	\$2,500.00	\$0.00
4	Construct, maintain & restore site access and staging area(s)	LS	1	\$10,000.00	\$10,000.00
5	Tree Clearing & Relocation	LS	1	\$30,000.00	\$30,000.00
6	Site Grading	LS	1	\$20,000.00	\$20,000.00
7	Geotextile Fabric - MN DOT Type 5, Non-Woven	SY	50	\$5.00	\$250.00
8	Class III Riprap (No Limestone or Volcanic Based Rock)	TON	20	\$120.00	\$2,400.00
9	24" to 36" fieldstone boulder toe	TON	110	\$120.00	\$13,200.00
10	Native Seed - MN State Seed Mix 33-262 Dry Swale / Pond & No Mow Fescue Cover Crop	SY	5,000	\$1.00	\$5,000.00
11	Erosion Control Blanket – MN DOT 3885 Category 3, Straw 2S, natural fiber netting only. No poly net allowed.	SY	5,000	\$3.00	\$15,000.00
12	Rolanka BioD-Net 40 or equivalent	SY	5,000	\$5.00	\$25,000.00
13	Street Sweeper (With Pickup Broom)	HR	20	\$125.00	\$2,500.00
				Subtotal	\$145,850.00
				20% Contingency	\$29,170.00
				Total	\$175,020.00

\*\*Paved trail stubs prevent tracking

**Table D-3. Restoration Construction Estimate For Purgatory Creek Restoration - Group 2.**

Bid Item	Description	Units	Quantity	Unit Price	Total Price
1	Mobilization - Demobilization (10% Due to Access)	LS	1	\$10,000.00	\$10,000.00
2	Temporary Erosion Control	LS	1	\$7,500.00	\$7,500.00
3	Temporary Rock Construction Entrance**	LS	0	\$2,500.00	\$0.00
4	Construct, maintain & restore site access and staging area(s)	LS	1	\$10,000.00	\$10,000.00
5	Tree Clearing & Relocation	LS	1	\$20,000.00	\$20,000.00
6	Site Grading	LS	1	\$10,000.00	\$10,000.00
7	Geotextile Fabric - MN DOT Type 5, Non-Woven	SY	200	\$5.00	\$1,000.00
8	24" to 36" fieldstone boulder toe	TON	200	\$120.00	\$24,000.00
9	Native Seed - MN State Seed Mix 33-262 Dry Swale / Pond & No Mow Fescue Cover Crop	SY	2000	\$1.00	\$2,000.00
10	Erosion Control Blanket – MN DOT 3885 Category 3, Straw 2S, natural fiber netting only. No poly net allowed.	SY	2000	\$3.00	\$6,000.00
11	Rolanka BioD-Net 40 or equivalent	SY	2000	\$5.00	\$10,000.00
12	Street Sweeper (With Pickup Broom)	HR	10	\$125.00	\$1,250.00
				Subtotal	\$101,750.00
				20% Contingency	\$20,350.00
				Total	\$122,100.00

\*\*Existing driveway prevents tracking.

## Lower Riley Creek Assessment

In 2005 the City of Eden Prairie submitted a petition to the Riley-Purgatory-Bluff Creek Watershed District to complete a hydrological analysis of the outlet of Riley Lake to determine if modifications or improvements could be made to better manage lake levels during periods of high water. The District's Engineer, Barr Engineering, completed this assessment, including an assessment of the conditions in Lower Riley Creek. That assessment broke the stream down into nine reaches, Reach A through Reach I, and noted a number of erosion sites and offered some potential stabilization measures (Barr 2007).

The City contracted with Wenck Associates in 2008 to conduct an in-channel reconnaissance survey of Lower Riley Creek from the headwaters (Riley Lake Outlet) to Flying Cloud Drive/Hwy 212, and to install devices for ongoing measurement of rates of erosion and stream deposition. Lower Riley Creek was divided into eleven reaches, and a reference point was established in each to monitor changes in channel alignment and depth (see Figure D-9). During the survey, noteworthy erosion features were documented and one representative channel cross section for each reach was identified. These reference points are evaluated periodically to measure change and to determine the need for and schedule of channel and bank repairs.

Upon completion of the initial reconnaissance survey, one erosion feature from each reach was selected for long-term erosion monitoring and analysis. These monitoring sites, along with the representative channel cross sections, have been revisited in 2011, 2012, 2013, and 2014. Two erosion pins and one scour chain were installed at each monitoring station. One erosion pin was installed on the lower bank (near or within the bank-full height) and the other on the upper bank (between bank-full and study bank height). Both pins were installed on the same plane near the point of maximum force/impact and sediment loss. Scour chains were created by connecting a duckbill earth anchor to a metal chain using a C-clamp. One scour chain was installed in the channel bottom where it is believed stream flow and bottom scouring is greatest.

Bank pin monitoring shows Riley Creek experienced a significant amount of bank loss in 2014 as several individual sites (reaches 2, 5, 7, 10 and 11) recorded their highest annual loss since monitoring began in 2008. Extremely high rainfall and flow events this year during the late spring and early summer likely led to the higher rates of bank loss measured at these sites in 2014. Reach 5 bank pins could not be located during the 2011 and 2012 site visits likely due to significant bank failure near the monitoring site. Bank pins were installed at a new location in reach 5 during the 2013 site visit, but banks at the new site completely eroded in 2014 and neither of the bank pins installed in 2013 could be located or recovered.

Overall, Wenck Reaches 4-7 (Barr Reaches D, E, and part of F) have the highest incidence of large erosion features and toppled banks. These reaches also have a significant number of downed trees along the banks and in the creek that have caused large debris dams and potential backwater areas and redirected flow patterns. Barr identified two high-priority clusters of erosion features (E1-E2-E3 and E7-E8-E9) in this area, as well as feature D3 on a side ravine. Wenck Reaches 1-3 (Barr Reaches A, B, and C) and 8-11 (Barr Reaches G, H, I, and part of F) have experienced some bank erosion and tree downfalls, especially near road crossings, outfalls and stream bends, and where seeps contribute to destabilizing bluff slopes.

The channel chains installed in 2008 were not visible during the 2011-2013 site visits. None of the monitoring sites displayed evidence of bottom scouring. It is likely these chains have been buried by collapsed bank material and/or general sediment deposition.

### **Lower Riley Creek Priority Projects**

Based on the existing conditions and estimated bank loss since 2008 (Table D-4 and Figure D-10), Wenck Reaches 4 to 7 are high priorities for stabilization, as nearly every outer bend is actively eroding, sending excess sediment and nutrients downstream. The area within Wenck Reaches 5 to 7 shown on Figure D-9 is of highest priority, starting with Barr's E1-E2-E3 and E7-E8-E9 clusters of features. In 2007 Barr estimated the cost of stabilizing those features as \$384,000. Second priority is Wenck Reach 4 and the balance of Wenck Reach 5, and Wenck Reach 1. Generally, the stabilization design should include boulder toe, bank resloping, stabilization and revegetation, and tree thinning. No specific projects were identified as the entire reaches are in need of stabilization, but as a rule of thumb the cost of such improvements is about \$200 per linear foot of streambank. Also of second priority are the specific clusters identified by Barr as H2-H3 and H4-H5-H6. Both are large scarps where groundwater seepage is contributing to instability. Barr estimated the 2007 cost of stabilizing those two areas as \$ 449,000.

Wenck Reaches 2, 3, and 9 contain areas of spot erosion that should be stabilized once the aforementioned sites have been addressed. Those reaches would also benefit from general vegetation maintenance, including tree thinning and native vegetation reestablishment. Reaches 10 and 11 should be monitored and managed with vegetation maintenance including tree thinning and vegetation reestablishment.

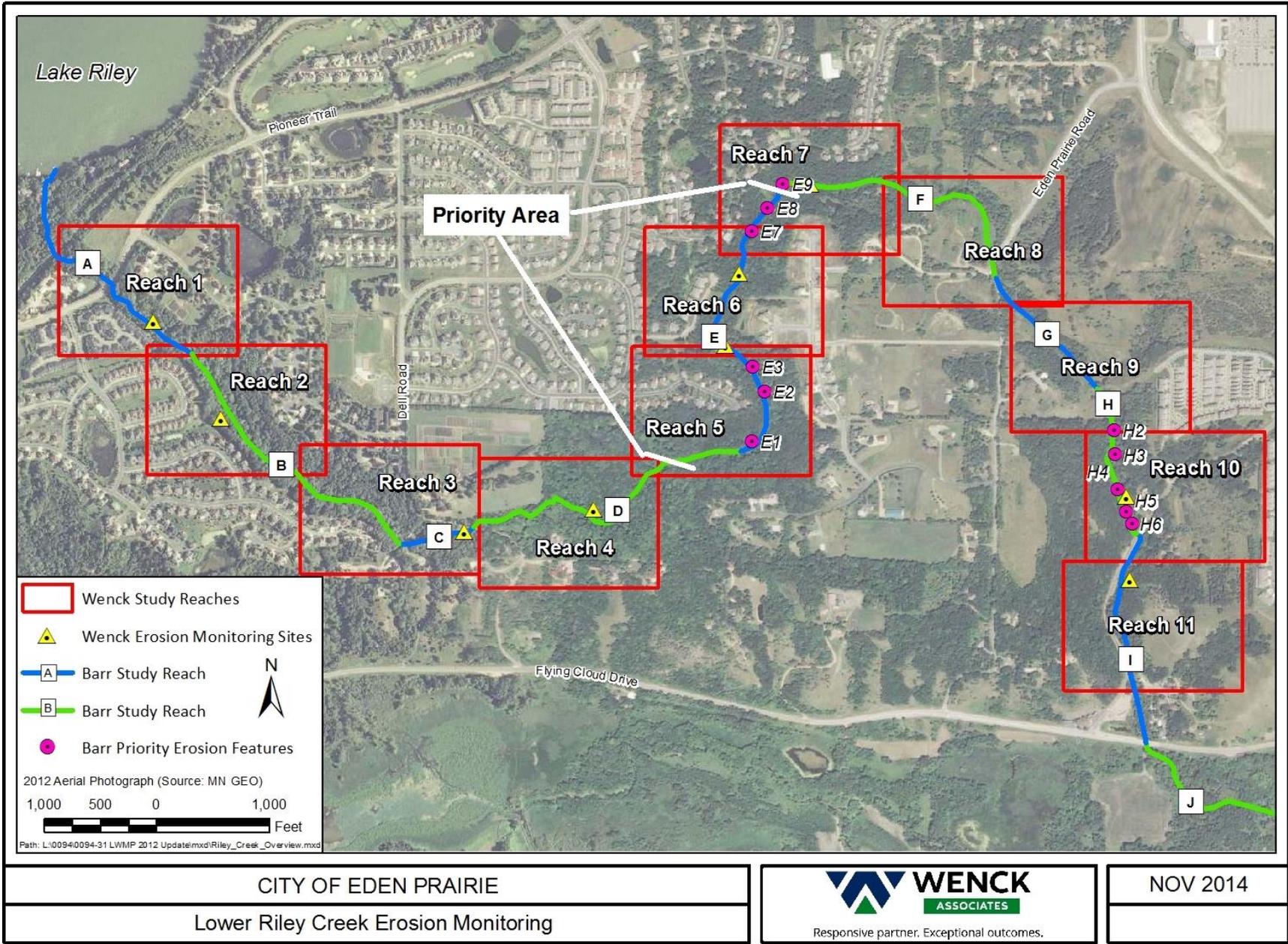


Figure D-9. Lower Riley Creek monitoring reaches

Table D-4. Measured lateral erosion and estimated bank loss at each Riley Creek monitoring site since the 2008 installation.

Reach	<sup>1</sup> Average Lateral Loss (ft/year)				<sup>2</sup> Total Bank Loss (ft <sup>3</sup> /year)				<sup>3</sup> Total Bank Loss (tons/year)				<sup>4</sup> Phosphorus Export (lbs/year)			
	2009-2011	2012	2013	2014	2009-2011	2012	2013	2014	2009-2011	2012	2013	2014	2009-2011	2012	2013	2014
1	<0.1	0.1	2.7	0.4	4.4	12.5	340.6	43.8	0.2	0.6	15.3	2.0	<0.1	0.1	3.1	0.4
2	0.2	0.3	0.4	0.7	19.9	38.3	39.4	73.1	0.9	1.7	1.8	3.3	0.2	0.3	0.4	0.7
3	0.2	0.3	0.2	0.2	14.2	23.6	13.9	19.9	0.6	1.1	0.6	0.9	0.1	0.2	0.1	0.2
4	0.6	0.8	2.0	0.2	90.1	128.9	318.8	31.3	4.1	5.8	14.3	1.4	0.8	1.2	2.9	0.3
*5	1.7	--	--	3.2	125.0	--	--	496.9	5.6	--	--	22.4	1.1	--	--	4.5
6	0.3	0.2	<0.1	0.3	39.9	25.0	2.9	37.2	1.8	1.1	0.1	1.7	0.4	0.2	<0.1	0.3
7	0.1	0.0	0.2	0.2	11.9	0.0	15.8	15.8	0.5	0.0	0.7	0.7	0.1	0.0	0.1	0.1
9	0.0	2.5	0.0	2.3	0.0	195.7	0.0	181.0	0.0	8.8	0.0	8.1	0.0	1.8	0.0	1.6
10	<0.1	<0.1	0.1	0.7	4.0	1.5	12.5	68.0	0.2	0.1	0.6	3.1	<0.1	<0.1	0.1	0.6
11	0.2	<0.1	0.5	0.5	8.9	1.8	24.6	24.1	0.4	0.1	1.1	1.1	0.1	<0.1	0.2	0.2

<sup>1</sup> Average of upper and lower bank pin annual later loss, measured between annual site visits

<sup>2</sup> Estimated by multiplying average lateral loss, total bank height and length of erosion feature (assumed 50 ft for each monitoring site)

<sup>3</sup> Estimated by multiplying total bank loss (ft<sup>3</sup>/year) by an assumed soil density of 90 lbs/ft<sup>3</sup>

<sup>4</sup> Estimated assuming 100 µg P per 1 gram of soil according to Headley Fractionation presented in Geoderma, 1995.

\*Reach 5 bank pins could not be located in 2012 or 2013, likely due to severe bank failure. 2009-2011 Erosion measurements for reach 5 monitoring site assumes complete bank failure at this location. Bank pins were re-installed in reach 5 during the 2013 site visit. Again, the reach 5 bank pins could not be located during the 2014 site visit due to severe bank failure.

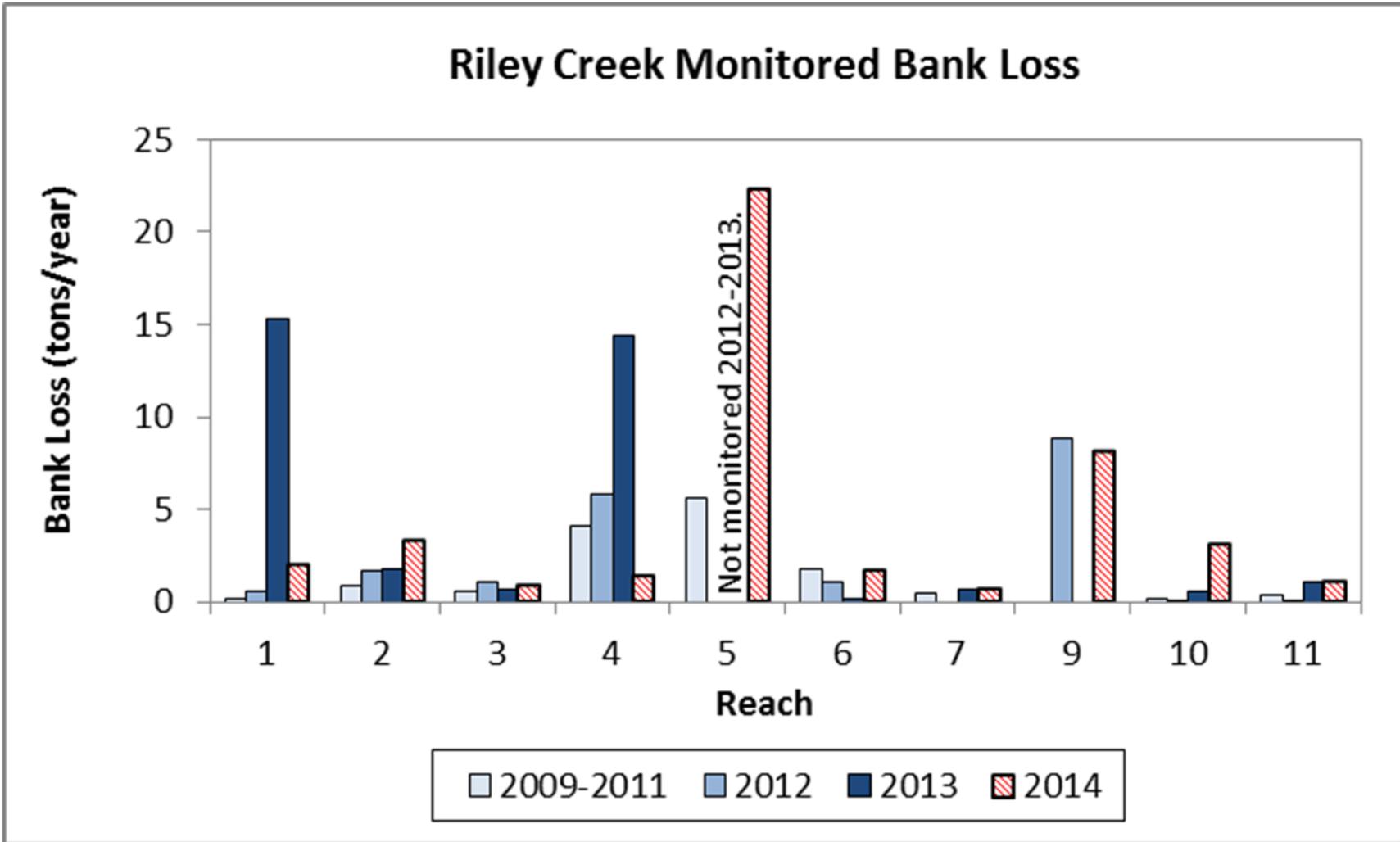


Figure D-10. Average annual bank loss estimated for each Riley Creek monitoring site. Note that Site 5 bank pins could not be located during 2012 and 2013 site visits and bank pins were re-installed during 2013 site visit.

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## **Appendix E**

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### Responses to Comments

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This Local Water Management Plan (LWMP) was submitted to the three watershed districts and the Metropolitan Council for review and comment on July 17, 2015. Staff and the Council reviewed the draft LWMP and district comments, and made a number of revisions. The final draft LWMP incorporates those revisions as follows:

1. The City Council discussed and chose not to take on stormwater permitting responsibility at this time (WCA permitting will continue unchanged). Therefore, Section 6.2.3 and other text in the LWMP were revised to note that land disturbing activities meeting certain thresholds will be required to obtain a permit from the appropriate watershed district. In March 2016 the City will start to review its ordinances to ensure the code sections meet not only the City's permit requirements but are also consistent with District permitting requirements. The City will work closely with the districts as this ordinance review and revision process takes place.
2. Section 8, Amendments to the Plan, was revised to clarify that the City will make routine updates to the LWMP (such as updating the CIP, enhancing the education and outreach program, or incorporating the results of the latest basin inventory and inspection program) as simple housekeeping revisions rather than as "administrative amendments". Any revisions that could substantively change the LWMP, such as adoption of more stringent official controls, proposals to discontinue programs, or revisions of the goals or policies, will be forwarded to the City Council and Watershed Districts for review to determine if a Plan amendment is necessary.
3. Goal statements were revised to be more affirmative, e.g., "require" rather than "encourage."
4. As requested by the LMRWD, Section 6.2.3 was revised to reference the District's water resources classification categories for Rice and Grass Lakes.
5. As requested by the LMRWD, Policy 1.3 was revised to reference gully restoration.
6. LMRWD requested that the City establish a separate overlay district for each of the watershed districts to adopt the standards identified in each watershed management plan. Since the City has opted to not take on regulatory authority within the Nine Mile Creek and Riley Purgatory Bluff Creek Watershed Districts, City Code Section 11.55 Subd. 3.D already requires that the Applicant procure permits required by other agencies, including watershed districts. The City will evaluate this language during the City Code update to determine if additional language is required to clarify these requirements. In addition, Subd. 8.G requires that proposed projects within the Lower Minnesota River Watershed District develop and provide a "Runoff Management Plan" that demonstrates that they meet the stormwater management requirements established in the District's Water Management Plan. This section will be updated to clarify this statement and to reference all of the current Water Management Plan requirements.
7. Each WMO noted that the LWMP should include a specific provision for providing to the WMOs annual reports on LWMP implementation. The City will provide a copy of its annual NPDES report as required by the MPCA.

8. LMRWD noted that it will be clarifying its expectations of the City with respect to project review and it is considering a variance process where the District would review and approve variance requests without issuing a permit. The City requests that we be invited to participate in this process if these discussions occur.
9. LMRWD stated that they are concerned with the official controls adopted by the City to regulate water quality and quantity. The Plan was revised to state that the City will be updating the appropriate code sections for wetlands, water quality and shoreland management starting in 2016 to meet the expectations of the Plan and to clarify roles and responsibilities for permitting.