



**Forest Lake**  
AS GOOD AS IT SOUNDS

# Local Water Management Plan (LWMP) City of Forest Lake

May 2019

**Submitted by:**  
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# Certification

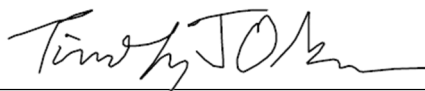
Local Water Management Plan (LWMP)

for

City of Forest Lake

May 2019

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

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# Table of Contents

1.	EXECUTIVE SUMMARY .....	1
2.	INTRODUCTION .....	2
2.1	BACKGROUND.....	2
2.2	PURPOSE AND SCOPE .....	3
2.3	ORGANIZATION.....	3
3.	LAND AND WATER RESOURCES .....	5
3.1	POPULATION AND LAND AREA .....	5
3.2	CLIMATE .....	5
3.3	TOPOGRAPHY AND WATERSHEDS .....	5
3.4	SOILS.....	7
3.5	LAND USE .....	9
3.6	KEY WATER RESOURCES .....	10
4.	GOALS AND POLICIES.....	14
4.1	PURPOSE .....	14
4.2	BACKGROUND.....	14
4.3	OVERVIEW.....	15
4.4	GOAL 1 - Control Rates and Volumes of Stormwater Runoff for Flood Protection.....	15
4.5	GOAL 2: Treat Stormwater Runoff To Protect Receiving Waterbodies.....	17
4.6	GOAL 3: Protect The City’s Valuable Water Resources.....	18
4.7	GOAL 4: Regulate The City’s Surface Water System to Ensure Proper Design, Construction, and Use.....	19
4.8	GOAL 5: Operate and Manage the City’s Surface Water System Consistent with Best Current Practices. ....	20
4.9	GOAL 6: Preserve, Maintain, and Enhance the City’s Natural and Recreational Resources. ....	22
4.10	GOAL 7: Control of Erosion and Sedimentation.....	23
5.	SYSTEM ASSESSMENT .....	24
5.1	OVERVIEW.....	24
5.2	ASSESSMENT OF PROBLEMS .....	24
5.3	IMPAIRED WATER BODIES.....	28
5.4	INTERCOMMUNITY FLOWS AND HYDRAULIC MODELING.....	30
6.	IMPLEMENTATION.....	32
6.1	OVERVIEW.....	32
6.2	REGULATORY ADMINISTRATIVE RESPONSIBILITIES .....	32
6.3	DESIGN STANDARDS .....	33
6.4	OPERATION AND MAINTENANCE .....	41

6.5	EDUCATION.....	44
6.6	CAPITAL IMPROVEMENT PROGRAM.....	45
6.7	FINANCING .....	46
6.8	AMENDMENT PROCEDURES.....	47
6.9	REPORT TO COUNCIL .....	48
7.	SUMMARY AND RECOMMENDATIONS .....	49
7.1	SUMMARY .....	49
7.2	RECOMMENDATIONS .....	49

## Tables

Table 1:	Monthly Average Temperature and Precipitation.....	5
Table 2:	Area of the City within each of the watershed districts. ....	7
Table 3:	DNR Public Waters. ....	13
Table 4:	Overview of Goals and Policies.....	15
Table 5:	Metropolitan Council Lake Quality Report Card. ....	25
Table 6:	Water Quality Data for Lakes Located within the RCWD. ....	26
Table 7:	Water Quality Data for Lakes Located within the CLFLWD.....	27
Table 8:	Goals for In-Lake Water Quality and Phosphorus Load Reductions (provided by CLFLWD). .	28
Table 9:	Forest Lake Impaired Waters.....	30
Table 10:	Summary of Intercommunity Flows .....	31
Table 11:	Regulatory Responsibilities for Stormwater Management and Related Issues. ....	33
Table 12:	Impervious Cover to be used for Parking Lots and Driveways. ....	34
Table 13:	Impervious Cover to be used for Residential Uses10.....	35
Table 14:	Curve Numbers (CN) and Rational Method runoff coefficients (C). ....	35
Table 15:	Receiving Water Pretreatment Requirement. ....	39
Table 16:	Water Quality Model Runoff Input Data. ....	39
Table 17:	Summary of Hydrologic Soils Groups, Design Infiltration Rates and Unified Soil Classifications. Source: Minnesota Stormwater Manual (MPCA, 2017). ....	40
Table 18:	Summary of Future Stormwater Projects.....	46

## Appendix A - Figures

Figure SW-01:	Regional Location Map
Figure SW-02:	Watershed Districts
Figure SW-03:	Existing Land Use
Figure SW-04:	Zoning
Figure SW-05:	Future Land Use
Figure SW-06:	Hydrologic Soils
Figure SW-07:	Lakes and Wetlands
Figure SW-08:	Natural Areas, Open Space, & RSEA
Figure SW-09:	Minnesota Land Cover Classification
Figure SW-10:	Impaired Waters
Figure SW-11:	What’s in My Neighborhood
Figure SW-12:	Major Subwatersheds and Drainage Paths

Figure SW-13: Storm Sewer System

## Appendix B: Ordinances

Chapter 151 – Stormwater Management

Chapter 153 – Zoning Code – Land Alteration and Grading Regulations

Chapter 153 – Zoning Code – 153.343: Shoreland Overlay District

Chapter 154 – Flood Plain Management

## Appendix C: Public Works/Engineering Standards (2016)

## Appendix D: Agreements

## Appendix E: Stormwater Pollution Prevention Plan (SWPPP)

## Appendix F: Wetland Inventory and Assessment (2012)

## Appendix G: Hydraulic Modeling Output

## Appendix H: Local Water Management Plan Review Letters

## Appendix I: City of Forest Lake Street Sweeping Management Plan (2018)

## 1. EXECUTIVE SUMMARY

The City of Forest Lake Local Water Management Plan (LWMP) serves as a comprehensive planning document to guide the City in conserving, protecting and managing its surface and groundwater resources. This document represents the 2018 update which follows updates made by the local regulatory watershed districts to their plans and aligns with the 10-year Comprehensive Plan update cycle.

The content of the LWMP is in large part determined by Minnesota Statute 103B and Rules 8410. Specifically, statute 103B.235 states:

*After the watershed plan is approved and adopted, or amended, pursuant to section 103B.231, the local government units having land use planning and regulatory responsibility for territory within the watershed shall prepare or cause to be prepared a local water management plan, capital improvement program, and official controls as necessary to bring local water management into conformance with the watershed plan*

Minnesota Rules 8410 is more specific about the content of the local plans. According to the rules, these plans shall include the following:

- Table of Contents
- Purpose
- Executive Summary
- Land and Water Resource Inventory
- Establishment of Goals and Policies
- Relation of Goals and Policies to Local, Regional, State and Federal Plans, Goals and Programs
- Assessment of Problems
- Corrective Actions
- Financial Considerations
- Implementation Priorities
- Amendment Procedures
- Implementation Program
- Appendix

The sections of this report directly reference several of the items listed above. The other items, though they do not form actual section headings, are nonetheless covered within this report.

It is not the intent of the City to pursue gaining local regulatory authority at this time. However, the City reserves the right to gain local regulatory control and assume permitting authority.

## 2. INTRODUCTION

### 2.1 BACKGROUND

The City of Forest Lake was incorporated as a village in 1893. Forest Lake became a Statutory City in 1974 in accordance with a state law designed to encourage uniformity in municipal government. The City and Township were recently unified on September 26, 2001.<sup>1</sup>

The City is currently experiencing steady growth and development. Forest Lake has been forecasted to increase from the current population of 20,216<sup>2</sup> to 28,900 in the year 2040<sup>3</sup>. The City is engaged in a continuous planning effort that is imperative for development of a community that places value on the preservation of natural resources, construction of interconnecting park and trail systems, a sustainable and clean drinking water supply and general creation of an enjoyable place to live.

The City of Forest Lake is located in the northwest corner of Washington County. Relative to the Twin Cities, Forest Lake is located approximately 15-20 miles north-northeast (see Figure SW-01). The City of Forest Lake is bounded on the north by the Wyoming Township (Chisago County), on the west by the City of Columbus (Anoka County), on the east by the City of Scandia, and on the south by the City of Hugo.

This report provides the City of Forest Lake with a local water management plan (LWMP) that will serve as a guide for expansion and development of the City's surface water system. This report builds upon previous studies within the City, including the:

- 2030 and 2040 Comprehensive Plan
- 2013 Local Water Management Plan
- Airport Alternative Urban Area-wide Review (AUAR)
- 2020 MUSA Wetland Inventory & Assessment
- High School/Industrial Park Drainage Study
- Rice Creek Watershed District Watershed Management Plan
- Comfort Lake-Forest Lake Watershed District Watershed Management Plan
- Clear Lake Diagnostics Study and Management Plan, Rice Creek Watershed District (February, 2012)
- Forest Lake Diagnostic Study and Implementation Plan, Comfort Lake-Forest Lake Watershed District (2017)
- Forest Lake Enhanced Street Sweeping Plan, Comfort Lake-Forest Lake Watershed District (October, 2017)
- Washington County Groundwater Plan 2014-2024 (September 23, 2014)

Should discrepancies be discovered between this LWMP and the plans listed above, this LWMP shall take precedence as the planning document.

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<sup>1</sup> City of Forest Lake Website

<sup>2</sup> 2016 United States Census

<sup>3</sup> Metropolitan Council, 2015 System Statement, September 17, 2015

## 2.2 PURPOSE AND SCOPE

The Local Water Management Plan (LWMP) will serve as a comprehensive planning document to guide the City in conserving, protecting, and managing its surface water resources. The LWMP meets requirements as established in Minnesota Rules 8410, Metropolitan Council's LWMP Guidelines, and all rules and regulations of the Rice Creek and Comfort Lake- Forest Lake Watershed Districts.

In a three-part process, the LWMP does the following:

1. Collect and compile the efforts of agencies and organizations including various departments of the City of Forest Lake. This includes past reports and studies, management plans, monitoring studies, as well as completed and proposed improvement projects.
2. Review the current state of the City's surface water resources in the context of goals and policies, ordinances, operations and maintenance, flood mitigation, and achievement of targeted water quality levels in its surface waterbodies.
3. Establish reasonable, achievable and affordable goals, and support them by a strong regulatory and management culture. Develop an implementation plan that includes projects and processes that derive from a thorough assessment of current City problem areas and current City stormwater regulations and controls.

In order to arrive at a LWMP that adequately addresses surface water needs, the emphasis has been on identifying important issues. City staff has participated in collecting data, providing feedback, and contributing knowledge of local systems to aid in developing a strategy that encompasses water quality and quantity issues. The City of Forest Lake is the organizer of the final document which includes contributions from the following agencies and watershed organizations:

- Metropolitan Council
- Rice Creek Watershed District
- Comfort Lake-Forest Lake Watershed District

Currently, the City defers the administration and establishment of stormwater management rules and standards to each respective watershed district. Also, wetland management rules are administered by Rice Creek Watershed District. In Comfort Lake Forest Lake Watershed, the City administers wetland rules. Each watershed district administers other watershed protection authority as defined in each respective permitting program. It is not the intent of the City to pursue gaining local regulatory authority at this time. However, the City reserves the right to gain local regulatory control and assume permitting authority under the terms detailed under Section 5.2.

## 2.3 ORGANIZATION

The LWMP is a combination of goals and policies, regulatory controls, management strategies and financial planning, and is organized as follows:

**Section 3** describes the physical environment including the climate, topography, watersheds and drainage patterns, dominant land uses, and significant waterbodies within the City.

**Section 4** lists the City's goals and policies.

**Section 5** presents an overview of surface water management in the City in the context of water quality and water quantity. Specific areas of interest and/or concern are identified for follow-up.



**Section 6** covers regulatory responsibilities, standards and regulatory controls, operation and maintenance of the surface water system, education, capital improvement program, and financing.

**Section 7** contains a summary and recommendations.

### 3. LAND AND WATER RESOURCES

#### 3.1 POPULATION AND LAND AREA

The City has shown impressive growth. Its estimated population in 1999 was 6900, compared with 6397 in the 1994 census, 5833 in 1990 and 4596 in 1980. With the unification on September 26, 2001 of the Forest Lake Township, the population has increased to 18,375<sup>4</sup>.

Up until 2008 the City had been experiencing steady growth and development. Since 2008 this growth has experienced a slowdown. In 2008 the Metropolitan Council forecasted the City’s population to increase to 22,000 in 2010, 33,300 in 2020, 28,000 in 2030 and 28,900 in 2040<sup>5</sup>. Since the population in 2016 is 20,216, it is unclear when the City will reach the projected peak population of 28,900.

Following the City and Township unification, the area of the City grew to incorporate the entire 36 sections of the township, encompassing 22,715 acres (app. 36 sq. mi.). The primary highways providing access to Forest Lake include Interstate Highway 35 and Highways 61, 97, and 8. Two large waterbodies are located within the City limits, Clear Lake and Forest Lake. Both lakes are located in the northern half of the City and are surrounded by developed and developing areas. The highest residential density is located in the northwest corner of the City, with the City center located near the northwest shore of Forest Lake. The majority of the developing area is currently located in the west-central and south-central areas. Some redevelopment is planned for the downtown area and will include new buildings, streets, and utilities.

#### 3.2 CLIMATE

The City of Forest Lake has a predominantly continental climate, strongly influenced in the summer months by weather systems that originate in the Gulf of Mexico and the Pacific Ocean, respectively. Growing season (May-September) precipitation averages 18.85 inches, or about 65% of the annual precipitation. Average annual temperatures and precipitation are listed in the following table:

Table 1: Monthly Average Temperature and Precipitation.

Climate Data	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
Mean Temperature (degrees Fahrenheit) <sup>1</sup>	15.6	20.8	32.8	47.5	59.1	68.8	73.8	71.2	62.0	48.9	33.7	19.7	46.3 (ave.)
Mean Participation (inches) <sup>2</sup>	0.82	0.82	1.50	2.35	3.63	4.49	3.74	3.79	3.20	2.33	1.49	0.98	29.10

<sup>1</sup>NOAA National Centers for Environmental Information, 1981-2010 three-decade average.

<sup>2</sup>University of Minnesota, State Climatology Office, 1891-2017)

#### 3.3 TOPOGRAPHY AND WATERSHEDS

The Minnesota landscape is a product of the continental glaciers that covered it. It consists of gently rolling to steep hills, numerous marshes and lakes, and extensive outwash plains. The City of Forest Lake has a relatively flat topography resulting from outwash deposited by the Des Moines Lobe, and specifically the Grantsburg sublobe, approximately 35,000 to 10,000 years ago

<sup>4</sup> 2010 United States Census

<sup>5</sup> Metropolitan Council Population Forecast, Regional Development Framework Adopted May 2008.

by the late Wisconsinan glaciations.<sup>6</sup>

The lowland lying between Forest Lake and Bald Eagle Lake (northeastern Ramsey County) was likely deepened by erosion from the Des Moines Lobe of the Wisconsinan glaciation. When the Grantsburg sublobe began its retreat, this lowland filled with meltwater and became part of an enormous glacial lake, Glacial Lake Hugo, which spanned several existing counties. When an outlet opened to the St. Croix River Valley, Glacial Lake Hugo drained, leaving behind several smaller lakes, including Forest Lake and Clear Lake.

The bedrock in the City of Forest Lake is comprised of flat-lying layers of carbonate, sandstone, and shale. These rocks form a terraced landscape of flat-topped hills that crest at approximately the same elevation. In the City of Forest Lake, the bedrock is buried by 50 to over 350 feet of glacial sediment (soils are discussed in more detail in Section 2.4). Despite this thick overburden, the influence of the bedrock topography is evident at the land surface. The glaciers and meltwater streams that shaped the landforms we see today were directed by the topographic highs and lows of the bedrock surface.<sup>7</sup>

Both the glacial sediment and the bedrock are important sources of groundwater. Understanding the relationship between the bedrock topography and the surface topography is essential for understanding the occurrence and movement of groundwater in the City of Forest Lake.

Groundwater is possibly the single most valuable natural resource in the metropolitan area. Much of our potable water is gathered from groundwater aquifers, and it is therefore very important to protect that resource from pollution. The sensitivity of the groundwater to pollution is a function of the properties of the soils present, and the depth of those soils. Two levels of groundwater are typically addressed when discussing the sensitivity to pollution in Washington County, the water table system and the Prairie Du Chien-Jordan Aquifer (most heavily used source of groundwater in the County). Groundwater sensitivity is measured by the amount of time contaminants would likely take to reach the system. The groundwater sensitivity to pollution is separated into seven categories, ranging from very high to very low. Systems with very high sensitivity may have pollutant travel times of only hours to months, while pollutants in systems with very low sensitivity will probably require centuries to reach the system. The water table and aquifer systems in the City both rank low on the scale of sensitivity to pollution in comparison to the remaining portion of the County. The water table system ranges from very high to low, with the majority of the area having moderate to low sensitivity. The aquifer system ranges from high-moderate to low, with the majority of the area having low to moderate sensitivity, and very little of the area having high-moderate sensitivity.<sup>8</sup>

The Washington County Groundwater Plan 2014-2024 (September 23, 2014) defines an overarching goal to manage the quality and quantity of groundwater to protect public health and to ensure sustainable and sufficient supplies of clean water. The City of Forest Lake and Washington County will continue to partner to protect valuable groundwater resources using the County's plan as a guide for future protection.

The "Integrating Groundwater and Surface Water Management – Northern Washington County" report provides additional groundwater information specific to the Forest Lake area. Included in this report is both a groundwater resources assessment and classification for Forest Lake as well as groundwater management policies.

The "North & East Metro Groundwater Management Area Plan" (November, 2015) presented by the Minnesota Department of Natural Resources describes critical impacts to groundwater resources in the northeast metro area primarily due to rapid development. Forest Lake is situated

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<sup>6</sup> Minnesota Geologic Survey, Washington County Geologic Atlas, Surficial Geology, 1990

<sup>7</sup> Minnesota Geologic Survey, Washington County Geologic Atlas, Bedrock Topography and Depth to Bedrock, 1990

<sup>8</sup> Minnesota Geologic Survey, Washington County Geologic Atlas, Sensitivity of Ground-Water Systems to Pollution, 1990

in the North and East Metro Groundwater Management Area and should utilize the management plan to develop strategies for groundwater savings.

The surface topography divides the City into three main watersheds; Rice Creek, Comfort Lake-Forest Lake, and Carnelian Marine (see Figure SW-02). The political boundaries of the Watershed Districts differ slightly from the topographic drainage boundaries. Politically, only Rice Creek Watershed District (RCWD) and Comfort Lake-Forest Lake Watershed District (CLFLWD) have jurisdiction within the City of Forest Lake municipal boundary, regardless of the fact that a portion of the City lies within the Carnelian Marine topographic drainage boundary. The acreages of each of the watersheds located within the City are summarized in Table 2 for both the political and topographic drainage boundaries.

Figure SW-02, is a map showing the contributing drainage areas and sub areas contributing runoff to each major water body and ditch within the City.

Table 2: Area of the City within each of the watershed districts.

Watershed District	Area (ac)	Percent
Rice Creek Watershed District	10273	45%
Comfort Lake Forest Lake Watershed District	12483	55%

Rice Creek begins at Clear Lake and generally flows southwest to the Mississippi River. The confluence with the Mississippi is located in Fridley.

The next largest creek in the City is Hardwood Creek. Hardwood Creek begins in central Hugo and flows north to the City, quickly turns southwest, and exits after a short duration within the City limits. The creek continues generally west to its confluence with Rice Creek in the northeast quadrant of Lino Lakes.

Several judicial ditches drain to Rice and Hardwood Creeks. Generally, judicial ditches consist of drain tiles with intermittent flow in the upstream reaches. As they propagate downstream, flows increase, become perennial, and are usually comprised of open ditches or creeks. Judicial Ditch 4 has four branches located in the southwestern quadrant of the City that generally flow west until reaching their confluence with Rice Creek in the southeast corner of the City of Columbus. Judicial Ditches 5 and 7 are located in the south-central area of the City and connect to Hardwood Creek (Judicial Ditch 2). Judicial Ditch 6 is located in the eastern area of the City.

This ditch conveys flows north to Forest Lake. The area serviced by Judicial Ditch 6 is within the jurisdiction of CLFLWD.

Drainage in the north and northeast areas of the City is dominated by the presence of Forest Lake. The majority of the existing ditches are relatively short, intermittent, and drain to the lake. The only reach located within the Comfort Lake-Forest Lake area of the City with perennial flows is the reach located in the northwest area of Forest Lake that receives discharge from the lake.

The RCWD and CLFLWD are the ditch authorities for the public drainage systems in Forest Lake and manage the right to maintain and repair the ditch system in accordance with the Minnesota state statutes and policies.

### 3.4 SOILS

The soils information in this section is taken from the USDA-NRCS Soil Survey of Washington and Ramsey Counties. The soils maps in that report are general and intended for broad planning purposes. The major soil associations found within the City are summarized below. Details on the soils included in each association can be found in the aforementioned report. The generalized soils located within the City have been mapped, and are shown on Figure SW-06.

The most abundant soils found in Forest Lake are the Nessel-Dundas-Webster and Hayden-Nessel-Dundas associations. They are generally located in a swath that is aligned in the southwest to northeast direction. A centrally-located break is aligned in the northwest to southeast direction, separating the Nessel-Dundas-Webster association to the southwest, and the Hayden-Nessel-Dundas to the northeast.

The next most abundant soil type in the area is the Zimmerman-Isanti-Lino association. This association is found prevalently in the southeast corner of the city, with a small portion also located in the northwest corner of the City.

The remaining associations found in the City are the Antigo-Chetek-Mahtomedi, Demontreville-Kingsley and Braham-Blomford-Urban Land associations. All of these associations are found in relatively small quantities, with the Antigo-Chetek-Mahtomedi located to the east and the other two associations located on the north side of Forest Lake.

The Nessel-Dundas-Webster association (Soil Group #5) was formed dominantly in glacial till. It consists of level to gently undulating soils, moderately well drained and poorly drained soils, moderately coarse textured and medium textured soils, and is typically found on uplands.

Typically, the Nessel soils are found on slight rises, low knolls, and broad tops of low hills, and are moderately drained. Dundas soils are generally located in drainage ways and low-lying areas, and are poorly drained. Webster soils typically occupy low-lying areas and small drainage ways, and are poorly drained.

The Hayden-Nessel-Dundas association (Soil Group #6) was also formed dominantly in glacial till. It consists of level to gently rolling soils, well drained, moderately well drained, and poorly drained soils, moderately coarse textured soils, and is typically found on uplands. Typically, the Hayden soils are found on irregular hills and knolls, and are well drained. Nessel soils are generally located on slight rises, low knolls, and broad tops of low hills, and are moderately well drained. Dundas soils typically occupy small flats adjacent to drainage ways in the upland, and are poorly drained.

The Zimmerman-Isanti-Lino association (Soil Group #1) was formed dominantly in outwash. It consists of level to steep soils, excessively drained, somewhat poorly drained, and very poorly drained soils, coarse textured soils, and is typically found on outwash plains. Typically, the Zimmerman soils are found on convex parts of knolls, ridgetops, and side slopes near drainage ways and depressions, and are excessively drained. Isanti soils generally occupy depressions and low lying flats, and are very poorly drained. Lino soils typically occupy small flats and depressions, and are somewhat poorly drained.

The Antigo-Chetek-Mahtomedi association (Soil Group #2) was formed dominantly in outwash. It consists of nearly level to steep soils, well drained to excessively drained soils, and medium textured to coarse textured soils. The Antigo soils are generally found in nearly level to gently rolling areas and are well drained. The Chetek soils are generally found in nearly level to steep areas and are somewhat excessively drained. The Mahtomedi soils are generally found in undulating to steep areas and are excessively drained.

The Demontreville-Kingsley association (Soil Group #8) was formed dominantly in a sandy mantle and the underlying glacial till and in glacial till. It consists of undulating to steep soils, well drained soils, coarse textured and moderately coarse textured soils, and is typically found on uplands. Typically, the Demontreville soils are located on convex crests and upper parts of side slopes, and are well drained. Kingsley soils are generally on convex crests and upper parts of side slopes, and are well drained.

The Braham-Blomford-Urban Land association (Soil Group #9) was also formed dominantly in a sandy mantle and the underlying glacial till and in glacial till. It consists of nearly level to hilly soils, well drained and poorly drained soils, coarse textured soils and urban land, and is typically

found on uplands. Typically, the Braham soils occupy slightly concave to convex side slopes and crests of knolls and hills, and are well drained. Blomford soils generally occupy small depressions, drainage ways, and flats, and are poorly drained. Urban Land consists of areas of residential development and is covered by concrete, asphalt, and buildings. Most soil materials around building foundations and most fill materials used to support structures consist of Braham or Braham like soils that have been cut or graded.

### 3.5 LAND USE

As mentioned in the introduction, the City is currently experiencing steady growth and development. The City uses its authority to plan future land uses, helping guide the development of the City and ultimately result in the creation of an enjoyable place to live.

Figure Sw-03 shows the City's current land use. Figure SW-04 shows the current zoning. Finally, Figure sw-05 shows the future 2040 land use. Descriptions of each land use follow below, used for planning purposes. Additional land use information can be found in the City's 2040 Comprehensive Plan.

- **Conservancy:** This category provides protection for areas with valuable natural resources. These are portions of the community that are particularly environmentally sensitive and include large, contiguous wetland areas. These areas include a large wetland complex that includes Hardwood Creek and the Hardwood Creek Wildlife Management Area, two smaller wetland areas north of Forest Lake, and part of Lamprey Pass Wildlife Management Area. Residential density permitted at one home per 40 acres.
- **Agricultural:** This district preserves areas for interim or permanent agricultural uses, preserving the rural character of outlying areas of the city and permitting a mixture of rural, large lot residential development and agricultural related uses. The maximum allowable density in these areas is one home per 10 acres. In areas within the city's future urban service area residential density will be at one home per 20 acres
- **Rural Residential:** Residential purposes include one-family homes. It may also include land used for agricultural purposes or plant nurseries. The Rural Residential designation comprises areas that are difficult to serve with municipal wastewater treatment systems and that will be so in the foreseeable future. The maximum allowable density in these areas is one home per five acres.
- **Low Density Residential:** This category identifies areas for single family detached residential development at a density of 1.5 to 3 units per acre.
- **Low-Medium Density Residential:** Residential purposes include one-family homes, both detached and attached, and two-family homes. Open or park space may be included within or adjacent to or related to a residential development. The density mix of attached and detached housing units is to maintain an overall average unit density of 3.6 units per acre.
- **Medium Density Residential:** These areas are intended to provide townhome development, multiplex development, and row homes at densities of 6 to 10 units per acre.
- **High Density Residential:** Residential purposes include duplexes, triplexes, townhomes, apartment buildings, and condominiums. It may also include open space within or adjacent to or related to a residential development. Density is intended to be 10 to 15 units per acre of greater.

- **Neighborhood Commercial:** This category is intended to be neighborhood based and include uses such as a small grocery or convenience store, coffee shop/deli, and personal and health type services for Forest Lake’s residents. The site and architecture design should be of scale and design compatible with the surrounding uses.
- **Highway Commercial:** Land guided for highway commercial is intended to accommodate uses that provide a wide range of goods and services that serve the needs of people who live or work in and around the City. This category also provides for general and light industrial uses allowed in underlying zone.
- **General Business:** This use is intended to accommodate general commercial businesses such as fast food restaurants, convenience stores, gas stations, big box retail, and other auto-oriented businesses. Limited office and service uses are also appropriate depending on scale and location.
- **Business Park:** This category provides for offices, wholesale showrooms, light manufacturing, research and development, and training. These areas are along major arterial corridors to provide easy access to businesses, accommodating larger site development.
- **Industrial:** This category mainly allows manufacturing and/or the processing of products and could include light or heavy industrial land use or large warehouse facilities.
- **Mixed Use:** The purpose of this category is to provide areas for compact, walkable, mixed use development along key community corridors and to support high quality development and site flexibility due to the unique site conditions in these areas. These districts permit a range of retail, office, service, and multi-family residential uses with residential densities between 10 to 15 units per acre.
- **Park and Open Space:** Primarily for public active recreation activities with playfields/ground, exercise equipment, or other similar areas and passive open space park amenities. Typical uses include tot lots, neighborhood parks, community parks, ball fields, public golf courses, public gardens, greenways and trail corridors, beaches, and community centers.
- **Public Institutional:** This category includes lands owned by the city for public use, religious, or educational facilities.
- **Open Water:** This category includes permanently flooded open water, rivers, and streams not including wetlands or periodically flooded areas.
- **Major Road Right-of-Way:** This category includes public or private vehicular, transit, and/or pedestrian right-of-way.

### 3.6 KEY WATER RESOURCES

The City of Forest Lake has a significant number of waterbodies within its boundaries each lying within either the Rice Creek Watershed District (RCWD) or the Comfort Lake –Forest Lake Watershed District (CLFLWD). While the City has the ability to petition each of these oversight organizations to self- manage the rules and policies of each district, the city has decided to defer this responsibility due to the cost and staffing requirements of management. Therefore, all water resources in the City will be managed by each respective watershed district. The City will continue to manage water resources on a watershed basis and in accordance with the respective

watershed district rules as agreed upon within this report. The Minnesota Department of Natural Resources (MNDNR or DNR) also plays a role in the protection of public waters, which are abundant within the City. Key water resources and DNR protected waters are shown on Figure SW-07. DNR protected waters are also listed in Table 3. Specifics on key water resources located within the City follow below. Figure SW-08 displays the natural areas, open spaces and regional significant ecological areas (RSEA) in Forest Lake.

### 3.6.1 Lakes and Ponds

The lakes located within the City of Forest Lake include: Forest, Clear, Mud, Higgins, Keewahtin, Shields, Cranberry, Twin, and Elwell. Forest Lake and Clear Lake stand out from the list as larger lakes with public accesses and high recreational use. Also, Shields Lake has a public fishing pier and supports recreational use. Keewahtin Lake does not have a public access, but is the only other lake in the area that the DNR lists as supporting recreational use. In general, the larger and deeper the lake, the higher the lake quality will be. All other lakes in the area are not typically utilized for recreation purposes. They are generally smaller and shallower, with large wetland fringes. While these lakes do not support recreational use, their habitat and water quality benefits are invaluable.

In coordination with the High School/Industrial Park Drainage Study, the City utilizes a regional ponding approach. The ponds included in the City's drainage system are critical in reducing flooding and overland flow, protection of receiving waters from nutrients and contaminants, and reduction in storm sewer sizes resulting in an overall more cost-effective stormwater drainage system.

RCWD completed the Clear Lake Diagnostic Study in February, 2012. The comprehensive assessment utilized targeted sampling to identify the highest contributors to nutrients and sediment and utilized a calibrated water quality model to determine the required pollutant removals to protect the lake. The study also identified numerous projects to help sustain Clear Lake and keep it off the impaired waters list.

CLFLWD completed the Forest Lake Diagnostic Study and Implementation Plan (updates in 2016) in conjunction with the Forest Lake South Stormwater Retrofit Analysis (March 2014), the Forest Lake North Stormwater Retrofit Analysis (January 2016) and the Forest Lake Enhanced Street Sweeping Plan (October 2017). The report identified key pollutant inflow points and prioritized projects in adjacent watersheds to reduce pollutant loading and protect Forest Lake.

### 3.6.2 Rivers and Creeks

Forest Lake and its tributary area serve as the majority of the headwaters for the Sunrise River. The previously abandoned JD 2 (within the CLFLWD) and its tributary area comprise the Sunrise River's remaining headwater area. The Sunrise River begins at the outlet of Forest Lake and exits Forest Lake across the northern boundary heading northeast. The Sunrise River continues in the northerly direction, flowing through Comfort Lake, the Carlos Avery State Wildlife Management Area, and eventually to the St. Croix River.

Two creeks exist within Forest Lake, Rice Creek and Hardwood Creek. Clear Lake and its drainage area are the headwaters for Rice Creek. Rice Creek flows west across the City boundary through Mud Lake and Howard Lake, then flows southwest to the Mississippi River where it terminates. Hardwood Creek begins south of Forest Lake in central Hugo, runs through the south-central area of Forest Lake, and then flows west to Rice Creek where it terminates.



### 3.6.3 Wetlands

The formation of the topography within the City of Forest Lake (discussed in Section 2.3) resulted in a generally flat topography. The flat topography has gradual high and low areas. Those low areas are home to the well over one thousand (NWI) wetlands located within the City limits, as shown on Figure SW-07.

Shortly following the City's unification with the Township, a Wetland Inventory and Assessment project was completed for the High School and Industrial Park areas. Wetland data gathered for that study include existing impacts, hydrology, inlet and outlet characteristics, adjacent land use, and vegetation type, quality, and species. That data was then used to determine each wetland's overall quality, stormwater susceptibility, and restoration potential. The wetlands inventoried for that study supersede the NWI wetlands within that project's study area limits. Figures 5-1 through 5-4 from the Wetland Inventory and Assessment report illustrate the stormwater susceptibility of the wetlands assessed with that report and have been included at the end of this report for reference.

In addition to the City's efforts of identifying and assessing wetlands, the RCWD completed a wetland inventory along JD 4 as a part of a Resource Management Plan (RMP) which included a State WCA Comprehensive Wetland Protection and Management Plan (CWPMP) (December, 2007). The results from the RMP are available on the District's website [www.ricecreek.org](http://www.ricecreek.org). These inventories must be referenced in combination with a site-specific assessment when a project is located within the study and subsequent regulatory boundaries.

For areas not included in the Wetland Inventory and Assessment Report, Section 6.3.2, Water Quality Design Standards, lists the steps necessary to determine a wetland's stormwater susceptibility. Section 4 of the Wetland Inventory and Assessment Report has been included in this report's appendices for reference. This section describes the project methodology, and lists steps taken to determine a wetland's rank and stormwater susceptibility. Once a wetland's stormwater susceptibility is known, Table 14 in this report should be referenced to determine the stormwater phosphorus pretreatment requirement to be met prior to discharge to that wetland.

### 3.6.4 Groundwater Characteristics

Information on the City's geologic and groundwater characteristics, including geologic features, groundwater sensitivity, groundwater discharge and recharge areas, and the influence of land use on groundwater can be found in the City's Wellhead Protection Plan (WPP). The WPP was completed for the City of Forest Lake by Bolton & Menk, Inc. in April, 2017.

The WPP does not discuss any conflicts between City infiltration requirements and wellhead protection goals and policies. However, to ensure compliance with objectives listed in the WPP, no infiltration practices should be allowed within the Inner Wellhead Management Zones (IWMZ, 200' radius) of each well within the City. A copy of this plan can be obtained at City Hall.

Table 3: DNR Public Waters.

Type	Name	Watershed*	DNR ID	Area (acres)	Max. Depth (ft)	Average Water Elevation (ft)	OHW** Elevation (ft)	Highest Recorded Water Elevation (ft)
Lake	Clear	RCWD	82-0163	424	28	889.13	889.5	891.1
	Cranberry	CLFLWD	82-0161	21~	n/a	901.88	903	902.47
	Elwell	CLFLWD	79W	4~	n/a	918~	n/a	n/a
	Forest	CLFLWD	82-0159	2251	37	901.43	901.8	902.23
	Higgins	CLFLWD	2-2P	73~	n/a	900~	n/a	n/a
	Mud	RCWD	82-0168	187	4	889.29	n/a	889.37
	Shields	CLFLWD	82-0162	26	27	902.16	902.5	903.99
	Keewahtin	CLFLWD	82-0080	75	34	936.79	937.1	938
	Twin	CLFLWD	157W	6~	n/a	912~	n/a	n/a
River	Sunrise	CLFLWD	-	-	-	-	-	-
Creek	Rice	RCWD	-	-	-	-	-	-
	Hardwood	RCWD	-	-	-	-	-	-
Ditch	JD 2	CLFLWD	-	-	-	-	-	-
	JD 5	RCWD	-	-	-	-	-	-
	JD 6	CLFLWD	-	-	-	-	-	-
Wetland	See Note Below							

\* Jurisdictional Boundary

\*\* Ordinary High Water Level as defined by the Minnesota Department of Natural Resources.

~ Estimated

n/a = not available

**NOTE:** Approximately 35 DNR protected wetlands are located within the RCWD, and 30 within the CLFLWD. Approximate wetland boundaries are shown on Figure SW-07. The DNR Protected Waters Maps should be referenced for accuracy and for the DNR Protected Wetland IDs.

## **4. GOALS AND POLICIES**

### **4.1 PURPOSE**

The primary purpose of this LWMP is to provide clear guidance on how the City of Forest Lake intends to manage its surface water. Over time, significant advancement has been made in our understanding of how natural and manmade systems function in the context of rainfall, infiltration and runoff. New regulations have been created that reflect increased protection for waterbodies and emphasize treatment of stormwater to protect downstream resources and groundwater. This LWMP provides the blueprint for how the City intends to be responsive to stormwater management priorities. The City's current ordinances for Stormwater Management, Grading and Erosion Control, Shoreland Controls and Floodplain Management are provided in Appendix B. The City's ordinances for stormwater management are organized as follows.

- Chapter 151: Stormwater Management
- Chapter 153: Zoning Code
  - Land Alterations and Grading Regulations
  - Zoning District Regulations
  - Shoreland Overlay District
- Chapter 154: Flood Plain Management

A number of the City's goals and policies are guided by federal, state, regional and local mandates (see the Appendix), while others arise out of the City's own desire to protect its natural resources. A number of regulations, strategies and tools have emerged to manage the City's land and water resources effectively. The goals and policies outlined in this section represent the City's efforts to regulate stormwater discharges within its developed area. These regulations are, in part, to fulfill the City of Forest Lake's responsibility as an MS4 regulated operator of a stormwater system. However, because of limited budgets and staff, and the level of effort extended by the local watershed districts, the City has opted to defer enforcement of stormwater requirements for qualifying projects to the respective watershed districts. Both RCWD and CLFLWD have utilized their resources to study existing resources within the City and develop regulations to protect these resources. Therefore, each watershed districts' rules will apply to the respective portions of the City in which they are located (see Figure SW-02). Together these entities make up the body of strategies and regulations that guide the protection and management of the water resources within the City.

The watershed districts' regulations are often triggered under lower land disturbance and other project activity thresholds than those defined in the City's ordinance. However, a request for variance of the City's ordinance may be requested that is also a variance of watershed district regulation. All requests for variance of the City's ordinance affecting surface or groundwater resources will be submitted to the applicable watershed district for review. The City and watershed districts will work together to understand the impact of the variance request and to ensure that proper sequencing has been performed.

### **4.2 BACKGROUND**

This section of the LWMP outlines goals and policies related specifically to surface water management. The goals and policies are consistent with the requirements of Minnesota Rules 8410, and demonstrate a desire, willingness, and commitment by the City to reach and sustain a high quality of life for its residents.

### 4.3 OVERVIEW

An overview of the goals and policies is presented in Table 4. Details on the goals and policies follow.

Table 4: Overview of Goals and Policies.

#	Goal	Policies to Support Goal
1	Flood Protection	Reduce potential for flooding, control excessive rates of runoff and volume.
2	Stormwater Runoff Quality	Improve runoff water quality through regulation of development, erosion and sediment control, and education of proper fertilizer use.
3	Protection of Valuable Resources	Set stormwater management standards, preserve and enhance wetlands, and protect shorelines and slopes. Monitor and document changes in surface water resources.
4	Surface Water System - Design, Construction, Regulation and Use	Regulate the construction of the surface water system through standards and review, enforcement procedures, inspection and maintenance requirements. Policies also include low impact development and impervious surface reduction.
5	Surface Water System - Operation and Maintenance	Manage the surface water system through inspection and maintenance, good housekeeping practices and education.
6	Natural and Recreational Resources - Preservation, Enhancement and Maintenance	Preserve and enhance natural and recreational resources through riparian connectivity.
7	Erosion and Sediment Control	Control or eliminate soil erosion and sedimentation. Establish standards and specifications for conservation practices and planning activities that minimize erosion and sedimentation.

### 4.4 GOAL 1 - Control Rates and Volumes of Stormwater Runoff for Flood Protection.

#### 4.4.1 Policy 1.1 - Reducing potential for flooding.

The City will pursue a policy of reduction of flood potential through land use changes or structural measures, as it deems appropriate. The City may employ any or all of the following means:

- A. Control excess runoff through plan review.
- B. Construct dry detention basins.
- C. Construct stormwater ponds.
- D. Use design standards that reduce the probability of flooding in problem areas during critical periods.
- E. Upgrade existing storm sewers in areas known to have flooding problems.

- F. Provide more inlet capacity by replacing grates with higher capacity models.
- G. Construct more catch basins.
- H. Increase inspections and maintenance of inlets and drains located in flood-sensitive areas.
- I. Utilize infiltration practices where feasible.

#### 4.4.2 **Policy 1.2** – Design storms and critical conditions

For new construction and other activities associated with new development or redevelopment, computed post-development peak flow rates will not exceed computed existing peak flow rates for Atlas 14 24-hour duration rain fall depths.

Post development peak flow rates will not exceed existing peak flow rates for the 2-year (2.8 inches in 24 hours), 10-year (4.2 inches in 24 hours), and 100-year (7.0 inches in 24 hours) storm events.

Conveyance facilities will be designed to convey the 10-year storm event without surcharging (in accordance with Rational Method procedures). Conveyance facilities will be designed to convey the storm events as described in Section 6.3, Design Standards.

#### 4.4.3 **Policy 1.3** - Peak flow rate limits

There will be no increase in peak flow rate over the existing peak flow rate for the design storms referenced in Policy 1.2 (see Design Standards in Section 6.3). As opportunities for new development and redevelopment arise, the City will use its plan review process to identify existing deficiencies and potential flooding problems at the site where development is proposed as well as downstream areas. If the review indicates increased flooding potential for downstream areas, the City will require the developer to incorporate such practices as are necessary to resolve a proportionate share of the problems to mitigate the downstream impact of such development. These standards are intended to preserve the integrity of downstream conveyance facilities and detention areas.

#### 4.4.4 **Policy 1.4** – Requirements for redevelopment

Stormwater quantity and quality design standards will be enforced for redevelopment of existing sites that have substandard or no on-site stormwater facilities. The City will encourage and promote stormwater management in redevelopment and new developments to include:

- A. Meet the redevelopment requirements defined by CLFLWD and RCWD.
- B. A reduction in impervious area and/or limit impervious coverage as outlined in the City zoning requirements; or
- C. The implementation of stormwater management practices; or
- D. A combination of both (a) and (b); and
- E. The Water Quality requirements as per Design Standards in Section 6.3.

#### 4.4.5 **Policy 1.5** – Freeboard requirements

Freeboard requirements will be implemented to provide new structures protection from any immediately adjacent surface waterbody, wetland or stormwater basin flooding. Additional protection may be required for landlocked areas with no identifiable overflow route (see Design Standards in Section 6.3).

#### 4.4.6 **Policy 1.6** – On-site basins vs. regional detention basins

Regional stormwater facilities provide a cost effective approach to stormwater management and will be utilized when feasible.

#### 4.4.7 **Policy 1.7** – Impervious surface reduction/minimization

The City encourages reduction of, or minimizing increases in, the amount of impervious surface created as a result of land development or redevelopment activities through the development review process.

#### 4.4.8 **Policy 1.8** – Preservation of flood storage

The City will maintain a policy of “no net loss of storage capacity” in designated stormwater basin ponding areas, and of at least maintaining the existing level of flood protection for all areas within a given watershed.

Compensatory storage will be required to mitigate fill within wetlands, ponds, and other similar runoff storage sites. Compensatory storage will be provided for flood storage lost below the City’s calculated high water level plus freeboard. This requirement applies to all development and redevelopment activities, regardless of size.

#### 4.4.9 **Policy 1.9** – Emergency overflows

The City will attempt to establish and maintain overflow routes, including stormwater basin overflows where feasible to provide relief from storms which exceed design conditions, provided that downstream areas would not flood due to the overflow operation.

### 4.5 **GOAL 2: Treat Stormwater Runoff To Protect Receiving Waterbodies.**

#### 4.5.1 **Policy 2.1** – Limiting phosphorus in runoff

The City will limit phosphorus levels in runoff by regulating all new developments and redevelopment through plan review in accordance with the City’s water quality requirements (see Section 6.3) developed by the City for all receiving waterbodies within its jurisdiction.

#### 4.5.2 **Policy 2.2** – Infiltration

Where soil conditions permit, and it is feasible, infiltration is required in new development and redevelopment in the City per the MPCA Construction Stormwater Permit, CLFLWD Rules and RCWD Rules. The City’s infiltration guidelines, summarized in Section 6.3.3, should be followed.

#### 4.5.3 **Policy 2.3** – Additional treatment for protection of downstream priority waterbodies

The City will require additional treatment, as a condition of approval for new developments and redevelopment, where necessary to protect the water quality of downstream priority waterbodies. This may be required even though improvements or ponds already exist.

#### 4.5.4 **Policy 2.4** – Use of natural site characteristics for stormwater management

The City will promote the use of natural resources and natural site characteristics for storing runoff and to improve water quality where appropriate. When natural depressions are determined to be wetlands, an appropriate level of pretreatment is provided as outlined in Section 6.3.2, Water Quality Design Standards.

#### 4.5.5 **Policy 2.5** – Erosion control for construction sites

The City will review plans to minimize the potential for erosion and sedimentation prior to construction. The City will also inspect new development and redevelopment sites during construction to enforce the finalized erosion and sediment control plans.

#### 4.5.6 **Policy 2.6** – Fertilizer policy

The use of phosphate-based fertilizer should be limited or eliminated to aid in the protection the City's water resources.

The City will apply the CLFLWD fertilizer application standards for areas immediately adjacent to wetlands, lakes, ponds and streams. The City will also educate citizens on the proper use of fertilizers.

#### 4.5.7 **Policy 2.7** – Total Maximum Daily Load/Waste Load Allocations

The City will work with RCWD, CLFLWD, Washington County and other project partners to identify projects in the subject watershed to meet the goals of the TMDLs and waste load allocations. The City will continue to implement projects, such as the Enhanced Street Sweeping Plan, and other MS4 Requirements.

### 4.6 **GOAL 3: Protect The City's Valuable Water Resources.**

#### 4.6.1 **Policy 3.1**– Stormwater management standards

Through the establishment of water quality goals and planning, the NPDES Phase II MS4 Permit, and local watershed district rules, the City has adopted stormwater management standards according. These standards include but are not limited to:

- A. Controlled rate and volume of runoff for discharges to creeks, areas prone to flooding, and areas with infrastructure limitations.
- B. A reduction in nutrients for stormwater discharging to lakes and wetlands.
- C. A reduction in stormwater runoff volume in areas that are not limited by soil conditions, depth to ground water table, industrial land uses and other known sources of soil contamination.

The standard for water quality treatment are defined in the City's Design Standards, as per the Water Quality Requirements (see Section 6.3), and in compliance with the design and performance standards for Best Management Practices (BMPs) as outlined in the Minnesota Stormwater Manual and Minimal Impact Design Standards (MIDS). Specific BMPs require approval by the City.

#### 4.6.2 **Policy 3.2** – Detention pond design

All stormwater ponds will be designed as per design requirements outlined in the Design Standards (see Section 6.3). Ponds will be designed for phosphorus removal based on level of protection required by the downstream waterbody.

#### 4.6.3 **Policy 3.3** – Joint use of stormwater facilities

At its discretion, the City will allow shared or joint use of stormwater facilities in new developments and redevelopments, including public or private stormwater basins.

The City will continue to coordinate with government entities such as Watershed Districts, the Minnesota Department of Natural Resources (MNDNR), highway departments, neighboring cities, Washington County, and the Metropolitan Council as necessary.

#### 4.6.4 **Policy 3.5** – Wetland inventory

The City will compile an inventory of wetlands as land comes into the City for development. It will also develop and maintain an inventory of constructed wetlands in order to make the inventory as comprehensive as possible.

#### 4.6.5 **Policy 3.6** – Wetland buffer

In order to maintain water quality, reduce flooding and erosion, and to provide sources of food and habitat for a variety of fish and wildlife, buffer strips shall be provided and maintained around all natural environment lakes and streams and type 3, 4, and 5 wetlands. A minimum buffer width of 50 ft is required for natural environment lakes and a 10 ft buffer is required on stormwater ponds. Wetland buffers are equivalent to 50% of the required wetland setback.

#### 4.6.6 **Policy 3.7**– Conservation and enhancement of wetlands and “no net loss”

The City will work to enhance and preserve existing wetlands. The City will pursue opportunities to introduce wetlands at appropriate locations. The City will pursue a policy of no net loss in quantity, quality, and biological diversity of wetlands in accordance with current Wetland Conservation Act (WCA) requirements.

#### 4.6.7 **Policy 3.8** – Fringe wetlands

Where feasible, the City will encourage the introduction of fringe wetlands in the vicinity of existing waterbodies to enhance water quality and provide wildlife habitat as area is volunteered and/or as required in the City’s shoreland ordinance.

#### 4.6.8 **Policy 3.9** – Wetland Conservation Act (WCA) administration

The City will act as the local government unit for protection of wetlands and administration and enforcement of WCA within the City’s limits for areas within the CLFLWD, while the RCWD currently administers and enforces WCA within their jurisdictional boundary.

#### 4.6.9 **Policy 3.10** – Shoreland and floodplain protection

The City will continue to protect shoreland and floodplain through structural and vegetative techniques as well as regulatory measures. The City will introduce native vegetation wherever feasible.

#### 4.6.10 **Policy 3.11** – Bank and slope stabilization for priority waterbodies

The City will continue to support efforts to maintain the natural appearance of a shoreline and steep slopes. And where repairs are necessary, the City will encourage the use of bioengineering, landscaping and preservation of natural vegetation as a means of stabilizing the shoreline.

#### 4.6.11 **Policy 3.12** – Groundwater protection

The City will continue to partner with Washington County and utilize its Groundwater Protection Plan as a guide for sustainable groundwater protection and preservation. The City will also update its Drinking Water Supply Plan to align with Washington County’s Plan and Minnesota Department of Natural Resources (MnDNR) requirements.

### 4.7 **GOAL 4: Regulate The City’s Surface Water System to Ensure Proper Design, Construction, and Use.**

#### 4.7.1 **Policy 4.1** – Standards and review

The City will continue to review information in site plan submittals for completeness and compliance with its standards and will periodically revise these requirements to reflect current engineering practice.

#### 4.7.2 **Policy 4.2** – Enforcement procedures and penalties

The City will continue to implement code enforcement procedures and penalties that help ensure compliance with its design standards.



#### 4.7.3 **Policy 4.3** – Inspection

Stormwater management facilities will be inspected during construction and periodically after construction to determine that proper construction, operation, and maintenance is ongoing.

#### 4.7.4 **Policy 4.4** – Maintenance and regulation of stormwater facilities

- A. All stormwater facilities should include a detailed maintenance plan or provision for easement to be approved by the City.
- B. Stormwater facilities will be maintained in proper condition for sustained use, consistent with the performance standards for which they were originally designed. Settled materials will be removed, and planted materials will be maintained periodically.

#### 4.7.5 **Policy 4.5** – Illicit discharge in storm sewer system

The City prohibits the dumping of foreign material into the stormwater management system, including oil, gasoline, antifreeze, paint, solvents, herbicides/pesticides, grass clippings/leaves, pet wastes, and other ecologically harmful chemicals. The City will educate the public via their website (primarily), and will continue to respond to complaints received from the public.

The NPDES Phase II MS4 permit includes regulation and enforcement response procedures for illicit discharges outlined in the City's Stormwater Pollution Prevention Plan (SWPPP).

### 4.8 **GOAL 5: Operate and Manage the City's Surface Water System Consistent with Best Current Practices.**

#### 4.8.1 **Policy 5.1** – Projects to correct existing deficiencies, if identified in the system, will follow the priority listing shown below:

- A. Projects designed to reduce or eliminate flooding of structures in known problem areas.
- B. Projects designed to improve water quality in receiving creeks, lakes and wetlands.
- C. Projects designed to reduce or eliminate flooding potential of structures in the 100-year floodplain.
- D. Projects designed to improve creeks and restore wetlands and habitat.
- E. Projects designed to reduce maintenance costs.

#### 4.8.2 **Policy 5.2** – Stormwater system inspection and maintenance

The City will continue to be actively engaged in stormwater inspection, operation and maintenance, and repair of the stormwater system on a day-to-day basis. The City will follow a formal inspection, cleaning, and repair schedule. Ponds are currently inspected once after two years following construction, then every ten years following the first inspection. Frequency of maintenance is also event-based and driven by experience and inspection history.

The City has identified procedures for inspecting stormwater ponds, identifying the quantity of accumulated sediment and schedule for cleaning the ponds to restore their water quality capacity. The procedures and timeline are summarized in the City's SWPPP. According to the City's SWPPP and the MS4 Permit, the City will conduct stormwater infrastructure inspection and maintenance based on the following timeline.

**Quarterly:** Inspect all stockpiles, storage material handling areas as identified on the facility inventory map, to determine any maintenance needs and proper function of BMPs.

**Annually:** Inspect all structural stormwater BMPs (except ponds). This includes sumps, skimmers, grit chambers, infiltration basins, rain gardens, hydrodynamic devices, etc.

**Annual SWPPP Assessment:** On an annual basis, prior to submitting the Annual Report, the SWPPP Assessment form should be filled out to determine program compliance, the appropriate of BMPs, and progress towards achieving the measurable goals as identified in the SWPPP.

The MS4 Permit required the City to establish a timeline to assess all stormwater ponds for sediment depth and resulting TP and TSS treatment effectiveness. During the summer of 2018, the City performed bathymetric assessment of the pond bottom and resulting sediment accumulation, as well as a visual inspection of pond side slopes and inlet and outlet structures. The analysis included 104 stormwater ponds and resulted in an assessment of the as-constructed pond condition, the current sedimentation condition and the total sediment accumulation. The top 10 priority ponds were identified, and, in 2019, will include sediment quality assessments, cost estimates for cleaning and a cleaning implementation schedule.

#### 4.8.3 **Policy 5.3** – Good housekeeping practices on City-owned land

The City will follow best management practices and environmentally friendly approaches in managing and maintaining City-owned land and property.

#### 4.8.4 **Policy 5.4** – Street sweeping

Citywide sweeping will take place seven to twelve times per year, in accordance with the recommended frequencies described in the 2018 Forest Lake Street Sweeping Management Plan. Additional sweeping beyond the recommended frequencies described in the plan will apply as needed. In coordination with NPDES Phase II requirements, additional sweeping is currently provided during construction. Operational routines will also employ special methods to address seasonal conditions.

CLFLWD prepared the Forest Lake Street Sweeping Management Plan to target neighborhoods that would directly benefit from increased street sweeping frequency and the expected nutrient and sediment load reductions. In 2017, the City of Forest Lake, in partnership with RCWD and CLFLWD, was awarded \$220,000 through the BWSR Clean Water Fund (CWF) to purchase a regenerative air street sweeper. The implementation plan is set to be initiated in 2019. A copy of the implementation plan is included in Appendix I. The City will begin collecting street sweeping information in 2019 and will assess street sweeping routes and frequencies. As needed, the City will modify routes and frequencies based on actual observed needs and resulting pollutant load removal (measured in pounds).

#### 4.8.5 **Policy 5.5** – Salt and sand application

When applying sand and salt to City roadways, efficient application methods will be used. All precautions will be taken to minimize salt and sand runoff in storage areas.

#### 4.8.6 **Policy 5.6** – Education

In general, the City will follow an education policy through education of citizens and staff, project specific mailings, appropriate signage, and their website.

#### 4.8.7 **Policy 5.7** – Spill Response

The City primarily relies on public sanitary sewer and drinking water distribution services. However, several individual on-site water and sewer systems still exist. In cooperation with Washington County, the City will enforce strict conformance with regulations for the design, installation, and maintenance of on-site treatment systems including minimum design, licensing,

and installation requirements of the Minnesota Rules Chapter 7080. The City's Zoning Ordinance also describes compliance with Minnesota Rules Chapter 7080.

The City will respond to pollutant spills that may impact ground or surface waters. The City's Fire Department coordinates response efforts based on established Hazmat protocols. The City will request assistance from the MPCA or other agencies as needed to respond to spill events.

All spills that have entered the storm or sanitary sewer system will be reported to the Metropolitan Council State Duty Officer. Any spill that occurs on a site with an Industrial Discharge Permit will be posted to the Spill Reporting Poster. All other Metropolitan Council requirements for spill reporting shall be met.

The City has developed an Illicit Discharge Detection and Elimination Plan and Enforcement Response Procedures in accordance with the MS4 Permit. The documents outline the required action based on the severity of the illicit discharge, strategies for repeat offence, and the hierarchy of enforcement should it be required. These documents are available on the City's website and will be updated as needed to meet the requirements of the MS4 permit.

#### **4.9 GOAL 6: Preserve, Maintain, and Enhance the City's Natural and Recreational Resources.**

##### **4.9.1 Policy 6.1 - Riparian Corridor Connectivity**

The City will make riparian corridor connectivity a goal through land use planning and park land dedication. Wherever possible, the City will attempt to preserve, maintain and create green space along riparian corridors for the benefit and enjoyment of both wildlife and people. This will promote habitat connectivity for wildlife as well as present opportunities for introduction of linear sports such as biking, hiking, inline skating, and cross-country skiing. The City's Comprehensive Park Plan, Minnesota Department of Natural Resources Regional Plan, as well as the watershed district's Watershed Management Plans all promote the use of riparian corridors. The City's goal of maintaining riparian corridors shall continue through all stages of the planning process. For example, the Community Center Concept Plan depicts large areas of natural preservation and riparian connectivity, building upon the concepts shown in the Comprehensive Park Plan.

##### **4.9.2 Policy 6.2 - Parks and Recreational Areas**

In Forest Lake, park areas are primarily for public active recreation activities with playfields/ground, exercise equipment, or other similar areas and passive open space park amenities. Parks offer vast open, vegetated spaces that help disconnect surrounding impervious areas from the connecting waterway. Further, the City maintains public golf courses, public gardens and greenways that provide access to additional open spaces. The City will continue to maintain park and recreational areas as critical open spaces and develop opportunities to enhance vegetated areas within park systems. This includes disconnection of impervious surfaces, enhanced vegetation plantings including native prairie and pollinator habitat, and reduced irrigation and/or stormwater reuse for irrigation.

##### **4.9.3 Policy 6.3 - Public Lakes**

The quality of the water flowing into a waterbody is the most important single factor influencing the quality of that waterbody and its ability to support recreational and aesthetic uses. The City, in partnership with RCWD, CLFLWD, the Lake Associations, Washington County, MnDNR, BWSR and other critical water resources stakeholders shall continue to work in harmony to strategize, prioritize, implement and maintain planning and practice to keep the public lakes of the City in good quality. For those lakes that are impaired, the City will continue to develop policy and construct projects, with funding assistance from the watershed districts, to improve water quality and bring impaired lakes back into water quality standard.

#### **4.10 GOAL 7: Control of Erosion and Sedimentation.**

**Policy 7.1** – Control or eliminate soil erosion and sedimentation within the City of Forest Lake.

City staff will continue to stay educated on the latest erosion and sediment control practices. The City will educate City residents and the construction trades community on the importance of erosion and sediment control during the land disturbance phase of construction. Along with the continued implementation and enforcement of these regulations, the City will remain constant in their vigilance to protect the City’s valuable citizen-owned natural resources.

##### **4.10.1 Policy 7.2** – Establish standards and specifications for conservation practices and planning activities which minimize soil erosion and sedimentation.

As erosion and sediment control regulations and best management practices (BMPs) change over time, the City will augment its plan review and inspection program to meet current industry and agency standards and requirements.

## 5. SYSTEM ASSESSMENT

### 5.1 OVERVIEW

The assessment of the City of Forest Lake surface water system includes both water quality and quantity. The assessment is an identification of strengths and weaknesses that have developed over time in the system. The assessment will be followed up by an appropriate allocation of resources based on prioritization of activities (see Section 6, Implementation). The City of Forest Lake will continue to work with RCWD and CLFLWD for opportunities to partner on improvement projects. Partnerships include analyses, feasibility studies, cost share, education, etc. Future projects are prioritized using a number of factors including condition of the receiving water, assessment of water quality and TMDL studies, MS4 priorities, and alignment with City projects and funding opportunities.

### 5.2 ASSESSMENT OF PROBLEMS

#### 5.2.1 Rice Creek Watershed

The Rice Creek Watershed District occupies approximately 50% of the area in the City of Forest Lake. In addition to Rice Creek, the primary surface waters in the watershed include Clear Lake, Mud Lake, Hardwood Creek, and several large wetlands.

##### A. Water Quantity Assessment

In the interest of providing proactive stormwater quantity (and quality) solutions, the City has planned regional ponding locations at two future sites, the 1st Avenue and Broadway redevelopment site and the Community Center site. This proactive approach to stormwater management is an attempt to minimize the need to correct difficult nuisance flooding problems, such as the SE corner of the intersection between Highway 61 and 190th Street North (190th Area). This area is considered to have “nuisance” flooding in that no loss of life or property has been realized, and the potential for those losses is very low.

The 190th Area has experienced springtime flooding for many years in the past. One particular property owner loses overland access to his property during springtime due to flooding of his driveway. This area is a concern for the City and the RCWD, both of which have monitored this area for the past several years. In the summer of 2003, the RCWD refurbished Branch 2 of Judicial Ditch #7, which serves the area of concern. As part of that project, a surface inlet was added to the tile line in an effort to address the springtime flooding issues in the area. The area will continue to be monitored by both entities into the future. If the addition of the surface inlet to JD 7 is determined to be inadequate for minimizing flooding in the area, additional measures to reduce flooding may be implemented in the future.

JD 5 has a similar history of flooding as JD 7. The City of Forest Lake is prepared to work with RCWD to monitor flooding as a result of the failing outlet. The City understands that RCWD will continue to monitor JD 5.

JD 2 is the confluence of JD’s 5 and 7. The City understands that function of JD’s 5 and 7 may be dependent on the function of JD 2. The City will work with RCWD as they continue to monitor JD 2.

The City continues to actively develop south of Headwaters Parkway near Fenway Avenue. The area is referred to as the Headwaters development. Development is likely to continue to progress to the south into tributary watersheds to Judicial Ditch (JD) 4. Specifically, the Main Trunk, Branch 3 and Branch 4 of JD 4 currently have limited discharge capacities and experience surface flooding. As development continues in this area, regional pond must be considered to ensure that flooding is not further perpetuated downstream. RCWD has identified this area as amongst its highest priorities for regional flood control. The City will develop a plan for regional pond,

highest priorities for regional flood control. The City will develop a plan for regional pond, reserve greenway corridors and establish drainage and utility easements for long term maintenance that will be implemented as development continues. The City and RCWD will follow 103E Ditch Regulations to ensure that appropriate segments of ditch are abandoned, realigned or altered according to state statute.

Judicial Ditch 4, including the Main Branch, Branch #3 and Branch #4 are currently experiencing capacity issues largely due to upstream development, sediment accumulation, overgrown vegetation and/or tile breakage. As development continues in this area, regional pond and greenway reserve will be imperative to regional flood protection and should be considered in detail prior to the onset of development.

**B. Water Quality Assessment**

The quality of the water flowing into a waterbody is the most important single factor influencing the quality of that waterbody and its ability to support recreational and aesthetic uses. In general, lakes with excellent water quality usually have a comparatively significant inflow of high quality groundwater. While most high quality lakes also receive surface runoff from their watershed, the volume and/or quality of the surface runoff is not enough to overwhelm the influence of the high quality groundwater.

Phosphorus is often used as a barometer of lake water quality. High levels of phosphorus often lead to blooms of algae and other aquatic plants during most or all of the summer recreation season. These blooms negatively impact the aesthetics of the waterbody because of the poor water clarity and floating scums they cause. Decomposition of the algae can also create offensive smells that further compromise the appeal of the lake.

The Metropolitan Council has prepared a lake quality report card for the Metro Area based on average total phosphorus concentrations and other data for the May through September recreation season for 119 Metro Area lakes. The report card provides an easy to understand measure of lake quality which can be compared with actual data. Table 5 lists the report card letter grade, phosphorus concentrations, chlorophyll-a concentrations, and water clarity. Total phosphorus is measured because it is typically the limiting nutrient for plant growth, chlorophyll-a is a measure of algae abundance, and a Secchi disk is used to measure the general clarity of the water.

*Table 5: Metropolitan Council Lake Quality Report Card.*

Grade	Interpretation	Total Phosphorus Concentration [TP] (ppb)	Chlorophyll-a Concentration (ppb)	Secchi Depth (meters)
A	Excellent	< 23	< 10	> 3.0
B	Good	23 - 32	10 - 20	3.0 - 2.2
C	Fair	32 - 68	20 - 48	2.2 - 1.2
D	Poor	68 - 152	48 - 77	1.2 - 0.7
F	Very Poor	> 152	> 77	< 0.7

Lakes receiving an “A” are deemed exceptional compared to other area lakes and have no recreation use impairment. Lakes with a “B” grade have very good water quality and only modest recreational use impairment, while lakes receiving a “C” are considered to have average water quality for the region and are somewhat impaired for recreational use. “D” grade lakes have poor water quality and lakes receiving an “F” grade have extremely poor quality compared with other area lakes and do not support recreational use.<sup>9</sup>

<sup>9</sup> Metropolitan Council, 2015 Study of the Water Quality of 164 Metropolitan Area Lakes

Table 6 lists the letter grades for the lakes located within the Rice Creek Watershed District and the City of Forest Lake.

Table 6: Water Quality Data for Lakes Located within the RCWD.

Lake*	Mean [TP]** (ppb)	Mean [Chlorophyll-a]** (ppb)	Mean Secchi Disk Reading** (m)	Met. Council Grade (A-F)
Clear	43	14	1.9	B-
Mud	31	8	1.1	B+

\* Lakes included in the Minnesota Pollution Control Association's (MPCA) Lake Water Quality Assessment Program.

\*\* Summertime Average

Both lakes located within the RCWD have above average water quality. As their drainage areas continue to develop, the water quality standards of the City should continue to be implemented to help ensure that the lakes' quality is preserved. The City of Forest Lake will continue to collaborate with RCWD to develop water quality practices as development occurs and retroactively treat runoff from otherwise untreated drainage areas.

The Clear Lake Diagnostic Study prepared by RCWD identified key pollutant inflow points. The Study also identified locations for best management practices to reduce the total phosphorus loading by 140 pounds per year. The City and RCWD have partnered to construct the City Center Water Quality Project and Forest Lake High School Stormwater Capture and Reuse for Irrigation Project to bring Clear Lake closer to its goal. The High School Reuse project captures stormwater from roof and parking lot areas and, in conjunction with additional BMPs and storage areas on site, is treated via ultraviolet light and pumped into the irrigation system. The project irrigates approximately 12 acres and will result in a groundwater savings of 4.1 million gallons per year.

The RCWD also proactively pursues projects to improve the overall water quality of the Rice Creek and other waterbodies within its jurisdiction. For example, the District completed the Hardwood Creek Impaired Biota (Fish) and Dissolved Oxygen TMDL Implementation Plan (July 2009).

### 5.2.2 Comfort Lake-Forest Lake Watershed

The Comfort Lake-Forest Lake Watershed District occupies approximately 50% of the area in the City of Forest Lake. In addition to Forest Lake, the primary surface waters in the watershed include Cranberry Lake, Elwell Lake, Higgins Lake, Shields Lake, Keewahtin Lake, Twin Lake, Sunrise River, and several large wetlands.

#### A. Water Quantity Assessment

The Shields Lake tributary area is an area of concern in regards to flooding within the City and the CLFLWD. Two areas are located within the tributary area of Shields Lake and adjacent to the Forest Hills Golf Course that experience drainage problems, Heath Avenue Court North and the Green Valley development. These areas are considered to have only "nuisance" flooding, similar to the 190th area in the RCWD.

Heath Avenue Court North experiences "nuisance" flooding during medium to large storm events. A portion of the Forest Hills Golf Course currently drains between two lots located on the cul-de-sac. The City storm sewer in that area was retrofitted in the past in an attempt to accommodate flows from the golf course. The modified City storm sewer adequately conveys small storm events, but was not designed to convey runoff generated on the golf course from the medium to large storm events. The golf course has committed to reducing peak flows from their

property to the City storm sewer system through the construction of storm water detention basins. These basins do not currently exist, but should be constructed in the near future.

The 208<sup>th</sup> St N and 209<sup>th</sup> St N neighborhood experiences routine flooding from an excess quantity of runoff and undersized infrastructure. This area was included in water quality planning and hydraulic modeling associated with the CLFLWD Shields Lake diagnostic work. The City has met with residents and CLFLWD to analyze the impacts of the flow diversion planned with the Forest Hills Golf Course stormwater capture and reuse project scheduled for construction in 2018-2019. Upon completion of the project, the flooding concerned will be readdressed. For this reason, the 208<sup>th</sup> St N neighborhood improvements have not been included in the Capital Improvement Plan.

Following the construction of the golf course ponds, this area will continue to be monitored by the City for flooding problems. Should flooding issues in the area persist, additional measures on the golf course may be necessary or the City may need to design and reconstruct the storm water conveyance system in the cul-de-sac.

The Green Valley development is similar in that it is located downstream of an area that generates large peak flows. Large culverts are used throughout the site to convey stormwater under driveways. Several wetlands are located adjacent to the development and are merely a couple feet of elevation difference than the roads through the development. The low roads offer little room for water surface “bounce” during storm events, resulting in overtopping of the roads and high peak flows during relatively small storm events. The City is currently studying alternatives to reduce peak flows through the Green Valley development.

#### B. Water Quality Assessment

The Metropolitan Council’s lake quality report card was used to determine a letter grade corresponding to each lake’s capacity for recreational use within the City and the CLFLWD. Details on the lake quality report card, and general water quality information have been summarized in Section 5.2.1.2, above. Table 7 lists the letter grades for the lakes located within the CLFLWD and the City of Forest Lake.

Table 7: Water Quality Data for Lakes Located within the CLFLWD.

Lake*	Mean [TP]** (ppb)	Mean [Chlorophyll-a]** (ppb)	Mean Secchi Disk Reading** (m)	Met. Council Grade (A-F)
Forest	35	15	1.8	C+
Shields	239	50.7	0.9	D-
Keewahtin	15	3.0	4.5	A

\* Lakes included in the Minnesota Pollution Control Association's (MPCA) Lake Water Quality Assessment Program (2015).

\*\* 5-Year Mean (2011 – 2017), Summertime Average

The quality of Forest Lake is comparable to the average lake quality in the Metro Area. As Forest Lake’s drainage area continues to develop, the water quality standards of the City should continue to be implemented to help ensure that the lakes’ quality is preserved. Areas in the City that currently discharge directly to the lake should be retrofitted to provide water quality treatment prior to discharge to the lake. Septic systems adjacent to lakes can also promote water quality degradation. When possible, septic systems should be taken off-line and sewage should be collected and treated at a centralized treatment plant. These actions can help to prevent sedimentation and nutrient enrichment of the lake, preventing degradation and possibly increasing the quality of the lake over time.



The Metropolitan Council determined from its monitoring results that lakes with “D” and “F” grades are typically small and shallow. Shields Lake is relative small at 26 acres, but is relatively deep for its size at 27 feet. Shields Lake is small for the size of its drainage area, which is a likely contributor to its low grade. The existing land use may also be a contributor to the low grade of Shields Lake. Within Shields Lake drainage boundary is low density residential, golf course, with the majority of the area being used for agricultural purposes. Given the high total phosphorus concentration of the lake, it’s likely that one, or a combination of, the listed land uses is contributing high concentrations of phosphorus to the lake. Pretreatment ponds would benefit the lake, though the reduction of phosphorus use within the drainage area would likely result in the highest benefit to the lake in the near future.

Keewahtin Lake is an example of a lake with exceptional recreational value, scoring off the chart for all three of the Metropolitan Council’s water quality criteria. Keewahtin Lake likely maintains its high quality through a high rate of exchange with groundwater, and relatively low impact from its drainage area.

CLFLWD has identified goals for in-lake water quality and phosphorus load reductions including the percent municipal portion of the lake drainage area. Table 8 is summary of the water bodies in the City of Forest Lake and CLFLWD. The City will continue to work with CLFLWD to prioritize water quality projects that help achieve these goals.

Table 8: Goals for In-Lake Water Quality and Phosphorus Load Reductions (provided by CLFLWD).

Lake	Forest Lake Portion of Drainage Area	10-Year In-Lake TP Goal	20-Year In-Lake TP Goal		
		In-Lake Concentration (µg/l)	In-Lake Concentration (µg/l)	Max. Load to Lake (lb/yr)	Total Load Reduction Needed (lb/yr)
Birch	7%	60	60	471	451
School	10%	50	40	452	476
Little Comfort	13%	40	40	577	678
Shields	100%	100	60	195	911
Keewahtin	38%	20	20	69	0
Forest Lake	93%	<40	<40	3312	153
Comfort	36%	40	40	2339	127

### 5.3 IMPAIRED WATER BODIES

As part of the federal Clean Water Act, the State of Minnesota is required to adopt water quality standards to protect lakes, streams, and wetlands from pollution. These standards identify how much bacteria, nutrients and other pollutants can be present and still have the water body meet its designated uses such as fishing and swimming. If a water body does not meet one or more of these standards it is identified as “impaired”.

The Minnesota Pollution Control Agency (MPCA) administers this program in which the State of Minnesota is required to identify and restore impaired waters.

To meet this requirement, the MPCA has developed a three step program in which:

- A. Assesses all waters of the state to determine if they meet water quality
- B. Lists all waters that do not meet standards
- C. Conducts studies to establish pollution reduction measures to restore the water bodies.

Once these steps are completed, each water body will have a pollutant reduction goal defined as a TMDL, or Total Maximum Daily Load, which represents the maximum amount of a pollutant a water body can receive and still meet water quality standards. The City will work with RCWD, CLFLWD and Washington County to develop actions, policies and projects to meet waste load allocations. For instance, the will implement the City-wide Enhanced Street Sweeping Plan in 2019.

The City of Forest Lake has three lakes and two streams within its boundaries which have been identified as impaired waters, as listed below in Table 9 (see also Figure SW-10).

Forest Lake was found to be impaired due to the detected levels of mercury and PCB in fish tissues. Clear Lake was also listed as impaired for mercury levels. A State-wide TMDL was approved in 2007 to address mercury reduction through a reduction in emissions incidental to mining and energy activities.

Shields Lake has been identified as having a nutrient/eutrophication impairment and was one of the six impaired lakes examined in “Six Lakes Total Maximum Daily Load Study” TMDL completed by the CLFLWD. This TMDL also addresses Moody, Bone, School, Little Comfort and Comfort Lakes. In this report, each lake is assessed for phosphorus reductions necessary to meet water quality standards. The full report is available at the Comfort Lake-Forest Lake Watershed District website <http://www.clflwd.org/>.

Clear Lake and Hardwood Creek both discharge to the Rice Creek and are upstream of 28 waterbodies within the watershed with impairments. Aside from the Statewide Mercury TMDL, TMDL studies are underway for nine of these impaired waters. Clear Lake discharges through Mud Lake to Howard Lake, which was impaired for phosphorus and delisted in 2014. Hardwood Creek discharges to Peltier and Centerville Lake, which are impaired for phosphorus/mercury and phosphorus, respectively; both lakes have approved TMDLs. The City will work with its project partners to develop projects in the JD4 watershed that will improve discharges leaving the City of Forest Lake into the lake systems. The City will also begin implementation of the City-wide Enhanced Street Sweeping Plan in 2019. In addition, a small portion of the City of Forest Lake is in the watershed which drains to White Rock Lake in Scandia. This lake has been found to be impaired for nutrients and biological indicators.

CLFLWD was awarded a BWSR Clean Water Fund grant in 2016 for the Shields Lake Stormwater Harvest and Irrigation Reuse System and Alum Treatment project. Shields Lake has been identified as the single largest pollutant contributor to Forest Lake. The project will impound water from a tributary to Shields Lake for irrigation reuse at the Forest Hills Golf Club, reducing watershed phosphorus loads to Shields Lake by 94 pounds per year. Additionally, the irrigation reuse system will supply the golf club with up to 26 million gallons of water per year, greatly reducing the demand for pumping from deep, regionally significant aquifer. A whole-lake alum treatment will also be applied to Shields Lake. The irrigation reuse system coupled with the alum treatment are expected to reduce phosphorus loads such that Shields Lake achieves a clear water state, which will reduce phosphorus loads to Forest Lake by up to 250 pounds per year.

All MS4 communities within the RCWD must address the Upper Mississippi River Bacteria TMDL. The City of Forest Lake has included provisions in their City Code for reductions in bacteria including its illicit discharge detection and elimination plan.

Table 9: Forest Lake Impaired Waters.

Lake/Stream	Impairment	TMDL Administrator	TMDL Approved
Clear Lake	Mercury	State of MN	Yes
Forest Lake	Mercury	State of MN	Yes
Forest Lake	PCB	State of MN	No
Hardwood Creek	DO, Biota	RCWD	Yes
Howard Lake	Nutrients	Delisted	
Judicial Ditch #2	Chlorides	State of MN	Yes
Lake St. Croix	Nutrients	State of MN	Yes
Little Comfort Lake	Nutrients	State of MN	Yes
Peltier and Centerville Lakes	Mercury, Nutrients	State of MN	Yes
Shields Lake	Nutrients	CLFLWD	Yes
Six Lakes TMDL <sup>1</sup>	Nutrients	CLFLWD	Yes
Sunrise River, South Branch	DO	State of MN	No
Upper Mississippi River	Bacteria	State of MN	Yes
White Rock Lake	Nutrients	State of MN	No

<sup>1</sup> Comfort Lake, Bone Lake, Shields Lake, Moody Lake, School Lake, Little Comfort Lake

#### 5.4 INTERCOMMUNITY FLOWS AND HYDRAULIC MODELING

RCWD and CLFLWD have developed regional hydraulic modeling in Forest Lake. The City has adopted these models by reference. During City street projects, regional drainage analyses and other applications, the City develops additional modeling detail that is used to supplement the watershed districts' regional modeling. As needed, these models are combined and shared amongst the project partners. Updated models for RCWD and CLFLWD are contained in the respective district Watershed Management Plan. The City of Forest Lake, RCWD and CLFLWD have entered into interagency agreements for digital file sharing, including updated geospatial and hydraulic modeling as needed.

Figure SW-12 displays the regional watershed areas modeled by the respective watershed districts. Figure SW-13 displays the City's storm sewer and ponding system. Appendix G contains modeling output from the respective watershed districts.

Forest Lake receives discharge from the City of Hugo along the southern municipal boundary through the JD 2 system. Otherwise, Forest Lake resides at the top of two major watersheds. The City of Forest Lake discharges into Columbus, Hugo and Wyoming through open ditch conveyances. The City of Forest Lake will continue to administer stormwater management rules and develop regional flood controls to ensure that flooding conditions are not perpetuated in adjacent communities. Table 10 summarizes the discharges into adjacent communities.

Table 10: Summary of Intercommunity Flows

Discharging City	Receiving City	10-Year In-Lake TP Goal			
		2-Year, 24-Hour Rainfall	10-Year, 24-Hour Rainfall	100-Year, 24-Hour Rainfall	100-Year, 10-Day Snow Melt
Forest Lake	Columbus	15	15	44	42
Forest Lake	Columbus	7	48	102	92
Forest Lake	Columbus	28	34	51	50
Forest Lake	Columbus	15	212	40	38
Forest Lake	Hugo	73	229	994	998
Forest Lake	Wyoming			190	159
Hugo	Forest Lake	42	130	703	670

\* Intercommunity flows provided by hydraulic modeling from RCWD and CLFLWD.

## **6. IMPLEMENTATION**

### **6.1 OVERVIEW**

This section of the LWMP provides a plan for regulating and managing the City's surface water system, addressing problem areas, and protecting key water resources in the City. The section assesses the adequacy of existing controls, standards, and capital improvements in the light of the City's current needs and long term objectives.

The real measure of success of the LWMP is in its implementation. Implementation of the LWMP covers a number of aspects, including:

- Regulatory administrative responsibilities
- Design standards for surface water management
- Inspecting, operating and maintaining the surface water system
- Protecting groundwater
- Public education regarding stormwater management
- Constructing prioritized capital improvements
- Financing projects and programs
- Providing a process for future amendments to the LWMP

### **6.2 REGULATORY ADMINISTRATIVE RESPONSIBILITIES**

Due to its limited capital funds and relatively small staff, the City of Forest Lake has deferred virtually all activities dealing with stormwater rules and regulations to the respective watershed districts within its boundaries.

The City does however have an obligation under the National Pollution Detection and Elimination (NPDES) Phase II program to obtain and manage a stormwater discharge permit as administered by the Minnesota Pollution Control Agency (MPCA). Under this program the City is required to write and maintain a Stormwater Pollution Prevention Plan (SWPPP) which includes regulatory responsibilities. The City's Municipal Separate Storm Sewer (MS4) Permit MN040000 was reissued in 2013.

The result of these circumstances is that the City of Forest Lake and local watershed districts share regulatory responsibility and in most cases have overlapping responsibilities. Table 11 lists the types of stormwater regulations along with the agency which regulates each activity. Figure SW-02 shows the jurisdictional boundaries of each of the two watershed districts within the City of Forest Lake.

The watershed districts' regulations are often triggered under lower land disturbance and other project activity thresholds than those defined in the City's ordinance. However, a request for variance of the City's ordinance may be requested that is also a variance of watershed district regulation. All requests for variance of the City's ordinance affecting surface or groundwater resources will be submitted to the applicable watershed district for review. The City and watershed districts will work together to understand the impact of the variance request and to ensure that proper sequencing has been performed.

The City reserves the right to re-gain local regulatory control and assume permitting authority in the future. Should the City decide to gain local regulatory control in the future, the City would assume responsibility for the adoption and enforcement of the rules and requirements of the watershed districts located within the City limits at that time.

Washington County regulates septic systems located within the City boundaries.

Table 11: Regulatory Responsibilities for Stormwater Management and Related Issues.

Regulations	City <sup>1</sup>	RCWD	CLFLWD
Land use (zoning, subdivision approval, etc.)	X		
Grading	X	X	X
Wetland Conservation Act	X	X	
Stormwater rate control	X	X	X
Stormwater quality treatment	X	X	X
Stormwater infiltration	X	X	X
Erosion and sediment control	X	X	X
Illicit discharges to storm drainage system	X	X	
Shoreland management zoning	X		
Floodplain	X	X	X
Dredging	X	X	X
Stream crossings	X	X	X
Wetland water buffers	X	X	X
Land preservation	X		
Wetland restoration	X	X	X
Project maintenance	X	X	X

<sup>1</sup> It is not the intent of the City to pursue gaining local regulatory authority at this time. However, the City reserves the right to gain local regulatory control and assume permitting authority under the terms detailed under Section 5.2.

### 6.3 DESIGN STANDARDS

The following section outlines the standards for design, performance and management of its stormwater systems developed in conjunction with 2017 changes to RCWD rules and February, 2018 changes to CLFLWD rules. As stated in the previous section (regulatory and administrative responsibilities) the design standard of each watershed district would be enforced on projects within the watershed boundaries. With these standards, the City intends this guidance to ensure that all hydrologic, hydraulic and water quality analyses will be prepared in a format that is consistent with the requirements of the City and comply with the required NPDES MS4 permit. Adherence to the City’s guidelines will facilitate timely assessment and review of proposed stormwater management systems. The City’s design standards are contained in Appendix C.

#### 6.3.1 Water Quantity

This section outlines design and management standards for water quantity. The intent of these standards is to:

- Ensure a system that is adequately sized to manage peak flows and volumes of water generated upstream and on-site.
- Prevent downstream flooding due to upstream development.
- Ensure a design that allows for economical future maintenance.
- Promote an overall high level of flood protection to all residents in the City.

#### A. Methods

- 1) The City prepared the Industrial Park and High School Districts Drainage Study in October of 2000 for the areas currently experiencing development pressure. That report includes a proposed regional ponding layout. Detailed modeling was also performed to quantify flows throughout the proposed system. Projects located within

the project area must reference the drainage study and meet design flow requirements as outlined by that plan. Additional requirements listed in this plan supersede the requirements of that drainage study.

- 2) A model that is designed around the TR-20 methodology developed by the USDA-NRCS is required when submitting calculations to the City. Due to the topography in the area, a model with the ability to account for tail water conditions is recommended. The City-preferred models are HydroCAD, XP-SWMM and Autodesk Storm and Sanitary Analysis (SSA). All models can account for tail water conditions. In certain instances, other models may be accepted by the City.
- 3) All off-site runoff that drains through proposed developments or redevelopment must be included in the proposed stormwater system design.
- 4) Post development peak flow rates shall not exceed existing peak flow rates for the 2-year, 10-year and 100-year, 24-hour Atlas 14 rainfall events, defined as follows:
  - 2-year: 2.8 inches in 24 hours
  - 10-year: 4.2 inches in 24 hours
  - 100-year: 7.0 inches in 24 hours
- 5) In some instances, more restrictive peak flow requirements may be imposed by the City. These are primarily: (1) in or upstream of areas with historic flooding within the City, (2) in storm sewers tributary to downstream under-capacity facilities, and (3) in areas where storm sewer surcharging and resulting flood damage is occurring.
- 6) Conveyance facilities should be designed to convey the 10-year storm event (in accordance with Rational Method procedures) without surcharging.
- 7) A Manning’s roughness coefficient (n) of 0.013 should be used for concrete pipe and 0.024 for corrugated metal pipe.

For non-residential and multi-family residential areas, the following impervious cover should be used:

*Table 12: Impervious Cover to be used for Parking Lots and Driveways.*

Land Cover	Impervious Cover (%)
Paved parking lots, roofs, paved driveways	100
Gravel parking lots and driveways	85

For single-family residential areas, the following impervious cover should be used:

Table 13: Impervious Cover to be used for Residential Uses<sup>10</sup>

Average Lot Size	Impervious Cover (%)
1/8 acre or less	65
1/4	38
1/3	30
1/2	25
1	20
2	12

Table 14 lists curve numbers (CN) and Rational Method runoff coefficients (C) associated with impervious cover to be used in calculations.

Table 14: Curve Numbers (CN) and Rational Method runoff coefficients (C).

Impervious Cover (%)	Curve Number, CN	Runoff Coefficient, C			
		100-year	10-year	5-year	2-year
0	61	0.33	0.22	0.17	0.10
5	63	0.36	0.25	0.20	0.13
10	65	0.39	0.27	0.23	0.15
15	67	0.42	0.30	0.25	0.18
20	69	0.45	0.33	0.28	0.20
25	70	0.46	0.35	0.30	0.22
30	72	0.49	0.38	0.33	0.25
35	74	0.53	0.41	0.36	0.28
40	76	0.56	0.45	0.40	0.31
45	78	0.59	0.49	0.44	0.35
50	80	0.63	0.53	0.48	0.39
55	82	0.66	0.56	0.52	0.44
60	83	0.68	0.59	0.54	0.46
65	85	0.71	0.63	0.58	0.51
70	87	0.75	0.67	0.63	0.56
75	89	0.79	0.72	0.71	0.61
80	91	0.82	0.76	0.73	0.68
85	93	0.86	0.81	0.79	0.74
90	94	0.88	0.84	0.81	0.77
95	96	0.92	0.89	0.87	0.84
100	98	0.96	0.94	0.94	0.92

## B. Design and Performance Requirements

### 1) General

All development and redevelopment sites that trigger applicable watershed district requirements should include with submittals a complete drainage study that quantifies the impact to downstream facilities. If the capacity of any downstream

<sup>10</sup> The impervious cover values summarized in this table are intended for use in quantification of stormwater runoff. The City's zoning ordinance should be referenced to determine impervious percentage requirements in relation to designated land use.



public storm conveyance system or culvert is surpassed during the design event, due directly to the development, the developer shall correct (mitigate) the capacity problem or construct an on-site detention facility unless approved otherwise by the City.

- a) The following standards generally apply to development and redevelopment work in the City. In some instances, more restrictive requirements may be imposed by the City. Instances where more restrictive requirements may apply: (1) in or upstream of areas with historic flooding within the City, (2) in storm sewers tributary to downstream under-capacity facilities, and (3) in areas where storm sewer surcharging and resulting flood damage is occurring.

## 2) Freeboard

- a) All new structures are required to be constructed so that the low ground elevation at the edge of the building is at least:
  - 2 feet above the peak water surface elevation for the Atlas 14 100-year, 24-hour storm event (7.0 inches in 24 hours), and
  - 1 foot above the surveyed emergency overflow elevation of any surface waterbody, wetland, stormwater basin, or low-lying areas in streets and alleys that will impact hydraulically connected areas (including storm sewer).
- b) Ponding in streets during storm events larger than the design event should be analyzed as part of the stormwater conveyance design.
  - The low ground elevation at the edge of adjacent buildings should be at least 2 feet above the peak water surface elevation in the street for the 100-year, 24- hour storm event (7.0 inches in 24 hours), and
  - The maximum depth in the street must not exceed 1 foot during a 100-year storm event.
- c) For areas hydraulically connected (including storm sewer) to landlocked ponds, or in areas without emergency overflows, freeboard should be provided to equal 3 feet above the peak water surface elevation for back-to-back 100-year, 24-hour storm events (7.0 inches in 24 hours each).

## 3) Conveyance

- a) Manholes for facilities within the public right-of-way shall be installed: at the end of each line at all changes in grade, size or alignment; at all intersections and at distances not greater than 400 feet for sewers 15 inches in diameter or less, and 500 feet for sewers 18 inches to 30 inches, except that distances up to 600 feet may be approved in cases where adequate modern cleaning equipment for such spacing is provided. Greater spacing may be permitted in sewers 36 inches in diameter or larger.
- b) Parking lot inlet capacity should match that necessary to convey, without ponding, the one-year recurrence rainfall event. Runoff from events larger than one-year can be temporarily stored within parking areas thereby reducing peak flow within the storm sewer system. The freeboard requirements defined above apply to temporary stormwater storage in parking lots.

- c) Adequate catch basins should be provided to collect runoff from the design storm event, as defined above under “Methods”, Item v. Catch basin grates should be located no further than 400 feet apart, where the runoff from the design storm exceeds 2 cfs, or where spread is calculated to enter traffic lanes, whichever is more restrictive. 2 cfs is the maximum capacity of the City standard catch basin and should not be exceeded during design.
  - d) Riprap protection is required at all pipe outlets. It should be placed to a thickness 2.5 times the mean rock diameter, or 1.5 times the maximum rock diameter.
  - e) Outlets without site-specific energy dissipation designs should have outlet velocities less than 4 to 6 feet per second depending on soil type, as approved by the City.
  - f) Pipes discharging to channels should have outlet velocities less than 4 feet per second.
  - g) Pond inlet and outlet pipes should be extended to the pond normal water level whenever possible.
- 4) Detention (Stormwater Basins)
- a) For side slopes leading to the normal water level, slopes of 4:1 or flatter are preferred. Maximum side slopes leading to the normal water level should be 3:1. Slopes steeper than 4:1 should be covered with erosion control blanket.
  - b) A minimum aquatic bench of 10' (width) at a 10:1 slope below the normal water level should be provided.
  - c) A minimum pond length-to-width ratio of 3:1 should be provided for wet ponds unless onsite circumstances prevent it.
  - d) Wet ponds designed for water quality treatment purposes should be over excavated by 20% of storage during construction to allow for sedimentation during development.
  - e) Erosion control must be provided at pond inlets and outfalls of pond outlet pipes or weirs.
  - f) Access from an existing City-owned easement or right-of-way to all basin outlet structure, inlets, and first cell of multi-cell basins must be provided. The access should be a minimum of 12' wide with maximum longitudinal and transverse slopes of 15%.
  - g) The pond inlet and outlet orientations should be such as to prevent short-circuiting. The distance between the inlet and outlet should be maximized to the greatest extent possible.
  - h) Pond outlet structures must be able to prevent trash and floating debris from entering the downstream conveyance system. If used, pond skimming devices should be designed to remove oils and floatables up to a minimum of a one-year frequency event, or a minimum of a ten-year frequency event when discharging to a wetland (WCA Rules).

- i) Wet ponds designed for water quality treatment purposes should have a minimum mean depth (storage volume below the NWL divided by the pond surface area at NWL) of 4 feet and dead storage at least equal to the runoff from a 2.5 inch rainfall over the area tributary to the pond.
- j) An emergency overflow that is capable of conveying flows greater than the 100-year storm event should typically be provided at or above the peak pond water level for the 100-year storm event. In situations where emergency overflow operation could adversely affect downstream areas, the City may preclude the use of an emergency overflow and instead require the stormwater basin to meet the requirements for landlocked basins.
- k) Pond slopes should be stabilized as soon as possible after grading so as to prevent erosion and sedimentation, in accordance with the NPDES construction site permit. Low-maintenance native plantings are preferred for slope stabilization.
- l) A conservation buffer strip is required around all stormwater ponds. The buffer shall extend from the pond's normal water level (NWL) to a 10' distance surrounding the pond. No impervious surfaces, mowing, or disturbance is allowed within the buffer strip.

### 6.3.2 Water Quality

This section outlines design and management standards for water quality. The intent of these standards is to:

- Ensure a system that is adequately sized to treat stormwater generated upstream and on-site.
- Prevent degradation of downstream waterbodies due to upstream development.
- Promote an overall high level of stormwater quality to all residents in the City.

#### A. Methods

- 1) The level of water quality treatment required of each pond design is determined by the downstream receiving water. When discharging to a wetland, the wetland's susceptibility to degradation is used to determine the upstream level of treatment. All wetlands located within the 2012 Wetland Inventory & Assessment study area, have susceptibilities that have already been determined. That plan should be referenced when developing within its study area. Figures 5-1 through 5-4 of the Wetland Inventory & Assessment Plan illustrate the wetlands stormwater susceptibility, and have been attached at the end of this report for reference. Once the susceptibility of the receiving water is known, refer to Table 15 to determine the allowable phosphorus outflow concentration from the pond.
- 2) If a wetland was not inventoried as a part of the 2002 Wetland Inventory & Assessment Plan, it should be assessed at the time that development is proposed that may impact the wetland. MNRAM should be applied by a wetland professional hired by the applicant. The City will determine the ranking for each functional value using the completed MNRAM form submitted by the applicant. The City or the applicant may request the use of a Technical Evaluation Panel (TEP) to make a decision on the functional value ranking. Final classification of the wetlands will be determined by

the City using the information contained within the completed MNRAM form and applying the criteria from the 2012 Wetland Inventory & Assessment Plan. The methodology applied in the Wetland Inventory & Assessment Plan has been attached at the end of this report for reference.

- 3) The PondNET model developed by William Walker Jr., P8 Urban Catchment Model developed by William Walker Jr., or the Minimal Impact Design Standards developed by the MPCA are used to determine inflow and outflow phosphorus concentrations of submitted BMP designs. The models predict the phosphorus removal efficiency and outflow concentration of ponds in parallel and in series. The models are available on spreadsheet software or through a Windows interface and are very user-friendly and easy to update.
- 4) All off-site runoff that drains through the proposed development or redevelopment must be included in the proposed stormwater system design.
- 5) The PondNET, P8 or MIDS models should be set up to produce annualized results. The time period should be set to 1 (year) and the total inches of yearly precipitation should equal 30.6 (MSP Airport yearly average, data current to 2018).
- 6) Runoff coefficients from the 2-yr storm listed in Table 13 should be used for all PondNET, P8 and MIDS models.
- 7) The phosphorus runoff concentration and dissolved fraction in the PondNET, P8 and MIDS models should be determined by land use and correspond to the values listed in Table 14.

Table 15: Receiving Water Pretreatment Requirement.

Management Category	Stormwater Phosphorus Pretreatment Requirement <sup>1</sup>
Highly Susceptible <sup>2</sup>	150 ppb <sup>3</sup>
Moderately Susceptible	200 ppb
Slightly Susceptible	250 ppb
Least Susceptible	Pond designed using the "Pitt Method" <sup>4</sup>

<sup>1</sup> Requirement is either as listed in the table or consistent with RCWD Rule C, whichever is more restrictive (RCWD Rules are included in the Appendix).

<sup>2</sup> Includes lakes, rivers, creeks, and streams (as defined by the USGS).

<sup>3</sup> A multi-cell configuration with lower cell being a constructed wetland or infiltration basin is recommended to achieve these levels of removal.

<sup>4</sup> Described in "Protecting Water Quality in Urban Areas" - Chapter 5, MPCA, March 2000.

Table 16: Water Quality Model Runoff Input Data.

Land Use	Runoff Phosphorus Concentration (ppb)	Fraction of Dissolved Phosphorus in Runoff
Open Space	200	0.6
Rural Residential	250	0.4
Low Density Residential	500	0.35
Medium Density Residential	500	0.35
High Density Residential	500	0.35
Industrial / Commercial	350	0.35
Agricultural	450	0.1

### 6.3.3 Infiltration Guidelines

This section outlines design and management guidelines for infiltration. The intent of these guidelines is to:

- 1) Promote infiltration according to watershed district regulation (where feasible) and limit the increase of stormwater runoff volume following development.
- 2) Promote groundwater recharge in areas away from known contamination and Wellhead Protection Areas.
- 3) Improve the quality of stormwater by filtration when infiltration is determined to be infeasible.
- 4) Promote an overall high level of stormwater quality to all residents in the City.

#### B. Methods

- 1) The infiltration basins hydrologic soil group must first be determined via soil boring analysis. If no borings are taken as part of the development process, a boring will be required at the proposed basin location(s).
- 2) Infiltration rates based on hydraulic soils group and unified soils classification should be used per the MPCA design criteria. Infiltration rates are shown in Table 17.
- 3) Infiltration is required where sites have an abundance of hydrologic soil groups A or B. Refer to Figure SW-06 for hydraulic soils group.
- 4) Areas with type C or D soils should design infiltration basins using the criteria outlined below for a type B soil. Drain tile is then required for the basin to provide filtration of the stormwater and to ensure long-term operation.
- 5) Similar to water quantity and quality ponds, an emergency overflow is required to bypass high flows.
- 6) The required volume is to be calculated by determining the total impervious area located within the area draining to the infiltration basin, multiplying it by the MSP median storm event (0.34") and with a runoff coefficient of 0.9 for impervious surfaces. The resulting number is the required acre-inches of infiltration basin storage volume.
- 7) The required acreage of infiltration area is then calculated by dividing the required volume by the maximum allowable basin depth. The basin depth in type A and B soils should not exceed 2.0' and 1.4', respectively.
- 8) Plantings should be selected that tolerate the design inundation period and maximum stormwater depth.
- 9) Pretreatment is required upstream of all infiltration/filtration basins.

The Part 1 of the Wellhead Protection Plan (WPP) was completed for the City of Forest Lake by TKDA in November 2006, and Part 2 was completed by Bolton & Menk, Inc in December, 2016. The WPP does not discuss any conflicts between City infiltration requirements and wellhead protection goals and policies. However, to ensure compliance with Objective F1 of the WPP, no infiltration practices should be allowed within the Inner Wellhead Management Zones (IWMZ, 200' radius) of each well within the City.

*Table 17: Summary of Hydrologic Soils Groups, Design Infiltration Rates and Unified Soil Classifications. Source: Minnesota Stormwater*

Hydrologic soil group	Infiltration rate (in/hr)	Infiltration rate (cm/hr)	Soil textures	Corresponding Unified Soil Classification
A	1.63	4.14	gravel	GW - well-graded gravels, sandy gravels
			sandy gravel	GP - gap-graded or uniform gravels, sandy gravels
			silty gravels	GM - silty gravels, silty sandy gravels
				SW - well-graded gravelly sands
	0.8	2.03	sand	SP - gap-graded or uniform sands, gravelly sands
			loamy sand	
sandy loam				
B	0.45	1.14		SM - silty sands, silty gravelly sands
	0.3	0.76	loam, silt loam	MH - micaceous silts, diatomaceous silts, volcanic ash
C	0.2	0.51	Sandy clay loam	ML - silts, very fine sands, silty or clayey fine sands
D	0.06	0.15	clay loam	GC - clayey gravels, clayey sandy gravels
			silty clay loam	SC - clayey sands, clayey gravelly sands

## 6.4 OPERATION AND MAINTENANCE

### 6.4.1 Surface Water System Maintenance

The surface water system in the City conveys runoff from an area of approximately 36 square miles. Frequency of inspections and maintenance are often event-driven and based on experience and inspection results history.

#### A. Open Channels

Overland flow routes constitute the majority of the current surface water drainage system. Open channels are typically vegetated and occasionally lined with more substantial materials. The lined channels typically require little or no maintenance. Vegetated channels are periodically inspected and maintained, as high flows can create erosion within the channel.

Eroded channels can contribute to water quality problems in downstream waterbodies as the soil is continually swept away. If not maintained, the erosion of open channels would accelerate and the repair would become increasingly more difficult and costly.

Judicial ditches are also a critical part of Forest Lake's drainage system. These primary flow routes must be considered as development continues, specifically in JD 4. Current flooding and limited capacity must be considered in the Main Branch, Branch 2 and Branch 3 so that existing flooding conditions are not perpetuated and that downstream impacts are not created. Regional ponding and greenway corridor dedication will be considered and planned for prior to new development.

#### B. Piping System

The following periodic inspection and maintenance procedures are followed:

- 1) Catch basin grates are inspected annually and cleaned on street sweeping routes during summer.
- 2) Catch basin and manhole castings are inspected and are cleaned and replaced as necessary.

- 3) Catch basin and manhole rings are inspected and are replaced and/or regouted as necessary.
- 4) Catch basin and manhole structures are inspected and are repaired or replaced as needed. Pipe inverts, benches, steps (verifying integrity for safety), and walls are checked. Cracked, deteriorated, and spalled areas are grouted, patched, or replaced.
- 5) Storm sewer piping is inspected either manually or by television to assess pipe condition. Items looked for include root damage, deteriorated joints, leaky joints, excessive spalling, and sediment buildup. The piping system is cleaned, repaired, or replaced as needed to ensure the integrity of the system.

C. Sump Manholes and Sump Catch Basins

Sump manholes and sump catch basins are included in storm sewer systems to collect sediments before they are transported to downstream waterbodies. These structures keep sediments from degrading downstream waterbodies. Once sediments are transported to a lake or pond, they become much more expensive to remove. Sediments originate primarily from road sanding operations, although construction activity and erosion can also contribute. Since these structures are designed to collect these sediments, they are routinely cleaned to provide capacity for future sedimentation. Suction vacuum equipment is typically used.

D. Storm Sewer Inlet Structures

To fully utilize storm sewer capacity, inlet structures are kept operational in order to get runoff into the system. All efforts are made to keep catch basins and inlet flared ends free of debris and sediments so as not to restrict inflow and cause flood damage. Leaf and lawn litter are the most frequent cause of inlet obstructions. On a routine basis, City staff visually inspects inlet structures to ensure they are operational.

E. Stormwater Basins

Stormwater basins represent a sizable investment in the City's drainage system. General maintenance of these facilities helps ensure proper performance and reduces the need for major repairs. Periodic inspections are performed to identify possible problems in and around the basin. Inspection and maintenance cover the following:

- 1) Basin outlets
- 2) Basin inlets
- 3) Side slopes
- 4) Sediment buildup

The City's SWPPP includes a Pond Treatment Effectiveness Assessment Plan that identifies procedures and timeline for inspecting stormwater basins to prioritize sediment removal projects. Upon completion, the originally intended water quality treatment capacity of the stormwater basin will be restored. The City has developed a plan and timeline for completion and will begin implementation in 2018.

F. Basin Outlets

A key issue with stormwater basins is ensuring that the outlets perform at design capacity. Inspection and maintenance of basin outlets address the following:

- 1) The area around outlets is kept free and clear of debris, litter, and heavy vegetation.
- 2) Trash guards are installed and maintained over all outlets to prevent clogging of the downstream storm sewer. Trash guards are inspected at least once a year, typically in the spring, to remove debris that may clog the outlet. Problem areas are addressed more frequently, as required.
- 3) Emergency overflow outlets are provided for all ponds when possible. These are kept clear of debris, equipment, and other materials and properly protected against erosion.

#### G. Basin Inlets

Inspection and maintenance of basin inlets address the following:

- 1) Inlets are inspected for erosion. Where erosion occurs near an inlet, energy dissipaters or riprap are installed.
- 2) Inlets are inspected for sediment deposits, which can form at the inlets due to poor erosion practices upstream. Where sediment deposits occur, these are removed to ensure design capacities of storm sewers entering the basin are maintained.

#### H. Side Slopes

Inspection and maintenance of basin side slopes address the following:

- 1) Side slopes are kept well-vegetated to prevent erosion and sediment deposition into the basin. Severe erosion alongside slopes can reduce the quality of water discharging from the basin and require dredging of sediments from the basin.
- 2) Noxious weeds are periodically removed from around basins.
- 3) Some basins in highly developed areas require mowing. If mowing is performed, a buffer strip of 20 feet or more adjacent to the normal water level is typically maintained. This provides filtration of runoff and protects wildlife habitat.

#### I. Sediment Buildup

Inspection and maintenance of sediment buildup in basins address the following:

- 1) Basins are inspected to determine if sediment buildup is causing significant loss of storage capacity from design levels. Excessive sediment buildup significantly reduces the stormwater treatment efficiency of water quality ponds.
- 2) Sediment removal is performed where excessive sediment buildup has occurred. As a general guideline, ponds require dredging every 15 to 20 years.

The Pond Treatment Effectiveness Assessment Plan in the City's SWPPP should be followed. These are standalone documents included in the City's MS4 requirements and not included in this plan.

#### 6.4.2 De-icing Practices

Minnesota receives approximately 54 inches of snow during a typical year. This requires a large amount of de-icing chemicals (primarily salt) to be applied to roads and sidewalks each winter. Estimates indicate that 80 percent of the environmental damage caused from de-icing chemicals is a result of inadequate storage of the material (MPCA 1989). Improper storage as well as



overuse of salt increases the risk of high chloride concentrations in runoff and groundwater. High chloride concentrations can be toxic to fish, wildlife, and vegetation.

The City currently uses a storage facility designed according to Minnesota Department of Transportation (MNDOT) specifications for runoff control. De-icing material is stored under cover to minimize potential for groundwater contamination and runoff.

The City will continue to use and improve procedures it has established for efficient application of de-icing materials to reduce cost and minimize environmental damage. Good accounting of materials applied during a season is in place. Street conditions are assessed for each individual event and ice control material application is adjusted accordingly. Equipment is maintained in good working order to place ice control material on roadways and is properly calibrated to prevent excessive application.

#### 6.4.3 Street Sweeping

Street sweeping is an integral part of the City's effective surface water management system. The objective of street sweeping is to minimize impacts from leaf litter, sand, salt and other debris on the surface waters of the City. It greatly reduces the volume of sediments that have to be cleaned out of sump structures and downstream waterbodies. The City will continue to practice a minimum of two sweeping operations a year, in spring and fall. All City streets in the urbanized residential areas are swept.

The CLFLWD prepared the Forest Lake Enhanced Street Sweeping Plan in 2017 and the City was awarded a grant to purchase a regenerative air sweeper to be purchased in 2018. The City will increase sweeping frequency in targeted areas based on the recommendations in the Street Sweeping Plan. The following describe the anticipated total suspended solids and total phosphorus removals when the sweeper is under operation.

- Clear Lake: 6,909 tons/yr TSS, 20 lbs/yr TP
- Forest Lake: 120,554 tons/yr TSS, 122 lbs/yr TP
- Shields Lake: 635 tons/yr TSS, 1.6 lbs/yr TP
- Keewahtin Lake: 600 tons/yr TSS, 2.3 lbs/yr TP
- Comfort Lake: 8,209 tons/yr TSS, 22 lbs/yr TP
- All Combined: 136,908 tons/yr TSS, 167 lbs/yr TP

## 6.5 EDUCATION

### 6.5.1 Overview

Education plays an important role in any effort to implement a stormwater management program. The objectives of an education effort differ based on the target audience. In general, the target audiences comprise City Staff, City residents, and the development community.

### 6.5.2 City Staff

City Staff have a wide range of responsibilities in the implementation of the LWMP, including:

- A. System inspection, maintenance, and operation
- B. Maintaining performance levels and efficiency of stormwater facilities
- C. Planning and management of projects aimed at pollutant removal
- D. Good housekeeping on City-owned property
- E. Requiring and evaluating BMPs during plan review

- F. Planning and delivering education programs
- G. Working out cooperative arrangements with regulatory and non-regulatory organizations to achieve LWMP objectives
- H. Assisting the City Council in the application of the LWMP policies.

#### 6.5.3 City Residents

In order to obtain the necessary political and economic support for successful LWMP implementation, it is vital to inform City residents about basic stormwater management, flood mitigation and water quality concepts, and policies and recommendations in the LWMP.

The City of Forest Lake keeps its residents informed through project specific mailings and their website. Public meetings are also held to invite public input on certain issues.

#### 6.5.4 Development Community

The LWMP is designed to provide the official policy direction that City Staff and the City Council desire to guide stormwater mitigation for new and redevelopment projects.

Information about mitigation requirements is disseminated to developers and their consulting engineers as early as possible in the development review process. In this way, developers know what is expected of them and can consider the requirements in their initial assessments of the site as well as incorporate the necessary BMPs in any subsequent designs.

Meetings between key City staff and the developers as early as possible in the review process are important for the successful implementation of the City goals and policies. This helps define expectations for submittals, clarify regulatory compliance issues, and provide additional detailed guidance.

### 6.6 CAPITAL IMPROVEMENT PROGRAM

As part of the NPDES MS4 program the City of Forest Lake now prepares an annual budget outlining the costs associated with implementing the SWPPP. Depending on specific changes in permitting requirements and long term planning efforts, the budget changes each year to accommodate the specific needs of the program.

In addition, to the system improvements outlined in the MS4 program, the city has also identified larger projects in which improvements to the stormwater system would result in significant improvements to the receiving waterbodies. These projects are listed in Table 17. The projects are not listed in any particular order, but are generally prioritized by the water quality and quantity concerns of the receiving water, alignment with other City capital improvement projects and funding opportunities, and other stakeholder needs. For instance, projects that have an approximate timeline in 2018 – 2019 are generally higher immediate priority because they align with City capital improvement projects, to meet prioritized MS4 program management goals and to address the highest water quality concerns. Project funding could easily change prioritization and the City maintains flexibility in implementing future projects.

Table 18: Summary of Future Stormwater Projects.

Project	Improvement Cost Estimate <sup>1</sup> (thousands of dollars)		Approximate Project Timeline	Funding Source
	Low	High		
190th Street North Drainage Improvements	100	150	2020+	RCWD/City
Heath Avenue Court North Drainage Improvements	50	100	2020+	CLFLWD/City
Green Valley Estates Drainage Improvements	100	300	Unknown	City
Implement the TH61 WQ and Aesthetics Plan	400	900	Ongoing	MnDOT/County/City/RCWD/CLFLWD
Castlewood Golf Course Parking Lot	20	30	2019+	CLFLWD/BWSR/City
Implement Enhanced Street Sweeping Plan	15	50	Ongoing	CLFLWD/RCWD/City/BWSR
Forest Road Water Quality Structure (South)	80	150	2020	City/BWSR/RCWD
Stormwater Pond Assessment	70	110	2018	City
City Center Stormwater Reuse Project	100	300	Unknown	RCWD/City
Comprehensive Hydraulic and Water Quality Modeling	50	120	Ongoing	City
Everton Townhome Stormwater Reuse	250	750	Unknown	RCWD/BWSR/City
LELA School Stormwater Reuse	250	750	Unknown	RCWD/City/Private
Judicial Ditch 4 Watershed Analysis and Development Planning	15	30	2018-2019	RCWD/City
Forest Lake Dead End Streets	TBD		2019+	CLFLWD/City
Shields Lake Water Quality Improvements	TBD		2018	CLFLWD/City
Judicial Ditch 4 Drainage Improvements	TBD		2020+	RCWD/City
Public & Private Drainage Ditch Maintenance	TBD		Ongoing	City/RCWD/CLFLWD
<b>Total</b>	<b>1485</b>	<b>3710</b>		

<sup>1</sup> Cost estimates include only stormwater related improvements and are subject to change. Costs will be analyzed annually as project timelines are realized.

## 6.7 FINANCING

In 2008, the City of Forest Lake implemented a stormwater utility to fund the increasing costs of stormwater management within the City. In 2012, this utility was increased to fund a full-time position on City Staff and capital improvements to the stormwater system. These efforts were taken to stabilize the funding of the stormwater management program and general maintenance associated with stormwater facilities. The total cost of the City of Forest Lake’s stormwater drainage system includes financing the maintenance of the system as well as construction of future improvements and enhancements. Future adjustments may be needed to accommodate anticipated drainage improvements.

In addition to the utility, the City will also pursue cooperating projects with local watersheds for cost sharing, such as the 2012 “TH 61 Aesthetics and Water Quality Improvements and Planning

Study”. Implementing these types of plans, which are cooperatively constructed, will aide in obtaining grants and outside agency funding.

The City of Forest Lake, CLFLWD and RCWD have developed successful partnerships and Board of Water and Soil Resources (BWSR) Clean Water Fund (CWF) grants and will continue to identify water quality improvement projects that have regional significance. Projects identified in this plan, the Clear Lake Diagnostic Study (RCWD), the Forest Lake Diagnostics Study and Implementation Plan (CLFLWD), the Shields Lake Diagnostic Study (CLFLWD), this comprehensive LWMP and other available reports should act as a foundation for project selection and preliminary budget.

## **6.8 AMENDMENT PROCEDURES**

The Forest Lake LWMP is intended to extend through the year 2028. Updates to this plan will occur every 10 years and align with the Comprehensive Plan update schedule defined by the Metropolitan Council. For the plan to remain dynamic, an avenue must be available to implement new information, ideas, methods, standards, management practices and any other changes that may affect the intent and/or results of the LWMP. The amendment procedure for the LWMP is presented below.

### **A. Request for Amendment**

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

### **B. Staff Review of Amendment**

A decision is made as to the validity of the request. Three options exist: 1) reject the amendment, 2) accept the amendment as a minor issue, with minor issues collectively added to the plan at a later date, or 3) accept the amendment as a major issue, with major issues requiring an immediate amendment. In acting on an amendment request, City staff shall recommend to the City Council whether or not a public hearing is warranted.

### **C. Council Consideration**

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

### **D. Public Hearing and Council Action**

This step allows for public input based on public interest. The City Council shall determine when the public hearing should occur in the process. Based on the public hearing, the City Council could approve the amendment.

### **E. Watershed District Approval**

All proposed amendments must be reviewed by the Watershed Districts, Metropolitan Council and Washington County prior to final adoption of the amendments.

### **F. Council Adoption**

Final action on an amendment, following approval by the Watershed Districts, is City Council adoption. However, prior to the adoption, an additional public hearing could be held to review the plan changes and notify the appropriate stakeholders.

## **6.9 REPORT TO COUNCIL**

Reports will be made by City staff summarizing development changes, capital improvements, and other water management-related issues that occur on a project related basis. Available funding sources for water resource issues should be explored for each project. Grant programs are important to review since they may change annually. These changes do not likely necessitate individual amendments to the LWMP. The reports should, however, be considered when the LWMP is brought up to date.

The City's LWMP will remain in effect through the year 2028. The City will then review the LWMP for consistency with current water resource management methods.

At that time, all reports and past amendments will be added to the document. Depending on the significance of changes, a new printing of the LWMP may be appropriate. At a minimum, the Capital Improvement Program should be amended every five years.

## **7. SUMMARY AND RECOMMENDATIONS**

### **7.1 SUMMARY**

The City of Forest Lake Local Water Management Plan is a comprehensive planning document that guides protection of the City's surface and groundwater resources. The emphasis of the LWMP is the need for standardization – standardized hydrologic analysis, lakes classification, ordinances and more. Consequently, the ultimate purpose of the LWMP is not new initiatives but a summary of current initiatives. These initiatives are essential to the preservation of the City's water resources and come at no small price to the City and its residents.

The City of Forest Lake LWMP is also a response to the statutory requirement that local jurisdictions prepare local water management plans in conformance with applicable watershed plans. Minnesota statutes and rules are clear on the subjects necessary to address within local plans. Reflective of this content requirement the following has been incorporated into the City of Forest Lake LWMP:

- An executive summary of the LWMP that highlights major content
- A statement of purpose for the City of Forest Lake LWMP
- A land and water resources inventory section that describes the setting for surface and groundwater management
- A section outlining the City's goals and policies
- An assessment of current problems, challenges, and opportunities both in terms of flood control and water quality
- An implementation plan consisting of various components including:
  - Regulatory responsibilities
  - System design standards, operations, and maintenance
  - Education
  - A capital improvement plan and financing discussion

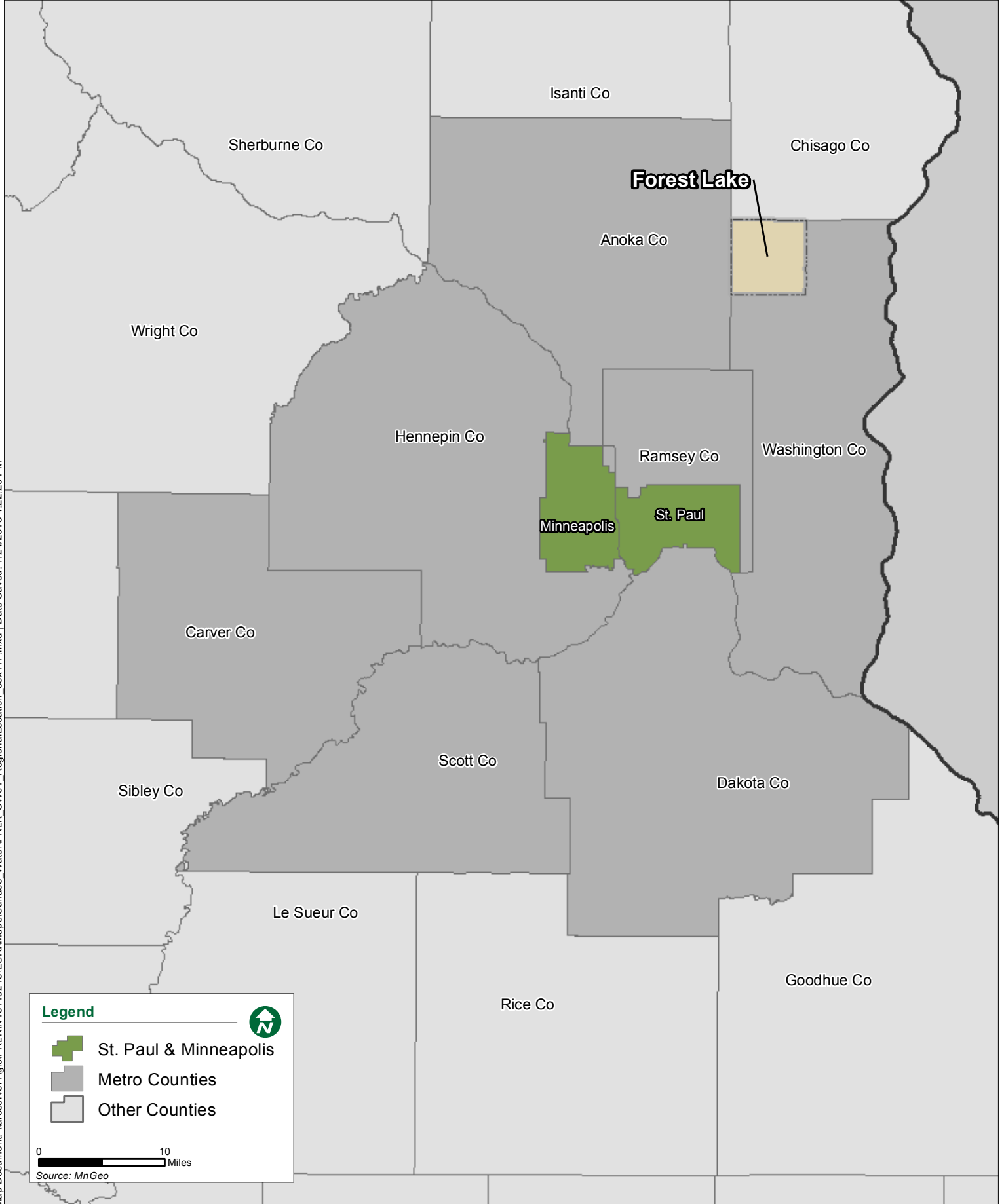
### **7.2 RECOMMENDATIONS**

The City of Forest Lake Local Water Management Plan is submitted to the City Council with the following recommendations:

- That the recommendations toward standardization contained herein be followed.
- That the City continues to operate its surface water system in accordance with this LWMP.
- That the City continues to foster a sense of common purpose among itself and the watershed organizations within the City.
- That the design standards described herein be applied.
- That the City adopt this Local Water Management Plan and implement amendments to it as deemed necessary.

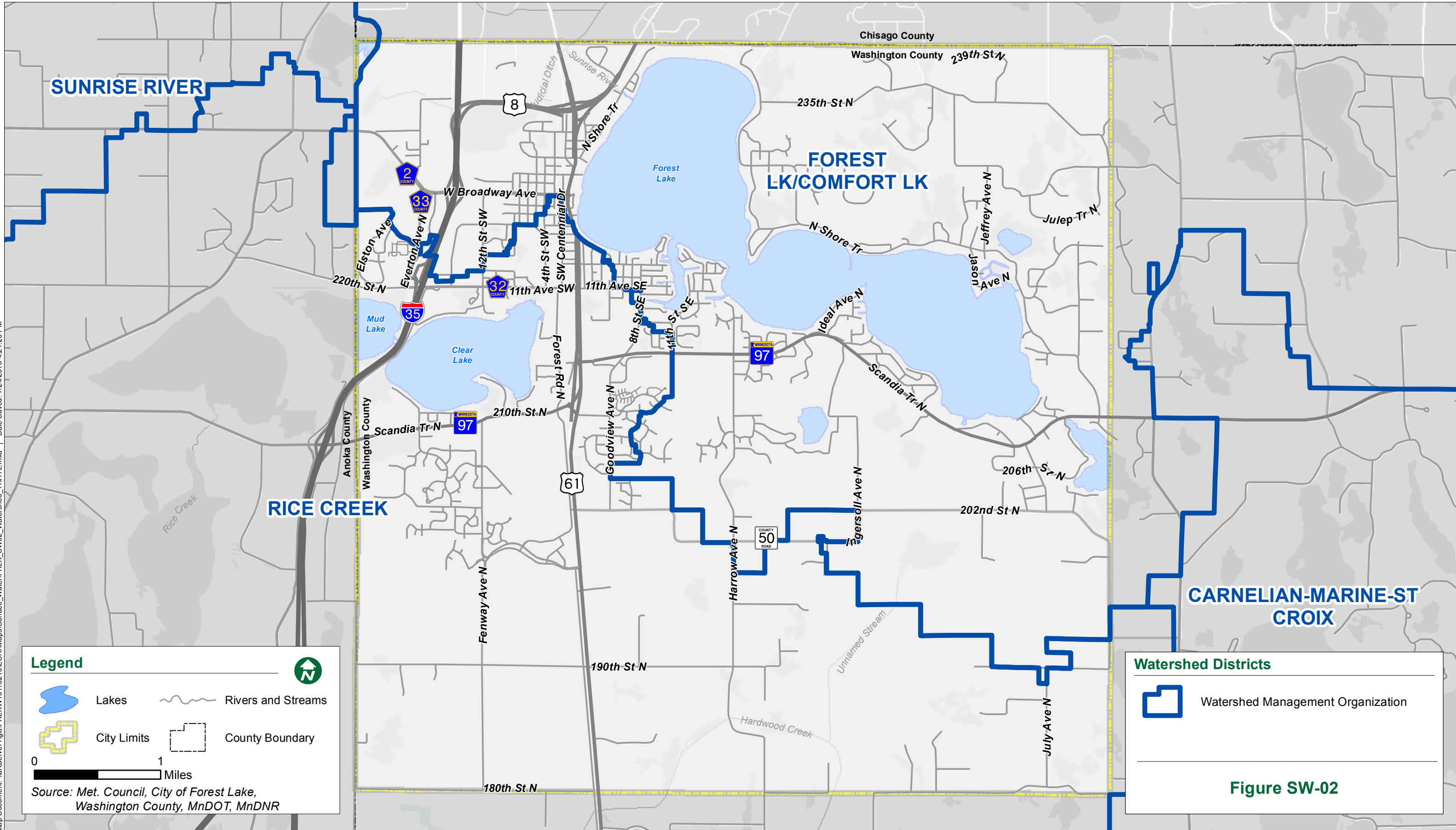
# Appendix A: Figures

- Figure SW-01: Regional Location Map**
- Figure SW-02: Watershed Districts**
- Figure SW-03: Existing Land Use**
- Figure SW-04: Zoning**
- Figure SW-05: Future Land Use**
- Figure SW-06: Hydrologic Soils**
- Figure SW-07: Lakes and Wetlands**
- Figure SW-08: Natural Areas, Open Space, & RSEA**
- Figure SW-09: Minnesota Land Cover Classification**
- Figure SW-10: Impaired Waters**
- Figure SW-11: What's in My Neighborhood**
- Figure SW-12: Major Subwatersheds and Drainage Paths**
- Figure SW-13: Storm Sewer System**



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**Legend**

- Lakes
- Rivers and Streams
- City Limits
- County Boundary

0 1 Miles

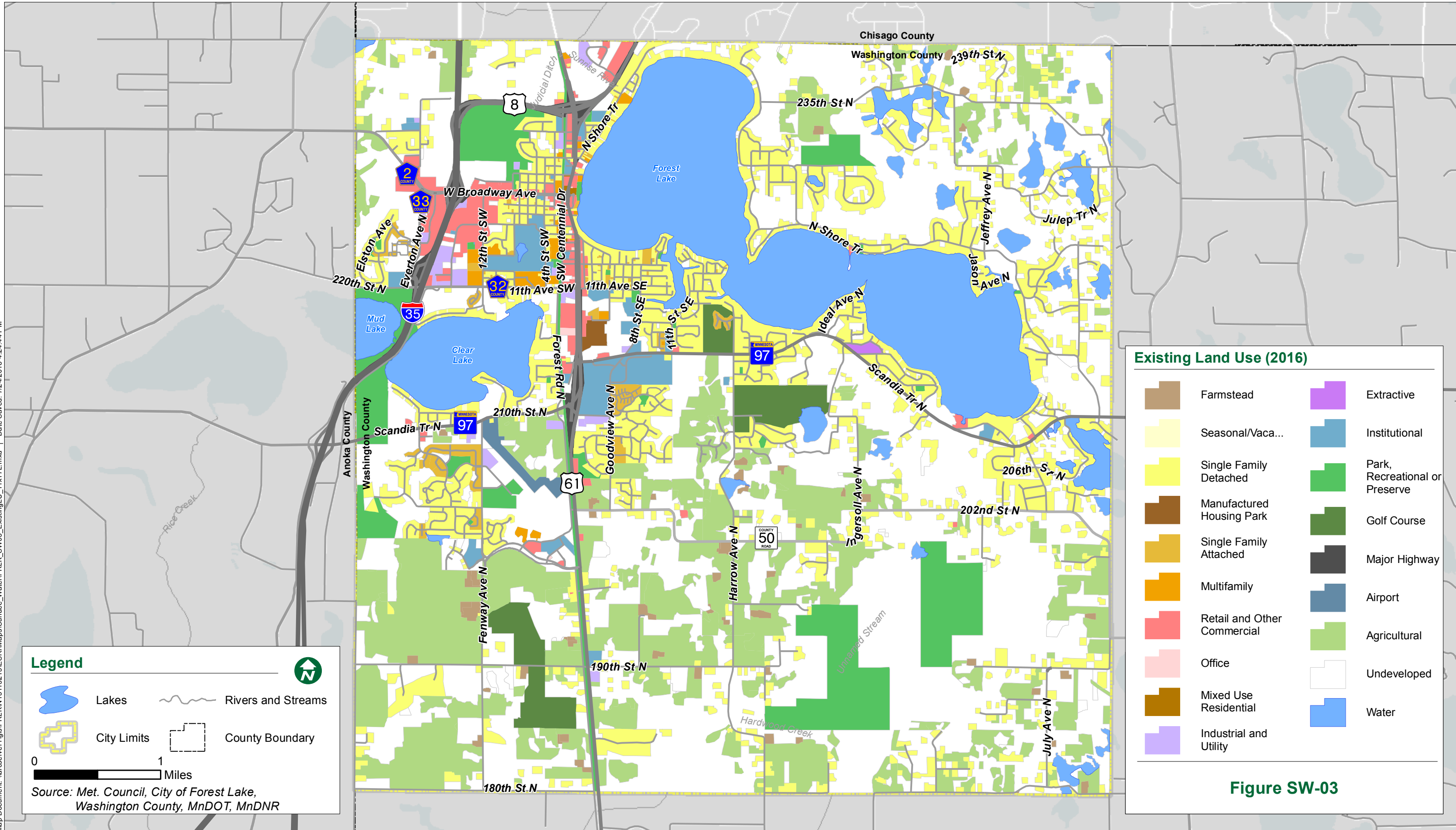
Source: Met. Council, City of Forest Lake, Washington County, MnDOT, MnDNR

**Watershed Districts**

- Watershed Management Organization

**Figure SW-02**

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**Existing Land Use (2016)**

	Farmstead		Extractive
	Seasonal/Vaca...		Institutional
	Single Family Detached		Park, Recreational or Preserve
	Manufactured Housing Park		Golf Course
	Single Family Attached		Major Highway
	Multifamily		Airport
	Retail and Other Commercial		Agricultural
	Office		Undeveloped
	Mixed Use Residential		Water
	Industrial and Utility		

**Legend**

	Lakes		Rivers and Streams
	City Limits		County Boundary

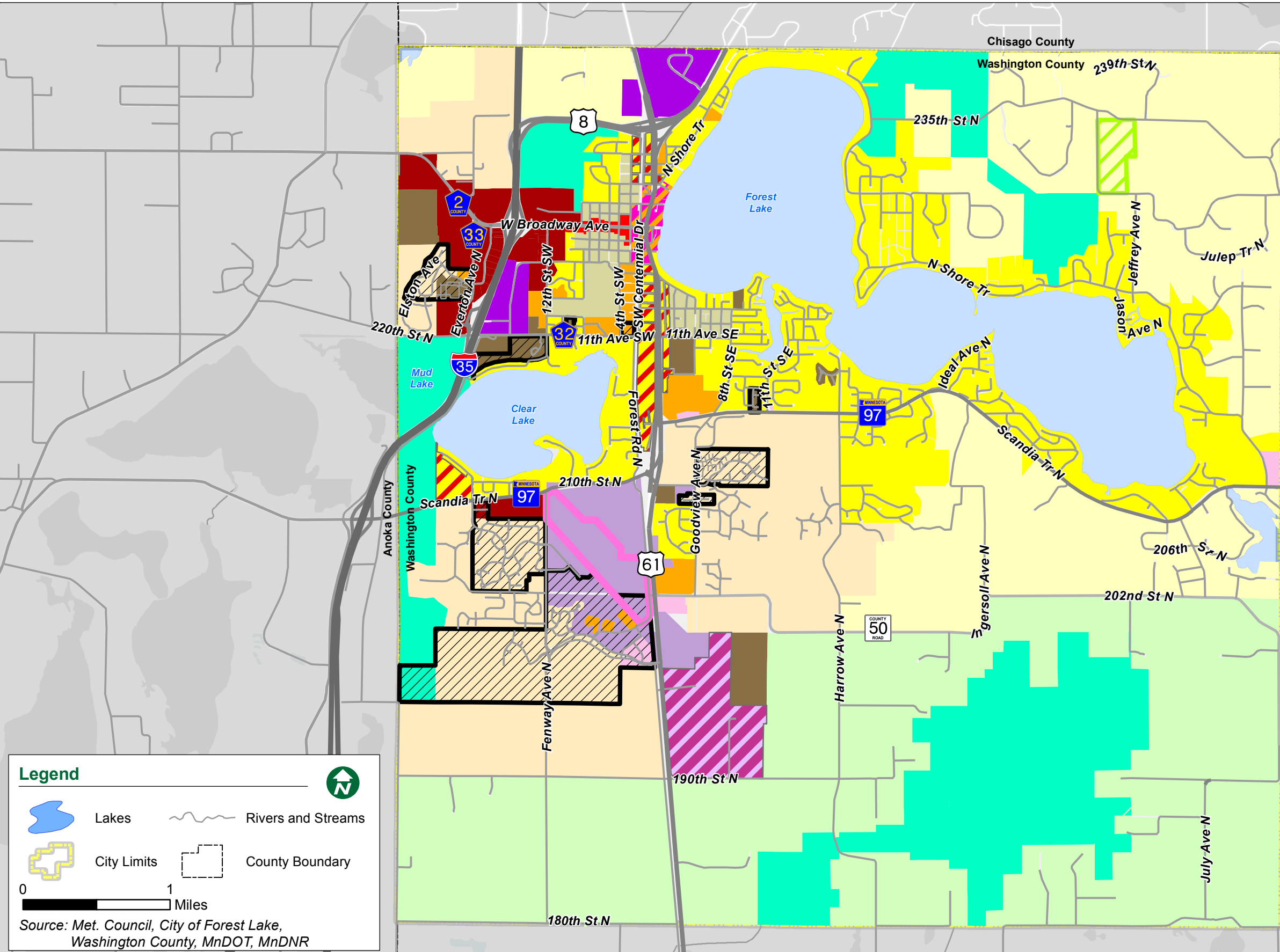
0 1 Miles

Source: Met. Council, City of Forest Lake, Washington County, MnDOT, MnDNR




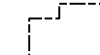
**Figure SW-03**

Map Document: \\arcserve1\gis\FRL\KN13113215\ESRI\Maps\Surface\_Water\FRLK\_SW03\_ExistingLU\_11x17L.mxd | Date Saved: 7/24/2018 4:24:44 PM

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**Legend**

-  Lakes
-  Rivers and Streams
-  City Limits
-  County Boundary

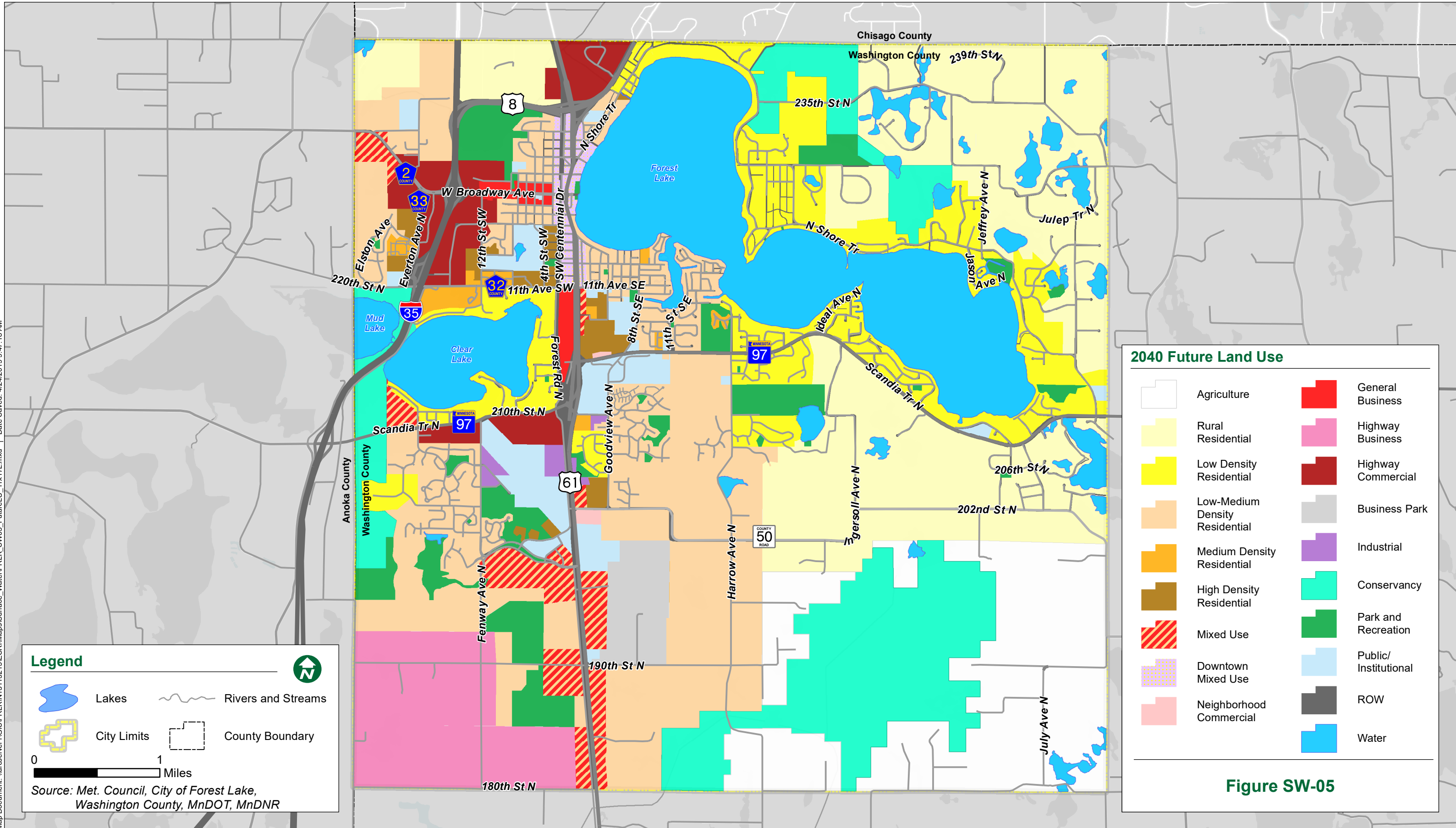
0 1 Miles

Source: Met. Council, City of Forest Lake, Washington County, MnDOT, MnDNR

**Zoning**

	C - Conservancy District		B-1 - Broadway Business District
	A - Agriculture District		B-2 - Highway Business District
	RR - Rural Residential District		B-3 - Light Industrial/Bus... District
	SF - Single Family Residential District		MU-1 - Downtown Mixed Use District
	MXR-1 - Single & Townhouse Residential District		MU-2 - General Mixed Use District
	MXR-2 - Single & Two Family Residential District		BP - Business Park District
	MXR-3 - Mixed Residential District		I - Industrial District
	MF - Multiple Family District		PUD - Planned Unit Development
	NC - Neighborhood Commercial District		AP - Agricultural Preserve overlay District
			Airport boundary

**Figure SW-04**



**Legend**

- Lakes
- Rivers and Streams
- City Limits
- County Boundary
- 0 to 1 Miles
- 

Source: Met. Council, City of Forest Lake, Washington County, MnDOT, MnDNR

**2040 Future Land Use**





	Agriculture		General Business
	Rural Residential		Highway Business
	Low Density Residential		Highway Commercial
	Low-Medium Density Residential		Business Park
	Medium Density Residential		Industrial
	High Density Residential		Conservancy
	Mixed Use		Park and Recreation
	Downtown Mixed Use		Public/Institutional
	Neighborhood Commercial		ROW
			Water

**Figure SW-05**

Map Document: \\arcserver1\GIS\FRLK\113215\ESRI\MapSurface\_Water\FRLK\_SW05\_FutureLU\_11x17L.mxd | Date Saved: 4/24/2019 9:47:18 AM

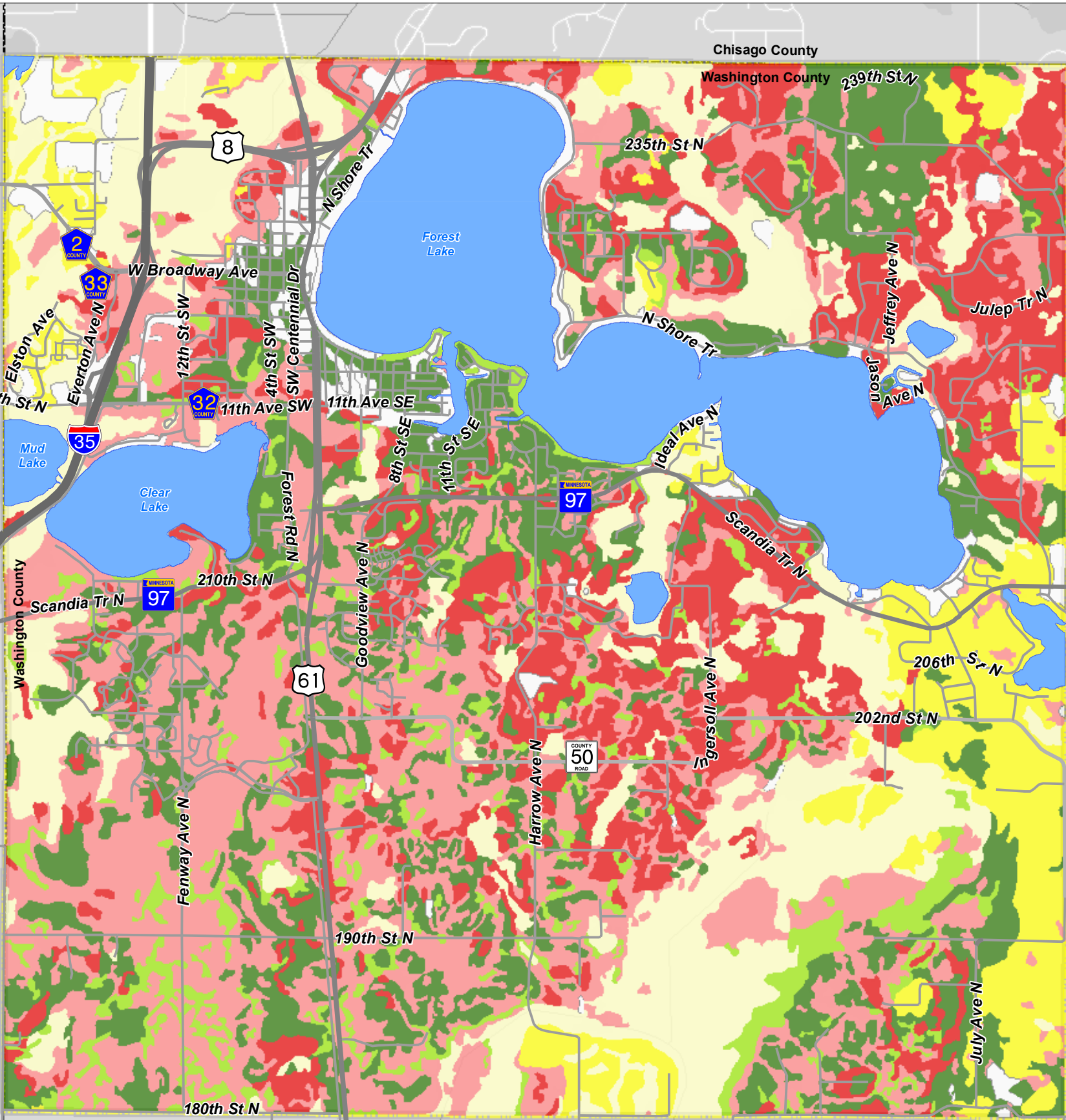
Map Document: \\arcserve1\gis\FRLK\13113215\ESRI\MapServer\Surface\_Water\FRLK\_SW06\_Soils\_11x17L.mxd | Date Saved: 7/24/2018 4:35:35 PM

**Legend**








-  Lakes
-  Rivers and Streams
-  City Limits
-  County Boundary

0 1 Miles

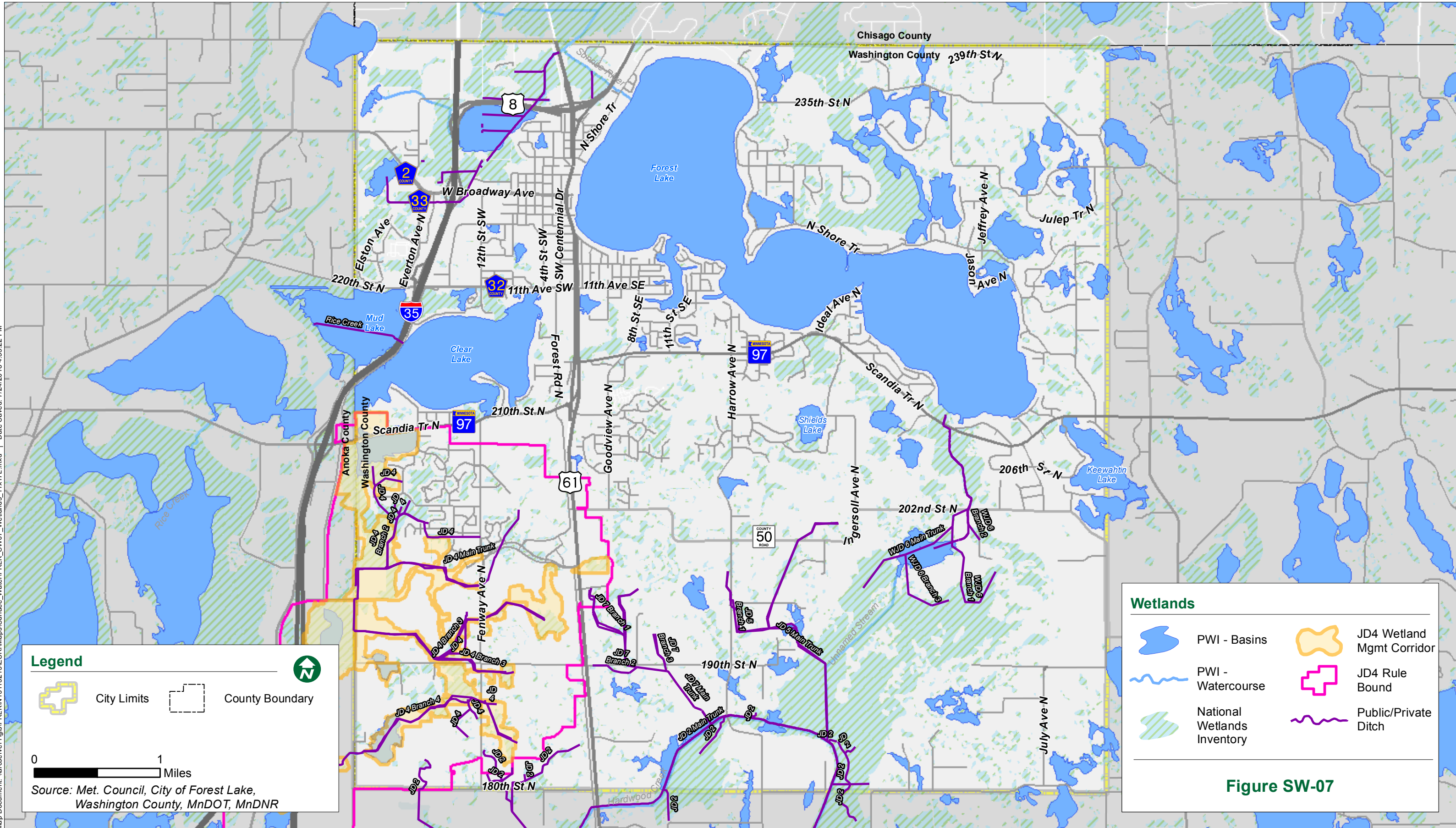
Source: Met. Council, City of Forest Lake, Washington County, MnDOT, MnDNR



**Hydrologic Soils Group**



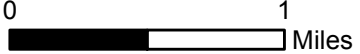
	Unclassified		B/D
	A		C
	A/D		C/D
	B		

**Figure SW-06**









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**Legend**

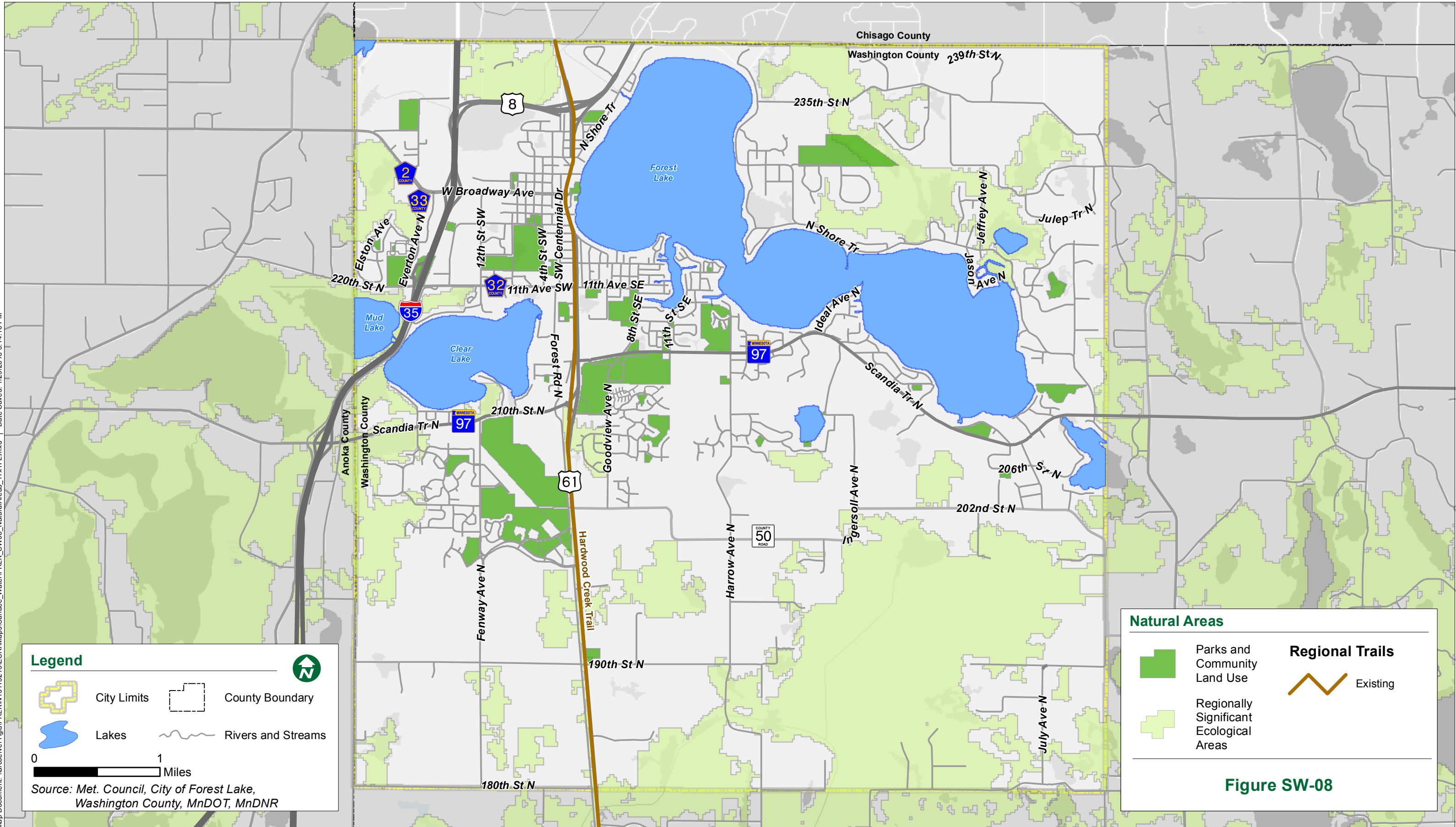
-  City Limits
-  County Boundary
-  0 1 Miles

Source: Met. Council, City of Forest Lake, Washington County, MnDOT, MnDNR

**Wetlands**

-  PWI - Basins
-  PWI - Watercourse
-  National Wetlands Inventory
-  JD4 Wetland Mgmt Corridor
-  JD4 Rule Bound
-  Public/Private Ditch

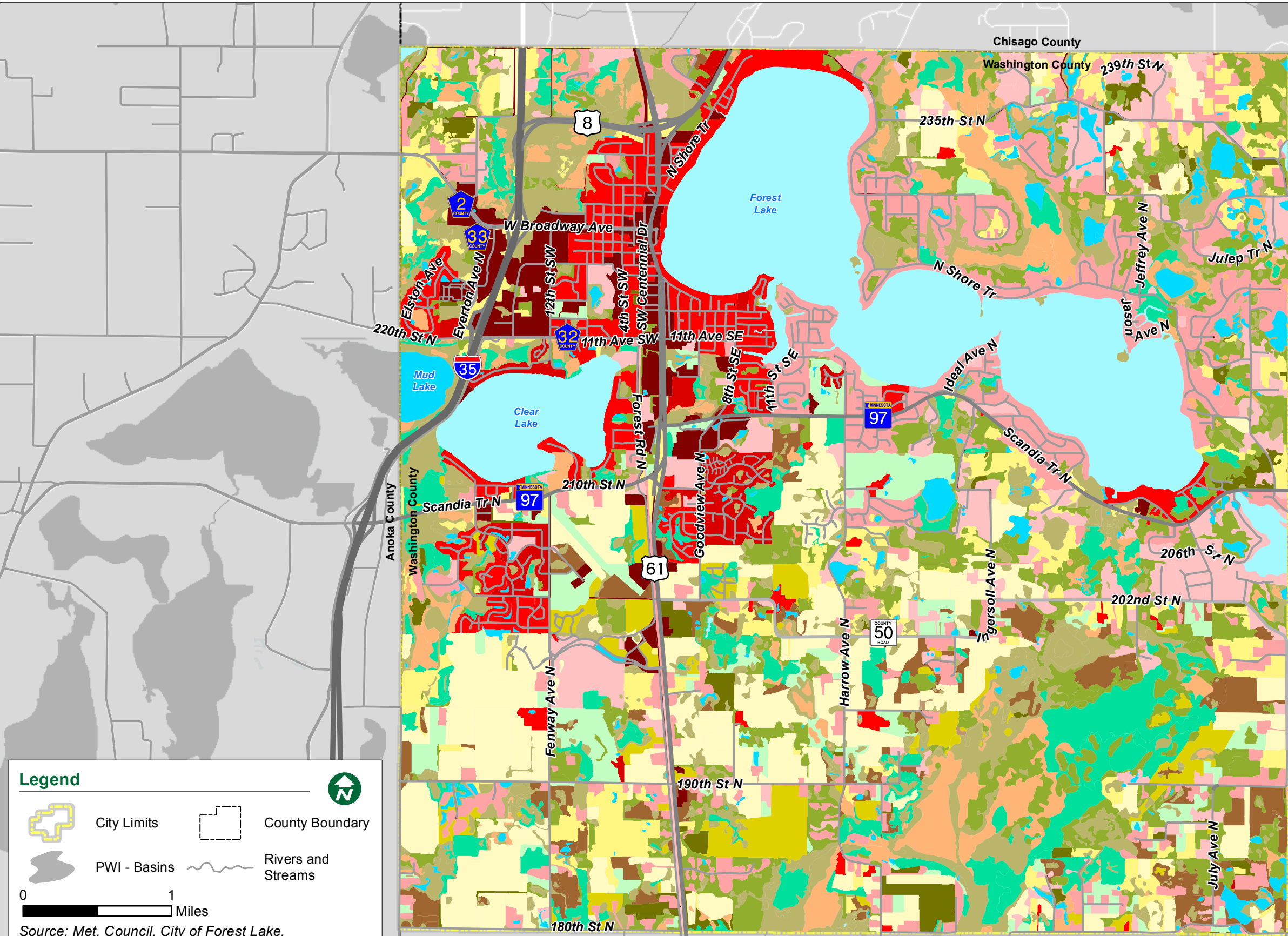
**Figure SW-07**



**Figure SW-08**

Map Document: \\arcserve1\gis\FRLK\13113215\ESRI\MapServer\Surface\_Water\FRLK\_SW08\_NaturalAreas\_11x17L.mxd | Date Saved: 1/29/2018 5:14:16 PM

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**Legend**

- City Limits
- County Boundary
- PWI - Basins
- Rivers and Streams

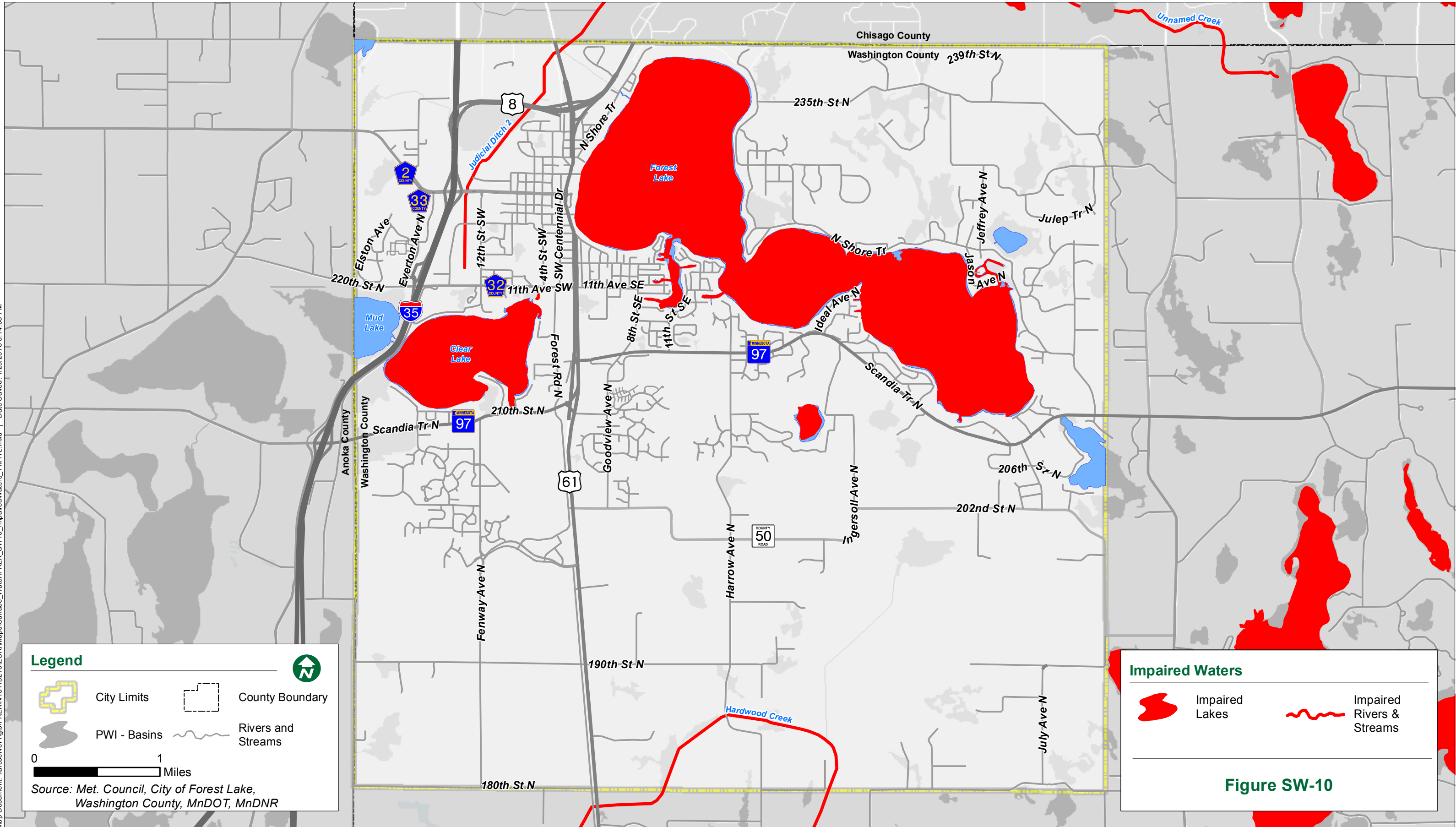
0 1 Miles

Source: Met. Council, City of Forest Lake, Washington County, MnDOT, MnDNR

MLCCS			
	11. 5-10% Impervious		31. Forest
	12. 11-25% Impervious		32. Wetland Forest
	13. 26-50% Impervious		51. Shrubland
	14. 51-75% Impervious		52. Wetland Shrubs
	15. 76-100% Impervious		61. Tall Grasses
	21. Short Grasses		62. Wetland Emergent Veg.
	22. Agricultural Land		63. Dry Tall Grasses
	23. Maintained Tall Grass		90. Open Water
	24. Tree Plantation		92. Wetland Open Water

**Figure SW-09**





**Legend**

- City Limits
- County Boundary
- PWI - Basins
- Rivers and Streams

0 1 Miles

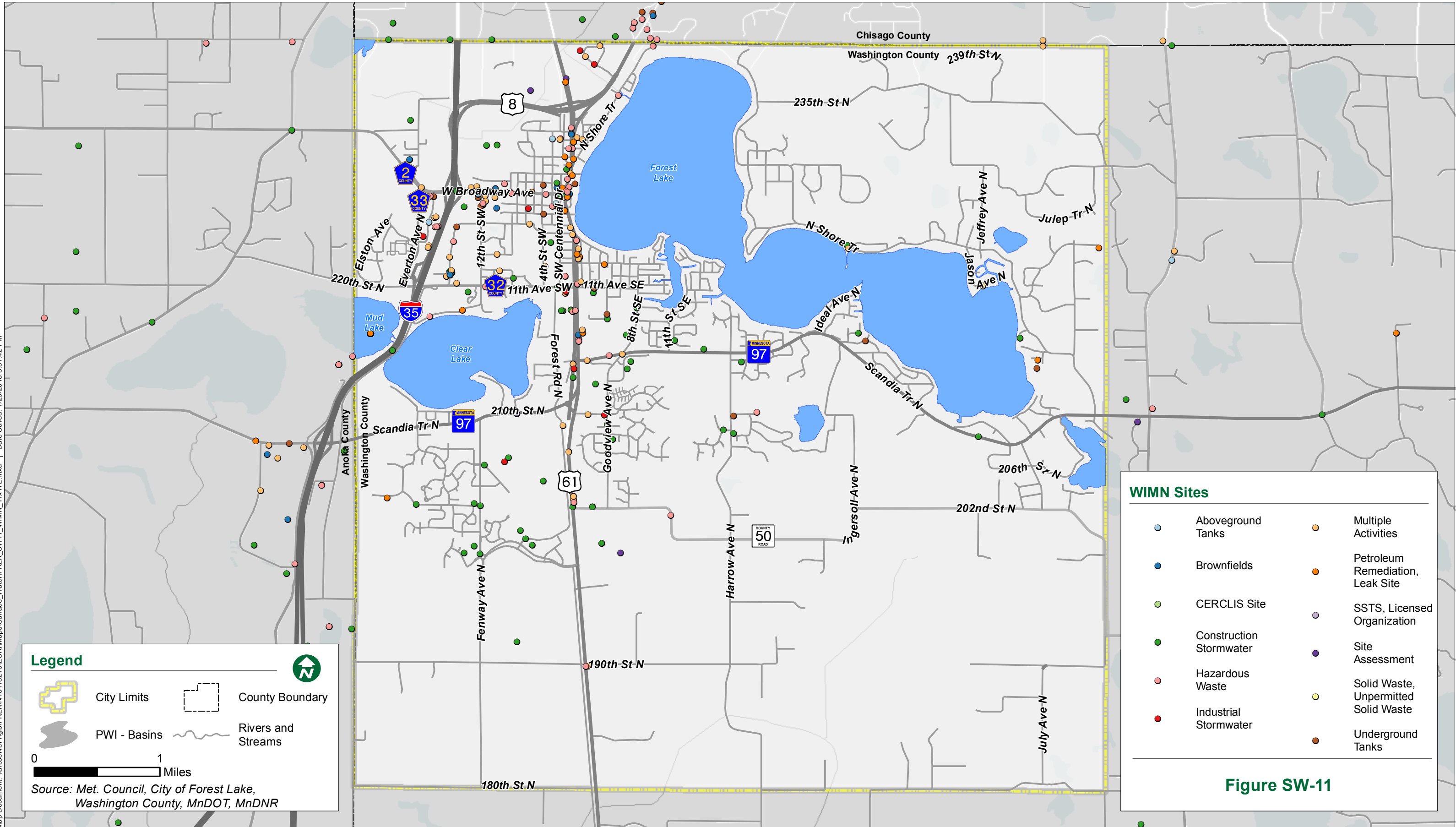
Source: Met. Council, City of Forest Lake, Washington County, MnDOT, MnDNR

**Impaired Waters**

- Impaired Lakes
- Impaired Rivers & Streams

**Figure SW-10**

Map Document: \\arcserve1\gis\FRLK\13113215\ESRI\Maps\Surface\_Water\FRLK\_SW10\_ImpairedWaters\_11x17L.mxd | Date Saved: 1/29/2018 5:14:05 PM



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**Legend**

- City Limits
- County Boundary
- PWI - Basins
- Rivers and Streams

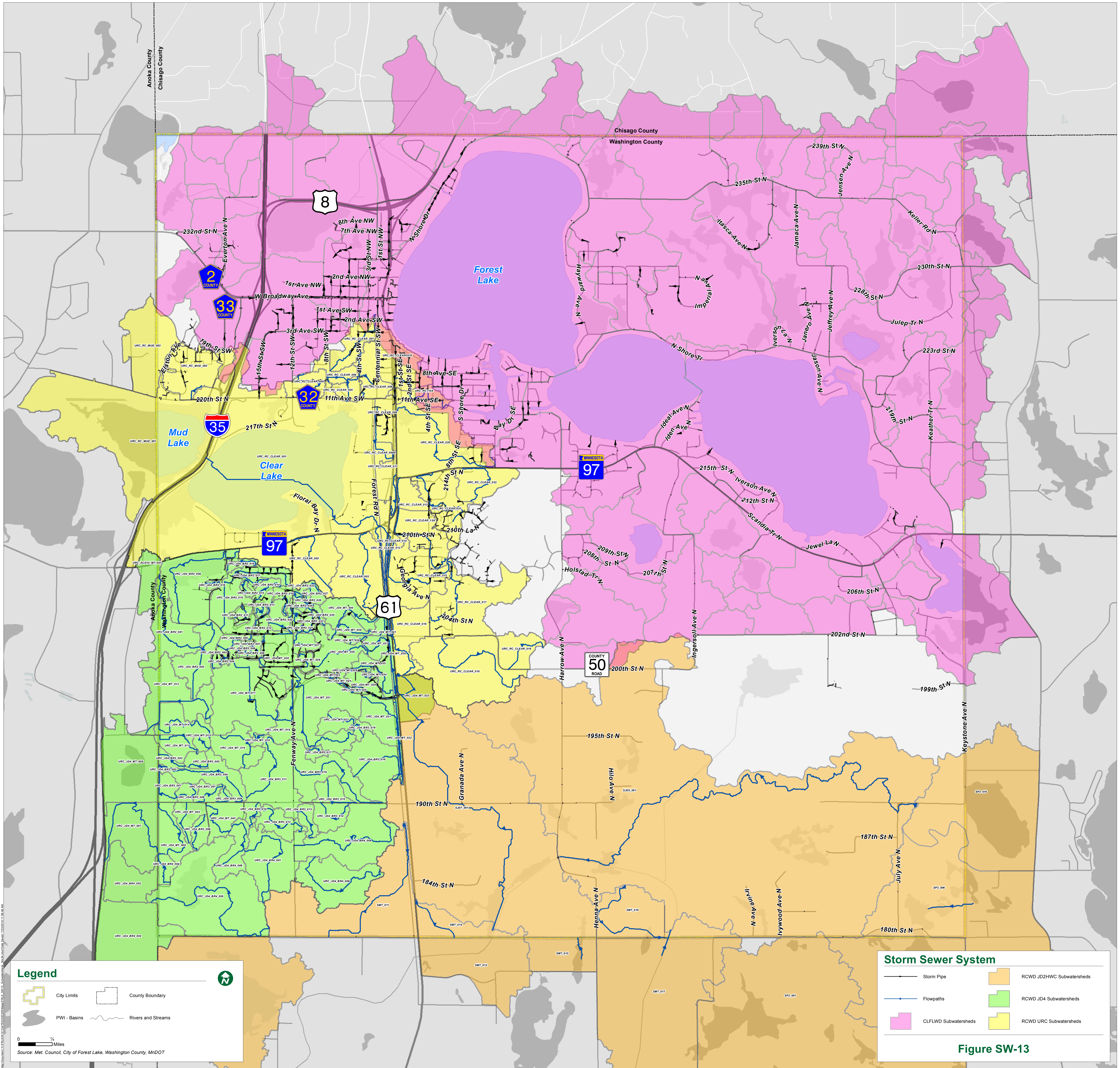
0 1 Miles

Source: Met. Council, City of Forest Lake, Washington County, MnDOT, MnDNR

**WIMN Sites**

- Aboveground Tanks
- Brownfields
- CERCLIS Site
- Construction Stormwater
- Hazardous Waste
- Industrial Stormwater
- Multiple Activities
- Petroleum Remediation, Leak Site
- SSTS, Licensed Organization
- Site Assessment
- Solid Waste, Unpermitted Solid Waste
- Underground Tanks

**Figure SW-11**



**Legend**

- City Limits
- County Boundary
- PWI - Basins
- Rivers and Streams

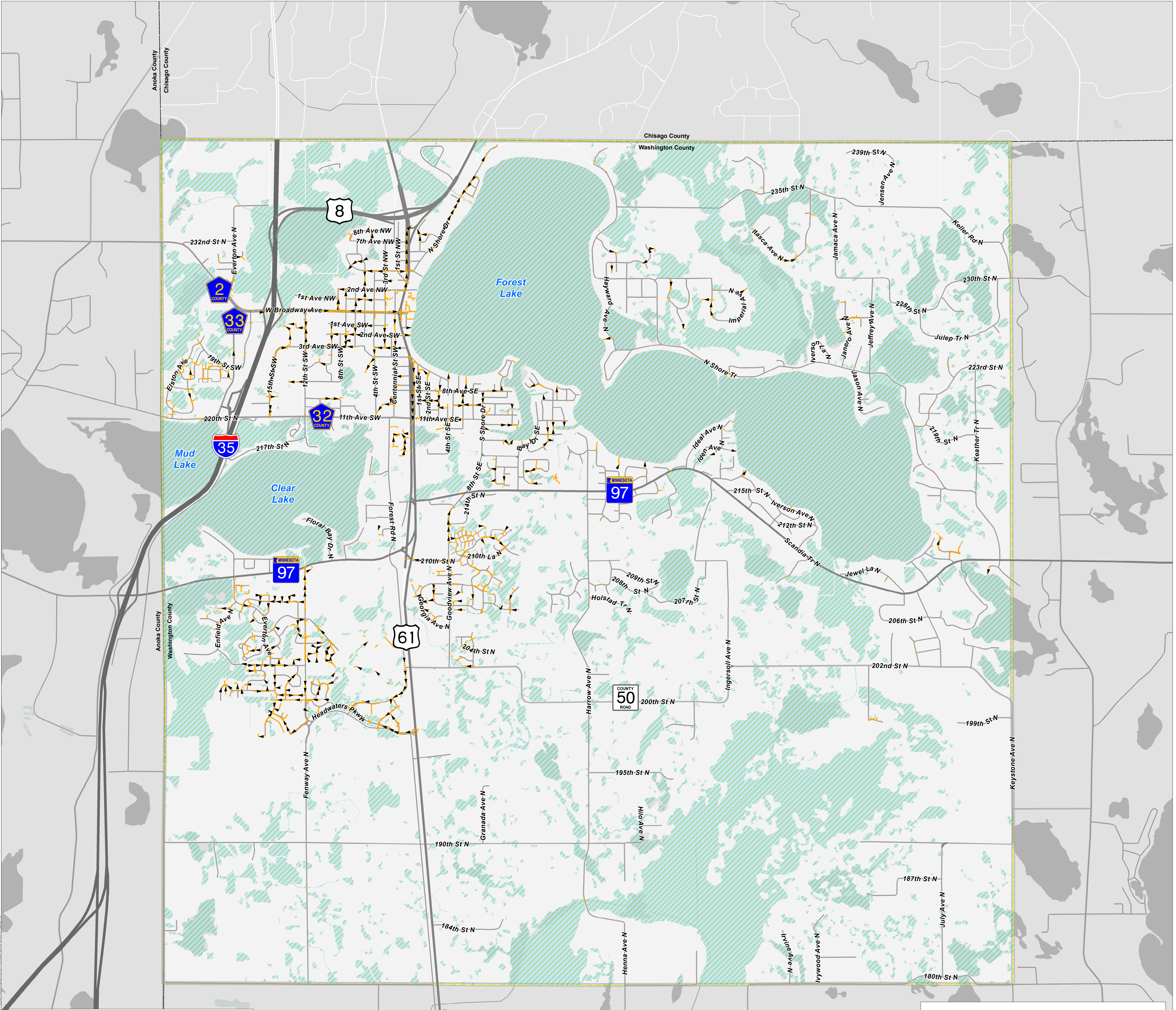
0 1/4 Miles

Source: Met. Council, City of Forest Lake, Washington County, MnDOT

**Storm Sewer System**

- Storm Pipe
- Flowpaths
- CLFLWD Subwatersheds
- RCWD JD2HWC Subwatersheds
- RCWD JD4 Subwatersheds
- RCWD URC Subwatersheds

Figure SW-13



**Legend**

- City Limits
- County Boundary
- PWI - Basins
- Rivers and Streams

0 1/4 Miles

Source: Met. Council, City of Forest Lake, Washington County, MnDOT

**Storm Sewer System**

- Storm Pipe
- Stormwater Ponds
- National Wetlands Inventory

**Figure SW-13**

## Appendix B: Ordinances

**Chapter 151 – Stormwater Management**

**Chapter 153 – Zoning Code – Land Alteration and Grading Regulations**

**Chapter 153 – Zoning Code – 153.343: Shoreland Overlay District**

**Chapter 154 – Flood Plain Management**

## CHAPTER 151: STORM WATER MANAGEMENT

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### Section

- 151.01 Authorization
- 151.02 Findings
- 151.03 Purpose
- 151.04 Definitions
- 151.05 Scope and effect
- 151.06 Storm Water Pollution Prevention Plan approval procedures
- 151.07 Plan review procedure
- 151.08 Minimum construction site best management practices
- 151.09 Lawn fertilizer regulations
- 151.10 Completion of work
- 151.11 Enforcement procedures
- 151.12 Effective date
- 151.13 Conflicts
  
- 151.98 Violations

### § 151.01 AUTHORIZATION.

This chapter is adopted pursuant to M.S. § 462.351, as it may be amended from time to time.

(Ord. 464, passed 6-26-1995)

### § 151.02 FINDINGS.

The City Council finds that uncontrolled land disturbing or development activities at construction sites, areas subject to soil erosion and areas containing restrictive soils adversely affect the public health, safety and general welfare by impacting water quality and contributing to other environmental problems, creating nuisances, impairing other beneficial uses of environmental resources and hindering the ability of the city to provide adequate water, sewage disposal, flood control, and other community services. In addition, extraordinary public expenditures may be required for the protection of persons and property in such areas and in areas which may be affected by unplanned land usage.

(Ord. 464, passed 6-26-1995; Am. Ord. 580, passed 11-24-2008)

## § 151.03 PURPOSE.

The purpose of this chapter is to promote, preserve and enhance the natural resources within the city and protect them from adverse effects occasioned by poorly sited development or incompatible activities by regulating land disturbing or development activities that would have an adverse and potentially irreversible impact on water quality and unique and fragile environmentally sensitive land; by minimizing conflicts and encouraging compatibility between land disturbing and development activities and water quality and environmentally sensitive land; and by requiring detailed review standards and procedures for land disturbing or development activities proposed for such areas, thereby achieving a balance between urban growth and development and protection of water quality and natural areas.

(Ord. 464, passed 6-26-1995)

## § 151.04 DEFINITIONS.

For the purposes of this chapter, the following definitions shall apply unless the context clearly indicates or requires a different meaning.

**APPLICANT.** Any person who wishes to obtain a building permit, zoning or subdivision approval.

**BEST MANAGEMENT PRACTICE (BMP).** Erosion and sediment control, water quality, and permanent storm water management practices that are the most effective and practicable means of controlling, preventing, and minimizing the degradation of surface water, including construction- phasing, minimizing the length of time soil areas are exposed, prohibitions, and other management practices published by state or designated area-wide planning agencies.

**CITY.** The elected governing body of the City of Forest Lake, or its designated officials or agents. Agents may include districts, water management organization, joint powers boards, watershed districts, or other governmental entities responsible for resource management within the city. After adopting this chapter, the city may enter into an agreement with its agent allowing the agent to administer the functions and perform the duties of the city set out in this chapter.

**CONTROL MEASURE.** A practice or combination of practices to control erosion and attendant pollution.

**DETENTION FACILITY.** A permanent natural or man-made structure, including wetlands, for the temporary storage of runoff which contains a permanent pool of water.

**DISCHARGE.** The release, conveyance, channeling, runoff, or drainage, of stormwater including snowmelt, from a construction site.

**EXPOSED SOIL AREAS.** All areas of the construction site where the vegetation (trees, shrubs, brush, grasses, and the like) or impervious surface has been removed, thus rendering the soil more prone to erosion. This includes topsoil stockpile areas, borrow areas and disposal areas within the construction site. It does not include stockpiles or surcharge areas of gravel, concrete or bituminous. Once soil is exposed it is considered "exposed soil," until it meets the definition of "final stabilization".

**FINAL STABILIZATION.** All soil disturbing activities at the site have been completed, and a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established, or equivalent permanent stabilization measures have been employed. Simply sowing grass is not considered final stabilization. All facilities designed to convey or store water shall be returned to their original design volume prior to meeting the final stabilization requirements of the site.

**FLOOD FRINGE.** The portion of the flood plain outside of the floodway.

**FLOODPLAIN.** The areas adjoining a watercourse or water basin that have been or may be covered by a regional flood.

**FLOODWAY.** The channel of the watercourse, the bed of water basins, and those portions of the adjoining flood plains that are reasonably required to carry and discharge flood water and provide water storage during a regional flood.

**HYDRIC SOILS.** Soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part.

**HYDROPHYTIC VEGETATION.** Macrophytic plant life growing in water, soil or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.

**LAND DISTURBING OR DEVELOPMENT ACTIVITIES.** Any change of the land surface, including removing vegetative cover, excavating, filling, grading and the construction of any structure.

**MPCA.** Minnesota Pollution Control Agency.

**NPDES.** The National Pollutant Discharge Elimination System; the program for issuing, modifying, revoking, reissuing, terminating, monitoring, and enforcing permits under the Clean Water Act (§§ 301, 318,402 and 405) and 33C.F.R. §§ 1317,1328, 1342 and 1345 authorizing the discharge of pollutants to water of the United States.

**PERSON.** Any individual, firm, corporation, partnership, franchise, association or governmental entity.

**PUBLIC WATERS.** Waters of the state as defined in M.S. § 103G.005, Subd. 15, as it may be amended from time to time.

**REGIONAL FLOOD.** A flood that is representative of large floods known to have occurred generally in the state and reasonably characteristic of what can be expected to occur on an average frequency in the magnitude of a 100 year recurrence interval.

**RETENTION FACILITY.** A permanent natural or manmade structure that provides for the storage of storm water runoff by means of a permanent pool of water.

**SEDIMENT.** Solid mineral or organic material that, in suspension, is being transported, or has been moved from its original site by air, water, gravity, or ice and has been deposited at another location.

**STORMWATER POLLUTION PREVENTION PLAN (SWPPP).** A joint storm water and erosion and sediment control plan containing the requirements of this chapter, that when implemented will decrease soil erosion on a parcel of land and off-site non-point pollution.

**STORMWATER RUNOFF.** Surface water arising from rain, snow or the action of any person.

**STRUCTURE.** Anything manufactured, constructed, or erected which is normally attached to or positioned on land, including portable structures, earthen structures, roads, parking lots and paved storage areas.

**WATERS OF THE STATE.** As defined in M.S. § 115.01, subd. 22, all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, reservoirs, aquifers, irrigation systems, drainage systems and all other bodies or accumulations of water, surface or underground, natural or artificial, public or private, which are contained within, flow through, or border upon the state or any portion thereof.

**WETLANDS.** Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this definition, wetlands must have the following three attributes:

- (1) Have a predominance of hydric soils;



(2) Are inundated or saturated by surface or ground water at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions; and

(3) Under normal circumstances support a prevalence of the vegetation.

(Ord. 464, passed 6-26-1995; Am. Ord. 580, passed 11-24-2008)

### **§ 151.05 SCOPE AND EFFECT.**

(A) *Applicability.* Except as provided in division (B) of this section, every applicant for a building permit, subdivision approval, or a permit to allow land disturbing activities must submit a storm water pollution prevention plan to the city. No building permit, subdivision approval, or permit to allow land disturbing activities shall be issued until approval of the storm water pollution prevention plan or a waiver of the approval requirements has been obtained in strict conformance with the provisions of this chapter. The provisions of § 151.07 apply to all land, public or private, located within the city.

(B) *Exemptions* The provisions of this chapter do not apply to:

(1) Any part of a subdivision if a plat for the subdivision has been approved by the City Council on or before the effective date of this chapter;

(2) Any land disturbing activity for which plans have been approved by the watershed management organization within 6 months prior to the effective date of this chapter;

(3) A lot for which a building permit has been approved on or before the effective date of this chapter;

(4) Excavation or grading resulting in the movement of less than 50 cubic yards of material;

(5) Installation of fence, sign, telephone, and electric poles and other kinds of posts or poles;

(6) Emergency work to protect life, limb or property;

(7) Tilling, planting, or harvesting of agricultural, horticultural, or silvicultural (forestry) crops; or

(8) Single-family residential site improvements such as the construction of houses, house additions, decks and garages that disturb an area less than one acre in size except that such land disturbances shall comply with § 151.08(A) and (H) of this chapter.

(C) *Waiver.* The City Council may waive any requirements of this chapter upon making a finding that compliance with the requirement will involve an unnecessary hardship and the waiver of the requirement will not adversely affect the standards and requirements set forth in this chapter.

(Ord. 464, passed 6-26-1995; Am. Ord. 580, passed 11-24-2008; Am. Ord. 587, passed 11-23-2009)

### **§ 151.06 STORM WATER POLLUTION PREVENTION PLAN APPROVAL PROCEDURES.**

(A) *Application.*

(1) A storm water pollution prevention plan shall be filed with the city and shall include a statement indicating the grounds upon which the approval is requested, that the proposed use is permitted by right or as an exception in the underlying zoning district and adequate evidence showing that the proposed use will conform to the standards set forth in this chapter. Prior to applying for approval of a storm water pollution prevention plan, an applicant may request that the storm water pollution prevention plan be reviewed by the appropriate departments of the city. A storm water pollution prevention plan shall be submitted in conjunction with any grading permit applications, land use applications or other applications as determined appropriate by the city.

(2) Five sets of clearly legible blue or black lined copies of drawings and required information shall be submitted to the city with required fees for processing and approval as set forth in § 151.07 and financial security when required by § 151.07 in the amount to be calculated in accordance with that section. Drawings shall be prepared to a scale appropriate to the site of the project and suitable for the review to be performed. At a minimum the scale shall be 1 inch equals 100 feet.

(B) *Storm water pollution prevention plan.* At a minimum, the storm water pollution prevention plan shall contain the following information.

(1) *Narrative.* A narrative describing the nature of the construction activity, including:

(a) Project description: the nature and purpose of the land disturbing activity and the amount of grading, utilities, and building construction involved;

(b) Chain of command describing who is responsible for implementing the erosion and sediment control BMPs during construction;

(c) Schedule of anticipated starting and completion date of each land disturbing activity, including the installation of construction site erosion control measures needed to meet the requirements of this chapter;

(d) A description of the soils of the site, including a map indicating soil types of areas to be disturbed as well as a soil report containing information on the suitability of the soils for the type of development proposed and for the type of sewage disposal proposed and describing any remedial steps to be taken by the developer to render the soils suitable;

(e) Receiving waters within 1 mile of the property;

(f) Pollution prevention measures;

(g) A plan for the maintenance and inspection of the construction site erosion and sediment control measures necessary to meet the requirements of this chapter;

(h) A description of the post construction stormwater management measures that are going to be used including drainage calculations modeling the existing and proposed conditions meeting the standards identified in §151.06; and

(i) The identity of the person responsible for overseeing the long term operation and maintenance of the permanent stormwater management system.

(2) *Existing site map.* A map of existing site conditions showing the site and immediately adjacent areas, including:

(a) The name and address of the applicant, the section, township and range, north point, date and scale of drawing and number of sheets;

(b) Location of the tract by an insert map at a scale sufficient to clearly identify the location of the property and giving such information as the names and number of adjoining roads, railroads, utilities, subdivisions, towns and districts or other landmarks;

(c) Existing topography with a contour interval appropriate to the topography of the land but in no case having a contour interval greater than 2 feet;

(d) Volume of material to be moved or removed;

(e) A woodland survey showing the removal, replacement, and preservation plan of all significant trees and woodlands, as regulated in §§ 153.295*et seq.*;

(f) A delineation of all streams, rivers, public waters and wetlands located on and immediately adjacent to the site, including depth of water, a description of all vegetation which may be found in the

water, a statement of general water quality and any classification given to the water body or wetland by the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency and/or the United States Army Corps of Engineers;

(g) Location and dimensions of existing storm water drainage systems and natural drainage patterns on and immediately adjacent to the site delineating in which direction and at what rate storm water is conveyed from the site, identifying the receiving stream, river, public water, or wetland, and setting forth those areas of the unaltered site where storm water collects;

(h) Vegetative cover and clearly delineating any vegetation proposed for removal; and

(i) 100 year flood plains, flood fringes and floodways.

(2) *Site construction plan.* A site construction plan, including:

(a) Locations and dimensions of all proposed land disturbing activities and any phasing of those activities;

(b) Locations and dimensions of all temporary soil or dirt stockpiles;

(c) Locations and dimensions of all construction site erosion control measures and best management practices (BMPs) necessary to meet the minimum BMP requirements of this chapter;

(d) Designation of the site's areas that have the most potential for erosion; and

(e) Any other information pertinent to the particular project which in the opinion of the applicant or city is necessary for the review of the project.

(3) *Plan of final site conditions.* A plan of final site conditions on the same scale as the existing site map showing the site changes and how the site will be stabilized after construction is completed, including:

(a) Finished grading shown at contours at the same interval as provided above or as required to clearly indicate the relationship of proposed changes to existing topography and remaining features;

(b) A landscape plan, drawn to an appropriate scale, including dimensions and distances and the location, type, size and description of all proposed landscape materials which will be added to the site as part of the development;

(c) A drainage plan of the developed site delineating in which direction and at what rate storm water will be conveyed from the site and setting forth the areas of the site where storm water will be allowed to collect;

(d) The proposed size, alignment and intended use of any structures to be erected on the site;

(e) A clear delineation and tabulation of all areas which shall be paved or surfaced, including a description of the surfacing material to be used; and

(f) Any other information pertinent to the particular project which in the opinion of the applicant is necessary for the review of the project.

(Ord. 464, passed 6-26-1995; Am. Ord. 580, passed 11-24-2008)

## **§ 151.07 PLAN REVIEW PROCEDURE.**

(A) *Process.* Storm water management plans meeting the requirements of § 151.06 and minimum BMP requirements of § 151.08 shall be submitted to the city for review.

(B) *Duration.* Approval of a plan submitted under the provisions of this chapter shall expire 1 year after the date of approval unless construction has commenced in accordance with the plan. However, if prior to

the expiration of the approval, the applicant makes a written request to the city for an extension of time to commence construction setting forth the reasons for the requested extension, the city may grant one extension of not greater than 1 single year.

(C) *Conditions.* A storm water pollution prevention plan may be approved subject to compliance with conditions reasonable and necessary to insure that the requirements contained in this chapter are met. The conditions may, among other matters, limit the size, kind or character of the proposed development, require the construction of structures, drainage facilities, storage basins and other facilities, require replacement of vegetation, establish required monitoring procedures, stage the work over time, require alterations of the site design to insure buffering, and require the conveyance to the city or other public entity of certain lands or interests therein.

(D) *Financial security.*

(1) Prior to approval of any storm water pollution prevention plan, the applicant shall submit an agreement to construct the required physical improvements, to dedicate property or easements, or to comply with such conditions as may have been agreed to. The agreement shall be accompanied by a financial security satisfactory to the city to cover the amount of the established cost of complying with the agreement. The agreement and financial security shall guarantee completion and compliance with conditions within a specific time, which time may be extended in accordance with division (B) of this section.

(2) The adequacy, conditions and acceptability of any agreement and financial security shall be determined by the city.

(E) *Fees.* All applications for storm water pollution prevention plan approval shall be accompanied by a processing and approval fee as established from time to time by duly adopted resolution or ordinance of the City Council.

(Ord. 464, passed 6-26-1995; Am. Ord. 580, passed 11-24-2008)

## **§ 151.08 MINIMUM CONSTRUCTION SITE BEST MANAGEMENT PRACTICES.**

(A) *Standards.* No storm water pollution prevention plan which fails to meet the standards contained in this section and in §§ 153.270*et seq.*, shall be approved by the City Council or its designated representative.

(B) *Site dewatering.* Water pumped from the site shall be treated by temporary sedimentation basins, grit chambers, sand filters, upflow chambers, hydra-cyclones, swirl concentrators or other controls, as appropriate. Water may not be discharged in a manner that causes erosion, sedimentation, or flooding of the site, receiving channels or a wetland. All dewatering must comply with the MPCA NPDES construction site general permit.

(C) *Waste and material disposal.* All waste and unused building materials (including garbage, debris, cleaning wastes, wastewater, toxic materials or hazardous materials, collected sediment, asphalt and concrete millings, floating debris, paper, plastic, fabric, construction and demolition debris and other wastes) shall be properly disposed of off-site and not allowed to be carried by runoff into a receiving channel or storm sewer system and must comply with MPCA disposal requirements.

(D) *Hazardous materials.* Oil, gasoline, paint and any hazardous substances must be properly stored, including secondary containment, to prevent spill, leaks or other discharge. Restricted access to storage areas must be provided to prevent vandalism. Concrete wash must be limited to a defined area of the site and runoff must be contained within the defined area. Storage and disposal of hazardous waste must be in compliance with MPCA regulations.

(E) *Liquid waste.* All non-stormwater discharges (concrete truck washout, vehicle washing, maintenance spills, and the like) conducted during the construction activity shall not be discharged to the municipal

storm sewer, wetlands, natural drainageways, or waters of the state and must comply with the MPCA NPDES Construction Site General Permit.

(F) *Tracking.* Each site shall have graveled roads, access drives and parking areas of sufficient width and length to prevent sediment from being tracked onto public or private roadways. Any sediment reaching a public or private road shall be removed by street cleaning (not flushing) before the end of each workday.

(G) *Drain inlet protection.* All storm drain inlets shall be protected during construction and must comply with the MPCA NPDES construction site general permit.

(H) Site erosion and sediment

(1) Channelized runoff from adjacent areas passing through the site shall be diverted around disturbed areas, if practical. Otherwise, the channel shall be protected as described below. Sheetflow runoff from adjacent areas greater than 10,000 square feet in area shall also be diverted around disturbed areas, unless shown to have resultant runoff rates of less than 0.5 cubic feet per second across the disturbed area for the 1-year storm. Diverted runoff shall be conveyed in a manner that will not erode the conveyance and receiving channels. All temporary or permanent drainage channels must be stabilized within 24 hours of being connected to a water of the state. Sediment control is required along channel edges to reduce sediment reaching the channel.

(2) All activities on the site shall be conducted in a logical sequence to minimize the area of bare soil exposed at any one time and to the extent feasible conform to the natural limitations presented by the topography and soils as to create the best potential for preventing soil erosion.

(a) All disturbed ground left inactive must be stabilized using the methods and time frames listed in the MPCA NPDES construction site general permit.

(b) Whenever possible, natural vegetation shall be retained and protected.

(c) For sites with more than 10 acres disturbed at one time, or if a channel originates in the disturbed area, 1 or more temporary or permanent sedimentation basins shall be constructed. Each sedimentation basin shall be designed to meet storage requirements identified in the MPCA NPDES construction site general permit with accepted design specifications. The basin discharge rate shall also be sufficiently low as to not cause erosion along the discharge channel or the receiving water.

(d) Any soil or dirt storage piles containing more than 10 cubic yards of material should not be located with a downslope drainage length of less than 25 feet from the toe of the pile to a roadway or drainage channel. If remaining for more than 7 days, they shall be stabilized by mulching, vegetative cover, tarps or other means. Erosion from piles which will be in existence for less than 7 days shall be controlled by placing silt fence barriers around the pile. In street utility repair or construction, soil or dirt storage piles located closer than 25 feet of a roadway or drainage channel must be covered with tarps or suitable alternative control, if exposed for more than 7 days, and the storm drain inlets must be protected with appropriate inlet protection.

(e) Perimeter sediment control measures shall be placed along all down gradient perimeters, side slopes, and down slope sides of the site. If a channel or area of concentrated runoff passes through the site, perimeter sediment control measures shall be placed along the channel edges to reduce sediment reaching the channel. All perimeter sediment control measures must include a maintenance and inspection schedule.

(f) Pipe outlets must have energy dissipation installed in accordance with the MPCA NPDES construction site general permit.

(g) Exposed slopes shall not be steeper in grade than 3 feet horizontal to 1 foot vertical (33%);

(h) Slopes over 33% (3:1) shall be reviewed and approved by the City Engineer and/or Washington Conservation District;

(i) Development on slopes with a grade between 25% (4:1) and 33% (3:1) shall be carefully reviewed to insure adequate measures have been taken to prevent soil erosion, sedimentation, vegetative and structural damage; and

(j) The bank of a natural waterway shall be protected with permanent turf vegetation.

(3) *Site restoration.*

(a) All disturbed areas shall be restored at the completion of the project;

(b) All restoration shall include the application of a minimum of 4 inches of a mineral topsoil or similar material that will support plant growth;

(c) Final grades shall be in conformity with the permit and topography of the surrounding land;

(d) If the land is to be restored to crop production, no slope shall exceed 5 feet horizontal to 1 foot vertical (20%);

(e) If the restoration is not for crop production, no grade shall exceed 4 feet horizontal to 1 foot vertical (25%);

(f) All restored areas shall be seeded with a mixture recommended by the Conservation District or returned to crop production; and

(g) The standards in divisions (B), (C), (D) and (E) above may be waived or modified to accommodate a specific restoration plan.

(4) The contractor or owner shall be responsible for inspections and maintenance on site and must comply with the MPCA NPDES construction site general permit. Inspections are required to track the following information:

(a) Date and time of the inspections;

(b) Name of person(s) conducting inspections;

(c) Findings of inspections including recommendations for corrective actions;

(d) Corrective actions taken (including dates, times, and party completing maintenance activities);

(e) Date and amount of rainfall events great than 1/2 inch in 24 hours;

(f) Documentation of changes made to the SWPPP;

(5) Maintenance is required as follows:

(a) When sediment reaches 1/3 the height of the BMP on perimeter control devices, sediment must be removed within 24 hours of discovery.

(b) If the perimeter control device is not functional it must be repaired or replaced within 24 hours of discovery.

(c) Temporary sediment basins shall be maintained when sediment reaches 1/2 the outlet height or 1/2 the basin storage volume. The basin must be drained or sediment removed within 72 hours of discovery.

(d) Construction site vehicle entrance and exit locations sediment must be removed from paved surfaces within 24 hours of discovery.

(I) *Storm water management criteria for permanent facilities.*

(1) An applicant shall install or construct, on or for the proposed land disturbing, development or redevelopment activity, all storm water management facilities necessary to manage increased runoff to

meet the water quantity and water quality guidelines identified in the city's Surface Water Management Plan (SWMP) and is also encouraged to meet the infiltration guidelines identified in the city's SWMP.

(2) The applicant shall give consideration to reducing the need for storm water management facilities by incorporating the use of natural topography and land cover such as wetlands, ponds, natural swales and depressions as they exist before development to the degree that they can accommodate the additional flow of water without compromising the integrity or quality of the wetland or pond.

(3) The drainage system shall be constructed and operational as quickly as possible during construction.

(4) The following storm water management practices shall be investigated in developing a storm water pollution prevention plan in the following descending order of preference:

- (a) Infiltration of runoff on-site, if suitable soil conditions are available for use;
- (b) Flow attenuation by use of open vegetated swales and natural depressions;
- (c) Storm water retention facilities; and
- (d) Storm water detention facilities.

(5) A combination of successive practices may be used to achieve the applicable minimum control requirements specified in division (1) above. Justification shall be provided by the applicant for the method selected.

(6) The banks of a natural waterway shall not exceed 5 feet horizontal to 1 foot vertical.

(7) The gradient of the natural waterway bank shall not exceed a grade that will result in a velocity that will cause erosion of the banks of the waterway.

(8) The bed of the natural waterway shall be protected with turf or sod. If turf or sod will not function properly, the bed shall be designed with a turf reinforcement mat, riprap or other suitable measures as approved by the City Engineer as to prevent erosion of the bed of the waterway. Riprap shall consist of quarried limestone or field stone (if random riprap is used). The riprap shall be no smaller than 2 inches square or larger than 2 feet square.

(9) The flow velocity in the natural waterway shall be controlled to a velocity that will not cause erosion of the natural waterway. If the flow velocity in the natural waterway is such that erosion of the turfside wall will occur, and the velocity cannot be decreased via velocity control structures, then other materials may replace turf on the side walls such as, turf reinforcement mat or riprap.

(J) *Design standards.* Storm water management facilities constructed in the city shall be designed in accordance with the city's SWMP and according to the most current technology as reflected in the MPCA publication *Minnesota Stormwater Manual*.

(K) *Wetland.*

(1) Runoff shall not be discharged directly into wetlands without presettlement of the runoff.

(2) A protective buffer strip of natural vegetation shall be provided around all wetlands in accordance with § 153.343.

(3) Wetlands must not be drained or filled, wholly or partially, unless replaced by restoring or creating wetland areas of at least equal public value in accordance with § 153.343. Replacement must be guided by the following principles in descending order of priority:

- (a) Avoiding the direct or indirect impact of the activity that may destroy or diminish the wetlands;

(b) Minimizing the impact by limiting the degree or magnitude of the wetland activity and its implementation;

(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected wetland environment;

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the activity; and

(e) Compensating for the impact by replacing or providing substitute wetland resources or environments.

(L) *Catch basins.* All newly installed and rehabilitated catch basins shall be provided with a sump area for the collection of coarse-grained material. The basins shall be cleaned when they are half filled with material.

(M) *Drain leaders.* All newly constructed or reconstructed buildings will route drain leaders to pervious areas wherein the runoff can be allowed to infiltrate. The flow rate of water exiting the leaders shall be controlled so no erosion occurs in the pervious areas.

(N) *Inspection and maintenance.* All storm water management facilities shall be designed to minimize the need of maintenance, to provide access for maintenance purposes and to be structurally sound. All storm water management facilities shall have a plan of operation and maintenance that assures continued effective removal of pollutants carried in storm water runoff. The Director of Public Works, or designated representative, shall inspect all storm water management facilities during construction, during the first year of operation, and at least once every 5 years thereafter. The inspection records will be kept on file at the Public Works Department for a period of 6 years. It shall be the responsibility of the applicant to obtain any necessary easements or other property interests to allow access to the storm water management facilities for inspection and maintenance purposes.

(O) *Models/methodologies/computations.* Hydrologic models and design methodologies used for the determination of runoff and analysis of storm water management structures shall be approved by the City Engineer and as per the design guidance in the city's SWMP. Plans, specifications and computations for storm water management facilities submitted for review shall be sealed and signed by a registered professional engineer. All computations shall appear on the plans submitted for review, unless otherwise approved by the City Engineer.

(P) *Watershed management plans/groundwater management plans.* Storm water pollution prevention plans shall be consistent with adopted watershed management plans and groundwater management plans prepared in accordance with M.S. §§ 103B.231 and 103B.255 respectively, as they may be amended from time to time, and as approved by the Minnesota Board of Water and Soil Resources in accordance with state law.

(Q) *Easements.* If a storm water pollution prevention plan involves direction of some or all runoff off of the site, it shall be the responsibility of the applicant to obtain from adjacent property owners any necessary easements or other property interests concerning flowage of water.

(R) *Fences, hedges and retaining walls.* No fence, hedge or retaining wall may be constructed or located within the drainage and utility easement of a stormwater drainage pond unless such improvement is approved, in writing, by the city. No fences or structures shall be constructed across the waterway that will reduce or restrict the flow of water. No such approval shall be granted for an improvement defined herein within the drainage and utility easement of a stormwater drainage pond to the extent it is constructed within 5 feet of either side yard property line or within 20 feet of the ordinary high water mark of the storm drainage pond. The property owner seeking to construct the improvement regulated herein must provide a certificate of compliance from the city.

(Ord. 464, passed 6-26-1995; Am. Ord. 580, passed 11-24-2008)



## **§ 151.09 LAWN FERTILIZER REGULATIONS.**

Fertilizer shall be applied in accordance with Chapter 100, Lawn Fertilizer and Pesticide Application Control.

(Ord. 464, passed 6-26-1995; Am. Ord. 580, passed 11-24-2008)

## **§ 151.10 COMPLETION OF WORK.**

Work will be considered complete when all exposed soil areas have undergone final stabilization, as defined in § 151.04; is constructed to finish grade, and is in conformance with all permit conditions to the satisfaction of the city. The applicant or its representative shall notify the city when the land disturbing operations are ready for final inspection. Final approval shall not be given until all work, including installation of all drainage facilities and their protective devices, and all erosion control measures, have been completed and final stabilization has occurred in accordance with this chapter.

(Ord. 464, passed 6-26-1995; Am. Ord. 580, passed 11-24-2008)

## **§ 151.11 ENFORCEMENT PROCEDURES.**

(A) *Right of entry.* The applicant shall promptly allow the city and its authorized representatives, upon presentation of credentials to:

(1) Enter upon the permitted site for the purposes of obtaining information, examining records and conducting investigations, inspections or surveys;

(2) Bring such equipment upon the permitted site as is necessary to conduct such surveys and investigations;

(3) Examine and copy any books, papers, records, or memoranda pertaining to activities or records required to be kept under the terms and conditions of the permitted site;

(4) Inspect the storm water pollution control measures;

(5) Sample and monitor any items or activities pertaining to storm water pollution control measures; and

(6) Move or remove any temporary or permanent obstruction to the safe and easy access to the site for the purposes herein described. The cost of providing such access shall be borne by the Applicant.

(B) *Notification of failure of the stormwater pollution prevention plan.*

(1) *Notification by the city.* The initial contact will be to a party listed on the application and/or the stormwater pollution prevention plan. Forty-eight hours after notification by the city or 72 hours after the failure of the erosion control measures, whichever is less, the city, at its discretion, may issue a stop work order, revoke any permit issued by the city to the applicant for the site in question or any other of the applicant's sites within the city's jurisdiction and withhold the scheduling of inspections, and/or the issuance of a certificate of occupancy.

(2) *Erosion off-site.* If erosion breaches the perimeter of the site, the applicant shall immediately develop a cleanup and restoration plan, obtain right-of-entry from the adjoining property owner, and implement the cleanup and restoration plan within 48 hours of obtaining the adjoining property owner's permission. In no case, unless written approval is received from the city, shall more than 7 calendar days go by without corrective action being taken.

(3) *Erosion into streets, wetlands or water bodies.* If eroded soils (including tracked soils from construction activities) enter or appear likely to enter streets, wetlands, or other water bodies, prevention strategies, cleanup and repair must be immediate. The applicant shall provide all traffic control and flagging required to protect the traveling public during cleanup operations.

(C) *Failure to do corrective work.* When an applicant fails to conform to any provision of this chapter within the time stipulated, the city may take the following actions:

(1) Issue a stop work order, withhold the scheduling of inspections, and/or withhold the issuance of a certificate of occupancy;

(2) Revoke any permit issued by the city to the applicant for the site in question or any other of the applicant's sites within the city's jurisdiction;

(3) Direct the correction of the deficiency by city forces or by a separate contract. The issuance of a permit constitutes a right-of-entry for the city or its contractor to enter upon the construction site for the purpose of correcting deficiencies in erosion control;

(4) All costs incurred by the city in correcting storm water pollution control deficiencies must be reimbursed by the applicant. If payment is not made within 30 days after costs are incurred by the city then the city may bring an action in court to collect its costs, assess the cost against the property to be collected with real estate taxes and/or draw on the financial security. As a condition of the permit, the owner shall waive notice of any assessment hearing to be conducted by the city, concur that the benefit to the property exceeds the amount of the proposed assessment, and waive all rights by virtue of M.S. § 429.081 to challenge the amount or validity of the assessment.

(D) *Action against the financial security.* If appropriate remedial action by the applicant has not been completed within 7 days after notification by the city, the city may draw against the financial security. The city shall use funds from this security to finance any corrective or remedial work undertaken by the city or a contractor under contract to the city and to reimburse the city for all direct costs incurred in the process of remedial work including, but not limited to, staff time, consultant's time, and attorney's fees if any of the following conditions exist:

(1) The applicant ceases land disturbing activities and/or filling and abandons the work site prior to completion of the city approved grading plan;

(2) The applicant fails to conform to any city approved grading plan and/or storm water pollution prevention plan as approved by the city, or related supplementary instructions;

(3) The techniques utilized under the storm water pollution prevention plan fail within 1 year of installation;

(4) The applicant fails to reimburse the city for corrective action taken under division (C) hereof; or

(5) Emergency action is required to be undertaken by the city under division (D) hereof.

(E) *Emergency action.* If circumstances exist such that noncompliance with this chapter poses an immediate danger to the public health, safety and welfare, as determined by the city engineer, the city may take emergency preventative action. The city shall also take every reasonable action possible to contact and direct the applicant to take any necessary action. Any cost to the city shall be the responsibility of the applicant and may be recovered from the applicant's financial security.

(Ord. 580, passed 11-24-2008)

## **§ 151.12 EFFECTIVE DATE.**

The ordinance set forth in this chapter shall be effective July 1, 1995.

(Ord. 464, passed 6-26-1995)

### **§ 151.13 CONFLICTS.**

In the event of any conflict between the provisions of this chapter and the provisions of the erosion control or shoreland protection chapter adopted by the City Council, the more restrictive standard prevails.

(Ord. 464, passed 6-26-1995; Am. Ord. 580, passed 11-24-2008)

### **§ 151.98 VIOLATIONS.**

Any person, firm, or corporation violating any provision of this chapter shall be punished as set forth in § 10.99, and a separate offense shall be deemed committed on each day during or on which a violation occurs or continues.

(Ord. 464, passed 6-26-1995; Am. Ord. 580, passed 11-24-2008)

(1) All requirements for installation and maintenance shall be met including but not limited to local, state, and federal regulations and manufacturer's specifications.

(2) An outdoor wood boiler system shall be located at least 300 feet from any residence or principal building which is not on the same property as the outdoor wood boiler system.

(3) An outdoor wood boiler system shall only be placed in a location meeting the minimum required setbacks of an accessory structure within the applicable zoning district.

(4) An outdoor wood boiler system shall have an attached permanent stack extending 2 feet higher than the roof line of the structure being served and residential or principal buildings within a 500-foot radius of the wood boiler system.

(5) An outdoor wood boiler system shall not be operated or maintained in a manner which creates a public nuisance.

(6) An outdoor wood boiler system shall burn clean fuel only. An outdoor wood boiler system shall not be operated in a manner which creates any dense smoke, noxious fumes or noxious gas or releases soot or cinders in unreasonable quantities.

(7) An outdoor wood boiler system shall be equipped with properly functioning spark arresters.

(8) An outdoor wood boiler system may not be operated from April 1 to October 1 in each year.

(H) *Right of entry and inspection.*

(1) An officer, agent, employee or representative of the city may inspect any property for the purpose of ascertaining compliance with the provisions of this section.

(2) If the city determines that the operation of a wood boiler system is creating a nuisance or is being operated in a manner hazardous to persons or property, or not meeting the requirements of this section, the city may revoke the certificate of compliance after a hearing is held by the City Council upon 10 days' written notice given to the owner.

(I) *Existing outdoor wood boiler systems.* Outdoor wood boiler systems installed prior to the adoption of this section shall be operated in compliance with the minimum requirements of this section except that the distance requirement of division (G)(2) above shall not apply; and for any existing outdoor wood boiler system not located in a conservancy, agriculture, or rural residential district, the requirements of division (C) above shall not apply. The owner(s) of the property on which the outdoor wood boiler system is installed shall make an application for a certificate of compliance within 30 days of adoption of this section.

(Ord. 570, passed 12-10-2007; Am. Ord. 596, passed 2-8-2010)

## **LAND ALTERATION AND GRADING REGULATIONS**

### **§ 153.270 LAND ALTERATION AND GRADING.**

(A) *Purpose.* Land alteration and grading means the reclaiming of land by depositing or moving material so as to alter the grade. The purpose of these standards is to regulate the alteration or grading of land.

(B) *Permit required.* A land alteration and grading permit is required for any excavating, filling, grading, or other changes in the land's topography that results in the movement of 50 cubic yards or more of material.

(C) *Permit not required.* A land alteration and grading permit is not required for the following, but the city may require the submittal of a grading plan:

- (1) Excavation or grading resulting in the movement of less than 50 cubic yards of material;
- (2) Grading activities associated with a construction project, provided a building permit is issued;
- (3) Grading undertaken in accordance with an approved preliminary plat; or
- (4) Driveways permitted in conjunction with an approved building permit.

(Ord. 537, passed 11-8-2004; Am. Ord. 596, passed 2-8-2010)

### **§ 153.271 PERMIT APPLICATION, REVIEW, AND APPROVAL PROCEDURE.**

(A) A land alteration and grading permit requires review and approval by the City Engineer.

(B) Application requirements for all proposals:

(1) A completed land alteration and grading permit and fee;

(2) A design in accordance with Ch. 151, regarding regulations of land disturbing and development activities in order to protect water quality and environmentally sensitive land with existing and proposed final grades with 2 foot contour intervals and 1 foot contour intervals if the distance between contours is over 100 feet.

(C) The city shall determine if the proposed operation is of a scale and has the potential to cause, either on or off-site, significant soil erosion, vegetation destruction, or drainage damage during the land alteration process. If such a determination is made, the city shall establish further application requirements. Any mining operation shall require this further documentation, including, but not limited to, such plans as the following:

(1) A Woodland Preservation Plan, as regulated in §§ 153.295*et seq.*, to assess the best possible layout to preserve significant trees and woodlands and to enhance the efforts to minimize damage to significant trees and woodlands;

(2) An annual staging plan, if the operation is expected to continue for more than 1 year, with grading plans for each year and an estimate of volume of material to be removed each year;

(3) A screening plan showing berms and/or landscaping to protect views from nearby properties and public streets and highways;

(4) A Storm Water Pollution Prevention Plan (SWPPP) as regulated by § 151.06.

(D) Review of the application shall be as stipulated in the conditional use permit (CUP) review procedure, with additional review and recommendation by the City Engineer and the Washington County Soil and Water Conservation District. Certain applications also require review, in accordance with other rules, by the Minnesota Department of Natural Resources, the Army Corps of Engineers, the Fish and Wildlife Service, and the appropriate Watershed District.

(E) Approval of the application shall be by the City Council as stipulated in the CUP approval process.

(F) The city may require the applicant to post a bond or other financial guarantee to ensure compliance with the permit.

(Ord. 537, passed 11-8-2004; Am. Ord. 596, passed 2-8-2010)

### **§ 153.272 CONSTRUCTION SITE STANDARDS.**

Construction site standards as described in § 151.08 shall be followed during construction.

(Ord. 537, passed 11-8-2004; Am. Ord. 580, passed 11-24-2008; Am. Ord. 596, passed 2-8-2010)

### **§ 153.273 EROSION CONTROL.**

The erosion control measures outlined in § 151.08 shall be followed during construction.

(Ord. 537, passed 11-8-2004; Am. Ord. 580, passed 11-24-2008; Am. Ord. 596, passed 2-8-2010)

### **§ 153.274 SEDIMENT CONTROL.**

The sediment control measures outlined in § 151.08 shall be followed during construction.

(Ord. 537, passed 11-8-2004; Am. Ord. 580, passed 11-24-2008; Am. Ord. 596, passed 2-8-2010)

### **§ 153.275 RESTORATION.**

The restoration standards outlined in § 151.08 shall be followed for project completion.

(Ord. 537, passed 11-8-2004; Am. Ord. 580, passed 11-24-2008; Am. Ord. 596, passed 2-8-2010)

### **§ 153.276 PUBLIC WATERS.**

No public water area shall be filled, partially filled, dredged, altered by grading or mining, or disturbed in any manner without first securing a permit from the Minnesota Department of Natural Resources, the United States Army Corp of Engineers, and a grading permit from the city.

(Ord. 537, passed 11-8-2004; Am. Ord. 596, passed 2-8-2010)

### **§ 153.277 DRAINAGE.**

(A) No land shall be developed or altered and no use shall be permitted that results in surface water runoff causing unreasonable flooding, erosion, or deposit of materials on adjacent properties or water bodies. The runoff shall be properly channeled into a storm drain, a natural watercourse or drainageway, a ponding area, or other public facility.

(B) Upon inspection of any site that has created drainage problems or could create a drainage problem with proposed new development, the owner or contractor of the site may be required to complete a grading plan and apply for a grading permit.

(C) On any slope where the natural drainage pattern may be disturbed or altered, the owner or contractor may be required to obtain a grading permit.

(Ord. 537, passed 11-8-2004; Am. Ord. 596, passed 2-8-2010)

### **§ 153.278 PRESERVATION OF NATURAL DRAINAGEWAYS/WATERWAYS AND WETLAND PRESERVATION.**

The alteration of wetlands shall comply with the rules and regulations of federal, state, and local agencies. A “natural drainageway” is defined as a depression in the earth’s surface, such as ravines, draws, and

hollows, that has definable beds and banks capable of conducting surface water runoff from adjacent lands.

(Ord. 537, passed 11-8-2004; Am. Ord. 596, passed 2-8-2010)

### **§ 153.279 PRESERVATION OF NATURAL DRAINAGEWAYS/WATERWAYS.**

The preservation of natural drainage/waterways outlined in § 151.08 shall be followed during construction.

(Ord. 537, passed 11-8-2004; Am. Ord. 580, passed 11-24-2008; Am. Ord. 596, passed 2-8-2010)

## **WOODLAND PRESERVATION REGULATIONS**

### **§ 153.295 PURPOSE.**

The purpose of this subchapter is to govern the preservation and protection of trees and woodlands within the city. The city recognizes the value of trees and woodlands for absorbing air pollutants, reducing noise, providing shade, providing wildlife habitat, providing visual amenity, and preventing soil erosion and siltation. This section is adopted to ensure that development occurs in a manner that protects and preserves these valuable resources.

(Ord. 537, passed 11-8-2004; Am. Ord. 596, passed 2-8-2010)

### **§ 153.296 DEFINITIONS.**

For the purpose of this chapter, the following definitions shall apply unless the context clearly indicates or requires a different meaning.

**APPLICANT.** Any person or entity that is required to submit and implement an approved Woodland Preservation Plan under this chapter.

**CALIPER INCH.** The diameter of a tree measured at 4.5 feet above ground level.

**CONIFEROUS TREES.** A wood plant which, at maturity, is at least 12 feet or more in height and has foliage on the outermost portions of the branches year round.

**CONSTRUCTION ZONE.** Any area in which movement of earth, alteration in topography, soil compaction, disruption of vegetation, change in soil chemistry, or other change in the natural character of the land occurs as a result of the site preparation, grading, building construction, or any other construction activity.

**CRITICAL ROOT ZONE (CRZ).** An imaginary circle surrounding the tree trunk radius distance of 1 foot per 1 inch of tree diameter (a 20 inch diameter tree has a CRZ with a radius of 20 feet).

**DRIP LINE.** The farthest distance away from the trunk that rain or dew will directly fall to the ground from the leaves or branches of the tree.

**EXEMPT TREE.** Eastern Cottonwood (*Populus deltoids*), Ash (any *fraxinus* species), willow (any *Salix* species), any species of the genus Elm, except those bred to be immune to Dutch Elm Disease, Common Buckthorn (*Rhamnus cathartica*), Russian Olive (*Elaeagnis angustifolia*), Black Locust (*Robinia pseudoacacia*), and Box-elder (*Acer negundo*) trees. These trees are not protected under the provisions of this Chapter unless the tree is located in the Shoreland Overlay District, and, unless located in the

## § 153.343 SHORELAND OVERLAY DISTRICT.

### (A) *Statutory authorization and policy.*

(1) *Statutory authorization.* This section is adopted pursuant to the authorization and policies contained in Minnesota Statutes.

(2) *Policy.* The uncontrolled use of shorelands of the city affects the public health, safety, and general welfare not only by contributing to pollution of public waters, but also by impairing the local tax base. Therefore, it is in the best interests of the public health, safety, and welfare to provide for the wise subdivision, use, and development of shorelands of public waters. The legislature of Minnesota has delegated responsibility to local governments of the state to regulate the subdivision, use, and development of the shorelands of public waters and thus preserve and enhance the quality of surface waters, conserve the economic and natural environmental values of shorelands, and provide for the wise use of waters and related land resources. This responsibility is recognized by the city.

### (B) *Scope and applicability.*

(1) The provisions of this section shall apply to the shorelands of the public water bodies as classified in this section and unclassified water bodies where applicable. A landscape/garden pond created by a private user where there was no previous water body may, at the discretion of the governing body, be exempt from this section.

(2) It is not intended by this section to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this section imposes greater restrictions, the provisions of this section shall prevail.

(3) The use of any shoreland of public water; the size and shape of lots; the use, size, type and location of structure on lots; the installation and maintenance of water supply and waste treatment systems; the grading and filling of any shoreland area; the cutting of shoreland vegetation; and the subdivision of land shall be in full compliance with the terms of this regulation and other applicable regulations.

(4) If any section, clause, provision, or portion of this section is determined to be unconstitutional or invalid by a court of competent jurisdiction, the remainder of this section shall not be affected thereby.

(5) The regulations contained in this section are in addition to and not in lieu of the other regulations contained in others sections of this chapter. All other regulations in this chapter that are inconsistent with the regulations of this section are repealed to the extent of the inconsistency only.

### (C) *Purpose.* It is the intent and purpose of these regulations to:

- (1) Designate suitable land use districts for each body of public water;
- (2) Regulate the sanitary and waste treatment system for lots;
- (3) Regulate the area of lot and the width of lots suitable for building sites;
- (4) Regulate the alteration of shoreland of public waters;
- (5) Regulate alterations of the natural vegetation and the natural topography along shorelands;
- (6) Conserve natural resources and maintain a high standard of environmental duality;
- (7) Preserve and enhance the quality of surface water;
- (8) Preserve the natural environmental values of shorelands;



(9) Provide for the utilization of water and related land resources;

(10) Maintain water quality, reduce flooding and erosion, and provide sources of food and habitat for a variety of fish and wildlife.

(D) *Definitions.* For the purpose of this section, the following definitions shall apply unless the context clearly indicates or requires a different meaning. Unless specifically defined below, words or phrases used in this section shall be interpreted so as to give them the same meaning as they have in § 153.010 and to give this section its most reasonable application.

**ACCESS CORRIDOR.** An area where vegetation is cut or removed through the buffer to provide access to a lake, stream, or wetland.

**BLUFF IMPACT ZONE.** A bluff and land located within 20 feet from the top of a bluff.

**BLUFF LINE.** A line along the top of a slope connecting points at which the slope, proceeding away from the water body or adjoining watershed channel, becomes less than 18% and it only includes slopes greater than 18% that meet the following criteria:

- (a) Part or all of the feature is located in a shoreland area;
- (b) The slope rises at least 20 feet above the ordinary high water level of the water body;
- (c) The slope must drain toward the water body;
- (d) The average slope of 18% or more shall extend over a distance of 50 feet or more.

**BUFFER STRIP.** Undisturbed strip of land adjacent to shorelines and wetlands consisting of native or existing vegetation.

**BUFFER WIDTH, MINIMUM.** The least buffer distance allowable measured perpendicular to the delineated wetland edge or ordinary high water mark of the lake or stream.

**BUILDABLE LAND.** Land with a slope less than 33% and outside of any required setbacks except that on a natural environment lake where a 200 foot structure setback is required, the buildable areas calculation shall be measured from a 153 foot setback rather than the required 200 foot setback, and above any 100 year floodplain, drainage way, or drainage easement.

**BUILDING LINE.** A line parallel to a lot line or the ordinary high water level at the required setback beyond which a structure may not extend.

**CLEAR CUTTING.** The removal of an entire stand of trees.

**COMMERCIAL USE.** The principal use of land or buildings for the sale, lease, rental, or trade of products, goods, and services.

**CONTROLLED ACCESS LOTS.** Lots intended to provide access to the lake for residents of a particular development.

**DECK.** A horizontal, unenclosed platform with or without attached railings, seats, trellises, or other features, attached or functionally related to a principal use or site and at any point extending more than 6 inches above ground.

**EXTRACTIVE USE.** The use of land for surface or subsurface removal of sand, gravel, rock, industrial minerals, other non-metallic minerals, and peat not regulated under Minnesota Statutes.

**FOREST LAND CONVERSION.** The clear-cutting of forested lands to prepare for a new land use other than reestablishment of a subsequent forest stand.

**HARDSHIP.** See §§ 153.036*et seq.*

**HEIGHT OF BUILDING.** See §§ 153.010et seq.

**IMPERVIOUS SURFACE.** The area of a lot (above the ordinary high water level) covered with buildings, including all appurtenances, driveways and sidewalks, and similar impervious materials. For the purpose of this section, driveways that have a gravel base shall be considered impervious. Decks that allow drainage through the decking and that do not have a plastic weed barrier or some other material that would impede drainage into the ground and swimming pool water surface area shall not be considered impervious.

**INTENSIVE VEGETATION CLEARING.** The complete removal of trees or shrubs in a contiguous patch, strip, row, or block.

**LAKE, GENERAL DEVELOPMENT.** Generally large, deep lakes of varying size and depths with high levels and mixes of existing development. These lakes often are extensively used for recreation and, except for the very large lakes, are heavily developed around the shore. Second and third tiers of development are fairly common.

**LAKE, NATURAL DEVELOPMENT.** Generally small, often shallow lakes with limited capacities for assimilation of the impacts of development and recreational use. They often have adjacent lands with substantial constraints for development such as high water tables, exposed bedrock, and unsuitable soils.

**LAKE, RECREATIONAL DEVELOPMENT.** Generally medium-sized lakes of varying depths and shapes with a variety of land form, soil and ground water situations on the lakes around them. They often are characterized by moderate levels of recreational uses and existing development. Development consists mainly of seasonal and year-round residences and recreational-oriented commercial uses.

**LOT WIDTH.** The horizontal distance between the side lot lines of a lot measured at the minimum required setback line from the ordinary high water mark or road right-of-way.

**NON-RIPARIAN.** A lot with no lake frontage.

**ORDINARY HIGH WATER LEVEL.** The boundary of public waters shall be an elevation delineating the highest water level which has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial. For watercourses, the **ORDINARY HIGH WATER LEVEL** is the elevation of the top of the bank of the channel. For reservoirs and flowage, the **ORDINARY HIGH WATER LEVEL** is the operating elevation of the normal summer pool. On lakes with an ordinary high water level established by the Minnesota Department of Natural Resources, that elevation shall be considered the **ORDINARY HIGH WATER LEVEL**.

**PUBLIC WATERS.** Any waters as defined in Minnesota Statutes.

**RIPARIAN.** A lot with lake frontage.

**RIVER, TRANSITION.** A river designated as such by the Minnesota Department of Natural Resources.

**RIVER, TRIBUTARY.** Consists of watercourses mapped in the Protected Waters Inventory that have not been assigned one of the river classes. These segments have a wide variety of existing land and recreational use characteristics.

**SENSITIVE RESOURCE MANAGEMENT.** The preservation and management of areas unsuitable for development in their natural state due to constraints such as shallow soils over ground water or bedrock, highly erosive or expansive soils, steep slopes, susceptibility to flooding, or occurrence of flora or fauna in need of special protection.

**SETBACK.** The minimum horizontal distance between a structure, sewage treatment system, or other facility and an ordinary high water level, top of a bluff, road, highway, property line, or other facility.

**SEWAGE TREATMENT SYSTEM.** An on-site septic tank and soil absorption system or other individual or cluster type sewage treatment system.

**SEWER SYSTEM.** Pipelines or conduits, pumping stations, and force main, and all other construction, devices, appliances, or appurtenances used for conducting sewage or industrial waste or other wastes to a point of ultimate disposal.

**SHORE IMPACT ZONE.** Land located between the ordinary high water level of public water and a line parallel to it at a setback of 50% of the required structure setback.

**SHORELAND.** Land which meets all of the following criteria from public waters:

(a) A portion of the lot must be located within 1,000 feet from the ordinary high water level of a lake, or 300 feet from a river or stream, or the landward extent of a floodplain designated by an ordinance on a river or stream, whichever is greater;

(b) A portion of the lot must fall within the Shoreland Zoning District as delineated on the Zoning Map;

(c) A lot must have public water frontage or be in the next tier of lots landward that has primary access from the same public or private road that serves the public water frontage lots (Tier Two lots).

**SIGNIFICANT HISTORIC SITE.** Any archaeological site, standing structure, or other property that meets the criteria for eligibility to the National Register of Historic Places or is listed in the State Register of Historic Sites, or is determined to be an unplatted cemetery.

**STEEP SLOPE.** Land where development or agricultural activity is either not recommended or described as poorly suited due to slope steepness and the site's soil characteristics. Where specific information is not available, **STEEP SLOPE** is a 12% slope measured over a horizontal distance of 50 feet.

**TIER TWO.** A lot or parcel of land which is across the street from a public or private road that serves the lots fronting a public water body.

**TOE OF THE BLUFF.** The lower point of bluff with an average slope exceeding 18%.

**TOP OF THE BLUFF.** The highest point of a bluff with an average slope exceeding 18%.

**TRIBUTARY STREAM.** A stream classified as such by the Minnesota Department of Natural Resources.

**UNCLASSIFIED BODY OF WATER.** Any lake, pond, backwater, swamp, marsh, wetland, stream, drainage way, flowage, river, floodplain, or other water-oriented topographical features not designated as being a natural environment lake, recreational development lake, general development lake, or transition river or tributary stream on the Zoning Map.

**VARIANCE.** A modification or variation of the provisions of this section as applied to a specific lot or property, except that modification in the allowable uses in the district in which the property is located shall not be allowed as a variance.

**VEGETATION, NATURAL.** Plant life which is native to the location and which would normally grow if the ground were left undisturbed.

**WETLAND.** Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water. For the purposes of the section, **WETLANDS** must have a predominance of hydric soils, be inundated or saturated by surface water or ground water at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions, and under normal circumstances, support a prevalence of hydrophytic vegetation. **WETLANDS** generally include swamps, marshes, bogs, and similar areas.

(E) *Administration.*

(1) *Compliance.* The use of any shoreland of public waters, the size and shape of lots, the use, size, type and location of structures on lots, the installation and maintenance of water supply and waste removal systems, the grading and filling of any shoreland area, the cutting of shoreland vegetation, and the subdivision of land shall be in full compliance with the terms of this section and other applicable regulations. In cases where standards conflict with the standards of the base zoning districts, the more restrictive standard will prevail.

(2) *Permits required.*

(a) A permit is required for the construction of buildings or building additions (and including such related activities as construction of decks, fences, and signs), the installation and/or alteration of sewage treatment systems, and grading and filling activities. Application for a permit shall be made to the city. The application shall include the necessary information so that the city can determine the site's suitability for the intended use and that a compliant sewage treatment system will be provided.

(b) A permit authorizing an addition to an existing structure shall stipulate that an identified failed sewage treatment system shall be reconstructed or replaced.

(3) *Notification to the Department of Natural Resources.*

(a) Copies of all notices of any public hearing to consider variances, amendments, or conditional uses under local shoreland management controls shall be sent to the Commissioner or the Commissioner's designated representative and postmarked at least 10 days before the hearings. Notices of hearings to consider proposed subdivisions/plats shall include copies of the subdivision/plat.

(b) A copy of approved amendments and subdivisions/plats and final decisions granting variances or conditional uses under local shoreland management controls shall be sent to the Commissioner or the Commissioner's designated representative and postmarked within 10 days of final action.

(4) *Variances.*

(a) Variances may only be granted in accordance with Minnesota Statutes. No variance may be granted for prohibited uses.

(b) When a variance is approved after the Department of Natural Resources has formally recommended denial in the hearing record, the notification of the approved variance shall be sent to the Department of Natural Resources and include the City Council's summary of the public record/testimony and the findings of facts and conclusions which supported the issuance of the variance.

(c) For existing developments, the application for variance shall clearly demonstrate whether a conforming sewage treatment system is present for the intended use of the property. The variance, if issued, shall require reconstruction of a nonconforming sewage treatment system.

(F) *Shoreland classification system.* The public waters of the Forest Lake have been classified below consistent with the criteria found in Minn. Regs. part 6120.3300 and the Protected Waters Inventory Map for Washington County, Minnesota, and designated on the Official Zoning Map for the City of Forest Lake.

(1) *Natural environment lakes.*

<i>Natural Environment Lake</i>	<i>Protected ID#</i>
Cranberry Lake	82-161
Shields Lake	82-162
Mud Lake	82-168
Higgins Lake	2-2

Department of Natural Resources protected wetlands over 10 acres in size

82-79W
82-157W
82-158W
82-160W
82-164W
82-165W

(2) *Recreational development lakes.*

<i>Recreational Development Lake</i>	<i>Protected ID#</i>
Sylvan Lake	80

(3) *General development lakes.*

<i>General Development Lake</i>	<i>Protected ID#</i>
Forest Lake	82-159
Clear Lake	82-163

(4) *Tributary streams.*

- (a) Sunrise River.
- (b) Hardwood Creek - Section 26, 27, and 34.

(G) *Lot requirements.* The lot area (land above the normal ordinary high water mark) and lot width standards (at road, shoreline, and building setback line) created after the date of enactment of this chapter for lake and river/stream classifications are the following.

(1) *Detached single residential lots.*

- (a) *Unsewered lakes.*

	<i>Area</i>	<i>Width</i>
Recreational development	1.5 acres	150 feet
General development	1.5 acres	150 feet
Natural environment	5 acres	200 feet

- (b) *Sewered lakes.*

	<i>Area</i>	<i>Width</i>
General development	15,000 sq. ft.	75 feet

(c) *River/stream standards.* Property fronting on rivers and streams shall meet underlying zoning density restrictions.

(2) *Attached single-family.* Where allowed by the underlying zoning districts with public sewer and water, attached single-family homes shall have a minimum lot area of 10,000 square feet per unit and a lot width of 65 feet per unit.

(3) *Additional special provisions.*

(a) A Planned Unit Development (PUD) may be utilized in the Shoreland Overlay District as stated in § 153.343. In no case shall a PUD increase the density beyond the density allowed by the underlying zoning district or alter the required setback from the ordinary high water mark.

(b) Only land above the ordinary high water level of public waters can be used to meet lot area standards. Lot width standards must be met at the minimum required building setback lines from the ordinary high water level and road right-of-way.

(c) Any lot intended as controlled access to public waters or recreation areas for use by owners of non-riparian lots within subdivisions are permissible providing all of the following standards are met:

1. The lot must meet the width and size requirements for residential lots and be suitable for the intended uses of controlled access lots;

2. If docking, mooring, or over-water storage of more than 6 watercraft is to be allowed at a controlled access lot, the width of the lot (keeping the same lot depth) must be increased by the percent of requirements for riparian residential lots for each watercraft beyond 6, consistent with the following table:

<i>Ratio of Lake Size to Shore Length (acres/mile)</i>	<i>Percent of Required Increase in Frontage</i>
Less than 100 to 1	25% per additional watercraft
101 - 200 to 1	20% per additional watercraft
201 - 300 to 1	15% per additional watercraft
301 - 400 to 1	10% per additional watercraft
Greater than 400 to 1	5% per additional watercraft

3. The lot(s) must be jointly owned by all purchasers of lots in the subdivision or by all purchasers of non-riparian lots in the subdivision who are provided riparian access rights on the access lot; and

4. A development agreement with the city specifying which lot owners have authority to use the access lot and what activities are allowed. The activities may include watercraft launching, loading, beaching, mooring, or docking. They must also include other outdoor recreational activities that do not significantly conflict with general public use or the public water or the enjoyment of normal property rights by adjacent property owners. Examples of the non-significant conflicts activities include swimming, sunbathing, or picnicking. The development agreement must limit the total amount of vehicles allowed to be parked and the total number of watercraft to be continuously moored, docked, stored over water, or parked on the property, and must require centralization of all common facilities and activities in the most suitable locations on the lot to minimize topographic and vegetation alterations. They must also require all parking areas and other facilities to be screened by vegetation or topography as much as practical from the public water, assuming summer, leaf-on conditions. No structures are allowed to be constructed on these lots except for docking facilities as approved by the Minnesota Department of Natural Resources and Washington County.

(H) *Vacant lots.*

(1) Any individual lot or lots that do not contain a seasonal or permanent home may not have a dock unless the first is contiguous to a lot within a seasonal or permanent home having the same ownership or as stated in § 153.343.

(2) No temporary structures, vehicles, or open storage are allowed.

(I) *Structure setback and other design criteria.*

(1) *Placement of structures on lots.* When more than 1 setback applies to a site, structures and facilities shall be located to meet all setbacks. Structures shall be located as follows.

(a) Structure setbacks (in feet) from ordinary high water level:

<b>CLASSES OF PUBLIC WATERS</b>	<b>SETBACKS</b>	
	<b>STRUCTURES</b>	
<b>LAKES</b>	<b>UNSEWERED</b>	<b>SEWERED</b>
Natural environment	200 feet	150 feet
Recreational development	100 feet	75 feet
General development	75 feet	50 feet
Unclassified waterbodies	50 feet	20 feet
<b>RIVERS/ STREAMS</b>		
Transition	200 feet	150 feet
Tributary	200 feet	150 feet

(b) *Additional structure setbacks.* The following additional structure setbacks apply regardless of the classification of the water body:

<b>SETBACK FROM</b>	<b>SETBACK (IN FEET)</b>
(a) Top of bluff	30 feet
(b) Unplatted cemetery	50 feet
(c) Arterial road	150 feet from centerline or 75 feet from road right-of-way, whichever is greater
(d) Right-of-way, road, public street, or other roads or streets not classified	Per underline zoning district regulations
(e) Side yard setback	Per underline zoning district regulations

(c) *Bluff impact zones.* Structures and accessory facilities, except stairways and landings, shall not be placed within bluff impact zones.

(d) *Additional regulations.* Refer to Washington County Development Code, Chapter Four, Individual Sewage Treatment System Regulations, for requirements relating to individual sewage treatment systems.

(e) *Additional requirements.* See § 153.110.

(2) *Design criteria for structures.*

(a) *High water elevations.* The elevation of structures located on riparian lots shall be regulated as follows: the lowest floor, including basement and crawl space shall be placed at least 1 foot above the 100

year flood level or, if the flood level has not been established, the lowest floor, including basement and crawlspace, shall be placed 3 feet above the ordinary high water level.

(b) *Stairways, lifts, walks, trails, and landings.* Stairways and lifts are the only permitted alterations for achieving access up and down bluffs and steep slopes to shore areas. All accesses shall meet the following design requirements:

1. Stairways, walks, trails, and lifts shall not exceed 4 feet in width on residential lots. Six foot stairways may be used for commercial properties and public open-space recreational properties. A 6 foot stair may be approved as part of a PUD;

2. Landings on residential lots shall not exceed 32 square feet in area;

3. Canopies or roofs are not allowed on stairways or landings;

4. Stairways, lifts, and landings may be either constructed above the ground on posts or pilings or placed into the ground, provided they are designed and built in a manner that ensures control of soil erosion;

5. Stairways, lifts, walks, trails, and landings shall be located in the most visually inconspicuous portions of lots as viewed from the surface of the public water assuming summer, leaf-on conditions, whenever practical; and

6. Facilities such as ramps, lifts, or mobility paths for persons with disabilities are also allowed for achieving access to the shore area, provided that the dimensional and performance standards of items 1 to 5 above are complied with in addition to the requirements of Minn. Regs., Ch. 1340.

(3) *Significant historic sites.* No structure may be placed on a significant historic site in a manner that affects the values of the site unless adequate information about the site has been removed and documented in a public repository.

(4) *Height of structures.* See underlying zoning district.

(5) *Lot coverage.* A maximum of 25% of the lot may be covered with impervious surface. If storm water ponding is provided (as required for new construction), certain developments may be exempt from this lot coverage requirement. Uses in those districts located east of Lake Street, south of 2nd Avenue NE, and north of 2nd Avenue SE shall be exempt from the lot coverage requirements of this section. This includes all structures, patios, walks, and surfaced or unsurfaced driveways. Landscaped areas may not have an impervious barrier installed. The removal of an impervious barrier under landscaping shall not be considered a reduction in impervious surface area.

(6) *Steep slopes.* The City Engineer shall evaluate possible soil erosion impacts and development visibility from public waters before issuing a permit for construction of sewage treatment systems, roads, driveways, structures, or other improvements on steep slopes. When determined necessary, conditions shall be attached to issued permits to prevent erosion and to preserve existing vegetation screening of structures, vehicles, and other facilities as viewed from the surface of public waters, assuming summer, leaf-on vegetation.

(J) *Shoreland alterations.* Alterations of vegetation and topography shall be regulated to prevent erosion into public waters, fix nutrients, preserve shoreland aesthetics, preserve historic values, prevent bank slumping, and protect fish and wildlife habitat.

(1) *Vegetation alterations.*

(a) No cutting or removal of deciduous trees over 6 inches in diameter measured at a point 4.5 feet above ground level, or coniferous trees 12 feet in height within the required building setback shall be permitted unless the trees are determined to be dead, diseased, or pose a safety hazard. A certificate of compliance must be obtained prior to the removal of any trees.



(b) Selective removal of natural vegetation shall be allowed, provided sufficient vegetative cover remains to screen cars, dwellings, and other structures, piers, docks, and marinas, when viewed from the water.

(c) In order to retard surface run-off and soil erosion, natural vegetation shall be restored insofar as is feasible after any construction project is completed.

(d) The provisions of this chapter shall not apply to normal maintenance of trees such as pruning or removal of limbs or branches that are dead or pose safety hazards.

(e) Vegetation alteration necessary for the construction of structures and sewage treatment systems and the construction of roads and parking areas under validly issued construction permits is exempt from these vegetation alteration standards.

(f) All other requirements as set forth in §§ 153.230 *et seq.* shall apply.

(2) *Topographic alterations/grading and filling.*

(a) Grading and filling and excavations necessary for the construction of structures, sewage treatment systems, and driveways under validly issued construction permits for these facilities do not require the issuance of a separate grading and filling permit. However, the grading and filling standards in this section shall be incorporated into the issuance of permits for construction of structures, sewage treatment systems, and driveways.

(b) Public roads and parking areas are regulated by §§ 153.125 through 153.135.

(c) Notwithstanding divisions (J)(2)(a) and (J)(2)(b) above, a grading and filling permit will be required for:

1. The movement of more than 10 cubic yards of material within the shore impact zones; and
2. The movement of more than 50 cubic yards of material outside of shore impact zones.

(d) The filling of any wetland or below the normal high water mark must be permitted by the appropriate government agency or jurisdiction.

(e) Excavations where the intended purpose is connection to a public water, such as boat slips, canals, lagoons, and harbors, will be allowed only after all government agencies with jurisdiction have approved the proposed connection to public waters.

(f) The following considerations and conditions shall be adhered to during the issuance of building permits, grading and filling permits, conditional use permits, variance, and subdivision approvals:

1. Grading or filling in any type of wetland must be in compliance with the Wetland Conservation Act;
2. Alterations shall be designed and conducted in a manner that ensures that only the smallest amount of bare ground is exposed for the shortest time possible;
3. Mulches or similar materials shall be used, where necessary, for temporary bare soil coverage and a permanent vegetation cover must be established within 6 months;
4. Methods to minimize soil erosion and to trap sediments before they reach any surface water feature shall be used;
5. Altered areas shall be stabilized to acceptable erosion control standards consistent with the field office technical guides of the local soil and water conservation districts and the United States Soil Conservation Service;
6. Fill or excavated material shall not be placed in a manner that creates an unstable slope;

7. Plans to place fill or excavated material on steep slopes must be reviewed by qualified professionals for continued slope stability and shall not create finished slopes of 33% or greater;

8. Any alterations below the ordinary high water level of public waters shall first be authorized by the Department of Natural Resources under Minnesota Statutes;

9. Alterations of topography shall not adversely affect adjacent or nearby properties;

10. Placement of natural rock riprap, including associated grading of the shoreline and placement of a filter blanket, is permitted if the finished slope does not exceed 3 feet horizontal to 1 foot vertical, the landward extent of the riprap is within 10 feet of the ordinary high water level and the height of the riprap above the ordinary high water level does not exceed 3 feet. Riprap should be used only where necessary and never to replace a stable, naturally vegetated shoreline area; and

11. At the end of excavation or filling operations, the disturbed area shall be restored with topsoil or other approved cover material and shall be reseeded within 1 growing season with native indigenous vegetation.

(K) *Placement and design of roads, driveways, and parking areas.*

(1) Public and private roads and parking areas shall be designed to take advantage of natural vegetation and topography to achieve maximum screening from view from public waters.

(2) All roads, driveways, and parking areas shall meet required setbacks.

(L) *Buffer strips.* In order to maintain water quality, reduce flooding and erosion, and to provide sources of food and habitat for a variety of fish and wildlife, buffer strips shall be provided and maintained around all natural environment lakes and streams and type 3, 4, and 5 wetlands.

(1) Lake, wetland, stream buffer widths:

(a) The minimum buffer width shall apply to all buffer widths, including those that are restored, replaced, or enhanced;

(b) The city may require a variable buffer width to protect valuable adjacent habitat when considering variances for building setbacks;

(c) The following buffer widths shall be maintained:

<b><i>LAKE/WETLAND</i></b>	<b><i>NE LAKE</i></b>	<b><i>WETLAND(S)</i></b>	<b><i>STORM WATER POND</i></b>
Minimum buffer width	50 feet	50% of required setback	10 feet

(2) An access corridor 10 feet wide or 25% of the lot width is permitted to gain access to the water body.

(M) *Storm water management.* See City of Forest Lake Storm Water Management Ordinance.

(N) *Standards for non-residential uses.* Any permitted use of land adjacent to public water must meet the following standards in addition to any other requirements of this section or the Zoning Code:

(1) The uses must be designed to incorporate topographic and vegetative screening of parking areas and structures;

(2) Uses that require short-term watercraft mooring for patrons must centralize these facilities and design them to avoid obstructions to navigation and to be the minimum size necessary to meet the need;

(3) Uses that depend on patrons arriving by watercraft may use signs and lighting to convey needed information to the public subject to the following general standards:

(a) No advertising signs or supporting facilities for signs may be placed in or upon public waters. Signs conveying information or safety messages may be placed in or on public waters by a public authority or under a permit issued by the Washington County Sheriff;

(b) Other outside lighting may be located within the shore impact zone or over public waters if it is used primarily to illuminate potential safety hazards and is shielded or otherwise directed to prevent direct illumination out across public waters. This does not preclude use of navigational lights.

(O) *Agricultural use standards.* General cultivation farming, grazing, nurseries, horticulture, truck farming, sod farming, and wild crop harvesting are permitted uses if steep slopes and shore bluff impact zones are maintained in permanent vegetation as provided by a qualified individual or agency. The shore impact zone for parcels with permitted agricultural land uses is equal to a line parallel to and 50 feet from the ordinary high water level.

(P) *Additional standards.*

(1) Uses allowed within shoreland areas shall be subject to review and approval procedures and criteria and conditions for review of conditional uses established in this chapter. A thorough evaluation of the water body and topography, vegetative, and soil conditions on the site must be made to ensure:

(a) The prevention of soil erosion or other possible pollution of public waters, both during and after construction;

(b) Limited visibility of structures and other facilities as viewed from public waters;

(c) The site is adequate for water supply and on-site sewage treatment;

(d) The types, uses, and numbers of watercraft that the project will generate are compatible in relation to the suitability of public waters to safely accommodate these watercraft.

(2) The city, upon consideration of the criteria listed above and the purposes of any proposal, may attach such conditions as it deems necessary to fulfill the purposes of this section. The conditions may include, but are not limited to, the following:

(a) Increased setbacks from the ordinary high water level;

(b) Limitations on the natural vegetation to be removed or the requirement that additional vegetation be planted;

(c) Special provisions for the location, design, and use of structures, sewage treatment systems, watercraft launching and docking areas, vehicle parking areas, lighting, signage, and noise.

(Q) *Sewage disposal.* Any premises used for human occupancy must be provided with an adequate method of sewage treatment.

(R) *Fences.* In addition to the standards contained in §§ 153.147*et seq.*, the following standards must also be met on shoreland property. No fence shall be constructed closer to the lake than the required lake setback unless the existing home is located closer to the lake than the required setback in which case the fence may be constructed even with the lake side of the home.

(S) *Nonconforming situations.* Nonconforming situations shall be regulated in accordance with §§ 153.050*et seq.* with the following exceptions:

(1) All legally established nonconformities as of the date of adoption of this section may continue, but they will be managed according to applicable state statutes and other regulations of the city for the subjects of alterations and additions, repair after damage, discontinuance of the use and intensification of use, except that the following standards will also apply in shoreland areas:

(a) On natural environment lakes, any separate lot or parcel of record legally created and recorded prior to the adoption of this section may be used for single-family detached dwelling purposes without a variance if it is at least 1.5 acres in size, is 120 feet in width, and meets all other requirements of this section;

(b) *Lots with nonconforming areas.* The maximum impervious coverage may be 30% but no more than a total square footage of 3,750;

(c) Existing lots with impervious surface exceeding 25% may continue to exist so as not to exceed impervious areas at the time of adoption of this section. Every effort must be made to lessen the impervious surface when a structure is altered. Landscaped areas may not have an impervious barrier installed. The removal of an impervious barrier under landscaping shall not be considered a reduction in impervious surface.

(2) Decks not meeting the required setback from the ordinary high water level without a variance may be allowed if all of the following criteria and standards are met:

(a) The deck must be an accessory to a principal structure that existed at the time of the adoption of this chapter;

(b) A thorough evaluation of the property and structure reveals no reasonable location for a deck meeting or exceeding the existing ordinary high water level setback of the structure;

(c) The deck encroachment toward the ordinary high water level shall not encroach more than 10 feet into the required setback, ordinary high water level, and does not encroach closer than 35 feet, whichever is more restrictive;

(d) The length of the deck may extend beyond the width of the principal structure by 3 feet, but shall not be set back less than 6 feet from the property line allowing access to the deck;

(e) The deck shall not be roofed, walled, or screened.

(T) *Subdivision provisions.* See City of Forest Lake Subdivision Ordinance.

(U) *Notifications to the Department of Natural Resources.*

(1) Copies of all notices of any public hearings to consider variance, amendments, or conditional uses under this section must be sent to the Commissioner or the Commissioner's designated representative and postmarked at least 10 days before the hearing. Notices of hearings to consider proposed subdivisions/plats must include copies of the subdivision/plat.

(2) A copy of approved amendments and subdivision/plats and final decisions granting variances or conditional uses under this section must be sent to the Commissioner of the Department of Natural Resources or the Commissioner's designated representative and be postmarked within 10 days of the final action.

(Ord. 537, passed 11-8-2004; Am. Ord. 596, passed 2-8-2010)

## **§ 153.344 AIRPORT OVERLAY DISTRICT.**

(A) *Purpose and authority.* The Forest Lake Airport Joint Airport Zoning Board, created and established by joint action of the City Council of Forest Lake and the Town Board of Columbus Township pursuant to the provisions and authority of M.S. § 360.063, as it may be amended from time to time, hereby finds and declares that:

(1) An airport hazard endangers the lives and property of users of the Forest Lake Airport, and property or occupants of land in its vicinity, and also if of the obstructive type, in effect reduces the size of

## CHAPTER 154: FLOOD PLAIN MANAGEMENT

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### Section

- 154.001 Statutory authorization, findings of fact and purpose
- 154.002 General provisions
- 154.003 Establishment of overlay zoning districts
- 154.004 Floodway Overlay District (FW)
- 154.005 Flood Fringe Overlay District (FF)
- 154.006 General Flood Plain Overlay District
- 154.007 Subdivisions
- 154.008 Public utilities, railroads, roads and bridges
- 154.009 Manufactured homes and manufactured home parks and placement of recreational vehicles
- 154.010 Administration
- 154.011 Nonconforming uses
- 154.012 Amendments
  
- 154.999 Penalty

### § 154.001 STATUTORY AUTHORIZATION, FINDINGS OF FACT AND PURPOSE.

(A) *Statutory authorization.* The legislature of the State of Minnesota has, in M.S. Ch. 103F and Ch. 462, as they may be amended from time to time, delegated the responsibility to local government units to adopt regulations designed to minimize flood losses. Therefore, the City Council of the City of Forest Lake, Minnesota does ordain as follows:

(B) *Findings of fact.*

(1) The flood hazard areas of the city are subject to periodic inundation which results in loss of property and health and safety hazards, which adversely affect the public health, safety, and general welfare.

(2) *Methods used to analyze flood hazards.* This chapter is based upon a reasonable method of analyzing flood hazards which is consistent with the standards established by the Minnesota Department of Natural Resources.

(3) *National Flood Insurance Program compliance.* This chapter is adopted to comply with the rules and regulations of the National Flood Insurance Program codified as 44 Code of Federal Regulations Parts

(C) *Statement of purpose.* It is the purpose of this chapter to promote the public health, safety, and general welfare and to minimize those losses described in § 154.001(B)(1) by provisions contained herein.

(Ord. 597, passed 7-12-2010)

## **§ 154.002 GENERAL PROVISIONS.**

(A) *Lands to which chapter applies.* This chapter shall apply to all lands within the jurisdiction of the city shown on the Official Zoning Map and/or the attachments thereto as being located within the boundaries of the Floodway, Flood Fringe, or General Flood Plain Districts. This chapter does not permit any use, activity or subdivision of property which is not permitted in the underlying zone pursuant to the provisions of Chapters 150 through 153 of the City Code.

(B) *Establishment of Official Zoning Map.* The Official Zoning Map together with all materials attached thereto is hereby adopted by reference and declared to be a part of this chapter. The attached material shall include the Flood Insurance Study for Washington County, Minnesota and Incorporated Areas and Flood Insurance Rate Map panels therein numbered 27163C0020E, 27163C0040E, 27163C0045E, 27163C0107E, 27163C0109E, 27163C0126E, 27163C0127E, 27163C0128E, 27163C0129E, 27163C0131E, 27163C0132E, 27163C0133E and 27163C0134E, all dated February 3, 2010 and prepared by the Federal Emergency Management Agency. The Official Zoning Map shall be on file in the Office of the City Clerk and the Community Development Director.

(C) *Regulatory flood protection elevation.* The regulatory flood protection elevation shall be an elevation no lower than 1 foot above the elevation of the regional flood plus any increases in flood elevation caused by encroachments on the flood plain that result from designation of a floodway.

(D) *Interpretation.*

(1) In their interpretation and application, the provisions of this chapter shall be held to be minimum requirements and shall be liberally construed in favor of the city and shall not be deemed a limitation or repeal of any other powers granted by state statutes.

(2) The boundaries of the zoning districts shall be determined by scaling distances on the Official Zoning Map. Where interpretation is needed as to the exact location of the boundaries of the district as shown on the Official Zoning Map, as for example where there appears to be a conflict between a mapped boundary and actual field conditions and there is a formal appeal of the decision of the Zoning Administrator, the Board of Adjustment shall make the necessary interpretation. All decisions will be based on elevations on the regional (100-year) flood profile, the ground elevations that existed on the site at the time the community adopted its initial flood plain chapter or on the date of the first National Flood Insurance Program map showing the area within the 100-year flood plain if earlier, and other available technical data. Persons contesting the location of the district boundaries shall be given a reasonable opportunity to present their case to the Board of Adjustment and to submit technical evidence.

(E) *Abrogation and greater restrictions.* It is not intended by this chapter to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this chapter imposes greater restrictions, the provisions of this chapter shall prevail. All other regulations inconsistent with this chapter are hereby repealed to the extent of the inconsistency only.

(F) *Warning and disclaimer of liability.* This chapter does not imply that areas outside the flood plain districts or land uses permitted within such districts will be free from flooding or flood damages. This chapter shall not create liability on the part of the city or any officer or employee thereof for any flood damages that result from reliance on this chapter or any administrative decision lawfully made thereunder.

(G) *Severability*. If any section, clause, provision, or portion of this chapter is adjudged unconstitutional or invalid by a court of competent jurisdiction, the remainder of this chapter shall not be affected thereby.

(H) *Annexations*. The Flood Insurance Rate Map panels adopted by reference into division (B) above may include flood plain areas that lie outside of the corporate boundaries of the city at the time of adoption of this chapter. If any of these flood plain land areas are annexed into the city after the date of adoption of this chapter, the newly annexed flood plain lands shall be subject to the provisions of this chapter immediately upon the date of annexation into the city.

(I) *Definitions*. For the purpose of this chapter, the following definitions shall apply unless the context clearly indicates or requires a different meaning.

**ACCESSORY USE OR STRUCTURE.** A use or structure on the same lot with, and of a nature customarily incidental and subordinate to, the principal use or structure.

**BASEMENT.** Any area of a structure, including crawl spaces, having its floor or base subgrade (below ground level) on all 4 sides, regardless of the depth of excavation below ground level.

**CONDITIONAL USE.** A specific type of structure or land use listed in the official control that may be allowed but only after an in-depth review procedure and with appropriate conditions or restrictions as provided in the official zoning controls or building codes.

**EQUAL DEGREE OF ENCROACHMENT.** A method of determining the location of floodway boundaries so that flood plain lands on both sides of a stream are capable of conveying a proportionate share of flood flows.

**FLOOD.** A temporary increase in the flow or stage of a stream or in the stage of a wetland or lake that results in the inundation of normally dry areas.

**FLOOD FREQUENCY.** The frequency for which it is expected that a specific flood stage or discharge may be equaled or exceeded.

**FLOOD FRINGE.** That portion of the flood plain outside of the floodway. **FLOOD FRINGE** is synonymous with the term “floodway fringe” used in the Flood Insurance Study for Washington County, Minnesota and Incorporated Areas.

**FLOOD PLAIN.** The beds proper and the areas adjoining a wetland, lake or watercourse which have been or hereafter may be covered by the regional flood.

**FLOOD PROOFING.** A combination of structural provisions, changes, or adjustments to properties and structures subject to flooding, primarily for the reduction or elimination of flood damages.

**FLOODWAY.** The bed of a wetland or lake and the channel of a watercourse and those portions of the adjoining flood plain which are reasonably required to carry or store the regional flood discharge.

**LOWEST FLOOR.** The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, used solely for parking of vehicles, building access, or storage in an area other than a basement area, is not considered a building’s **LOWEST FLOOR**.

**MANUFACTURED HOME.** A structure, transportable in 1 or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term **MANUFACTURED HOME** does not include the term “recreational vehicle.”

**OBSTRUCTION.** Any dam, wall, wharf, embankment, levee, dike, pile, abutment, projection, excavation, channel modification, culvert, building, wire, fence, stockpile, refuse, fill, structure, or matter in, along, across, or projecting into any channel, watercourse, or regulatory flood plain which may impede, retard, or change the direction, of the flow of water, either in itself or by catching or collecting debris earned by such water.

**PRINCIPAL USE OR STRUCTURE.** The primary or predominant use for which a lot and structure, if located thereon, is conducted or maintained, as contrasted to an accessory use or structure.

**REACH.** A hydraulic engineering term to describe a longitudinal segment of a stream or river influenced by a natural or man-made obstruction. In an urban area, the segment of a stream or river between 2 consecutive bridge crossings would most typically constitute a **REACH**.

**RECREATIONAL VEHICLE (RV).** A vehicle that is built on a single chassis, is 400 square feet or less when measured at the largest horizontal projection, is designed to be self-propelled or permanently towable by a light duty truck, and is designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use. For the purposes of this chapter, the term **RECREATIONAL VEHICLE** shall be synonymous with the term “travel trailer/travel vehicle.”

**REGIONAL FLOOD.** A flood which is representative of large floods known to have occurred generally in Minnesota and reasonably characteristic of what can be expected to occur on an average frequency in the magnitude of the 100-year recurrence interval. **REGIONAL FLOOD** is synonymous with the term “base flood” 1% annual chance flood or 100-year flood elevation used in a flood insurance study.

**REGULATORY FLOOD PROTECTION ELEVATION.** Shall be an elevation no lower than 1 foot above the elevation of the regional flood plus any increases in flood elevation caused by encroachments on the flood plain that result from designation of a floodway.

**STRUCTURE.** Anything constructed or erected on the ground or attached to the ground or on-site utilities, including, but not limited to, buildings, factories, sheds, detached garages, cabins, manufactured homes, recreational vehicles not meeting the exemption criteria specified in this chapter and other similar items.

**SUBSTANTIAL DAMAGE.** Damage of any origin sustained by a structure where the cost of restoring the structure to its before damaged condition would equal or exceed 50% of the market value of the structure before the damage occurred.

**SUBSTANTIAL IMPROVEMENT.** Within any consecutive 365-day period, any reconstruction, rehabilitation (including normal maintenance and repair), repair after damage, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the “start of construction” of the improvement. This term includes structures that have incurred “substantial damage,” regardless of the actual repair work performed. The term does not, however, include either:

(a) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions.

(b) Any alteration of an historic structure provided that the alteration will not preclude the structure’s continued designation as an historic structure. For the purpose of this chapter, **HISTORIC STRUCTURE** shall be as defined in 44 Code of Federal Regulations, Part 59.1.

**VARIANCE.** A modification of a specific permitted development standard required in an official control including this chapter to allow an alternative development standard not stated as acceptable in the official control, but only as applied to a particular property for the purpose of alleviating a hardship, practical difficulty or unique circumstance as defined in the city’s Zoning Code.

(Ord. 597, passed 7-12-2010)

## **§ 154.003 ESTABLISHMENT OF OVERLAY ZONING DISTRICTS.**

(A) Overlay districts:



(1) *Floodway Overlay District.* The Floodway District shall include those areas designated as floodway on the Flood Insurance Rate Map adopted in § 154.002(B). For lakes, wetlands and other basins, the Floodway District shall include those areas designated as Zone AE (that do not have a floodway designated) and Zone A on the Flood Insurance Rate Map panels adopted in § 154.002(B) that are below the ordinary high water level as defined in M.S. § 103G.005, Subd. 14, as it may be amended from time to time.

(2) *Flood Fringe Overlay District.* The Flood Fringe District shall include those areas designated as floodway fringe, which shall include the areas shown on the Flood Insurance Rate Map, adopted in § 154.002(B) as being within Zone AE but being located outside of the floodway. For lakes, wetlands and other basins, the Flood Fringe District shall include those areas designated as Zone AE (that do not have a floodway designated) and Zone A on the Flood Insurance Rate Map panels adopted in § 154.002(B) that are below 1% annual chance flood elevation (100-year flood elevation) but above the ordinary high water level as defined in M.S. § 103G.005, Subd. 14, as it may be amended from time to time.

(3) *General Flood Plain Overlay District.* The General Flood Plain District shall include those areas designated as Zone A and Zone AE (without a floodway designated) on the Flood Insurance Rate Map adopted in § 154.002(B) which are not subject to criteria in (A)(1) and (A)(2) above.

(B) No new structure or land shall hereafter be used and no structure shall be constructed, located, extended, converted, or structurally altered without full compliance with the terms of this chapter and other applicable regulations which apply to uses within the jurisdiction of this chapter. Within the Floodway, Flood Fringe and General Flood Plain Overlay Districts, all uses not listed as permitted uses or conditional uses in §§ 154.004 through 154.006 that follow, respectively, shall be prohibited. In addition, a caution is provided here that:

(1) New manufactured homes, replacement manufactured homes and certain travel trailers and travel vehicles are subject to the general provisions of this chapter and specifically § 154.009.

(2) Modifications, additions, structural alterations, normal maintenance and repair, or repair after damage to existing nonconforming structures and nonconforming uses of structures or land are regulated by the general provisions of this chapter and specifically § 154.011.

(3) As-built elevations for elevated or flood proofed structures must be certified by ground surveys and flood proofing techniques must be designed and certified by a registered professional engineer or architect as specified in the general provisions of this chapter and specifically as stated in § 154.010 of this chapter.

(Ord. 597, passed 7-12-2010) Penalty, see § 154.999

## **§ 154.004 FLOODWAY OVERLAY DISTRICT (FW).**

(A) *Permitted uses.*

(1) General farming, pasture, grazing, horticulture, forestry, sod farming, and wild crop harvesting.

(2) Private and public golf courses, tennis courts, driving ranges, archery ranges, picnic grounds, boat launching ramps, swimming areas, parks, wildlife and nature preserves, game farms, fish hatcheries, shooting preserves, target ranges, trap and skeet ranges, hunting and fishing areas, and single or multiple purpose recreational trails.

(3) Residential lawns, gardens, parking areas, and play areas.

(B) *Standards for floodway permitted uses.*

(1) The use shall have a low flood damage potential.

(2) The use shall be permissible in the underlying zoning district.

(3) The use shall not obstruct flood flows or increase flood elevations and shall not involve structures, fill, obstructions, excavations or storage of materials or equipment.

(C) *Conditional uses.*

(1) Structures accessory to the uses listed in division (A) above and the uses listed in divisions (C)(2) through (C)(8) below.

(2) Extraction and storage of sand, gravel, and other materials.

(3) Marinas, boat rentals, docks, piers, wharves, and water control structures.

(4) Railroads, streets, bridges, utility transmission lines, and pipelines.

(5) Storage yards for equipment, machinery, or materials.

(6) Placement of fill or construction of fences.

(7) Recreational vehicles either on individual lots of record or in existing or new subdivisions or commercial or condominium type campgrounds, subject to the exemptions and provisions of this chapter.

(8) Structural works for flood control such as levees, dikes and floodwalls constructed to any height where the intent is to protect individual structures and levees or dikes where the intent is to protect agricultural crops for a frequency flood event equal to or less than the 10-year frequency flood event.

(D) *Standards for floodway conditional uses.*

(1) *All uses.* No structure (temporary or permanent), fill (including fill for roads and levees), deposit, obstruction, storage of materials or equipment, or other uses may be allowed as a conditional use that will cause any increase in the stage of the 100-year or regional flood or cause an increase in flood damages in the reach or reaches affected.

(2) All floodway conditional uses shall be subject to the procedures and standards contained in § 154.010(D) of this chapter.

(3) The conditional use shall be permissible in the underlying zoning district.

(4) Fill:

(a) Fill, dredge spoil, and all other similar materials deposited or stored in the flood plain shall be protected from erosion by vegetative cover, mulching, riprap or other acceptable method.

(b) Dredge spoil sites and sand and gravel operations shall not be allowed in the floodway unless a long-term site development plan is submitted which includes an erosion/sedimentation prevention element to the plan.

(c) As an alternative, and consistent with division (D)(4)(b) immediately above, dredge spoil disposal and sand and gravel operations may allow temporary, on-site storage of fill or other materials which would have caused an increase to the stage of the 100-year or regional flood but only after the City Council has received an appropriate plan which assures the removal of the materials from the floodway based upon the flood warning time available. The conditional use permit must be title registered with the property in the Office of the County Recorder.

(5) Accessory structures:

(a) Accessory structures shall not be designed for human habitation.

(b) Accessory structures, if permitted, shall be constructed and placed on the building site so as to offer the minimum obstruction to the flow of flood waters:

1. Whenever possible, structures shall be constructed with the longitudinal axis parallel to the direction of flood flow; and

2. So far as practicable, structures shall be placed approximately on the same flood flow lines as those of adjoining structures.

(c) Accessory structures shall be elevated on fill or structurally dry flood proofed in accordance with the FP-1 or FP-2 flood proofing classifications in the State Building Code. As an alternative, an accessory structure may be flood proofed to the FP-3 or FP-4 flood proofing classification in the State Building Code provided the accessory structure constitutes a minimal investment, does not exceed 500 square feet in size at its largest projection, and for a detached garage, the detached garage must be used solely for parking of vehicles and limited storage. All flood proofed accessory structures must meet the following additional standards:

1. The structure must be adequately anchored to prevent flotation, collapse or lateral movement of the structure and shall be designed to equalize hydrostatic flood forces on exterior walls;

2. Any mechanical and utility equipment in a structure must be elevated to or above the regulatory flood protection elevation or properly flood proofed; and

3. To allow for the equalization of hydrostatic pressure, there must be a minimum of 2 “automatic” openings in the outside walls of the structure having a total net area of not less than 1 square inch for every square foot of enclosed area subject to flooding. There must be openings on at least 2 sides of the structure and the bottom of all openings must be no higher than 1 foot above the lowest adjacent grade to the structure. Using human intervention to open a garage door prior to flooding will not satisfy this requirement for automatic openings.

(6) Storage of materials and equipment:

(a) The storage or processing of materials that are, in time of flooding, flammable, explosive, or potentially injurious to human, animal, or plant life is prohibited.

(b) Storage of other materials or equipment may be allowed if readily removable from the area within the time available after a flood warning and in accordance with a plan approved by the City Council.

(7) Structural works for flood control that will change the course, current or cross section of protected wetlands or public waters shall be subject to the provisions of M.S. Ch. 103G, as it may be amended from time to time. City-wide structural works for flood control intended to remove areas from the regulatory flood plain shall not be allowed in the floodway.

(8) A levee, dike or floodwall constructed in the floodway shall not cause an increase to the 100-year or regional flood and the technical analysis must assume equal conveyance or storage loss on both sides of a stream.

(Ord. 597, passed 7-12-2010) Penalty, see § 154.999

## **§ 154.005 FLOOD FRINGE OVERLAY DISTRICT (FF).**

(A) *Permitted uses.* Permitted uses shall be those uses of land or structures listed as permitted uses in the underlying zoning use district(s). All permitted uses shall comply with the standards for Flood Fringe District “permitted uses” listed in division (B) of this section and the “standards for all flood fringe uses” listed in division (E) of this section.

(B) *Standards for flood fringe permitted uses.*

(1) All structures, including accessory structures, must be elevated on fill so that the lowest floor including basement floor is at or above the regulatory flood protection elevation. The finished fill elevation

for structures shall be no lower than 1 foot below the regulatory flood protection elevation and the fill shall extend at such elevation at least 15 feet beyond the outside limits of the structure erected thereon.

(2) As an alternative to elevation on fill, accessory structures that constitute a minimal investment and that do not exceed 500 square feet at its largest projection may be internally flood proofed in accordance with § 154.004(D)(5)(c).

(3) The cumulative placement of fill where at any one time in excess of 1,000 cubic yards of fill is located on the parcel shall be allowable only as a conditional use, unless said fill is specifically intended to elevate a structure in accordance with division (B)(1) of this section.

(4) The storage of any materials or equipment shall be elevated on fill to the regulatory flood protection elevation.

(5) The provisions of division (E) of this section shall apply.

(C) *Conditional uses.* Any structure that is not elevated on fill or flood proofed in accordance with divisions (B)(1) and (B)(2) of this section and/or any use of land that does not comply with the standards in divisions (B)(3) and (B)(4) of this section shall only be allowable as a conditional use. An application for a conditional use shall be subject to the standards and criteria and evaluation procedures specified in divisions (D) and (E) of this section and § 154.010(D) of this chapter.

(D) *Standards for flood fringe conditional uses.*

(1) Alternative elevation methods other than the use of fill may be utilized to elevate a structure's lowest floor above the regulatory flood protection elevation. These alternative methods may include the use of stilts, pilings, parallel walls, and the like, or above-grade, enclosed areas such as crawl spaces or tuck under garages. The base or floor of an enclosed area shall be considered above-grade and not a structure's basement or lowest floor if: 1) the enclosed area is above-grade on at least 1 side of the structure; 2) it is designed to internally flood and is constructed with flood resistant materials; and 3) it is used solely for parking of vehicles, building access or storage. The above-noted alternative elevation methods are subject to the following additional standards:

(a) *Design and certification.* The structure's design and as-built condition must be certified by a registered professional engineer or architect as being in compliance with the general design standards of the State Building Code and, specifically, that all electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities must be at or above the regulatory flood protection elevation or be designed to prevent flood water from entering or accumulating within these components during times of flooding.

(b) *Specific standards for above-grade, enclosed areas.* Above-grade, fully enclosed areas such as crawl spaces or tuck under garages must be designed to internally flood and the design plans must stipulate:

1. A minimum area of openings in the walls where internal flooding is to be used as a flood proofing technique. There shall be a minimum of 2 openings on at least 2 sides of the structure and the bottom of all openings shall be no higher than 1 foot above grade. The automatic openings shall have a minimum net area of not less than 1 square inch for every square foot of enclosed area subject to flooding unless a registered professional engineer or architect certifies that a smaller net area would suffice. The automatic openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of flood waters without any form of human intervention; and

2. That the enclosed area will be designed of flood resistant materials in accordance with the FP-3 or FP-4 classifications in the State Building Code and shall be used solely for building access, parking of vehicles or storage.

(2) Basements, as defined by § 154.002(I) of this chapter, shall be subject to the following:

(a) Residential basement construction shall not be allowed below the regulatory flood protection elevation.

(b) Non-residential basements may be allowed below the regulatory flood protection elevation provided the basement is structurally dry flood proofed in accordance with division (D)(3) of this section.

(3) All areas of non-residential structures including basements to be placed below the regulatory flood protection elevation shall be flood proofed in accordance with the structurally dry flood proofing classifications in the State Building Code. Structurally dry flood proofing must meet the FP-1 or FP-2 flood proofing classification in the State Building Code and this shall require making the structure watertight with the walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy. Structures flood proofed to the FP-3 or FP-4 classification shall not be permitted.

(4) When at any one time more than 1,000 cubic yards of fill or other similar material is located on a parcel for such activities as on-site storage, landscaping, sand and gravel operations, landfills, roads, dredge spoil disposal or construction of flood control works, an erosion/sedimentation control plan must be submitted unless the community is enforcing a state approved shoreland management chapter. In the absence of a state approved shoreland chapter, the plan must clearly specify methods to be used to stabilize the fill on site for a flood event at a minimum of the 100-year or regional flood event. The plan must be prepared and certified by a registered professional engineer or other qualified individual acceptable to the City Council. The plan may incorporate alternative procedures for removal of the material from the flood plain if adequate flood warning time exists.

(5) Storage of materials and equipment:

(a) The storage or processing of materials that are, in time of flooding, flammable, explosive, or potentially injurious to human, animal, or plant life is prohibited.

(b) Storage of other materials or equipment may be allowed if readily removable from the area within the time available after a flood warning and in accordance with a plan approved by the City Council.

(6) The provisions of division (E) of this section shall also apply.

(E) *Standards for all flood fringe uses.*

(1) All new principal structures must have vehicular access at or above an elevation not more than 2 feet below the regulatory flood protection elevation. If a variance to this requirement is granted, the Board of Adjustment must specify limitations on the period of use or occupancy of the structure for times of flooding and only after determining that adequate flood warning time and local flood emergency response procedures exist.

(2) *Commercial uses.* Accessory land uses, such as yards, railroad tracks, and parking lots may be at elevations lower than the regulatory flood protection elevation. However, a permit for such facilities to be used by the employees or the general public shall not be granted in the absence of a flood warning system that provides adequate time for evacuation if the area would be inundated to a depth and velocity such that when multiplying the depth (in feet) times velocity (in feet per second) the product number exceeds 4 upon occurrence of the regional flood.

(3) *Manufacturing and industrial uses.* Measures shall be taken to minimize interference with normal plant operations especially along streams having protracted flood durations. Certain accessory land uses such as yards and parking lots may be at lower elevations subject to requirements set out in division (E)(2) above. In considering permit applications, due consideration shall be given to needs of an industry whose business requires that it be located in flood plain areas.

(4) Fill shall be properly compacted and the slopes shall be properly protected by the use of riprap, vegetative cover or other acceptable method. The Federal Emergency Management Agency (FEMA) has established criteria for removing the special flood hazard area designation for certain structures properly

elevated on fill above the 100-year flood elevation - FEMA's requirements incorporate specific fill compaction and side slope protection standards for multi-structure or multi-lot developments. These standards should be investigated prior to the initiation of site preparation if a change of special flood hazard area designation will be requested.

(5) Flood plain developments shall not adversely affect the hydraulic capacity of the channel and adjoining flood plain of any tributary watercourse or drainage system where a floodway or other encroachment limit has not been specified on the Official Zoning Map.

(6) Standards for recreational vehicles are contained in § 154.009(C).

(7) All manufactured homes must be securely anchored to an adequately anchored foundation system that resists flotation, collapse and lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state or local anchoring requirements for resisting wind forces.

(Ord. 597, passed 7-12-2010) Penalty, see § 154.999

## **§ 154.006 GENERAL FLOOD PLAIN OVERLAY DISTRICT.**

(A) *Permitted uses.*

(1) The uses listed in § 154.004(A) of this chapter shall be permitted uses.

(2) All other uses shall be subject to the floodway/flood fringe evaluation criteria pursuant to division (B) below. Section 154.004 shall apply if the proposed use is in the Floodway District and § 154.005 shall apply if the proposed use is in the Flood Fringe District.

(B) *Procedures for floodway and flood fringe determinations for streams within the General Flood Plain District.*

(1) Upon receipt of an application for a permit or other approval from the city within the General Flood Plain District, the applicant shall be required to furnish the following information as deemed necessary by the Community Development Department for the determination of the regulatory flood protection elevation and whether the proposed use is within the Floodway or Flood Fringe Overlay District.

(a) A typical valley cross-section(s) showing the channel of the stream, elevation of land areas adjoining each side of the channel, cross-sectional areas to be occupied by the proposed development, and high water information, if determined to be necessary by the city.

(b) Survey showing elevations or contours of the ground, pertinent structure, fill, or storage elevations, the size, location, and spatial arrangement of all proposed and existing structures on the site, and the location and elevations of streets.

(c) Photographs showing existing land uses, vegetation upstream and downstream, and soil types, if determined to be necessary by the city.

(d) Profile showing the slope of the bottom of the channel or flow line of the stream for at least 500 feet in either direction from the proposed development, if determined to be necessary by the city.

(e) Other necessary information as requested by the city.

(2) The applicant shall be responsible to submit 1 or more copies of the above information to a designated engineer or other expert person or agency for technical assistance in determining whether the proposed use is in the Floodway or Flood Fringe District and to determine the regulatory flood protection elevation. Procedures consistent with Minnesota Regulations 1983, Parts 6120.5000 - 6120.6200 and 44 Code of Federal Regulations Part 65 shall be followed in this expert evaluation. The designated engineer or

expert is strongly encouraged to discuss the proposed technical evaluation methodology with the respective Department of Natural Resources' Area Hydrologist prior to commencing the analysis. The designated engineer or expert shall:

(a) Estimate the peak discharge of the regional flood.

(b) Calculate the water surface profile of the regional flood based upon a hydraulic analysis of the stream channel and overbank areas.

(c) Compute the floodway necessary to convey or store the regional flood without increasing flood stages more than .5 foot. A lesser stage increase than .5 foot shall be required if, as a result of the additional stage increase, increased flood damages would result. An equal degree of encroachment on both sides of the stream within the reach shall be assumed in computing floodway boundaries.

(3) The Community Development Department, Building Department, and/or City Engineer must formally accept the technical evaluation and the recommended Floodway and/or Flood Fringe District boundary or deny the permit application. The city may submit the application and all supporting data and analyses to the Federal Emergency Management Agency or the Department of Natural Resources. Once the Floodway and Flood Fringe District boundaries have been determined, the Community Development Department shall process the permit application consistent with the applicable provisions of §§ 154.004 and 154.005 of this chapter.

(Ord. 597, passed 7-12-2010) Penalty, see § 154.999

## **§ 154.007 SUBDIVISIONS.**

(A) *Land suitability review criteria.* No land shall be subdivided which is unsuitable for the reason of flooding, inadequate drainage, water supply or sewage treatment facilities. All lots within the flood plain districts shall be able to contain a building site outside of the Floodway District at or above the regulatory flood protection elevation. All subdivisions shall have water and sewage treatment facilities that comply with the provisions of this chapter and have road access both to the subdivision and to the individual building sites no lower than 2 feet below the regulatory flood protection elevation. For all subdivisions in the flood plain, the Floodway and Flood Fringe District boundaries, the regulatory flood protection elevation and the required elevation of all access roads shall be clearly labeled on all required subdivision drawings and platting documents.

(B) *Floodway/flood fringe determinations in the General Flood Plain District.* In the General Flood Plain District, applicants shall provide the information required in § 154.006(B) of this chapter to determine the 100-year flood elevation, the Floodway and Flood Fringe District boundaries and the regulatory flood protection elevation for the subdivision site.

(C) *Removal of special flood hazard area designation.* The Federal Emergency Management Agency (FEMA) has established criteria for removing the special flood hazard area designation for certain structures properly elevated on fill above the 100-year flood elevation. FEMA's requirements incorporate specific fill compaction and side slope protection standards for multi-structure or multi-lot developments. These standards should be investigated prior to the initiation of site preparation if a change of special flood hazard area designation will be requested.

(Ord. 597, passed 7-12-2010) Penalty, see § 154.999

## **§ 154.008 PUBLIC UTILITIES, RAILROADS, ROADS AND BRIDGES.**

(A) *Public utilities.* All public utilities and facilities such as gas, electrical, sewer, and water supply systems to be located in the flood plain shall be flood proofed in accordance with the State Building Code

or elevated to above the regulatory flood protection elevation.

(B) *Public transportation facilities.* Railroad tracks, roads, and bridges to be located within the flood plain shall comply with §§ 154.004 and 154.005 of this chapter. Elevation to the regulatory flood protection elevation shall be provided where failure or interruption of these transportation facilities would result in danger to the public health or safety or where such facilities are essential to the orderly functioning of the area. Minor or auxiliary roads or railroads may be constructed at a lower elevation where failure or interruption of transportation services would not endanger the public health or safety.

(C) *On-site sewage treatment and water supply systems.* Where public utilities are not provided:

(1) On-site water supply systems must be designed to minimize or eliminate infiltration of flood waters into the systems; and

(2) New or replacement on-site sewage treatment systems must be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters and they shall not be subject to impairment or contamination during times of flooding. Any sewage treatment system designed in accordance with the state's current statewide standards for on-site sewage treatment systems shall be determined to be in compliance with this section.

(Ord. 597, passed 7-12-2010) Penalty, see § 154.999

### **§ 154.009 MANUFACTURED HOMES AND MANUFACTURED HOME PARKS AND PLACEMENT OF RECREATIONAL VEHICLES.**

(A) New manufactured home parks and expansions to existing manufactured home parks shall be subject to the provisions placed on subdivisions by § 154.007 of this chapter.

(B) The placement of new or replacement manufactured homes in existing manufactured home parks or on individual lots of record that are located in flood plain districts will be treated as a new structure and may be placed only if elevated in compliance with § 154.005 of this chapter. If vehicular road access for preexisting manufactured home parks is not provided in accordance with § 154.005(E)(1), then replacement manufactured homes will not be allowed until the property owner(s) develops a flood warning emergency plan acceptable to the city.

(1) All manufactured homes must be securely anchored to an adequately anchored foundation system that resists flotation, collapse and lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state or local anchoring requirements for resisting wind forces.

(C) Recreational vehicles that do not meet the exemption criteria specified in division (C)(1) below shall be subject to the provisions of this chapter and as specifically spelled out in divisions (C)(3) and (C)(4) below.

(1) *Exemption.* Recreational vehicles are exempt from the provisions of this chapter if they are placed in any of the areas listed in division (C)(2) below and further they meet the following criteria:

(a) Have current licenses required for highway use.

(b) Are highway ready meaning on wheels or the internal jacking system, are attached to the site only by quick disconnect type utilities commonly used in campgrounds and recreational vehicle parks and the recreational vehicle has no permanent structural type additions attached to it.

(c) The recreational vehicle and associated use must be permissible in any pre-existing, underlying zoning use district.

(2) Areas exempted for placement of recreational vehicles:



- (a) Individual lots or parcels of record.
- (b) Existing commercial recreational vehicle parks or campgrounds.
- (c) Existing condominium type associations,

(3) Recreational vehicles exempted in division (C)(1) above lose this exemption when development occurs on the parcel exceeding \$500 for a structural addition to the recreational vehicle or exceeding \$500 for an accessory structure such as a garage or storage building. The recreational vehicle and all additions and accessory structures will then be treated as a new structure and shall be subject to the elevation/flood proofing requirements and the use of land restrictions specified in §§ 154.004 and 154.005 of this chapter. There shall be no development or improvement on the parcel or attachment to the recreational vehicle that hinders the removal of the recreational vehicle to a flood free location should flooding occur.

(4) New commercial recreational vehicle parks or campgrounds and new residential type subdivisions and condominium associations and the expansion of any existing similar use exceeding 5 units or dwelling sites shall be subject to the following:

(a) Any new or replacement recreational vehicle will be allowed in the Floodway or Flood Fringe Districts provided said recreational vehicle and its contents are placed on fill above the regulatory flood protection elevation and proper elevated road access to the site exists in accordance with § 154.005(E)(1) of this chapter. No fill placed in the floodway to meet the requirements of this section shall increase flood stages of the 100-year or regional flood.

(b) All new or replacement recreational vehicles not meeting the criteria of division (C)(4)(a) above may, as an alternative, be allowed as a conditional use if in accordance with the following provisions and the provisions of § 154.010(D) of the chapter. The applicant must submit an emergency plan for the safe evacuation of all vehicles and people during the 100-year flood. Said plan shall be prepared by a registered engineer or other qualified individual, shall demonstrate that adequate time and personnel exist to carry out the evacuation, and shall demonstrate the provisions of divisions (C)(1)(a) and (C)(1)(b) of this section will be met. All attendant sewage and water facilities for new or replacement recreational vehicles must be protected or constructed so as to not be impaired or contaminated during times of flooding in accordance with § 154.008(C) of this chapter.

(Ord. 597, passed 7-12-2010) Penalty, see § 154.999

## **§ 154.010 ADMINISTRATION.**

(A) *Community Development Department.* The Community Development Department or other official designated by the City Council shall administer and enforce this chapter. If the Community Development Department finds a violation of the provisions of this chapter the Community Development Department shall notify the person responsible for such violation in accordance with the procedures stated in § 154.999 of this chapter.

(B) *Permit requirements.*

(1) *Permit required.* A permit issued by the Community Development Department in conformity with the provisions of this chapter shall be secured prior to the erection, addition, modification, rehabilitation (including normal maintenance and repair), or alteration of any building, structure, or portion thereof; prior to the use or change of use of a building, structure, or land; prior to the construction of a dam, fence, or on-site septic system; prior to the change or extension of a nonconforming use; prior to the repair of a structure that has been damaged by flood, fire, tornado, or any other source; and prior to the placement of fill, excavation of materials, or the storage of materials or equipment within the flood plain.

(2) *Application for permit.* Following established process in place per the City Zoning and Building Codes an application for a permit shall be made in duplicate to the Community Development Department

on forms furnished by the Community Development Department and shall include the following where applicable: plans in duplicate drawn to scale, showing the nature, location, dimensions, and elevations of the lot; existing or proposed structures, fill, or storage of materials; and the location of the foregoing in relation to the stream channel.

(3) *State and federal permits.* Prior to granting a permit or processing an application for a conditional use permit or variance, the Community Development Department shall determine that the applicant has obtained all necessary state and federal permits.

(4) *Certificate of compliance and building permit for a new, altered, or nonconforming use.* It shall be unlawful to use, occupy, or permit the use or occupancy of any building or premises or part thereof hereafter created, erected, changed, converted, altered, or enlarged in its use or structure until a certificate of compliance or building permit shall have been issued by the Community Development Department stating that the use of the building or land conforms to the requirements of this chapter.

(5) *Construction and use to be as provided on applications, plans, permits, variances and certificates of zoning compliance.* Building permits, conditional use permits, or certificates of zoning compliance issued on the basis of approved plans and applications authorize only the use, arrangement, and construction set forth in such approved plans and applications, and no other use, arrangement, or construction. Any use, arrangement, or construction at variance with that authorized shall be deemed a violation of this chapter, and punishable as provided by § 154.999 of this chapter.

(6) *Certification.* The applicant shall be required to submit certification by a registered professional engineer, or registered land surveyor that the finished fill and building elevations were accomplished in compliance with the provisions of this chapter. Flood proofing measures shall be certified by a registered professional engineer or registered architect.

(7) *Record of first floor elevation.* The Community Development Department shall maintain a record of the elevation of the lowest floor (including basement) of all new structures and alterations or additions to existing structures in the flood plain. The Community Development Department shall also maintain a record of the elevation to which structures or alterations and additions to structures are flood proofed.

(8) *Notifications for watercourse alterations.* The Community Development Department shall notify, in riverine situations, adjacent communities and the Commissioner of the Department of Natural Resources prior to the community authorizing any alteration or relocation of a watercourse. If the applicant has applied for a permit to work in the beds of public waters pursuant to M.S. Ch. 103G, as it may be amended from time to time, this shall suffice as adequate notice to the Commissioner of Natural Resources. A copy of said notification shall also be submitted to the Chicago Regional Office of the Federal Emergency Management Agency (FEMA).

(9) *Notification to FEMA when physical changes increase or decrease the 100-year flood elevation.* As soon as is practicable, but not later than 6 months after the date such supporting information becomes available, the Community Development Department shall notify the Chicago Regional Office of FEMA of the changes by submitting a copy of said technical or scientific data.

(C) *Board of Adjustment.*

(1) The City Council shall act as the Board of Adjustment and Appeals.

(2) *Administrative review.* The Board of Adjustment shall hear and decide appeals where it is alleged there is error in any order, requirement, decision, or determination made by an administrative official in the enforcement or administration of this chapter.

(3) *Variances.* Applications for variances shall be in accordance with § 153.036 of the City Code and may be granted in cases where it will not be contrary to the public interest and only for those circumstances such as hardship, practical difficulties or circumstances unique to the property under consideration, as provided for in the Zoning Code. In the granting of such variance, the City Council shall clearly identify in writing the specific conditions that existed consistent with the criteria specified in this chapter and Chapter

153 of the City Code. No variance shall have the effect of allowing in any district uses prohibited in that district, permit a lower degree of flood protection than the regulatory flood protection elevation for the particular area, or permit standards lower than those required by state law. The following additional variance criteria of the Federal Emergency Management Agency must be satisfied:

(a) Variances shall not be issued by the city within any designated regulatory floodway if any increase in flood levels during the base flood discharge would result.

(b) Variances shall only be issued by the city upon (i) a showing of good and sufficient cause, (ii) a determination that failure to grant the variance would result in exceptional hardship to the applicant, and (iii) a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or chapters.

(c) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

(d) The city shall submit by mail to the Commissioner of Natural Resources a copy of the application for proposed variances sufficiently in advance so that the Commissioner will receive at least 10 days notice of the hearing.

(e) A copy of all decisions granting variances shall be forwarded by mail to the Commissioner of Natural Resources within 10 days of such action.

(4) *Appeals.* Appeals from any decision of the Board of Adjustment may be made, and as specified in the city's official controls and also by Minnesota Statutes.

(5) *Flood insurance notice and record keeping.* The Community Development Department shall notify the applicant for a variance that: 1) The issuance of a variance to construct a structure below the base flood level will result in increased premium rates for flood insurance up to amounts as high as \$25 for \$100 of insurance coverage and 2) Such construction below the 100-year or regional flood level increases risks to life and property. Such notification shall be maintained with a record of all variance actions. The city shall maintain a record of all variance actions, including justification for their issuance, and report such variances issued in its annual or biennial report submitted to the administrator of the National Flood Insurance Program.

(D) *Conditional uses.* Applications for a conditional use permit shall be processed in accordance with the terms and conditions set forth in § 153.034 of the City Code.

(1) Additional procedures to be followed by the Planning Commission and City Council in passing on conditional use permit applications within all flood plain districts are:

(a) The applicant shall be required to furnish such of the following information and additional information as deemed necessary by the Planning Commission and City Council for determining the suitability of the particular site for the proposed use:

1. Plans in triplicate drawn to scale showing the nature, location, dimensions, and elevation of the lot, existing or proposed structures, fill, storage of materials, flood proofing measures, and the relationship of the above to the location of the stream channel; and

2. Specifications for building construction and materials, flood proofing, filling, dredging, grading, channel improvement, storage of materials, water supply and sanitary facilities.

(b) Transmit 1 copy of the information described in division (D)(1)(a) to a designated engineer or other expert person or agency for technical assistance, where necessary, in evaluating the proposed project in relation to flood heights and velocities, the seriousness of flood damage to the use, the adequacy of the plans for protection, and other technical matters.

(c) The city shall submit by mail to the Commissioner of Natural Resources a copy of the application for proposed conditional use sufficiently in advance so that the Commissioner will receive at least 10 days notice of the hearing.

(d) Based upon the technical evaluation of the designated engineer or expert, the City Council shall determine the specific flood hazard at the site and evaluate the suitability of the proposed use in relation to the flood hazard.

(4) *Factors upon which the decision of the City Council shall be based.* In passing upon conditional use applications, the City Council shall consider all relevant factors specified in other sections of this chapter, and:

(a) The danger to life and property due to increased flood heights or velocities caused by encroachments.

(b) The danger that materials may be swept onto other lands or downstream to the injury of others or they may block bridges, culverts or other hydraulic structures.

(c) The proposed water supply and sanitation systems and the ability of these systems to prevent disease, contamination, and unsanitary conditions.

(d) The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner.

(e) The importance of the services provided by the proposed facility to the community.

(f) The requirements of the facility for a waterfront location.

(g) The availability of alternative locations not subject to flooding for the proposed use.

(h) The compatibility of the proposed use with existing development and development anticipated in the foreseeable future.

(i) The relationship of the proposed use to the comprehensive plan and flood plain management program for the area.

(j) The safety of access to the property in times of flood for ordinary and emergency vehicles.

(k) The expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters expected at the site.

(l) Such other factors which are relevant to the purposes of this chapter.

(5) *Conditions attached to conditional use permits.* Upon consideration of the factors listed above and the purpose of this chapter, the City Council shall attach such conditions to the granting of conditional use permits as it deems necessary to fulfill the purposes of this chapter. Such conditions may include, but are not limited to, the following:

(a) Modification of waste treatment and water supply facilities.

(b) Limitations on period of use, occupancy, and operation.

(c) Imposition of operational controls, sureties, and deed restrictions.

(d) Requirements for construction of channel modifications, compensatory storage, dikes, levees, and other protective measures.

(e) *Flood proofing measures, in accordance with the State Building Code and this chapter.* The applicant shall submit a plan or document certified by a registered professional engineer or architect that the flood proofing measures are consistent with the regulatory flood protection elevation and associated flood factors for the particular area.

(6) A copy of all decisions granting conditional use permits shall be forwarded by mail to the Commissioner of Natural Resources within 10 days of such action.

(Ord. 597, passed 7-12-2010) Penalty, see § 154.999

### **§ 154.011 NONCONFORMING USES.**

(A) Nonconforming uses and structures shall be subject to the terms and conditions of §§ 153.051 and 153.053 of the City Code.

(B) Any structural alteration or addition to a nonconforming structure or nonconforming use which would result in increasing the flood damage potential of that structure or use shall be protected to the regulatory flood protection elevation in accordance with any of the elevation on fill or flood proofings techniques (i.e., FP-1 thru FP-4 flood proofing classifications) allowable in the State Building Code, except as further restricted in this chapter.

(C) If a substantial improvement occurs, as defined in § 154.002(I) of this chapter, from any combination of a building addition to the outside dimensions of the existing building or a rehabilitation, reconstruction, alteration, or other improvement to the inside dimensions of an existing nonconforming building, then the building addition and the existing nonconforming building must meet the requirements of §§ 154.004 or 154.005 of this chapter for new structures, depending upon whether the structure is in the Floodway or Flood Fringe District, respectively.

(Ord. 597, passed 7-12-2010) Penalty, see § 154.999

### **§ 154.012 AMENDMENTS.**

(A) The flood plain designation on the Official Zoning Map shall not be removed from flood plain areas unless it can be shown that the designation is in error or that the area has been filled to or above the elevation of the regulatory flood protection elevation and is contiguous to lands outside the flood plain. Special exceptions to this rule may be permitted by the Commissioner of Natural Resources if he or she determines that, through other measures, lands are adequately protected for the intended use.

(B) All amendments to this chapter, including amendments to the Official Zoning Map, must be submitted to and approved by the Commissioner of Natural Resources prior to adoption. Changes in the Official Zoning Map must meet the Federal Emergency Management Agency's (FEMA) Technical Conditions and Criteria and must receive prior FEMA approval before adoption. The Commissioner of Natural Resources must be given 10 days written notice of all hearings to consider an amendment to this chapter and said notice shall include a draft of the chapter amendment or technical study under consideration.

(Ord. 597, passed 7-12-2010) Penalty, see § 154.999

### **§ 154.999 PENALTY.**

(A) Violation of the provisions of this chapter or failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with grants of variances or conditional uses) shall constitute a misdemeanor and shall be punishable as defined by law.

(B) Nothing herein contained shall prevent the city from taking such other lawful action as is necessary to prevent or remedy any violation. Such actions may include but are not limited to:

(1) In responding to a suspected chapter violation, the Community Development Department and City Council may utilize the full array of enforcement actions available to it including but not limited to prosecution and fines, injunctions, after-the-fact permits, orders for corrective measures or a request to the National Flood Insurance Program for denial of flood insurance availability to the guilty party. The city must act in good faith to enforce these official controls and to correct chapter violations to the extent possible so as not to jeopardize its eligibility in the National Flood Insurance Program.

(2) When a chapter violation is either discovered by or brought to the attention of the Community Development Department it shall immediately investigate the situation and document the nature and extent of the violation of the official control. As soon as is reasonably possible, this information will be submitted to the appropriate Department of Natural Resources' and Federal Emergency Management Agency Regional Office along with the city's plan of action to correct the violation to the degree possible.

(3) The Community Development Department shall notify the suspected party of the requirements of this chapter and all other official controls and the nature and extent of the suspected violation of these controls. If the structure and/or use is under construction or development, the Community Development Department may order the construction or development immediately halted until a proper permit or approval is granted by the city. If the construction or development is already completed, then the Community Development Department may either: (1) issue an order identifying the corrective actions that must be made within a specified time period to bring the use or structure into compliance with the official controls; or (2) notify the responsible party to apply for an after-the-fact permit/development approval within a specified period of time not to exceed 30 days.

(4) If the responsible party does not appropriately respond to the Community Development Department within the specified period of time, each additional day that lapses shall constitute an additional violation of this chapter and shall be prosecuted accordingly. The Community Development Department shall also upon the lapse of the specified response period notify the landowner to restore the land to the condition which existed prior to the violation of this chapter.

(Ord. 597, passed 7-12-2010)

# Appendix C: Public Works/Engineering Standards (2016)



# Forest Lake

AS GOOD AS IT SOUNDS

## *2016 PUBLIC WORKS / ENGINEERING STANDARDS*

CITY OF FOREST LAKE, MINNESOTA

*Date: May 2016*

*Adopted by the Forest Lake City Council on May 9, 2016.*

*It is the intent that these Engineering Standards supersede any prior standards adopted by the City of Forest Lake.*



CITY OF FOREST LAKE, MINNESOTA  
2016 PUBLIC WORKS / ENGINEERING STANDARDS

The purpose of these Public Works / Engineering Standards is to provide consistency in the level of detail required for the submittal of plans for preliminary plat approval, plan preparation guidelines for public improvements, and to provide the applicant detailed product material and construction requirements.

The City Council reviews and adopts these standards on an annual basis, and the City of Forest Lake reserves the right to amend the requirements herein, as it may apply to various site conditions.

2016 PUBLIC WORKS / ENGINEERING STANDARDS  
TABLE OF CONTENTS

Sanitary Sewer and Water Works Rates/Charges .....	1
Project Acceptance Forms .....	2
Engineering Design Standards .....	5
General Requirements .....	5
<i>Developer Installed Public Improvements</i> .....	5
<i>Private Improvements</i> .....	6
Product/Material Requirements .....	8
<i>Sanitary Sewer Materials</i> .....	8
<i>Water Main Materials</i> .....	9
<i>Storm Sewer Materials</i> .....	10
<i>Street Materials</i> .....	10
<i>Sidewalk / Trail / Fire Department Access Lane Materials</i> .....	11
Design Requirements .....	13
<i>Sanitary Sewer Design Requirements</i> .....	13
<i>Water Main Design Requirements</i> .....	13
<i>Storm Sewer Design Requirements</i> .....	14
Plan Requirements.....	19
<i>General Plan Requirements</i> :.....	19
<i>Construction Plans</i> :.....	20
Building Permit Requirements & Policy on Rear Yard Drainage .....	27
Issuance of Building Permits .....	27
Policy on Rear Yard Drainage .....	27
Standard Detail Plates .....	28

## Sanitary Sewer and Water Works Rates/Charges

1. Water System Area Charges include distribution system expansion and related costs associated with the extension of the trunk water distribution system required for community growth. The charges are determined from the comprehensive water system plan adopted by the City.
2. Sanitary Sewer Area Charges include facilities and related costs associated with the expansion of the sanitary sewer system due to community growth. The charges are determined from the comprehensive Sanitary Sewer plan adopted by the City. The area charges have been established to recover costs associated with extension of trunk sanitary sewer, 12" in diameter and larger.
3. Metropolitan Council Sewer Availability Charge (SAC) is a one-time fee to customers for each new connection or increase in capacity demand of the Metropolitan Disposal System.
4. City Water Availability Charge (WAC) is a water system connection charge established to recover costs associated with the construction, reconstruction, maintenance or expansion of the water supply, treatment, distribution and storage facilities required to provide water service. The fee is determined from the Comprehensive water system plan adopted by the City.
5. City Sanitary Sewer Core Fee (SAC) is a sanitary sewer system connection charge established to recover costs associated with the maintenance, construction, reconstruction and expansion, of sanitary sewer system including but not limited to lift stations, SCADA system expansion, stand-by power systems, pump upgrades, and related improvements.

## *Project Acceptance Forms*

*Project Acceptance Form*

Project Name: \_\_\_\_\_

CITY OF FOREST LAKE

Project No. \_\_\_\_\_

Recommendation for Acceptance

This project included sanitary sewer, water main, storm sewer and street improvements. The improvements were installed as a private *[public]* improvement project based on plans and specifications prepared by the Owner's *[City's]* Engineer. The majority of the work was completed in 20(xx)

This project was constructed in general conformance with standard policy and procedures of the City of Forest Lake. The work is complete and in general conformance with the plans and specifications. Therefore this project is recommended for formal acceptance by the City Council for perpetual maintenance.

\_\_\_\_\_  
City Engineer Date: \_\_\_\_\_

\_\_\_\_\_  
Public Works Director Date: \_\_\_\_\_

\_\_\_\_\_  
Finance Director Date: \_\_\_\_\_

\_\_\_\_\_  
Zoning Administrator Date: \_\_\_\_\_

\_\_\_\_\_  
City Administrator Date: \_\_\_\_\_

\_\_\_\_\_  
Parks & Recreation Coordinator Date: \_\_\_\_\_

\_\_\_\_\_  
Resident Project Representative Date: \_\_\_\_\_

City Council Acceptance Date: \_\_\_\_\_



## Project Acceptance Form

Project Name: \_\_\_\_\_

CITY OF FOREST LAKE

Project No. \_\_\_\_\_

### Recommendation for Acceptance

This project included a building, sanitary sewer service, water main service, storm sewer and street improvements. The improvements were installed as a private improvement project based on plans and specifications prepared by the Owner's Engineer. The majority of the work was completed in 20(xx).

This project was constructed in general conformance with standard policy and procedures of the City of Forest Lake. The work is complete and in general conformance with the plans and specifications. Therefore this project is recommended for formal acceptance by the City Council for perpetual maintenance.

\_\_\_\_\_  
City Engineer/Resident Project Representative Date: \_\_\_\_\_

\_\_\_\_\_  
Public Works Director Date: \_\_\_\_\_

\_\_\_\_\_  
Finance Director Date: \_\_\_\_\_

\_\_\_\_\_  
Zoning Administrator Date: \_\_\_\_\_

\_\_\_\_\_  
City Administrator Date: \_\_\_\_\_

\_\_\_\_\_  
Building Official Date: \_\_\_\_\_

\_\_\_\_\_  
Fire Inspector Date: \_\_\_\_\_

\_\_\_\_\_  
Parks & Recreation Coordinator Date: \_\_\_\_\_

City Council Acceptance Date: \_\_\_\_\_

# *Engineering Design Standards*

## *General Requirements*

As set forth in various sections of the City ordinances, Developers of property within the City of Forest Lake are required to submit certain plans and specifications for review and approval by the City. These include, but are not limited to items such as grading plans, drainage plans, topographic surveys, plats, street and utility plans and specifications. Competent licensed professionals shall prepare these plans and specifications.

The professional services required of the Developer might include an architect, land surveyor, planner, wetland specialist and engineer. "Project Engineer" in this document refers to a Professional Engineer registered in the State of Minnesota hired by the Developer. The Project Engineer responsibilities include not only preparation of plans and specifications, but also construction coordination with the City's Resident Project Representative.

Whenever public improvements or other conditions of approval are required with an approved development, a contract (Development Contract) is required between the Developer/property owner and the City. This contract guarantees the City that all requirements will be satisfactorily completed by the Developer. Within the development contract, the Developer has a choice in determining how the required improvements will be handled. The Developer can either construct and finance the improvements or request that they be installed under a public improvement project, if approved by the City Council.

### *Developer Installed Public Improvements*

If the Developer chooses to install required public improvements within the development, the following procedures shall be followed:

- a. The Developer shall submit plans, specifications and copies of all design calculations to the City for review and approval. The developer shall submit 5 paper copies and an electronic copy in AutoCAD's DWG file format and PDF format, of the approved plans/construction documents. These plans are to be prepared by a Registered Professional Engineer and shall be in accordance with City standards as outlined herein.
- b. The City's comprehensive plans for sanitary sewer, water, storm drainage and thoroughfare plans shall be adhered to in design considerations. All sanitary sewer and water main testing shall be completed and copies of service ties submitted to the City prior to issuance of any service connection permits.
- c. The Developer shall submit a Grading, Drainage and Erosion/Sediment Control Plan to the City for review and approval. No work is to begin until all erosion and sediment control methods are in place and approved by the City. All project operations must comply with the City's Erosion Control Ordinance and all applicable permits.

- d. The Developer shall provide proper notification of improvements to the responsible governmental agencies, watershed districts, etc. affected by said construction. All necessary permits shall be obtained by the Developer and copies provided to the City prior to commencing any work. All special requirements of the responsible agencies shall be complied with.
- e. The contractor shall submit a list of suppliers as well as all certification tests of materials that will be used on the project to the City at the "Pre-construction" meeting.
- f. Any changes to the approved plans and specifications shall be approved by the City in writing before changes are made in the field.
- g. The City will provide inspections of public improvement work and shall be notified 24 hours in advance of all scheduled tests so its representatives can be present at the time tests are performed. The required tests will cover the sanitary sewer, water main, storm sewer, street subgrade, bituminous base course, bituminous wear course, concrete sidewalk, bituminous trail and curb and gutter.
- h. Upon completion of all the utility and road work required on both the public and private portions of the project, the City will make the required final inspections of all work. This includes a final inspection of all site grading and approval by the City before any building permits will be issued. Before the final payment is made to the contractor by the Developer, the City shall be satisfied that all work is satisfactorily completed in accordance with the approved plans and specifications, and the Project Engineer submit a written statement attesting to same.
- i. Acceptance of said work shall be made by the City and the project acceptance for signed by all parties.

### *Private Improvements*

If private drives or utilities are included in a development the following procedures are required.

- a. The design cross section of private drives shall be in accordance with the public street design requirements or approved by the City.
- b. Whenever practical, public sewer and water lines shall not be placed under private drives. A twenty (20) foot utility and drainage easement will be required for any public utilities that are not constructed within the public street right-of-way.



- c. Private utility installation requires a permit from the City and will be required to meet all applicable City Standards as determined by the City and/or Building Official.
- d. The entrance to each private drive must include design features that clearly differentiate it from a public street such as concrete apron.
- e. Private small utilities shall be installed per standard details GEN-1 of the City Standard Details. Junction boxes shall not be installed on property lines that have public utilities installed under them.

## Product/Material Requirements

The following list of items provides product material requirements for development projects in the City of Forest Lake. The product material requirements have been established and adopted by the City to provide consistency in the materials installed for sanitary sewer, water main, storm sewer, and streets. Consistent material product requirements identify items that are consistent with today's engineering and construction practices, and provide for consistent maintenance practices.

### *Sanitary Sewer Materials*

- Main Pipe
  - Material ..... PVC
  - Class
    - Depth to 18 feet.....SDR 35
    - Depth 18 feet to 26 feet.....SDR 26
    - Depth > 26 feet ..... as required by Engineer
- Manhole
  - Type .....Precast Concrete conforming to ASTM C478
  - Install rubber gasket joint forming watertight seal conforming to ASTM C443
  - Wrap each MH barrel joint with 12" mastic seal or ram-nek in barrel joint
  - Type of Casting..... R-1642-B Stamped "Sanitary Sewer"  
With two concealed pick holes and self-sealing lids
  - Outside drop Material ..... PVC DR 18
  - HDPE adjustment rings..... 2 minimum, 8" height maximum  
Set bottom ring in mortar, glue remaining rings  
Wrap exterior of rings with geotextile fabric
- Service Pipe
  - Residential
    - Size ..... 4 inch
    - Material ..... PVC
    - Class ..... Schedule 40
  - Commercial ..... 6 inch (connect to manhole)
    - Size ..... 6 inch
    - Material ..... PVC
    - Class ..... SDR 26, 150 psi pressure rating ASTM 2241
  - Risers ..... same requirements as service pipe
- Cleanout
  - Material ..... PVC
  - Class..... SDR 26 or schedule 40, 150 psi pressure rating ASTM 2241

## Water Main Materials

- Main Pipe
  - Material ..... PVC C-900 (4" to 12"), DR-18  
..... PVC C-905 (14" to 48"), DR-25
  - Directional Drill ..... Fusible C900 (4" to 12"), DR-18  
..... Fusible C900 (14" to 48"), DR-25
  - Fittings..... DIP, Epoxy Coated, U.S. Manufacture
  - Fitting Bolts..... Cor-Blue
  - Restraints..... Mega-Lug
  - Tracer wire.....Copperhead 12 gauge copper clad steel – 30V rating, insulated
  
- Hydrant
  - Type..... Waterous Pacer WB-67
  - Operating Rod..... Heavy Duty
  - Body bolts..... Stainless Steel
  - Tracer Wire Access Box ..... Magnetized Tracer Box  
Snake Pit Magnetized Tracer Box by Copperhead Industries,  
Concrete/Driveway Tracer Box Model, or approved equal
  
- Valves
  - Type 12" or less.....Resilient Wedge Gate Valve (AWWA C515)  
14" or greater ..... Butterfly Valve (AWWA C504)
  - Manufacturer . Waterous, American Flow Control 2500 Series or approved equal
  - Valve Box ..... 4" through 12" – Tyler 6860 Series
  - Bottom Bell section ..... 4" through 12" Power Seal Ductile Iron Box
  - Gate Valve Box Adaptor Plate.....¼" Steel w/protective coating  
by Adaptor, Inc. or approved equal
  - Valve Body Bolts..... Stainless Steel
  - Extension Rod (single piece steel).....Top Nut – 12"-18" below finished surface
  
- Residential Service Pipe
  - Service Size ..... 1" Diameter
  - Service Material ..... Type "K" Copper or Polyethylene Plastic pipe (CTS-SDR-11)
  - Service Saddles..... Long stainless steel saddles for PVC water main  
.....Fused saddles for HDPE water main
  - Type of Corporation Stop .....Mueller ball valve. H-25000 or approved equal
  - Type of Curb Stop.....Mueller ball valve H-25154 or approved equal
  - Type of Curb Box..... Mueller H-10300 or approved equal
  - Pigtail Length ..... 10 feet with crimped end
  - Tracer wire.....Copperhead 12 gauge copper clad steel – 30V rating, insulated
  - Casting for curb box in paved area ..... Neenah R-1914-A or approved equal
  
- Irrigation Service Pipe
  - Service size..... 4" Diameter extending to the property line
  - Service Material ..... Class 52 DIP (poly wrapped), or PVC C-900
  - Standard City Gate Valve at lateral main tee connection

## Storm Sewer Materials

- Main Pipe
  - Material ..... RCP Only
  - Depth and Class..... Varies
  - Culvert Material ..... CMP (rural driveway only) /RCP (street crossing)
  
- Manhole
  - Type ..... Precast, RCP
  - HDPE Adjustment Rings..... 2 minimum, 8" height maximum  
..... Set bottom ring in mortar, glue remaining rings  
..... Wrap exterior of rings with geotextile fabric
  - Minimum MH depth..... 4 feet
  - Sump Depth ..... n/a
  - Type of Casting..... R-1642-B, Stamped "Storm Sewer"
  
- Catch Basin
  - Type ..... Precast, RCP
  - HDPE Adjustment Rings..... 2 minimum, 8" height maximum  
..... Set bottom ring in mortar  
..... Wrap exterior of rings with geotextile fabric
  - Minimum CB Depth to Invert..... 3.5 feet
  - Sump Depth ..... 2' in CB upstream of pond
  - Type of Casting – Curb Inlet..... Neenah R-3067-V
  - Type of Casting – off-street drop inlet..... Neenah R-4342

## Street Materials

- Street Section (Residential)
  - Geotextile Fabric..... Mn/DOT Type V, Non-Woven
  - Subbase ..... 20" Select Granular - Modified
  - Base ..... 10" Aggregate Base, Cl. 5
  - Bit. Wear Course ..... 4 inches – SPWEA240C Wearing Course Mixture
  - Drain tile..... 4" HDPE perforated with filter sock
  
- Street Section (Commercial)
  - Geotextile Fabric..... Mn/DOT Type V, Non-Woven
  - Subbase ..... 20" Select Granular - Modified
  - Base ..... 10" Aggregate, Cl. 5
  - Bit. Wear Course ..... SPWEA240C Wearing Course
  - Bit Base Course ..... SPNWB230C Non-wearing Course
  - Drain tile..... 4" HDPE perforated with filter sock
  - Commercial Pavement. Thickness ..... varies
  
- Shoulder
  - Material ..... 4", Cl.2 or Cl. 5 - recycled
  
- Boulevard
  - Sod ..... salt resistant, type lawn

- Seed .....MNDOT 3876 for appropriate application
- Topsoil .....4" Minimum Depth
  - Residential.....Boulevard Topsoil Borrow (MnDOT 3877-F)
  - Commercial .....Boulevard Topsoil Borrow (MnDOT 3877-F)
  - Rural.....Loam Topsoil Borrow (MnDOT 3877-B)
- Fertilizer .....Type 3 (MnDOT 3884)

- Curb

- Mix Design (machine/hand formed) ..... MnDOT 3F32C / 3F52C
- Type – Residential Reconstruction ..... Surmountable/B618
- Type – New Residential Developments..... Surmountable/ B618
- Type – Commercial .....B618

- Street Name Signs

- Multi lane – Speed limits 40mph and greater ..... 12" plates
  - Lettering ..... 8" upper case, 6" lower case
- Multi lane – Speed limits less than 40 mph and all 2-Lane ..... 9" plates
  - Lettering .....6" upper case, 4" lower case
- Private Streets..... White lettering on blue background
- Public Streets ..... White lettering on green background
- Reflective sheeting ..... Diamond grade DG3

### *Sidewalk / Trail / Fire Department Access Lane Materials*

- Sidewalk Section

- Base ..... 6 inch Aggregate, Cl. 5 (7 feet min. width)
- Concrete ..... 6 inch – Mn/DOT 3F52A
- Width (min)..... 6 feet

- Detectable Warning Plates ..... Gray Iron, ASTM A-48, Class 30B

- Thickness (min) .....5/16"
- Color ..... Unpainted

- Trail Section

- Base ..... 6 inch Aggregate, Cl. 5 (12 feet min. width)
- Bituminous Wear Course.....3" – SPWEA230B Wearing Course
- Width (min)..... 10 feet

- Fire Department Access Lane Section

- Min. 85,000 lb load carrying capacity (Design approval req'd by City Engineer)
- Subgrade and aggregate base compaction testing required
- Geotextile Fabric (as required by engineer) ..... Mn/DOT Type V, Non-Woven
- Subbase.....minimum 12" Select Granular Modified  
.....(or as required by the soils engineer)
- Base (bituminous section)..... 10" Aggregate Cl. 5  
(option: gravel shoulder section) ..... 14" Aggregate Cl. 5

- Bituminous Wear Course (SPWEA240C) (2 Lifts) ..... 4"
- Option: Gravel Shoulders (in addition to Base Aggregate) ..... 4"

## Design Requirements

The following list of items provides engineering design requirements for development projects in the City of Forest Lake. The requirements have been established and adopted by the City to provide consistency with today's engineering and construction practices.

### *Sanitary Sewer Design Requirements*

- Manhole
  - Maximum Manhole Spacing..... 400 feet
  - Maximum inlet/outlet elevation difference..... 2 feet
  - Minimum depth of Manhole ..... 10 feet
  - Outside drop..... 2.0 feet minimum
  
- Service
  - Extend from mainline pipe to property line with cleanout
  
- Cleanout
  - 8' bury at property line
  - Maximum length between cleanouts ..... 75 feet

### *Water Main Design Requirements*

- Main Pipe
  - Minimum diameter ..... 8"
  - Maximum Length of Dead Ends..... 600 feet
  - Air Release measures ..... Hydrant
  - Minimum Cover ..... 8 feet
  - Side of Street ..... North and East side of centerline preferred
  
- Hydrant
  - Depth ..... 8'-6" Bury (8 feet cover)
  - Spacing ..... 250'R to cover Building Pad
  - Gate valve on 6" Hydrant leads (distance from center of hydrant) ..... 3 feet
  - Supply two (2) Spring Mounted snow flags per hydrant
  
- Valves
  - Maximum distance between Valves on Trunk Mains ..... 600 feet
  - Maximum No. house services between Valves on Lateral Mains ..... 20
  
- Residential Service Pipe
  - No splices in services are allowed
  
- Irrigation Service Pipe
  - Minimum diameter ..... 4"

## Storm Sewer Design Requirements

- Main Pipe
  - Minimum pipe diameter ..... 12"
  - Minimum culvert size..... 15"
  - Minimum culvert length.....24 feet
  - Maximum culvert length..... (residential) 30 feet
  - Apron and Trash Guard requirements ..... All Culverts
- Manhole
  - Must meet storm design criteria for specific project
- Catch Basin
  - Minimum pipe cover .....2 feet
  - Sumps ..... 2' in last CB in street upstream of pond
- Design
  - Design frequency of storms..... 10 yr.
  - Minimum storm sewer design velocity ..... 3 fps
  - Design frequency for detention basins ..... 100 yr.
  - Low Opening elevation ..... 2.0 feet higher than 100yr. HWL
  - Emergency overflow swale below building openings ..... 1.0 foot
  - Maximum basin side slope ..... 3:1
  - Minimum detention basin depth ..... 4.0 feet
  - Maximum detention basin depth ..... 10.0 feet
  - Minimum swale grade..... 2.0%

## Street Design Requirements

### •Street Width and Rights-of-way

Major Thoroughfares and Major Streets – Rights-of-way as indicated on Street Comprehensive Plan, Capital Improvement Plan, and Municipal State Aid Needs Report.

Street Width shall be as indicated on the Street Comprehensive Plan, Capital Improvement Plan, and Municipal State Aid Needs Report.

#### Collector Streets – 70 foot Rights-of-way

- Width ..... face to face 44' (two 12' through lanes with 10' shoulders)
- Width can increase to accommodate four through lanes upon traffic analysis.

#### Residential Public (Minor) Streets – 60 foot Rights-of-way

##### Width

- face to face ..... 32' (Residential)
- face to face ..... 30' (on approved cul-de-sacs and low volume streets)
- face to face ..... varies (Commercial)



Streets with Medians – 80 foot Rights-of-way

- 10 foot maximum median width
- 20 foot minimum lane width

Cul-de-sac

- Radius ..... 60 foot rights-of-way
- face to face ..... 50' (Residential)
- face to face ..... varies (Commercial)

Private Streets

- Width
- face to face ..... 32'with parking on both sides (Residential)
- face to face ..... 28'with parking on one side (Residential)

Private Drives - Shared

- face to face ..... 22' with no parking (Residential)
- Maximum Length ..... 225 feet

- Street Section (Residential)

The Standard Street Section shall meet the requirements of City Detail STR-22A for urban streets  
Drain tile is required behind curb, for a minimum of 50' each way from Catch Basins

- Street Section (Rural)

The Standard Street Section shall meet the requirements of City Detail STR-22 for rural streets

- Street Section (Commercial)

The Standard Street Sections will vary

- Boulevard

- Width .varies
- Sidewalk Width ..... 6 feet
- Bituminous Trail Width ..... 10 feet

- Entrances (Single family residential)

- Driveway – Width ..... Minimum – 12 feet  
..... Maximum – 30 feet  
..... Cul-de-sac widths to be reviewed by City Staff for approval  
..... All driveways are to meet minimum side yard setbacks - 5 feet
- Driveway location ..... 50 feet from the curb of an intersecting street
- One access per Residential Property
- Maximum driveway slope 10%
- Secondary Access (if approved by City)



- Maximum percent of grade..... 5.0%
- Distance from building to centerline of Access Lane .....
  - Minimum .....25 feet
  - Maximum .....65 feet
- Unobstructed Vertical Clearance..... 13'-6"
- Maximum length dead end Access Lane ..... 150 feet  
 .....(City approved turn around required if length exceeds 150 feet)
- The alignment of the Access Lane must be approved by the City and may be modified to match the circumstances and capabilities of the fire department.
- At least one Access Lane must be positioned parallel to the building along the entire length of the building.
- Overhead power and utility lines are not allowed within the Access Lane.
- Signage (Fire Dept. approval required).....within 20' of every entrance

• Street Miscellaneous

- Crown ..... 2.5%
- Minimum percent of grade ..... 0.5%
- Maximum approach grade at intersection for 50' distance..... 2.0%
- Maximum percent of grade..... 6.0%
- Diameter of Cul-de-sac (no islands allowed)..... 100 feet
- Minimum % of grade around Cul-de-sac Curb Flow line..... 0.5%
- Minimum intersection radii for local and Arterial streets.....20 feet
- Maximum length of Cul-de-sac.....600 feet Urban Development  
 .....Varies for Rural Development
- Minimum Radius for Cul-de-sac return required..... 30 feet
- Temporary Cul-de-sac at plat line.....yes

• Horizontal Street Alignment

When a horizontal street centerline deflection at any one point is more than 10 degrees, a horizontal curve shall be introduced into the alignment with radius no less than 100 feet in length.

Street "jogs" or offsets shall be spaced at least 250 feet, centerline of street to centerline of street for minor streets. Collector street intersections shall not be offset.

Intersecting streets shall have centerlines that intersect at a single point, with the angle between the intersecting street centerlines of no less than 80 degrees and no more than 100 degrees. 90 degree intersections are preferred.

• Vertical Street Alignment

Vertical street centerline alignment with different connecting gradients shall be connected with vertical curves. Minimum length, in feet, of these vertical curves shall be thirty (30) times the algebraic difference in the percent of grade of the two adjacent slopes.

• Sign requirements

All signs shall conform to the Minnesota Manual on Uniform Traffic Control Devices, Current Edition, and Mn/DOT Standard Specifications for Construction, Current Edition, Section 2564

- Mailbox requirements ..... Cluster Mailboxes, 8 to 16 per location
  - 4" thick concrete slab at each mailbox location
  - Swing away post as per detail Gen-2
  - COORDINATE LOCATIONS WITH THE POSTMASTER
  
- Private Utilities
  - All private utilities, including gas, electric, telephone, and cable television are to be constructed in a joint trench in accordance with City Detail GEN-1.

## Plan Requirements

The following provides the project plan requirements for development projects in the Forest Lake, Minnesota. The requirements have been established and adopted by the City to provide consistency with today's engineering and construction practices

### *General Plan Requirements:*

1. The maximum plan sheet size shall be 22" x 34".
2. The electronic files must be submitted in both AutoCAD.DWG and PDF format.
3. The electronic AutoCAD file must have layered designations for various items and text as indicated by the table named Minimum Layering Requirements.
4. The intent of the layering requirements is to separate various items of the drawing. The general concept of the layering is to separate:
  - a. Proposed features from existing features
  - b. Proposed text labeling from existing text labeling
  - c. Different utilities of the construction project
  - d. Proposed lateral and trunk features from utility services
5. Additional layering from that indicated by the Minimum Layering Requirements may be needed, and can be completed based on specific project needs.
6. All electronic files must be accompanied by a "layer description list" that clearly identifies the elements of each layer or level.
7. Horizontal control of the plans must be on Washington County Coordinate System.
8. Vertical control of the Plans must be on the City's Benchmark System.
9. All sheets shall include bar scale(s), north arrows, headings, and sheet numbers, match lines and text, and sheet references.
10. Where practical, north shall be orientated up and to the right or somewhere in between the two on the plan sheet.

Minimum Layering Requirements	
Individual layers shall be used to differentiate between existing, proposed and future, if applicable, for elements noted.	
Annotation	<ul style="list-style-type: none"> <li>• General: Scales, North Arrow</li> <li>• General Notes</li> </ul>
Survey Lines	<ul style="list-style-type: none"> <li>• Rights of Way</li> <li>• Property Lines</li> <li>• Easements</li> <li>• Section lines</li> <li>• Annotation</li> </ul>
Topographic Survey	<ul style="list-style-type: none"> <li>• Each individual differential element shall have its own layer (i.e. curb back, curb face, curb lip, bituminous edge, gravel edge, top of slope, bottom of slope, existing utilities, etc.)</li> </ul>

	<ul style="list-style-type: none"> <li>• Line types shall be used to differentiate between linear elements</li> </ul>
Removals	<ul style="list-style-type: none"> <li>• Hatching, Shading</li> <li>• Removal Pipe (separate into different utilities)</li> <li>• Removal Structures (separate into different utilities)</li> </ul>
Grading Elements	<ul style="list-style-type: none"> <li>• Contours</li> <li>• Contour Labels</li> <li>• Slope Labels and Spot Elevations</li> <li>• Annotation relating to grading elements</li> </ul>
Sanitary Sewer	<ul style="list-style-type: none"> <li>• Structures ( Manholes and clean outs)</li> <li>• Pipe</li> <li>• Services</li> <li>• Annotation relating to sanitary sewer elements</li> </ul>
Water Main	<ul style="list-style-type: none"> <li>• Water Main</li> <li>• Hydrants</li> <li>• Valves</li> <li>• Services</li> <li>• Annotation relating to water main elements</li> </ul>
Storm Sewer	<ul style="list-style-type: none"> <li>• Structures (Catch Basins, Manholes, Outlet Structures, Flared End Sections)</li> <li>• Pipe</li> <li>• Drain tile</li> <li>• Annotation relating to storm sewer elements</li> </ul>
Streets	<ul style="list-style-type: none"> <li>• Street Centerline</li> <li>• Curb</li> <li>• Surface edges (concrete, bituminous, gravel, etc.)</li> <li>• Annotation relating to street elements</li> </ul>

As noted previously, additional layering is encouraged. However, placing similar items on multiple layers is not acceptable.

### *Construction Plans:*

Base Drawings: Individual base drawings shall be utilized at a minimum to differentiate between the existing and proposed elements to a project. The base drawing shall be in Washington County coordinates and referenced into the individual construction plan sheets. The base drawings should NOT include annotation relating to the project work and should be put into the individual plan sheets where it is most appropriate.

Title Sheet – Includes a vicinity map, a plan sheet index, and identifies type of improvement.

Legend, Typical Section Plan - Standard symbology, linework, and hatching to be used throughout the plan. Storm sewer schedule and general notes can be located on this plan sheet. Typical Sections shall be drawn to scale.

Location Plan – The location plan shall include all right-of-way lines, property lines, and easements. All existing and proposed sanitary, water, storm lines, and structures. Structure labels shall be included on this sheet. Street names, addresses, lot and block numbers, and adjacent subdivision names (if applicable) shall be labeled.

Demolition Plan – Clearly show all existing sewer, water, storm sewer lines, manholes and valves, curb lines, pavement, sidewalks and pathways. Limits of removals shall be clearly noted. Provide a legend if necessary.

Site Grading And Drainage Plan - Show and label existing and proposed contours. Label slopes, provide spot elevations, and provide dimensions necessary for construction. Show building pads with building location. Define location of house and garage. Indicate NWL and 100-year HWL, low floor elevations, and emergency overflow elevations.

Erosion Control Plans – These plans shall address both temporary and permanent erosion control needs for the project. Where sufficient both can be addressed on one sheet. The plan shall be adequate to represent a Stormwater Pollution Prevention Plan (SWPPP) as required by the NPDES Construction Permit. Show proposed storm sewer, grading and ponding improvements and indicate locations of concentrated surface flow. A legend shall be provided identified the proposed BMP's.

Sanitary Sewer And Water Main Plan - This sheet is required for the construction of sanitary sewer, water main and services. Provide only relevant information to these utilities on these sheets. Plan and profile sheets shall contain both sanitary sewer and water main. All sanitary sewer and water main must be shown on both plan and profile views at 1"=50' horizontal and 1"=10' vertical scales. All storm sewer on the same streets should be shown in shaded line work on the sanitary sewer/water main plan and profiles. The plan view for these sheets should also indicate locations of the existing utilities, public and private.

Sanitary Sewer:

Plan View

Include lot and block numbers, street names, addresses, adjoining development names, structure labels, size of sanitary sewer main (proposed and existing), pipe stationing, wye stationing, sewer service invert elevation, riser lengths, easement dimensions and all construction notes. Direction of flow shall be shown in plan view, typically with the line type. Match points shall reference the proper sheets.

Profile View

Structure labels, manhole sewer station\*, rim and pipe invert elevations to the nearest hundredth of a foot, length of pipe between manholes, diameter of pipe, material or class of pipe, slope of pipe labeled in percent of grade, length of riser pipe for any drop

manholes and service riser. All pipes that cross the sanitary sewer should be shown. Existing and design profile over the pipe shall be labeled.

Subsurface information pertinent to construction should also be shown, such as top of bedrock and ground water elevations, if known.

\* Sewer baseline stationing shall begin at the downstream manhole and be continuous from manhole to manhole following the centerline of the pipe.

Water Main:

Plan View

Lot, block numbers, street names, addresses, easement dimensions and adjoining development names. The water main size shall be labeled (example 6" WM, 12" WM). The water main should be dimensioned if located anywhere but on a lot line or parallel to the sanitary sewer. Each hydrant, valve, fitting, and special structure shall be labeled. The elevation to the top nut of the hydrants should be shown to the nearest tenth of a foot. The depth of cover over the water main should be shown. All match points should be referenced to the proper sheet or location on the same sheet.

Profile View

The water main should be drawn at the appropriate depth, top and bottom of pipe. The size, material and class of pipe should be labeled. Any variations from the standard depth shall be noted. All other pipe crossings should be shown. Existing and design profile over the pipe shall be labeled.

Services:

For single-family residential areas, where the services are to be of a uniform size, a general note stating the size and material should be shown on each sheet. If the service sizes vary, each service must be noted with the proper size and location. The wye station, top of curb box, sewer service invert and top of riser elevation, if applicable, should be noted on the appropriate lot. Both the sanitary and water service lines should be shown on the plan from the main to the end of the service. Show and identify all irrigation services.

Storm Sewer Plan -The purpose of these sheets is for bidding, construction and record drawings of the storm sewer. Only information related to this utility is shown on these sheets. Sanitary sewer, water main and streets shall be shown as background in these sheets. Storm sewer pipes and structures are drawn in a base drawing. Sheets should reference in the base drawing and any other necessary sheets. The sheets should have annotation in them to include the following:

Plan View:

Lot and block numbers, street names, addresses, adjoining development names, structure numbers, bends, aprons, rip rap, easement dimensions, and construction notes. Show and identify all storm sewer services. Show drainage arrows at all intersections. All match points should be referenced to the proper sheet or location on the same sheet.



Profile View:

Structure numbers, structure sewer station\*, rim, pipe and sump invert elevations to the nearest hundredth of a foot, length of pipe between manholes or bends, diameter of pipe, material or class of pipe, slope of pipe labeled in percent of grade. All critical pipes that cross the storm sewer should be shown. Profiles need to be shown for all pipes, including catch basin leads. Sheets containing profiles only should be avoided. Plan/Profile sheets are preferred for ease of use. Subsurface information pertinent to construction should also be shown, such as top of bedrock and ground water elevations, if known.

\*Sewer baseline stationing shall begin at the downstream structure and be continuous from structure to structure following the centerline of the pipe.

Street Plans - The purpose of these sheets is for bidding, construction and record drawings of the street improvements. Only information related to curb and gutter and street design is shown on these sheets. Sanitary manholes, water main valves, hydrants and storm sewer structures shall be shown on these sheets, but not the pipes. If private utility conduits are to be installed they will be shown on these sheets.

Curb lines, sidewalks, trails and all other line work should be drawn in the base drawing. Sheets should reference in the base drawing or any other necessary sheets. The street sheets should have annotation in them, to include the following:

Plan View:

Lot and block numbers, street names, addresses, and adjoining development names. All match points should be referenced to the proper sheet or location on the same sheet. The centerline of each street should be stationing with a tick mark at every 50-foot station and stations labeled every 100 feet using a text height of 0.08". Show the type of curb and gutter. Streets with curb and gutter should be labeled face-to-face (F-F). Sidewalks and or trails should be labeled indicating width and type. Radiuses at intersections need to be labeled. Top of curb elevations, along with the street stations, shall be shown at each begin and end radius at street intersections and around cul-de-sacs at 30° intervals. Show drainage arrows at all intersections. Include construction notes. Separate sheets for the cul-de-sac and intersections are necessary to include more detailed information.

Profile View:

The centerline stationing and elevation of each intersecting street should be shown on the profile. Finished centerline should be labeled every 50-foot station at a minimum. Existing centerline grades should be shown when the grading is part of the contract. Vertical curve information to include at a minimum the PVI station and elevation, high and low point station and elevation, and length of curve. Tangents should be labeled in percent of grade to the nearest one-hundredth of a percent.

Cul-De-Sac Street Improvements:

Include additional sheets for cul-de-sac streets. Label centerline, right-of-way, lot lines, easements, street stationing at beginning, end, PC, PT and even 100' elevations. Label the size of radii, street and pathway width and type, lot and block numbers, intersecting streets. Show all of the utility structures, but not the pipes.

### Intersection Street Improvements:

Create intersection details for all intersections. Label all begin and end radius points, mid radius if high or low point, show arrow indicating flow direction. Please note spot elevations should be edge of pavement/lip of curb.

### Cross Sections:

Show right-of-way, centerline and any easement lines on each section. Show finished and existing ground lines, including finished and existing centerline grade. Sections are typically plotted at 50-foot stations and any critical station. Grading slopes (3:1, 4:1, etc.) and dimensions should be labeled on each section when they vary from the typical section. Cumulative average end area excavation and embankment volumes should be shown. Use a 1"=10' horizontal and 1"=5' vertical scale when plotting cross sections (This will present them at a 1"=20' H and 1"=10' V at half scale). When earthwork quantities are shown, specify if a shrinkage factor was used and if so, identify it.

Standard Details - The purpose of these sheets is to show the standard details that are pertinent to the construction of the project.

Traffic Signs And Pavement Markings - The purpose of these sheets is for bidding, construction and record drawings of the traffic signs and pavement markings. Only information related to these items is shown on these sheets.

Blocks representing traffic signs, street name signs and traffic markings should be placed in the traffic base drawing(s) along with line work for traffic paint striping. Reference in this base drawing(s) and other necessary base drawings to show curb, property lines and any other relative features. The plan sheets should have annotation in them, to include the following:

### Traffic Signs

Sign number as described in *Minnesota Manual on Uniform Traffic Control Devices*, the size of sign in inches and a block representing the image of the sign. Show each sign location along with sign symbol noting the type and size.

### Traffic Markings

A circled reference number and leader referencing the pavement stripe or marking along with a legend including the reference number and description.

Street Light Plan - Standard street lights are "Traditional Coach Lantern" (Connexus Energy) and "Traditional" (Xcel Energy) Luminaires. The Developer can upgrade street lights to an "Acorn" (Xcel and Connexus) style. All street lights are to be furnished, paid, and installed by the Developer, with the City taking over the maintenance and repair costs after the system is approved by the Engineer and accepted by the City.

### As-Built/Record Drawings:

After construction is completed, two printed sets of as-built construction record drawings are to be prepared and provided to the City by the Developer. The final record drawings must also be submitted in electronic format in accordance with the Plan Requirements. The record drawings shall indicated all changes from the as-bid plans. The contractor and construction year shall also

be noted on the record plan drawings. The following are specific requirements for each element constructed with the project.

Sanitary Sewer:

As-built elevations of the rim and invert of each structure must be surveyed. The elevations shall be recorded and revised to the nearest 0.01'. If pipe elevations change more than 1 foot, the changed portion of the profile should be redrawn. The percentage of grade between manholes should be changed accordingly and recorded to the nearest 0.01%. Distance between manholes should be changed on both the plan and profile. The distance shall be measured from center of casting to the nearest 1'. Length of service risers shall be revised to the nearest 1'.

Water Main:

Any change in elevation of more than 1-foot should be noted on the profile. Any change in location of a main, hydrant, valve, etc. should be corrected on the plan as well as any additions. Each gate valve must have two or more ties recorded on the record plan recorded to the nearest 0.1'. The location of water main fittings shall be noted on the record plans. All top of hydrant elevations shall be recorded to the nearest 0.01'. The manufacturer, type, size, and class of piping, fittings, valves and boxes, brass, stop boxes shall be noted on the record drawings.

Services:

Service wye locations accurate to the nearest foot. The end of the service must be located with two or more ties. If a water service is installed in the same trench with the sanitary sewer the ties should be to the curb box. Service ties shall be recorded to the nearest 0.1'. Ties to drantile service stub and clean-outs, recorded to the nearest 0.1'. Service invert elevations at R/W line, recorded to the nearest 0.1'.

Storm Sewer:

As-built elevations of the rim and invert of each structure must be surveyed, which includes storm sewer manhole and catch basin casting/inlet tops and inverts, flared end section inverts, and any other structure elevations shown on the as-bid plan. The elevations shall be recorded and revised to the nearest 0.01'. If pipe elevations change more than 1 foot, the changed portion of the profile should be redrawn. The percentage of grade between structures shall be changed accordingly and recorded to the nearest 0.01%. Any change in distance between structures or changes in bends or aprons must be changed on the plan sheet and profile. The distance shall be measured from center of casting/end section to the nearest 1'.

Streets:

Drawings should reflect any changes made. Any subgrade corrections that were made in addition to what is noted in the construction documents shall be noted.

Special Structures:

Record plans on special structures such as lift stations, pump houses, treatment plans, etc. should be include as-built elevations of critical piping, slabs, etc. as well as any changes which may have occurred during construction.

## *Building Permit Requirements & Policy on Rear Yard Drainage*

### Issuance of Building Permits

Building Permits, in a platted subdivision, will not be issued until the public improvements are completed, including public sanitary sewer, water main, services, private utilities (gas, electric, telephone, and cable television), concrete curb and gutter, aggregate base, bituminous base, and storm water management basins are constructed, street signs installed, and street lights installed.

Building permits will not be issued until the developer has installed silt fence along the back of curb on all streets and along the back property lines for all lots. Side lot line silt fence is required adjacent to lots that have been finished graded, and have established turf.

The individual builders shall maintain silt fence throughout home/building construction.

Street sweeping is to be performed on a weekly basis, at the developer's cost, until 75% of the homes in the subdivision are constructed, or for a period of two years after the placement of the bituminous base course.

The bituminous wearing course is to be constructed after a minimum of one frost cycle season and 75% of the homes are constructed, or two years after placement of the bituminous base course.

### Policy on Rear Yard Drainage

The City's rear yard drainage policy allows property owners to petition for improvements to a correct a problem drainage area. The City will provide property owners with technical assistance regarding the problem; however, the City will not assist with the cost of any improvements, as it is only responsible for the drainage from the roadways and respective right-of-way. All costs associated with any improvements performed as a City project are assessed to each property contributing flow to the problem area.

## *Standard Detail Plates*

# CITY OF FOREST LAKE STANDARD DETAILS INDEX

City Plate No.

PIPE INSTALLATION DETAILS

BED-1	PIPE BEDDING METHODS FOR PVC
BED-2	PIPE BEDDING METHODS FOR RCP OR DIP
BED-3	IMPROVED FOUNDATION FOR ALL PIPES

EROSION CONTROL DETAILS

ERO-1A	SILT FENCE - MACHINE SLICED
ERO-1B	SILT FENCE - HEAVY DUTY
ERO-1C	SILT FENCE - STANDARD
ERO-1D	SILT FENCE - J HOOK
ERO-2	EROSION CONTROL BLANKET INSTALLATION
ERO-3	FLOATING SILT CURTAIN
ERO-4A	INLET PROTECTION - SILT BOX FOR CATCH BASIN BEFORE ROAD CONSTRUCTION
ERO-4B	INLET PROTECTION - ROCK FILTER FOR CATCH BASIN DURING ROAD CONSTRUCTION
ERO-4C	INLET PROTECTION - CATCH BASIN INSERT AFTER PAVING
ERO-4D	INLET PROTECTION - SILT BOX FOR BEEHIVE CASTING
ERO-5A	DITCH CHECK - 3D VIEW FOR 5B, 5C AND SPACING
ERO-5B	DITCH CHECK - ROCK WEEPER AND BIO WEEPER
ERO-5C	DITCH CHECK - SMALL CHECK DAM AND LARGE CHECK DAM
ERO-5D	DITCH CHECK - MACHINE SLICED SILT FENCE
ERO-5E	DITCH CHECK - TRIANGULAR SILT DIKE
ERO-5F	DITCH CHECK - COMPOST LOG
ERO-6A	PIPE CHECK - WOODEN WEIR
ERO-6B	PIPE CHECK - BIO ROLL WEIR AND ROCK WEIR
ERO-7	CONSTRUCTION ENTRANCE - ROCK AND WOOD CHIP
ERO-8A	TEMPORARY SEDIMENTATION BASIN - PIPE OUTLET
ERO-8B	TEMPORARY SEDIMENTATION BASIN - STANDPIPE OUTLET
ERO-9	TEMPORARY SEDIMENT TRAP
ERO-10	DIVERSION MOUND AND TEMPORARY PIPE DOWNDRAIN
ERO-11	SLOPE TRACKING
ERO-12A	SUPER DUTY PERIMETER CONTROL - SILT FENCE / CONCRETE BARRIER SYSTEM
ERO-12B	SUPER DUTY PERIMETER CONTROL - HAY BALES / CONCRETE BARRIER SYSTEM
ERO-12C	PERIMETER / SEDIMENT CONTROL - HAY BALES



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STANDARD DETAILS

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
MARCH 2013

CITY PLATE NO.  
INDEX - 1

# CITY OF FOREST LAKE STANDARD DETAILS INDEX

## City Plate No.

### GENERAL DETAILS

GEN-1	TYPICAL UTILITY LOCATIONS - PUBLIC AND PRIVATE
GEN-2	MAIL BOX INSTALLATION
GEN-2A	MAIL BOX INSTALLATION
GEN-3	WETLAND BUFFER SIGN
GEN-4	WETLAND BOUNDARY SIGN
GEN-5	STRUCTURE MARKER SIGNS

### SANITARY SEWER DETAILS

SAN-1	SANITARY SEWER MANHOLE
SAN-2	SANITARY SEWER JUNCTION MANHOLE
SAN-3	SANITARY SEWER DROP INLET MANHOLE
SAN-5	AIR RELEASE MANHOLE
SAN-420	SUMP PUMP DISCHARGE

### SERVICE DETAILS

SER-1	SEWER AND WATER SERVICE CONNECTIONS
SER-2	SERVICE RISER
SER-3	SANITARY SEWER SERVICE
SER-5A	IRRIGATION SERVICE BY PRIVATE CONTRACTOR
SER-6	WATER SERVICE SHUT OFF LOCATION

### STORM SEWER DETAILS

STO-3	STORM SEWER JUNCTION MANHOLE W/REINFORCED TOP SLAB
STO-4	STORM SEWER JUNCTION MANHOLE W/REINFORCED TOP SLAB AND SUMP
STO-5	TYPE II CATCH BASIN MANHOLE
STO-6	CATCH BASIN MANHOLE WITH SUMP
STO-8	CATCH BASIN WITH SUMP
STO-9	2'X3' CATCH BASIN WITHOUT SUMP
STO-12	FLARED END SECTION
STO-13	RIP RAP AT OUTLETS



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## STANDARD DETAILS

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2016

CITY PLATE NO.  
INDEX - 2



# CITY OF FOREST LAKE STANDARD DETAILS INDEX

## City Plate No.

## STORM SEWER DETAILS

STO-18	CATCH BASIN AND MANHOLE ADJUSTMENT
STO-20	4" HDPE PERFORATED DRAINTILE WITH FILTER SOCK
STO-28	PRECAST 27" SHALLOW DEPTH BEEHIVE
STO-31	POND OUTLET SKIMMER STRUCTURE
STO-32	TYPICAL BENCH DETAIL
STO-33	GREASE INTERCEPTOR

## PAVEMENT, CURB, WALKS DETAILS

STR-1	CURB AND GUTTER
STR-2	CONCRETE CURB AND GUTTER CONSTRUCTION AT CATCH BASINS
STR-3	SURMOUNTABLE CURB AND GUTTER CONSTRUCTION AT CATCH BASINS
STR-4	CONCRETE DRIVEWAY APRON
STR-7	PEDESTRIAN CURB RAMP
STR-9	URBAN RESIDENTIAL DRIVEWAY APRON
STR-10	CONCRETE VALLEY GUTTER
STR-11	DOUBLE PERMANENT BARRICADE
STR-19	STREET NAME BLADE SIGNS - PUBLIC STREETS
STR-20	STREET NAME BLADE SIGNS - PRIVATE STREETS
STR-21	TYPICAL DRIVEWAY AND CULVERT INSTALLATION
STR-22	TYPICAL RURAL ROAD SECTION
STR-22A	TYPICAL URBAN ROAD SECTION
STR-23	TYPICAL STREET TURNAROUND - RURAL SECTION
STR-24	TYPICAL BITUMINOUS TRAIL AND CONCRETE SIDEWALK
STR-25	PLAYGROUND PLAY AREA
STR-26	FIRE DEPARTMENT ACCESS LANE (BUILDINGS UP TO 24' HIGH)
STR-27	FIRE DEPARTMENT ACCESS LANE (BUILDINGS OVER 24' HIGH)
STR-28	TYPICAL PUBLIC PARKING LOT SECTION
STR-29	TYPICAL TRAFFIC SIGN INSTALLATION BOULEVARD

## WATERMAIN DETAILS

WAT-4	GATE VALVE AND BOX
WAT-6	CONCRETE THRUST BLOCKING
WAT-8	HYDRANT
WAT-10	WATERMAIN OFFSET
WAT-11	MULTIPLE UNITS USING MAIN WATER METER
WAT-12	MUTIPLE UNITS USING INDIVIDUAL WATER METERS

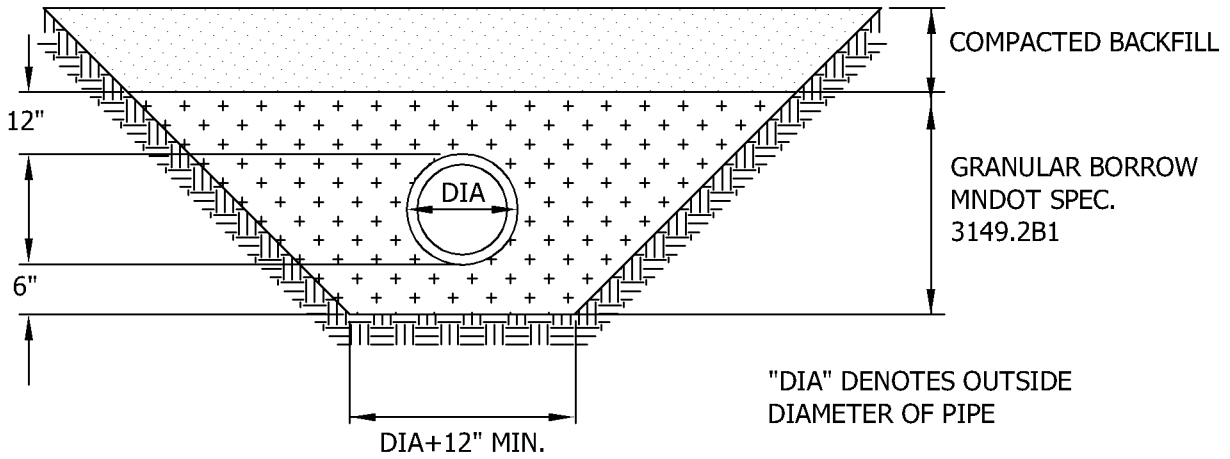


## STANDARD DETAILS

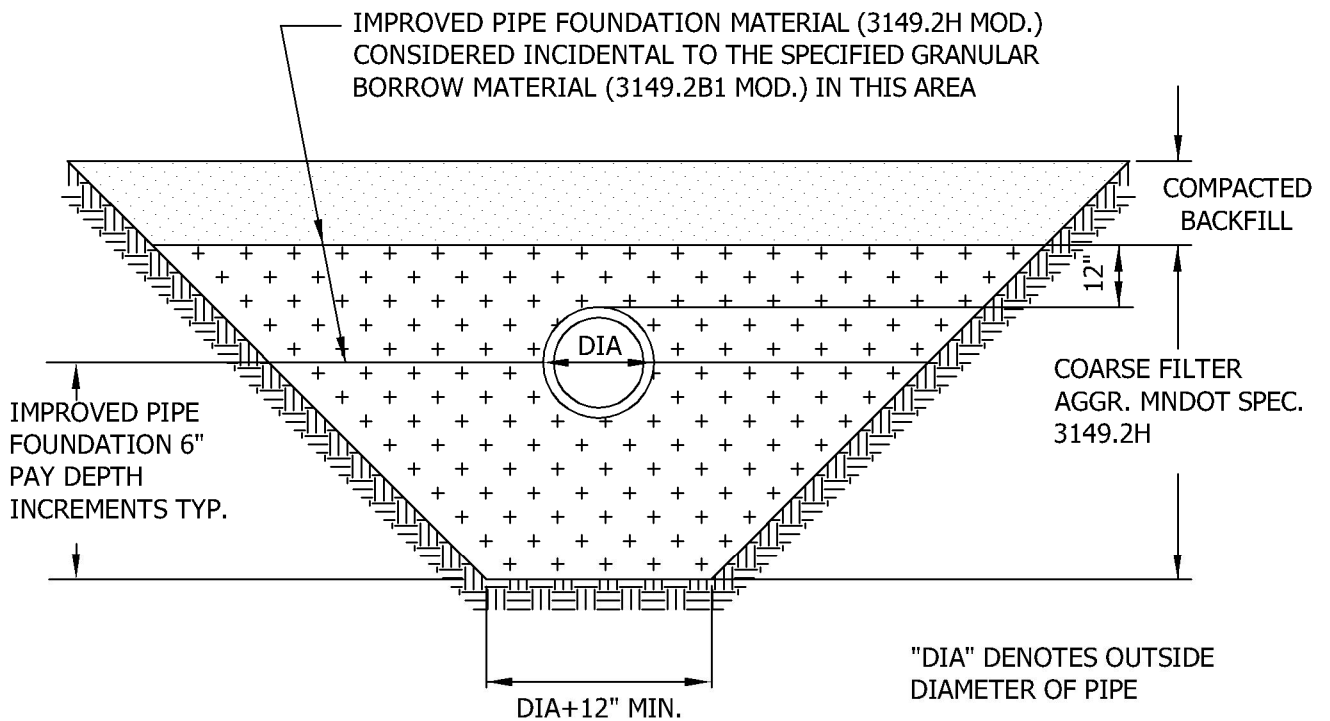
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2016

CITY PLATE NO.  
INDEX - 3



**PIPE FOUNDATION & BEDDING  
GOOD SOILS**



**IMPROVED PIPE FOUNDATION MATERIAL  
POOR SOILS**



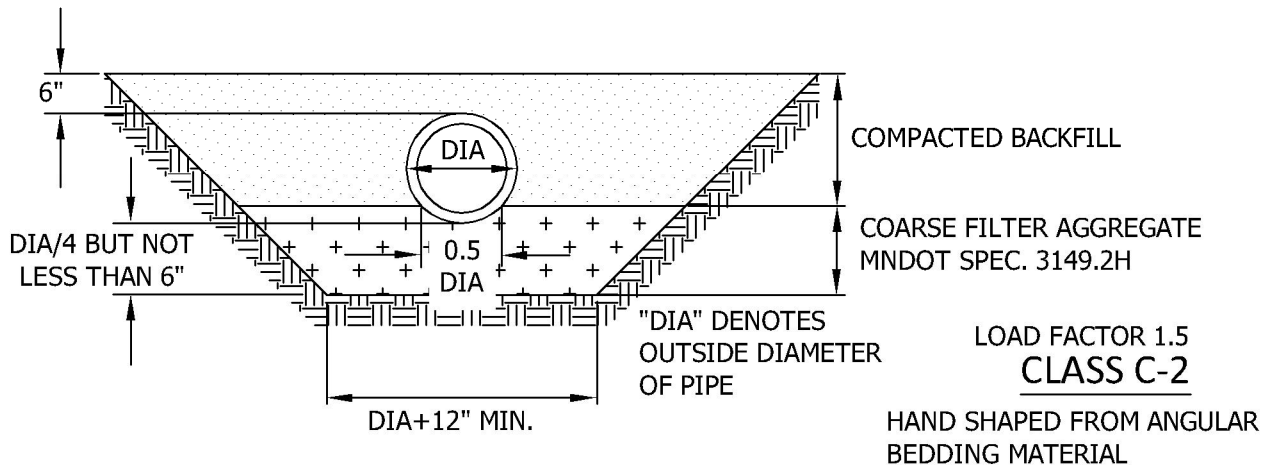
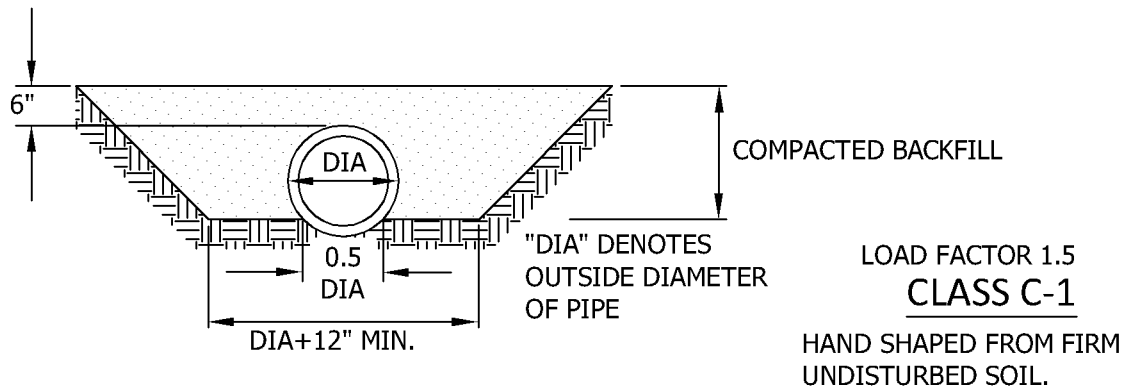
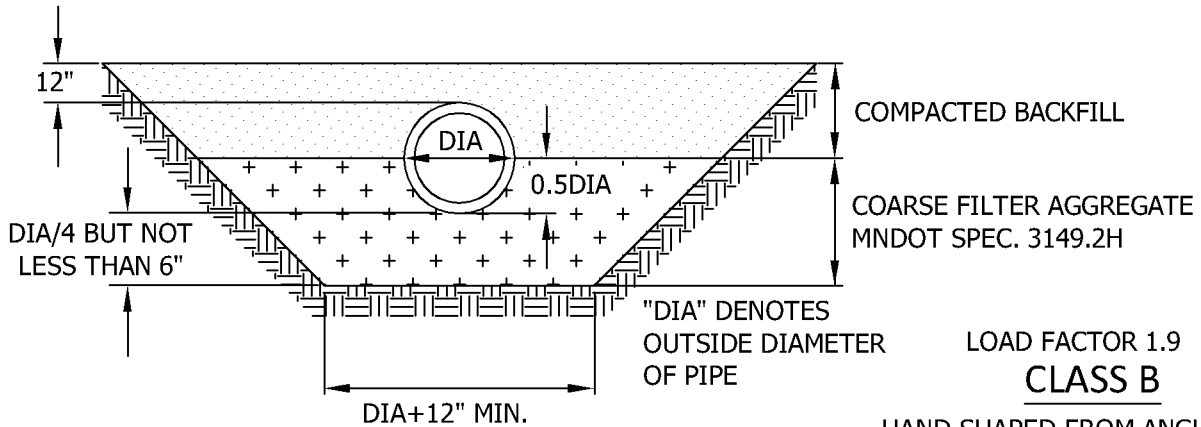
**STANDARD DETAILS  
PIPE FOUNDATION & BEDDING  
METHODS FOR PVC**

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2016

CITY PLATE NO.  
BED-1

"DIA" DENOTES  
OUTSIDE DIAMETER  
OF PIPE



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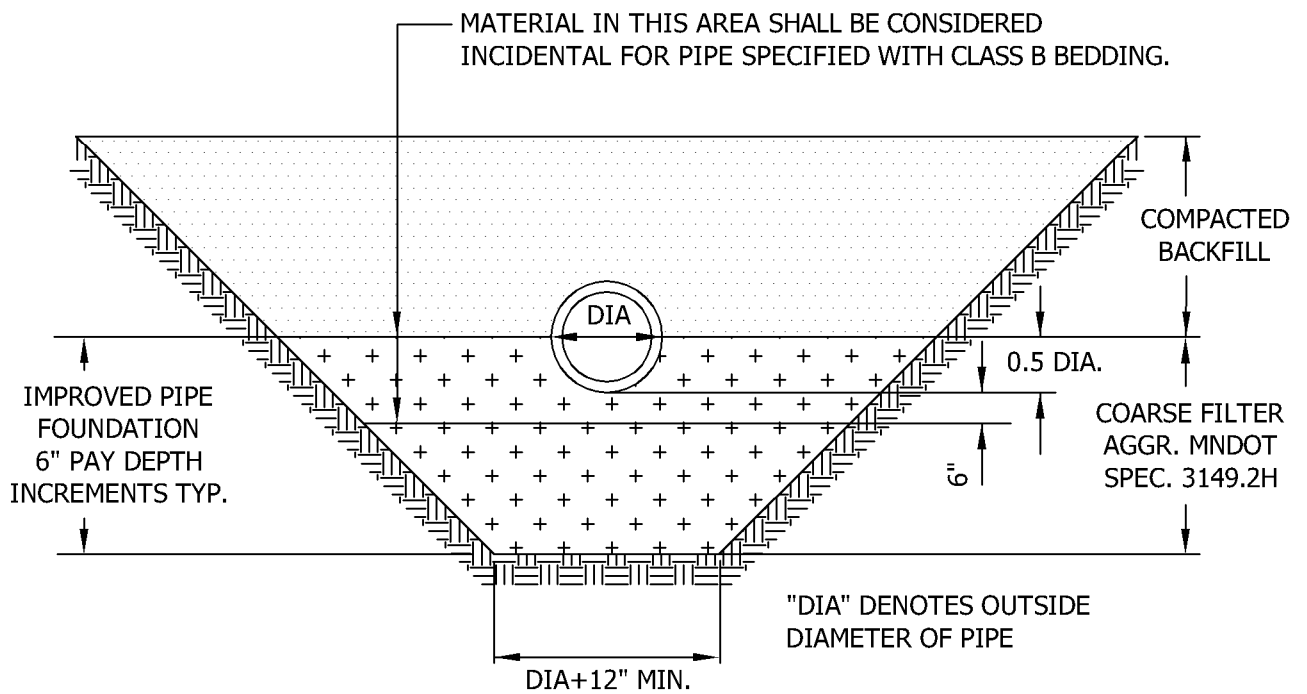
## STANDARD DETAILS

BEDDING METHODS  
FOR RCP OR DIP

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2016

CITY PLATE NO.  
BED-2

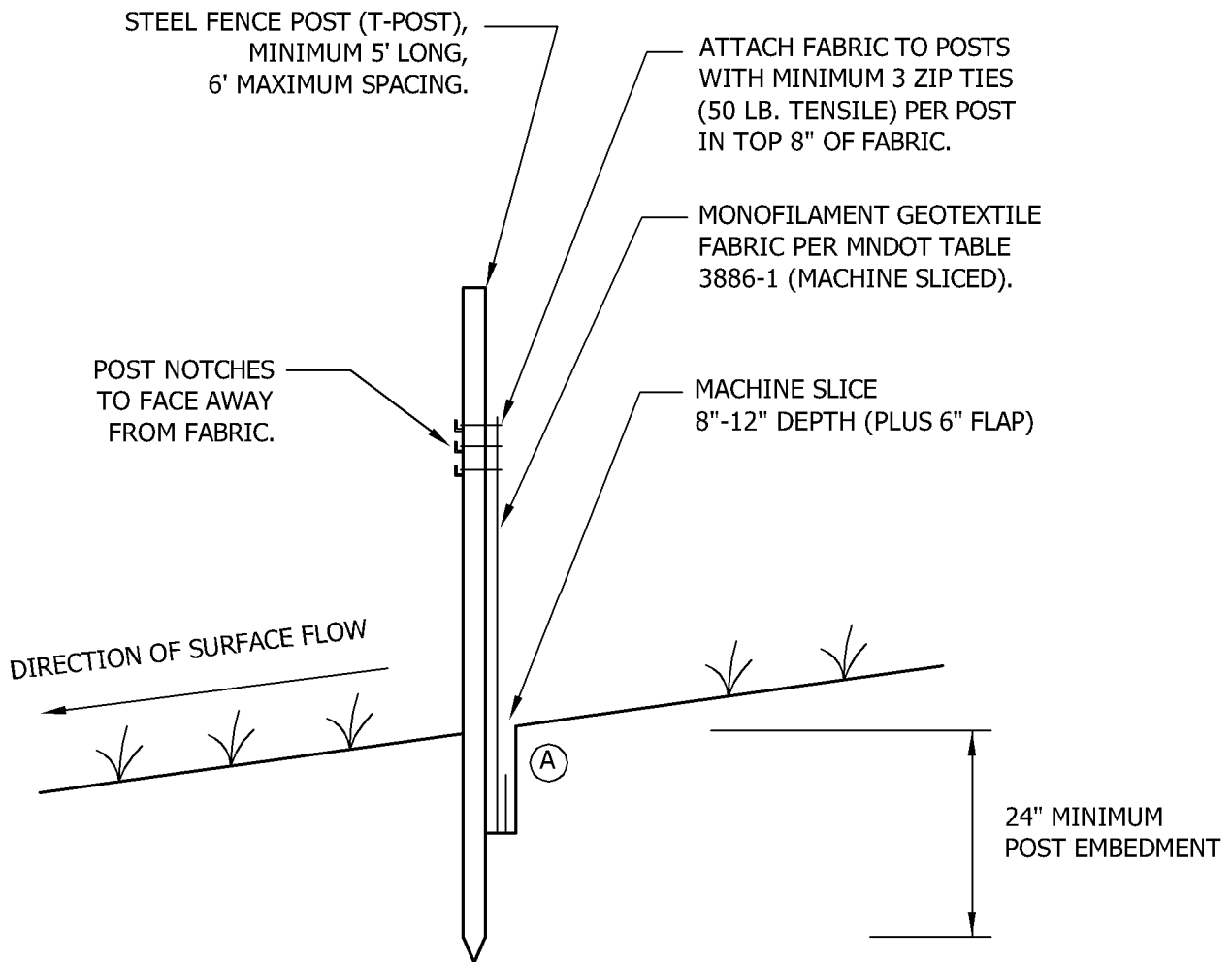


**STANDARD DETAILS**  
IMPROVED FOUNDATION FOR ALL PIPE TYPES

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2016

CITY PLATE NO.  
BED-3



**NOTE:**

THE MACHINE SLICED METHOD (THIS DETAIL) IS THE STANDARD SILT FENCE INSTALLATION METHOD. HEAVY-DUTY (ERO-1B) OR STANDARD (ERO-1C) SILT FENCE INSTALLATION METHODS SHOULD ONLY BE USED WHEN APPROVED OR DIRECTED BY THE CITY.

**(A) COMPACTION:**

AFTER "SLICING" IN THE FABRIC AND *BEFORE* INSTALLATION OF STEEL POSTS, DRIVE INSTALLATION EQUIPMENT OVER THE "SLICE" WHILE FABRIC IS LAYING ON THE GROUND. *THEN* INSTALL STEEL POSTS AND PULL UP FABRIC TO ATTACH AT A UNIFORM HEIGHT.



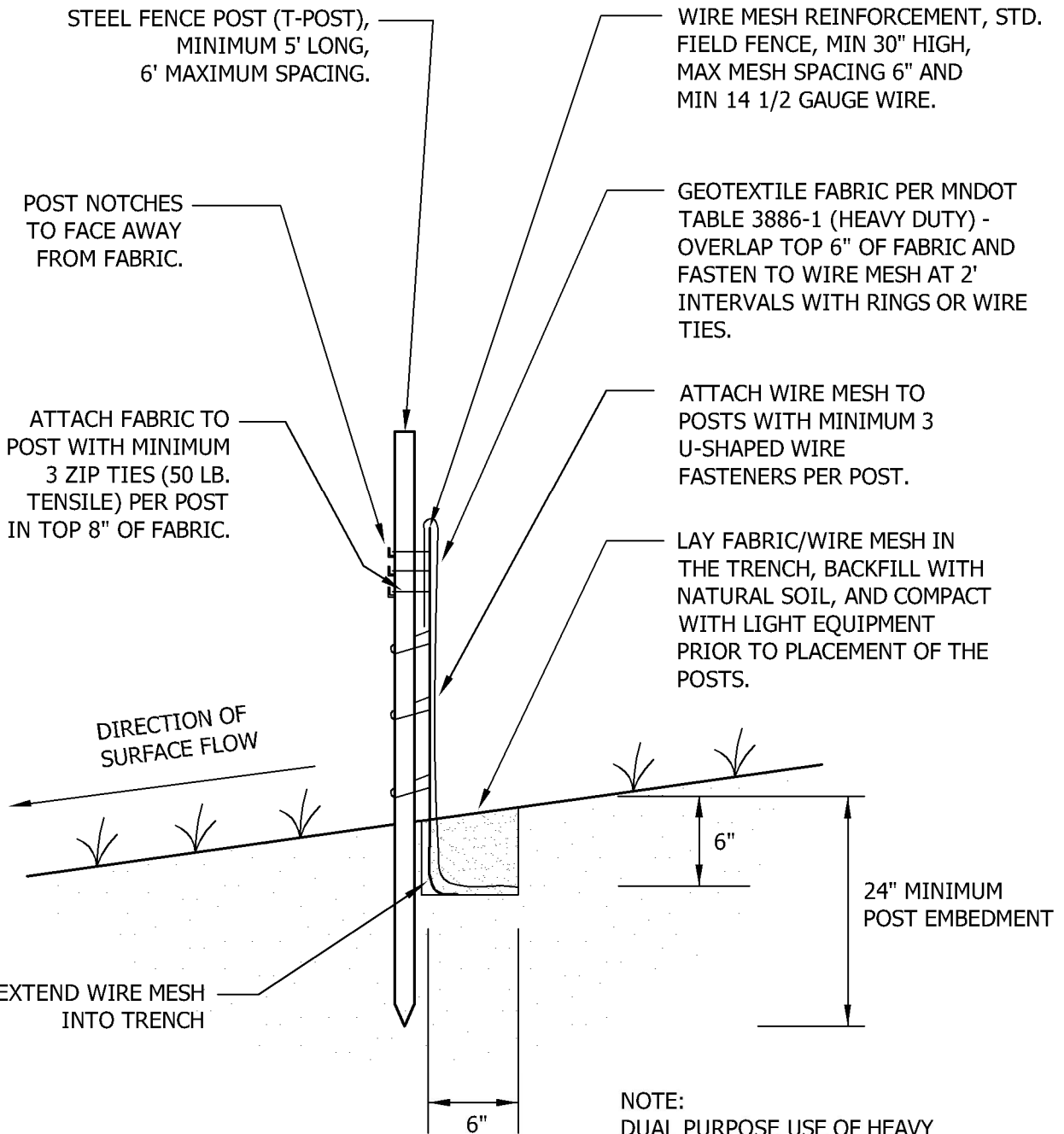
**STANDARD DETAILS**

SILT FENCE  
MACHINE SLICED

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-1A



NOTE:  
HEAVY DUTY SILT FENCE FOR CURB PROTECTION REQUIRE POSTS TO BE INSTALLED ON HOUSE SIDE OF FABRIC.

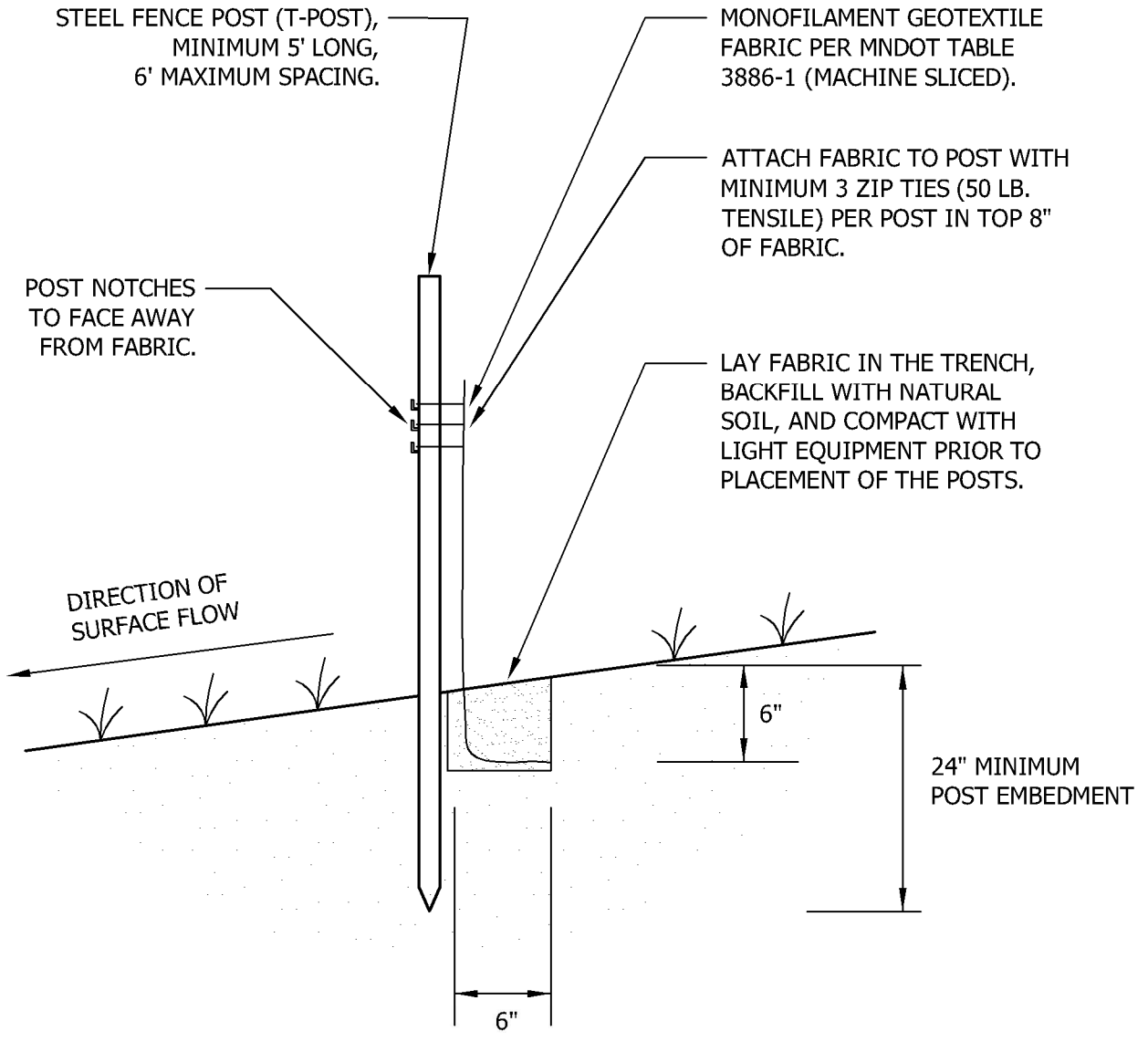
NOTE:  
DUAL PURPOSE USE OF HEAVY DUTY FENCE FOR PERIMETER CONTROL AND CURB PROTECTION REQUIRE STEEL POSTS ALTERNATING ON BOTH SIDES OF FABRIC WITH 4' SPACING. SEE LAND DISTURBANCE PERMIT.



**STANDARD DETAILS**  
SILT FENCE  
HEAVY DUTY  
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-1B



STANDARD DETAILS  
SILT FENCE  
STANDARD  
**FOREST LAKE, MINNESOTA**

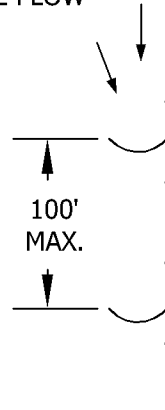
LAST REVISION:  
APR 2016

CITY PLATE NO.  
ERO-1C

## PLAN VIEW

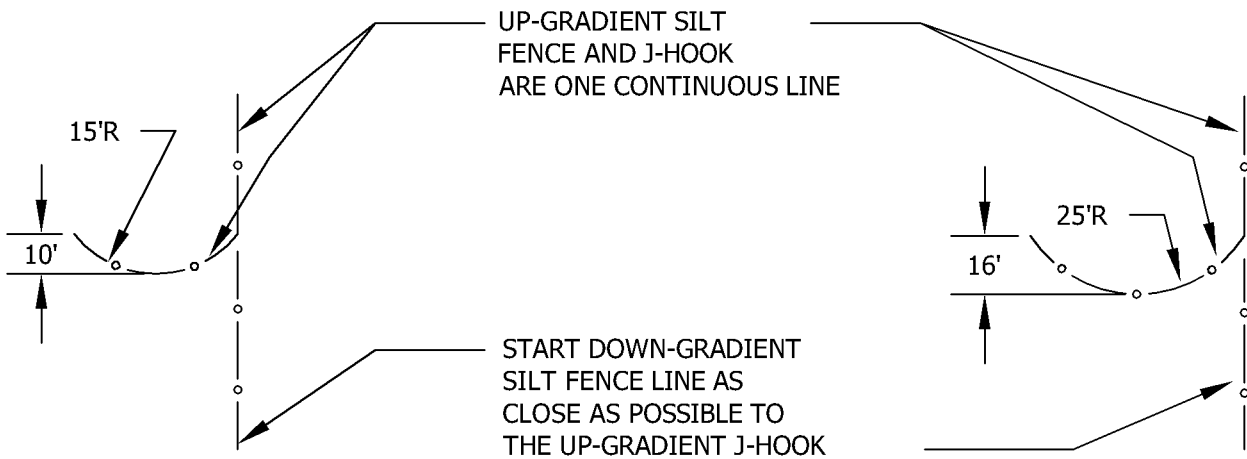
### I. SPACING REQUIREMENTS

DIRECTION OF SURFACE FLOW



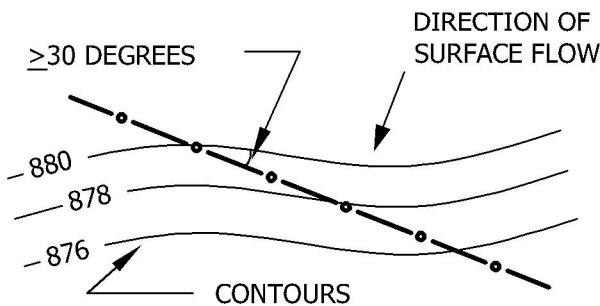
NOTE: SPACING DISTANCES WILL VARY, BUT ARE NOT TO EXCEED 100 FEET.

### II. SIZING REQUIREMENTS: J15, J25



J15 - FOR CATCHMENT AREA < 0.25 ACRES

J25 - FOR CATCHMENT AREA  $\geq$  0.25 ACRES



NOTE: J-HOOKS SHALL BE USED WHEN THE SILT FENCE IS INSTALLED AT AN ANGLE OF 30 DEGREES OR GREATER FROM PARALLEL TO THE CONTOURS.



### STANDARD DETAILS

SILT FENCE  
J - HOOK

FOREST LAKE, MINNESOTA

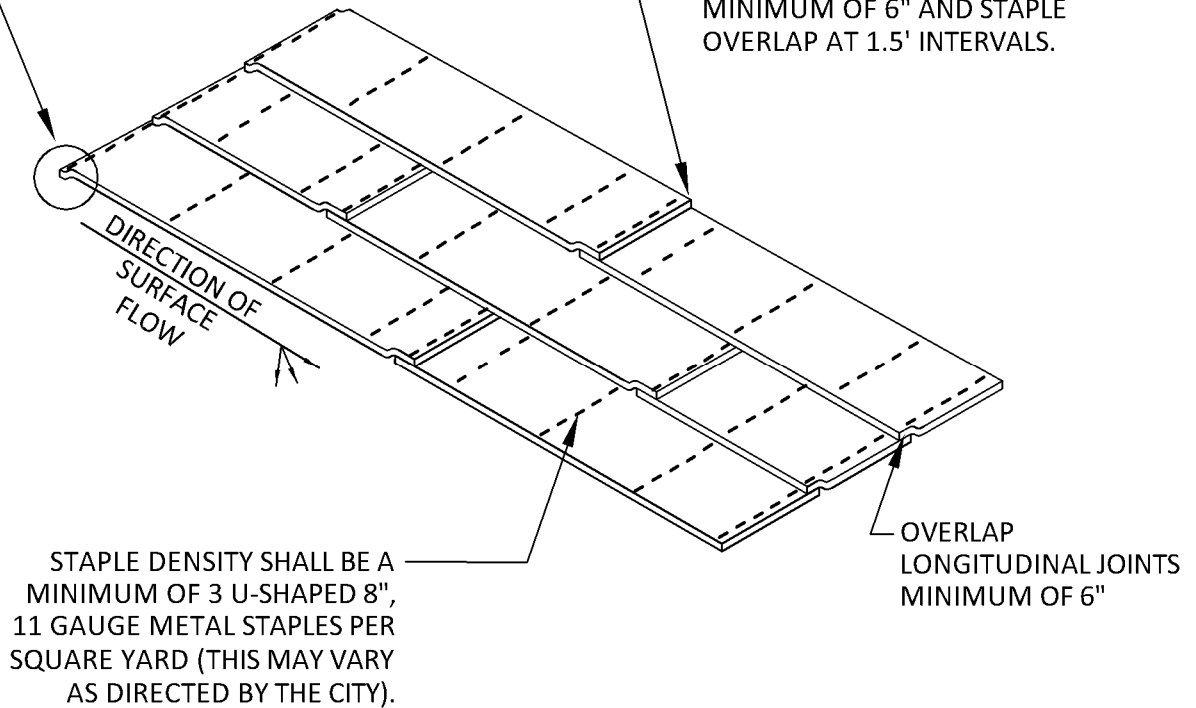
LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-1D



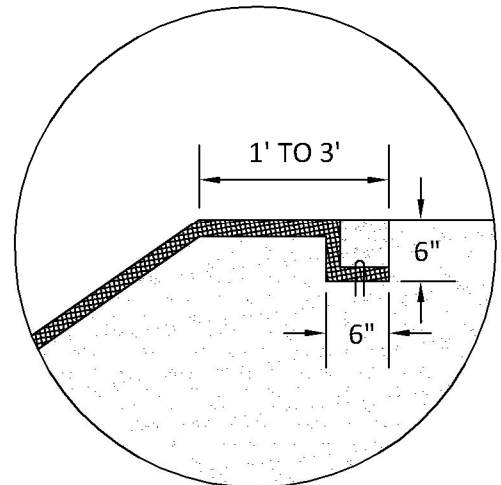
ANCHOR TRENCH  
(SEE DETAIL AND NOTES BELOW)

OVERLAP END JOINTS  
MINIMUM OF 6" AND STAPLE  
OVERLAP AT 1.5' INTERVALS.



**ANCHOR TRENCH**

1. DIG 6" X 6" TRENCH
2. LAY BLANKET IN TRENCH
3. STAPLE AT 1.5' INTERVALS
4. BACKFILL WITH NATURAL SOIL AND COMPACT
5. BLANKET LENGTH SHALL NOT EXCEED 100' WITHOUT AN ANCHOR TRENCH

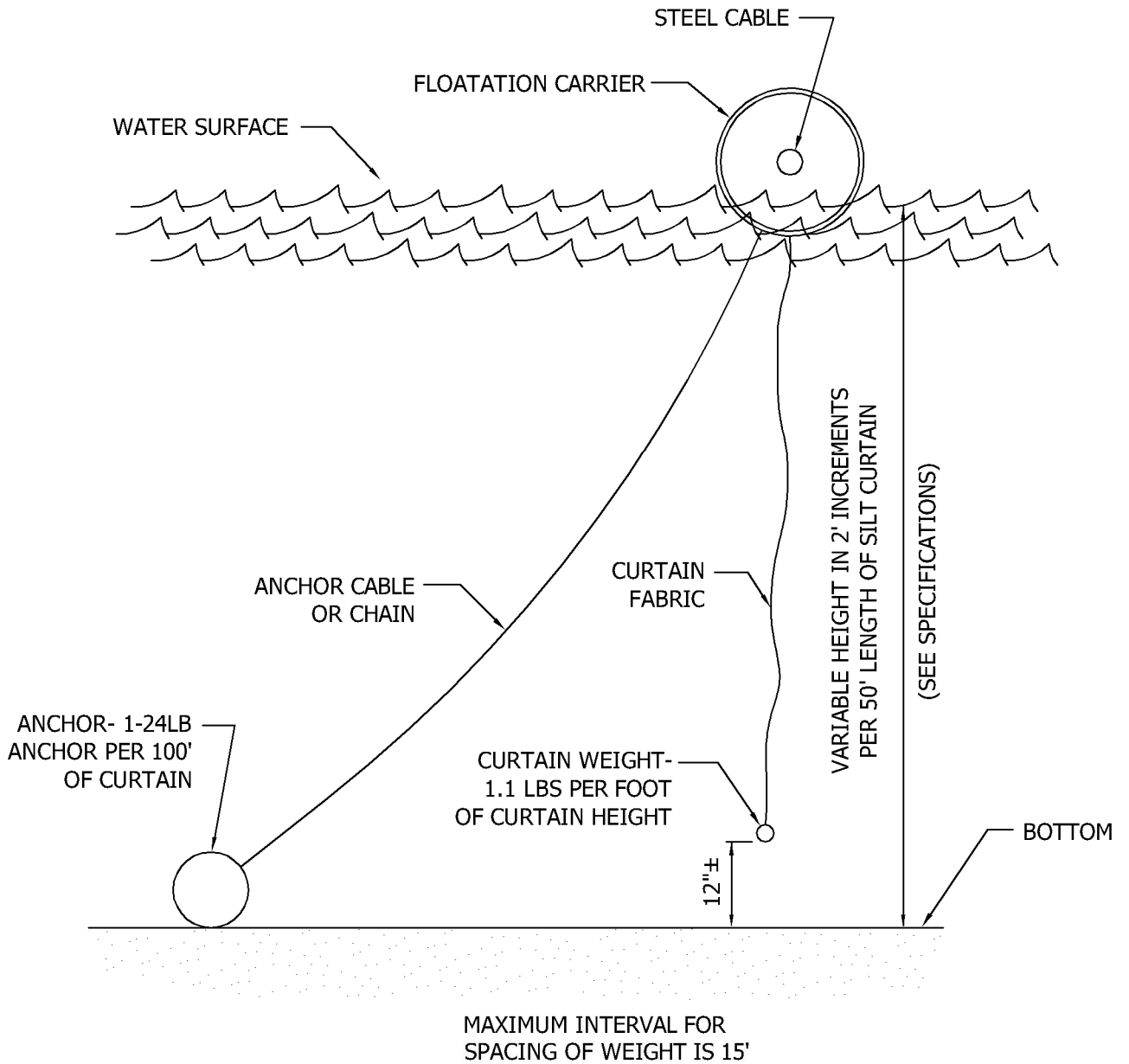


**STANDARD DETAILS**  
EROSION CONTROL BLANKET  
INSTALLATION

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-2



**NOTES:**

- DOUBLE SILT CURTAINS SHOULD BE SPACED 10' APART.
- CURTAIN LENGTH TO MATCH BOTTOM PROFILE AS CLOSELY AS POSSIBLE.



**STANDARD DETAILS**

FLOATING SILT CURTAIN

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
MAR 2007

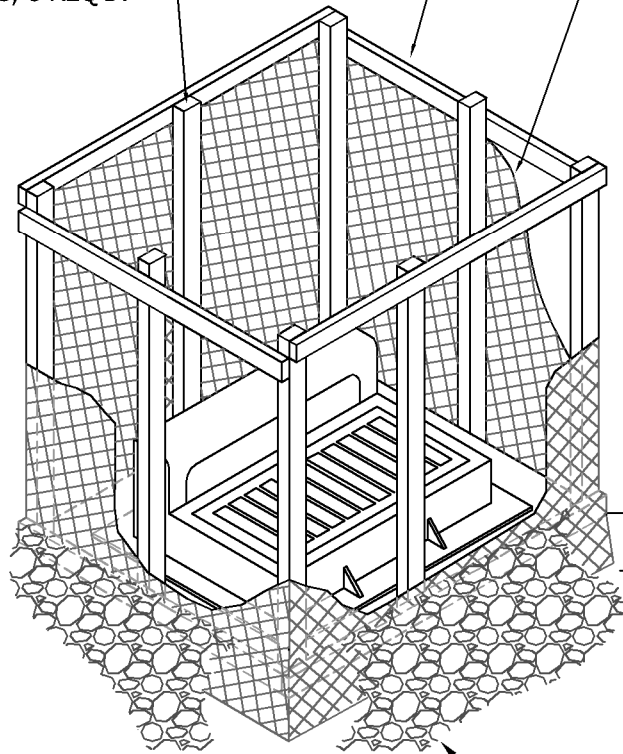
CITY PLATE NO.  
ERO-3

WOODEN LATH SHALL BE NAILED SECURELY TO THE POST MEMBER TO SECURE FILTER FABRIC.

2" X 4" HORIZONTAL MEMBERS CONTINUOUS AROUND TOP AND BOTTOM. FASTENED TO EACH POST USING 2-20D COMMON NAILS

2" X 4" X 2.5' LONG WOOD POSTS, 8 REQ'D.

MONOFILAMENT GEOTEXTILE FABRIC AS PER MNDOT TABLE 3886-1 (MACHINE SLICED). ADDITIONAL 8-10" OF FABRIC FLAP AT BOTTOM OF BOX



2'-6"

8-10" FABRIC FLAP EXTENDING BEYOND BOTTOM 2"x4" - BURY UNDER ROCK TO PREVENT UNDERWASHING

1 1/2" WASHED ROCK  
1' DEEP X 1' WIDE

**NOTES:**  
CONTRACTOR SHALL CONSTRUCT SILT BOX TO FIT AROUND THE INLET STRUCTURE WITH 6" MINIMUM CLEARANCE TO EDGES OF STRUCTURE. SILT BOX TO BE PLACED ON AN EVEN SURFACE 6" BELOW STRUCTURE OPENING. TOP OF SILT BOX TO EXTEND 18" MINIMUM ABOVE EXISTING GRADE.

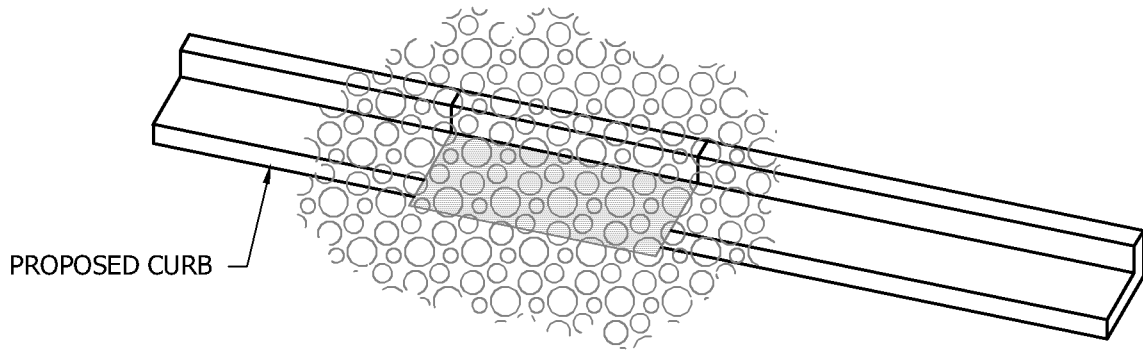


**STANDARD DETAILS**  
INLET PROTECTION SILT BOX  
FOR CATCH BASIN BEFORE CONSTRUCTION  
**FOREST LAKE, MINNESOTA**

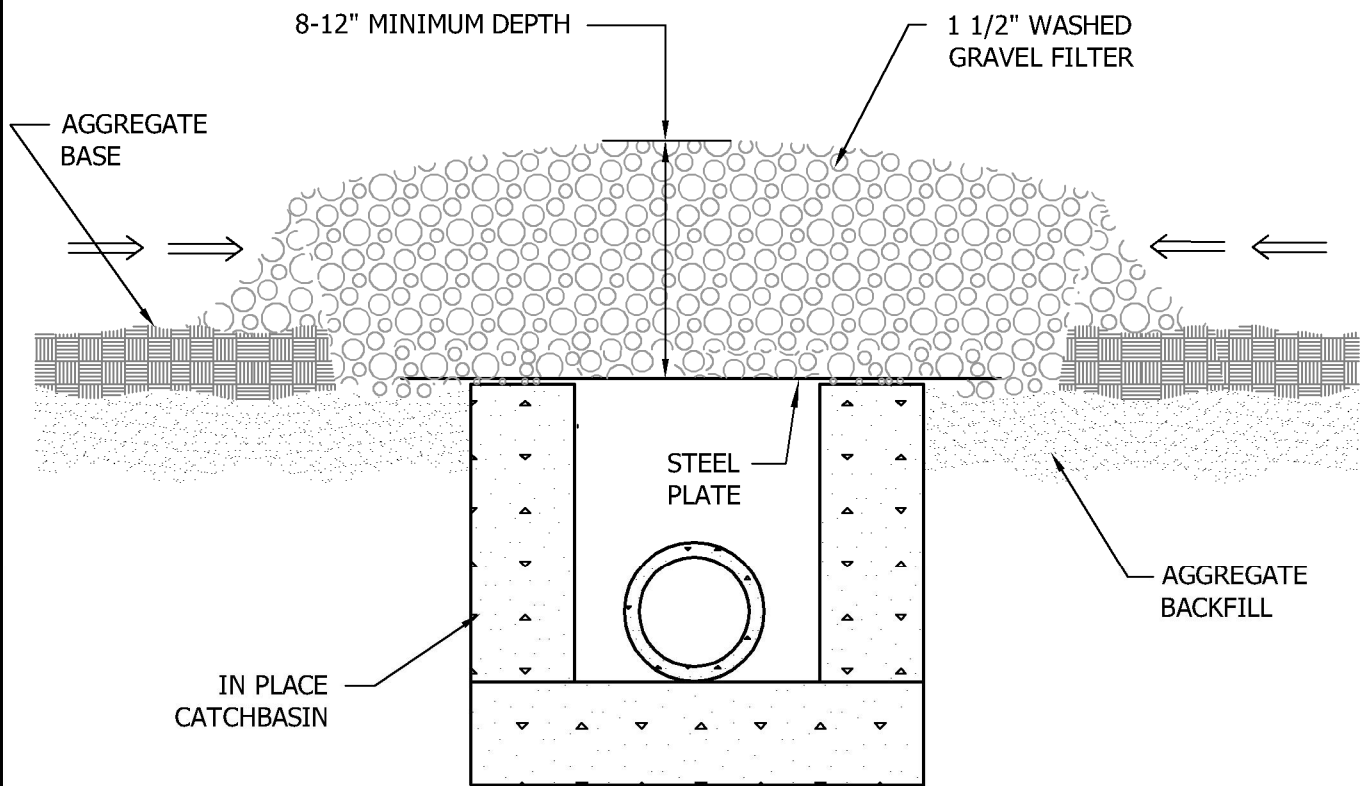
LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-4A

PLAN



← ← = DIRECTION OF SURFACE FLOW



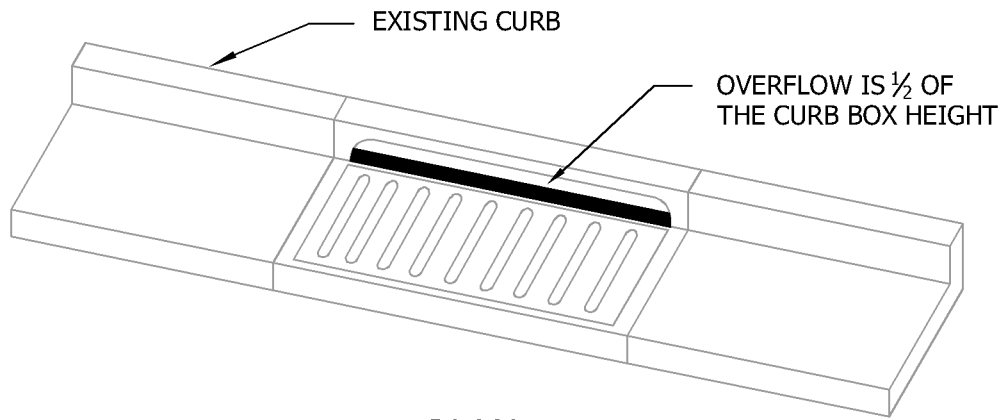
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STANDARD DETAILS  
INLET PROTECTION ROCK FILTER FOR  
CATCH BASIN DURING ROAD CONSTRUCTION

**FOREST LAKE, MINNESOTA**

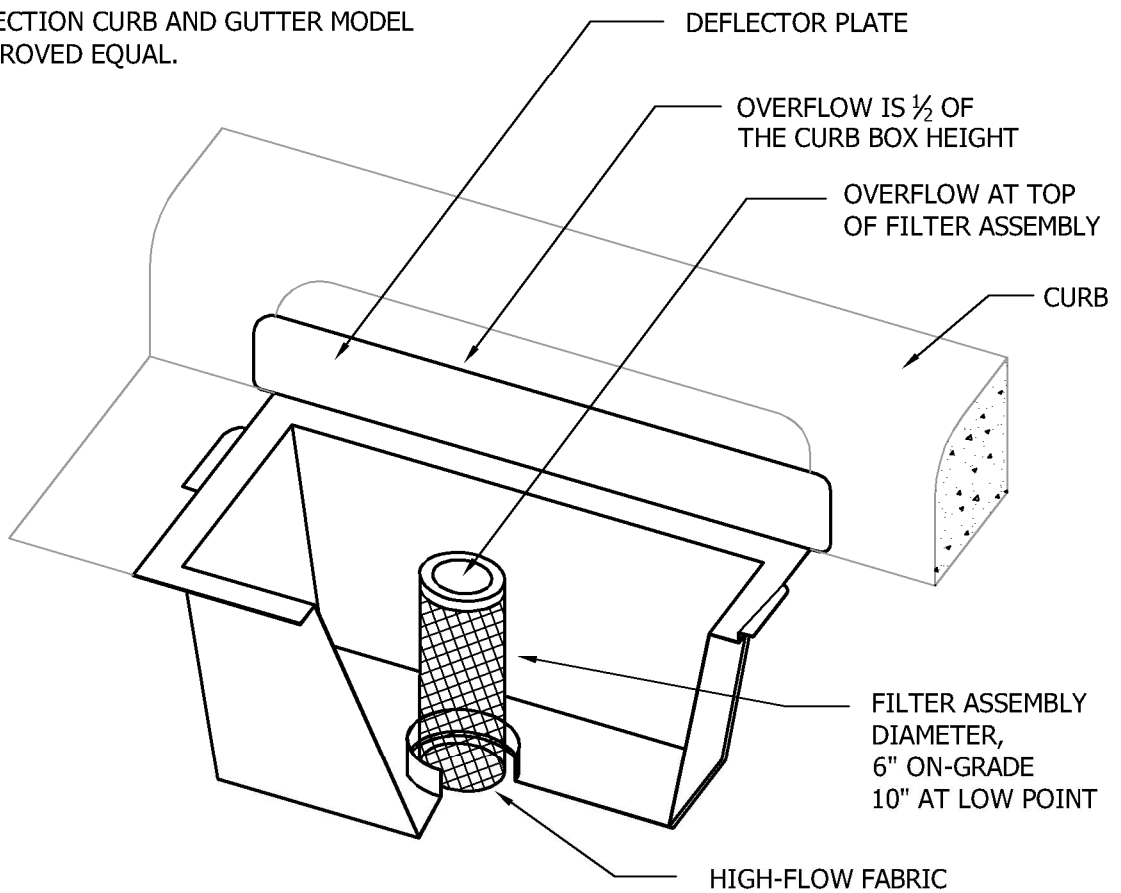
LAST REVISION:  
APR 2016

CITY PLATE NO.  
ERO-4B



PLAN

WIMCO ROAD DRAIN CG-23\* HIGH FLOW  
INLET PROTECTION CURB AND GUTTER MODEL  
OR CITY APPROVED EQUAL.



\* FOR THE NEW R-3067-VB STANDARD CASTING,  
INSTALL WIMCO ROAD DRAIN  
CG-3290 OR CITY APPROVED EQUAL.



STANDARD DETAILS  
INLET PROTECTION  
CATCH BASING INSERT AFTER PAVING  
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2016

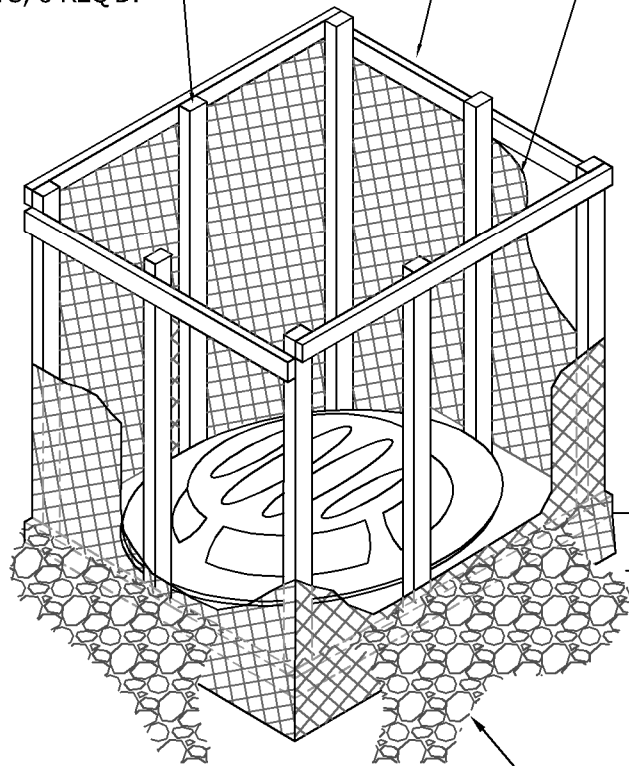
CITY PLATE NO.  
ERO-4C

WOODEN LATH SHALL BE NAILED SECURELY TO THE POST MEMBER TO SECURE FILTER FABRIC.

2" X 4" HORIZONTAL MEMBERS CONTINUOUS AROUND TOP AND BOTTOM. FASTENED TO EACH POST USING 2-20D COMMON NAILS

2" X 4" X 2.5' LONG WOOD POSTS, 8 REQ'D.

MONOFILAMENT GEOTEXTILE FABRIC AS PER MNDOT TABLE 3886-1 (MACHINE SLICED). ADDITIONAL 8-10" OF FABRIC FLAP AT BOTTOM OF BOX



2'-6"

8-10" FABRIC FLAP EXTENDING BEYOND BOTTOM 2"x4" - BURY UNDER ROCK TO PREVENT UNDERWASHING

1 1/2" WASHED ROCK  
1' DEEP X 1' WIDE

**NOTES:**

CONTRACTOR SHALL CONSTRUCT SILT BOX TO FIT AROUND THE INLET STRUCTURE WITH 6" MINIMUM CLEARANCE TO EDGES OF STRUCTURE. SILT BOX TO BE PLACED ON AN EVEN SURFACE 6" BELOW STRUCTURE OPENING. TOP OF SILT BOX TO EXTEND 18" MINIMUM ABOVE EXISTING GRADE.



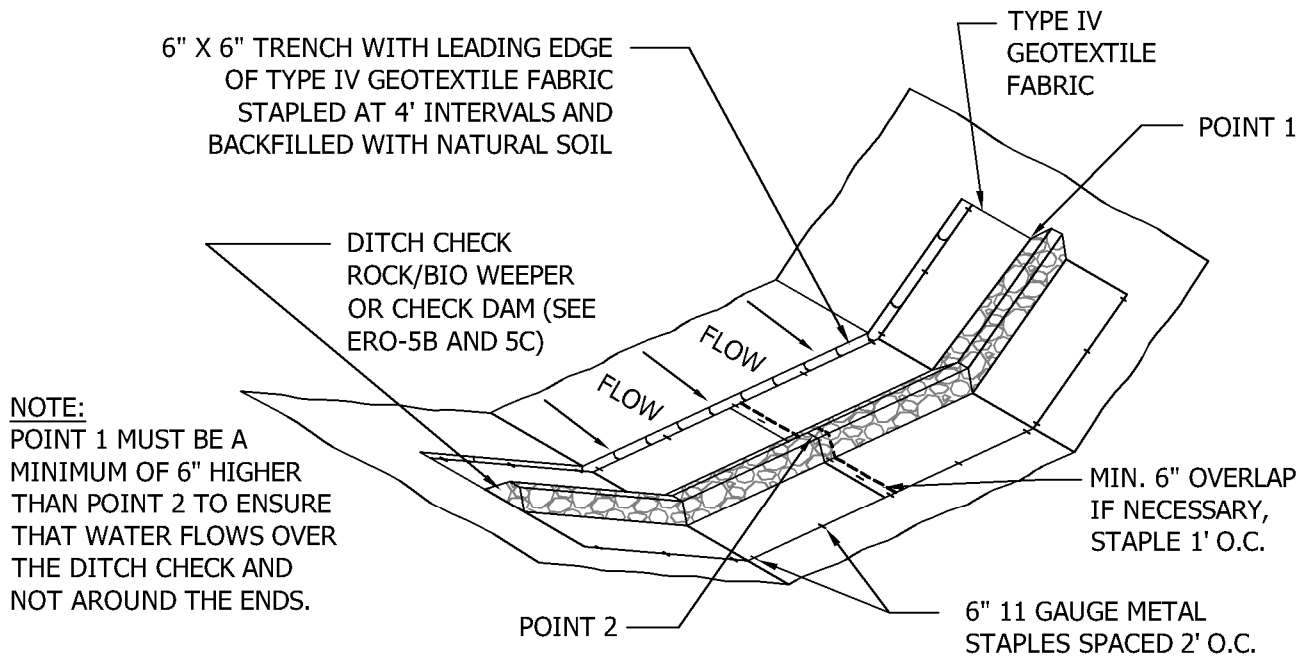
**Forest Lake**  
AS GOOD AS IT SOUNDS

**STANDARD DETAILS**  
INLET PROTECTION  
SILT BOX FOR BEEHIVE CASTING

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
MAR 2007

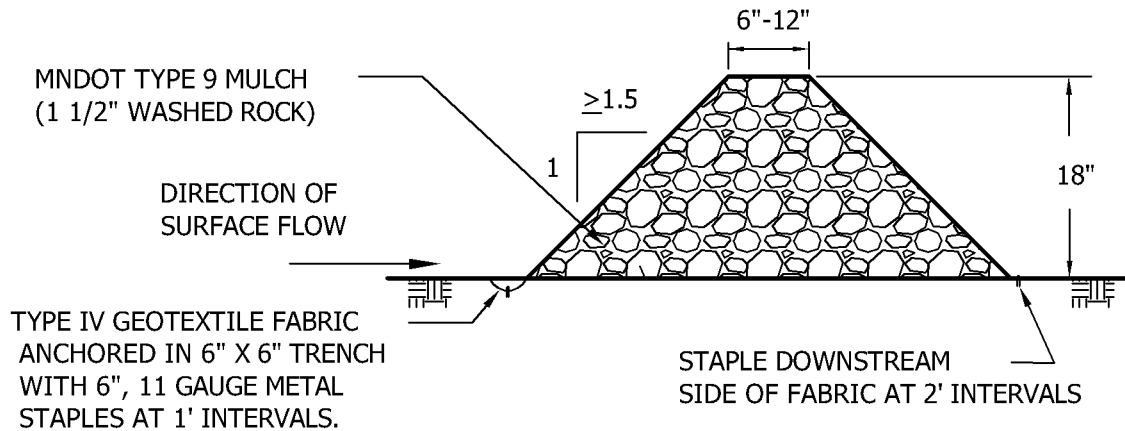
CITY PLATE NO.  
ERO-4D



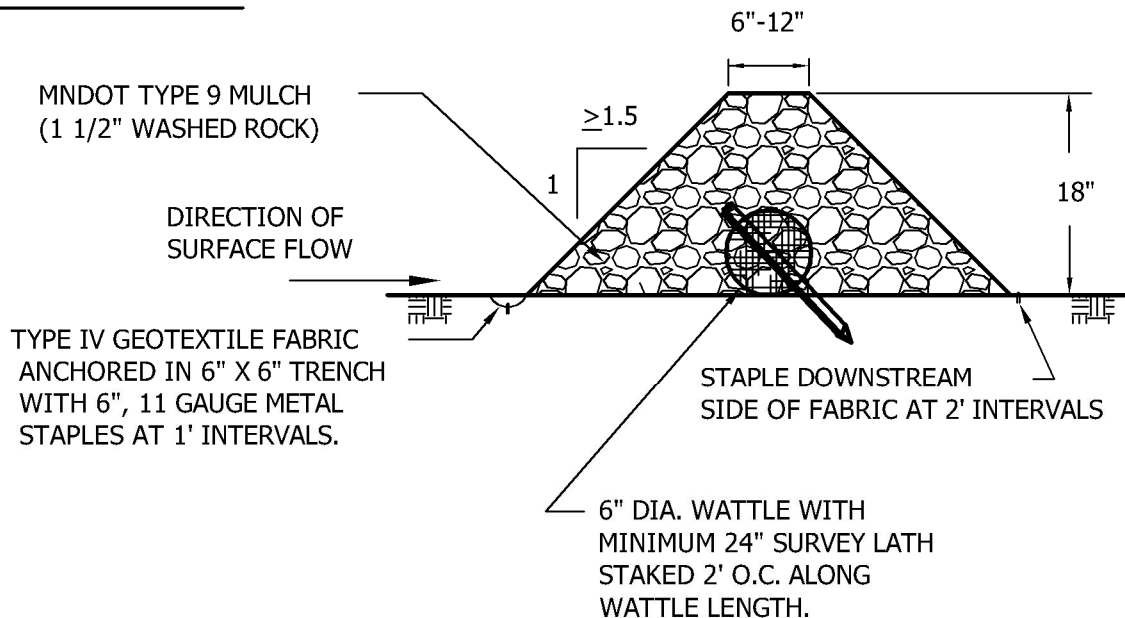
DITCH CHECK SPACING  
(USE FOR DETAILS ERO-5B, 5C, 5D, AND 5E)

DITCH GRADE	INTERVAL
(%)	(FT)
2	100
4	75
6	50
8	40
10	25
10+	25

## I. ROCK WEEPER



## II. BIO WEEPER



**Forest Lake**  
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STANDARD DETAILS  
DITCH CHECK  
ROCK WEEPER, BIO WEEPER

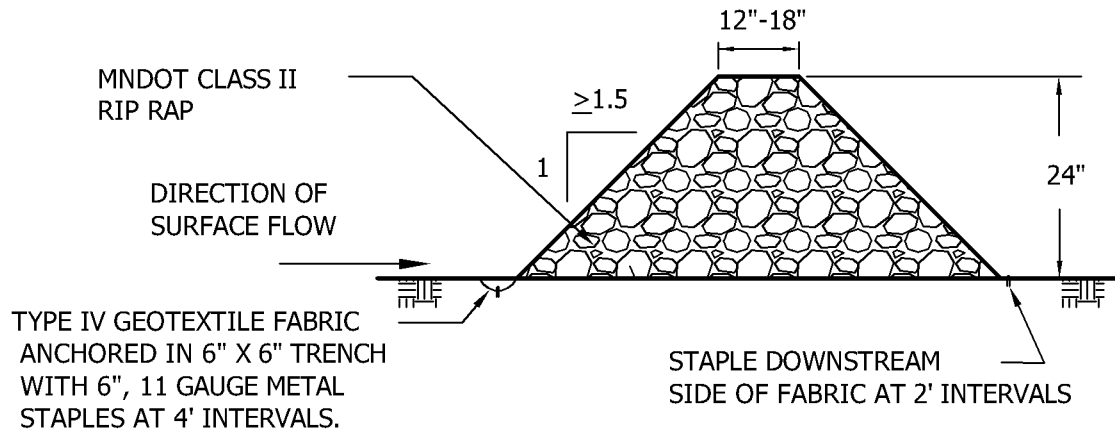
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
MAR 2007

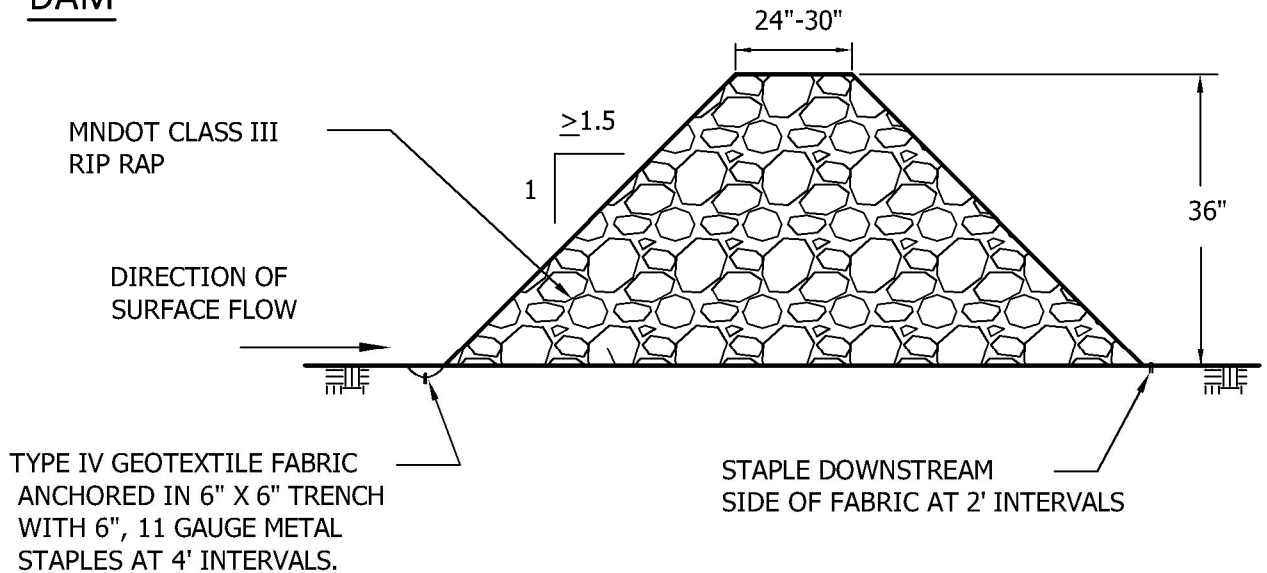
CITY PLATE NO.  
ERO-5B



## I. SMALL CHECK DAM



## II. LARGE CHECK DAM



**Forest Lake**  
AS GOOD AS IT SOUNDS

STANDARD DETAILS  
DITCH CHECK  
ROCK WEEPER, BIO WEEPER

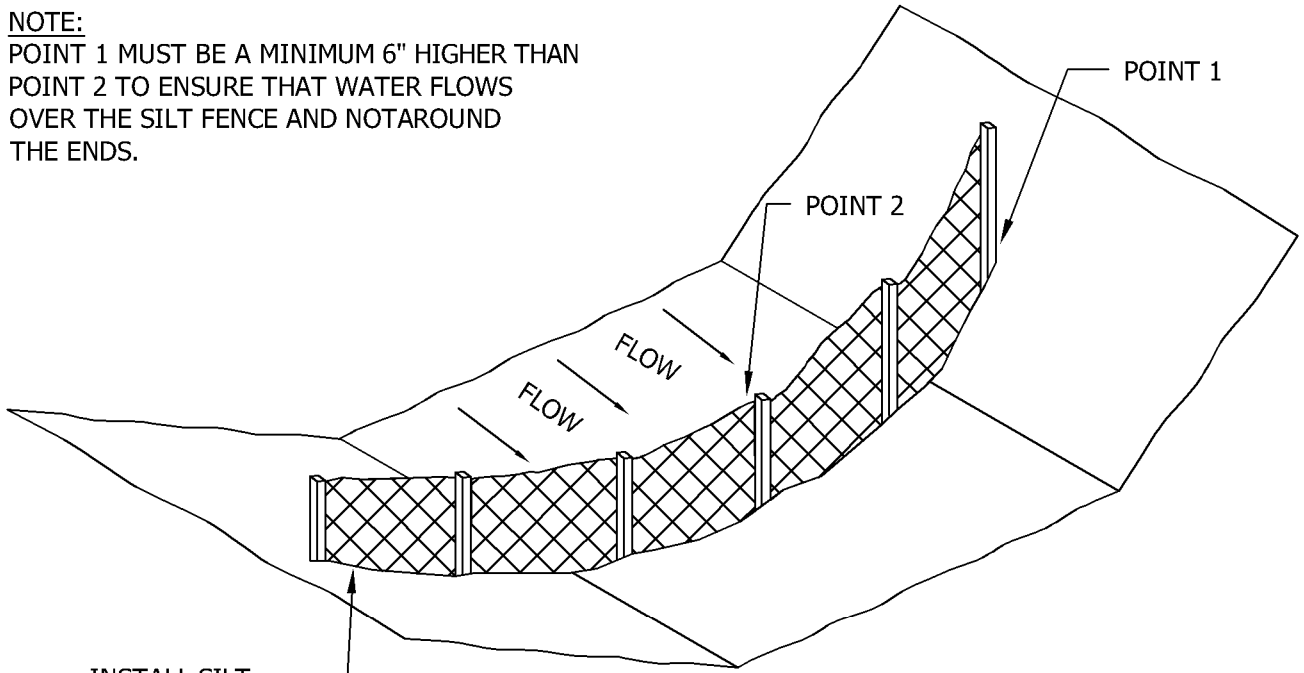
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-5C

**NOTE:**

POINT 1 MUST BE A MINIMUM 6" HIGHER THAN POINT 2 TO ENSURE THAT WATER FLOWS OVER THE SILT FENCE AND NOT AROUND THE ENDS.



INSTALL SILT FENCE AS SHOWN BELOW

STEEL FENCE POST (T-POST),  
MINIMUM 5' LONG,  
4' MAXIMUM SPACING.

POST NOTCHES  
TO FACE AWAY  
FROM FABRIC.

ATTACH FABRIC TO POSTS  
WITH MINIMUM 3 ZIP TIES  
(50 LB. TENSILE) PER POST  
IN TOP 8" OF FABRIC.

MONOFILAMENT GEOTEXTILE  
FABRIC PER MNDOT TABLE  
3886-1 (MACHINE SLICED).

MACHINE SLICE  
8"-12" DEPTH (PLUS 6" FLAP)

DIRECTION OF SURFACE FLOW

24" MINIMUM  
POST EMBEDMENT

**(A) COMPACTION:**  
AFTER "SLICING" IN THE FABRIC AND  
BEFORE INSTALLATION OF STEEL POSTS, DRIVE INSTALLATION  
EQUIPMENT OVER THE "SLICE" WHILE FABRIC IS LAYING ON THE  
GROUND. THEN INSTALL STEEL POSTS AND PULL UP FABRIC TO  
ATTACH AT A UNIFORM HEIGHT.



**Forest Lake**  
AS GOOD AS IT SOUNDS

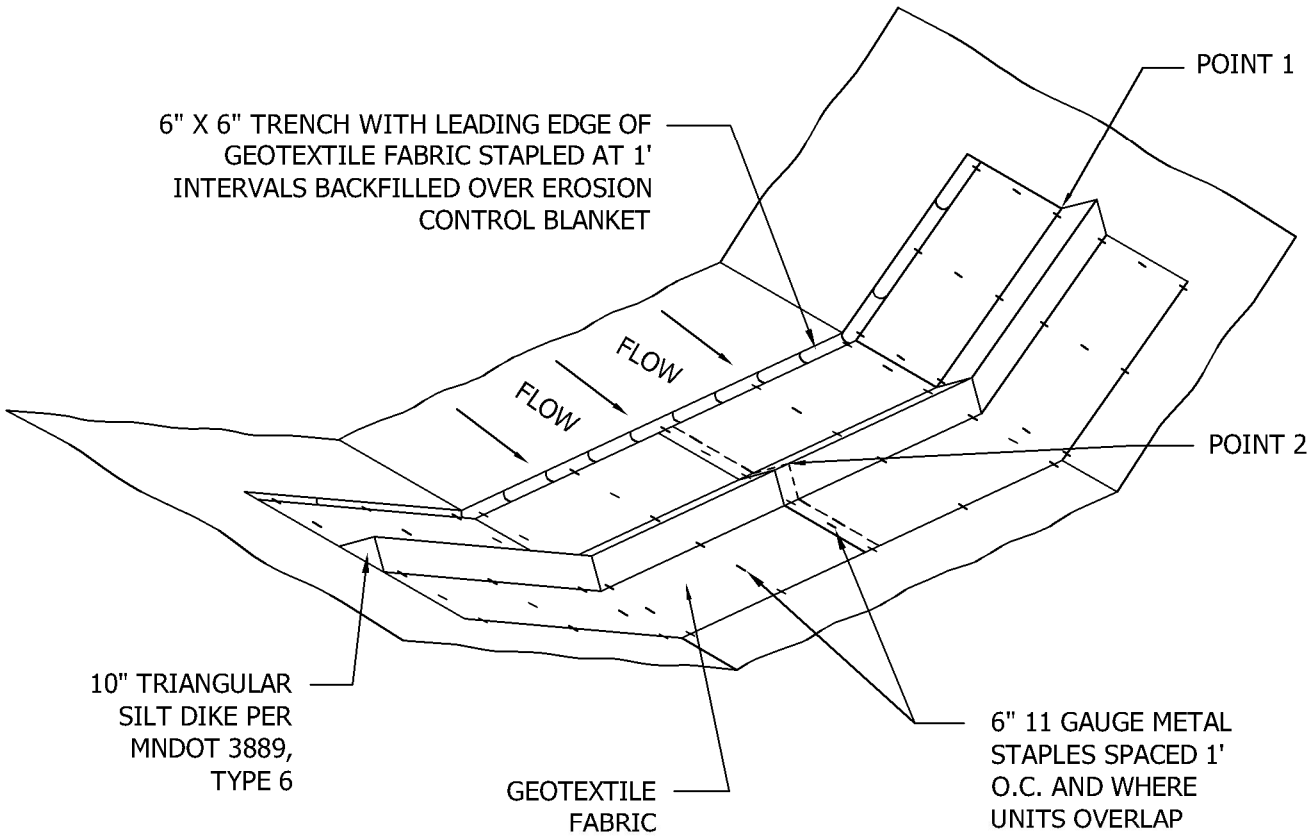
**STANDARD DETAILS**  
DITCH CHECK  
MACHINE SLICED SILT FENCE

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-5D

**NOTE:**  
 POINT 1 MUST BE A MINIMUM OF 6"  
 HIGHER THAN POINT 2 TO ENSURE  
 THAT WATER FLOWS OVER THE DIKE  
 AND NOT AROUND THE ENDS.

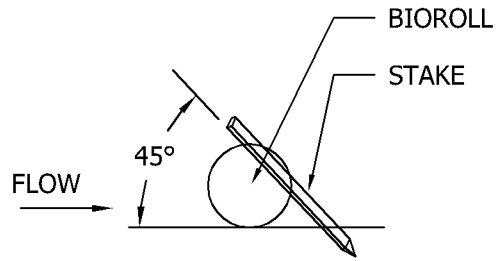
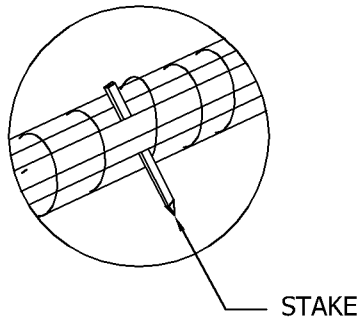


**STANDARD DETAILS**  
 DITCH CHECK  
 TRIANGULAR SILT DIKE

**FOREST LAKE, MINNESOTA**

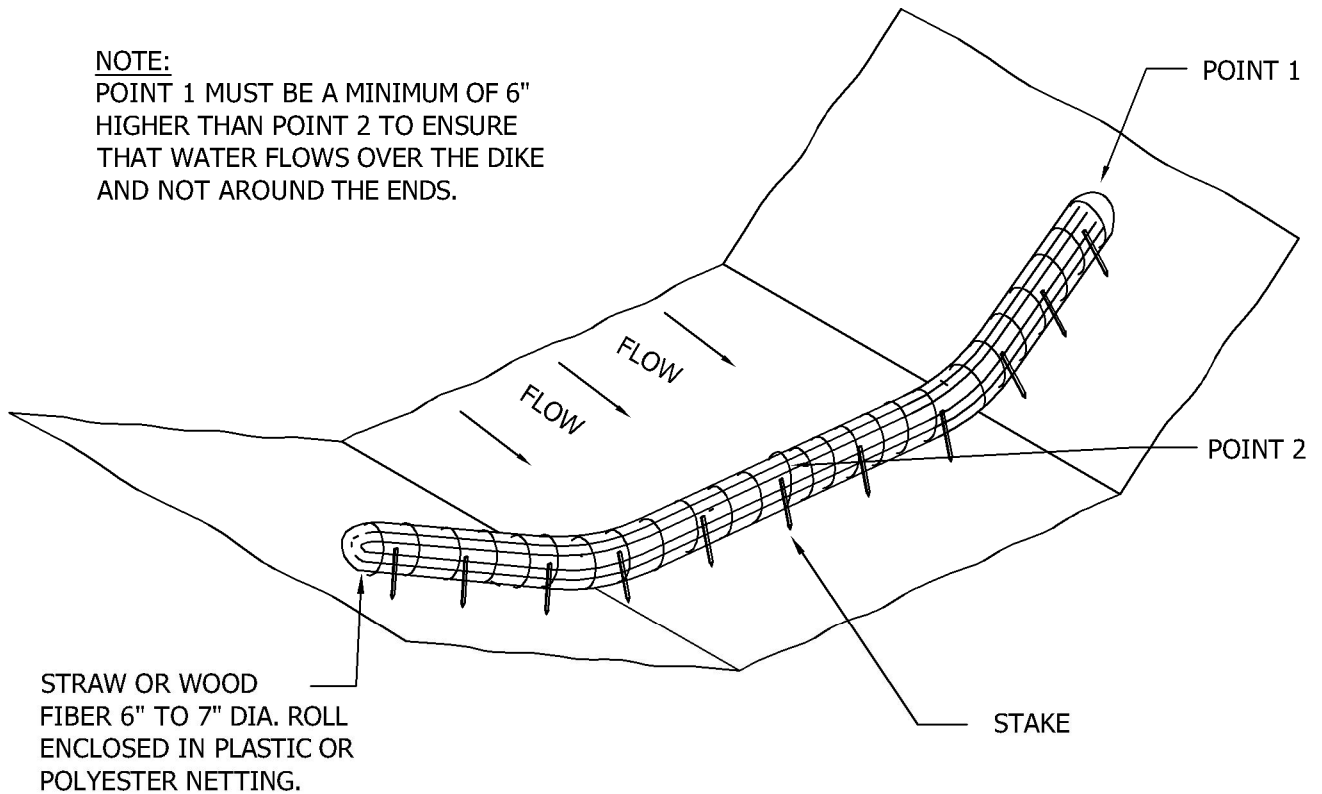
LAST REVISION:  
 MAR 2007

CITY PLATE NO.  
 ERO-5E



1/2" x 2" x 16" LONG WOODEN STAKES AT 1'-0" SPACING MINIMUM. STAKES SHALL BE DRIVEN THROUGH THE BACK HALF OF THE COMPOST LOG AT AN ANGLE OF 45° WITH THE TOP OF THE STAKE POINTING UPSTREAM.

**NOTE:**  
POINT 1 MUST BE A MINIMUM OF 6" HIGHER THAN POINT 2 TO ENSURE THAT WATER FLOWS OVER THE DIKE AND NOT AROUND THE ENDS.



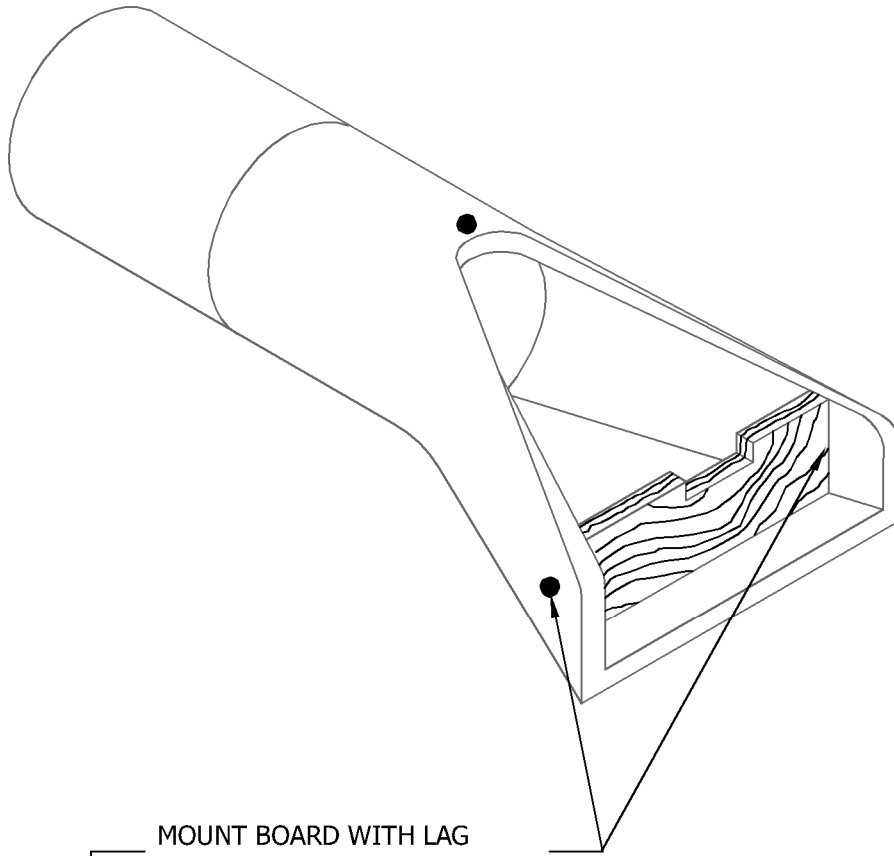
**STANDARD DETAILS**

COMPOST LOG  
DITCH CHECK

**FOREST LAKE, MINNESOTA**

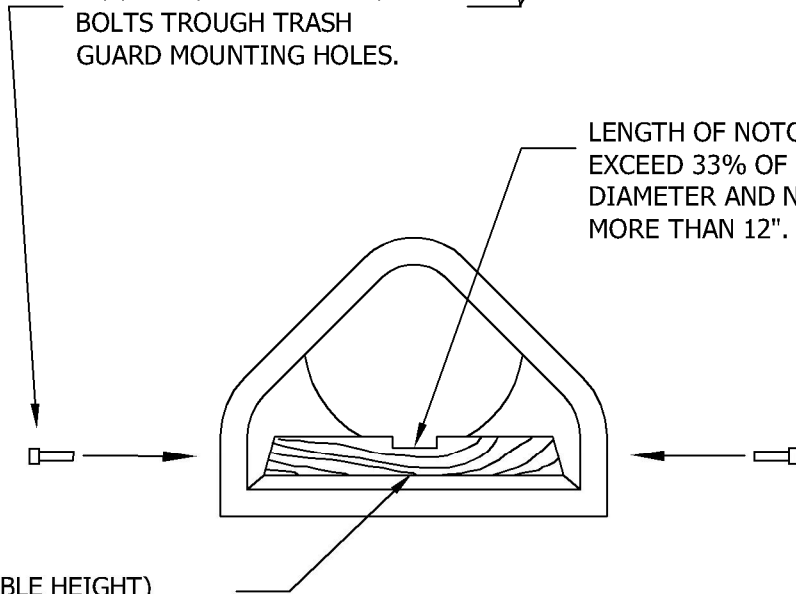
LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-5F



MOUNT BOARD WITH LAG BOLTS THROUGH TRASH GUARD MOUNTING HOLES.

LENGTH OF NOTCH NOT TO EXCEED 33% OF PIPE DIAMETER AND NEVER MORE THAN 12".



WEIR (2" x VARIABLE HEIGHT) NOT MORE THAN 33% OF PIPE DIAMETER AND NEVER MORE THAN 12".

NOTE:  
1" NOTCH FOR WEIRS 4"-6" HIGH  
2" NOTCH FOR WEIRS 6"-12" HIGH



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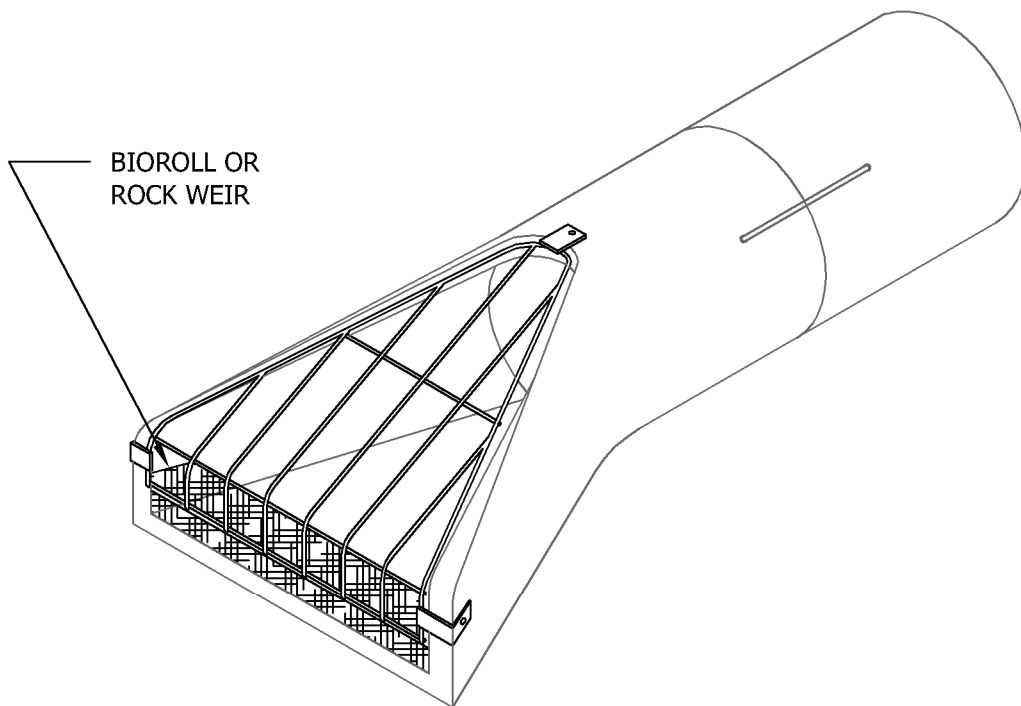
STANDARD DETAILS

PIPE CHECK  
WOODEN WEIR

**FOREST LAKE, MINNESOTA**

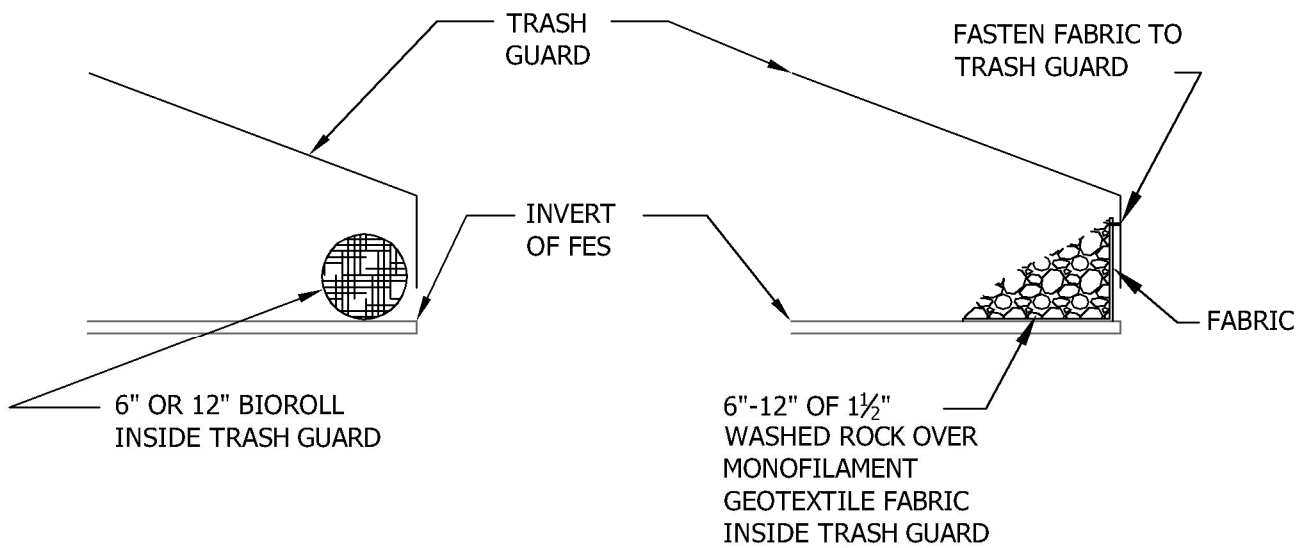
LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-6A



BIOROLL WEIR

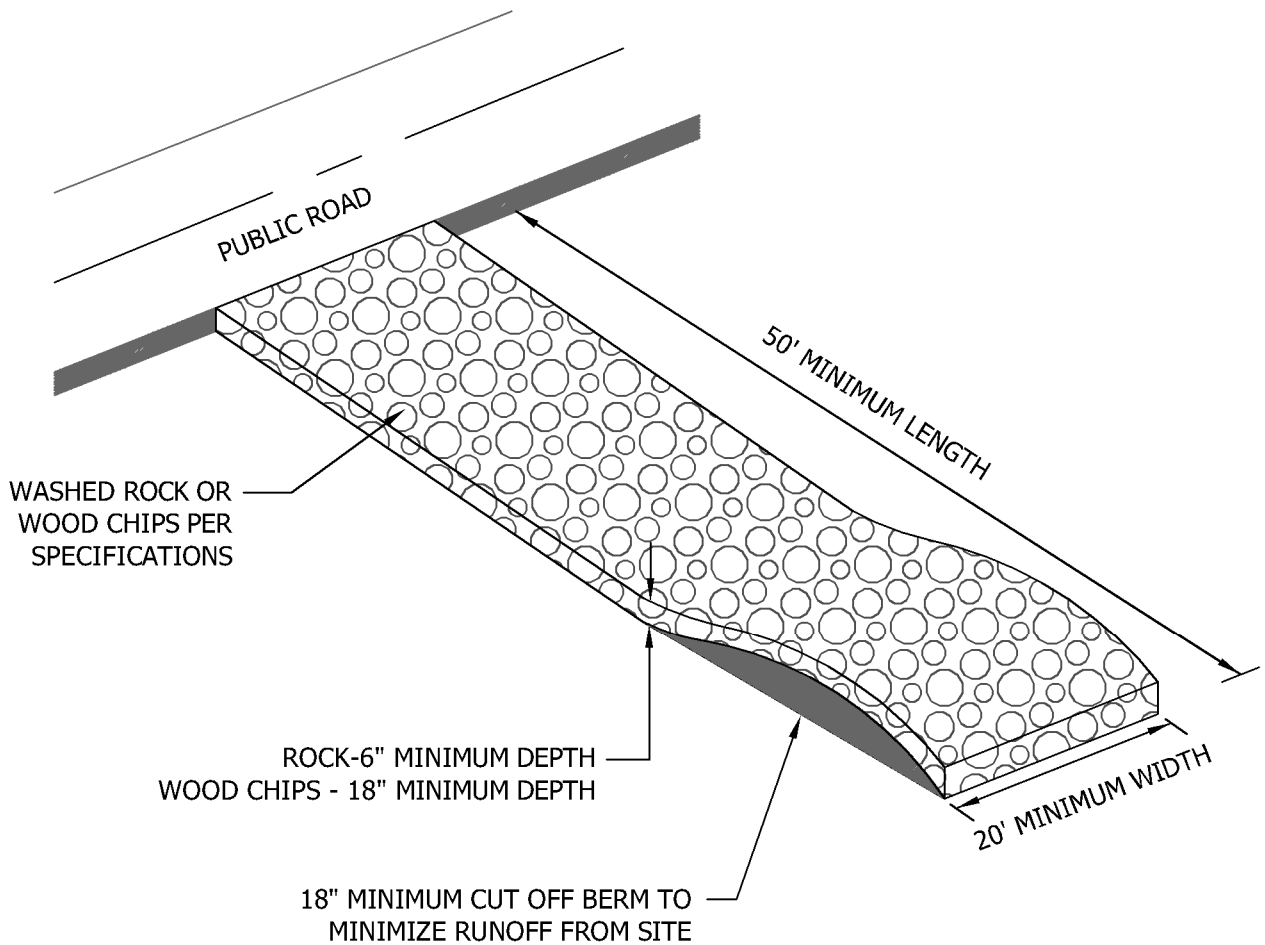
ROCK WEIR



STANDARD DETAILS  
 PIPE CHECK  
 BIOROLL WEIR, ROCK WEIR  
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
 MAR 2007

CITY PLATE NO.  
 ERO-6B



**NOTES:**

1. FILTER FABRIC SHALL BE PLACED UNDER ROCK OR MULCH TO STOP MUD MIGRATION THROUGH ROCK. FILTER FABRIC IS NOT REQUIRED UNDER WOOD CHIPS.
2. 80% OF WOOD CHIPS USED FOR CONSTRUCTION ENTRANCES MUST BE BETWEEN 2 INCHES AND 5 INCHES. NO CHIPPED-UP MANUFACTURED WOOD AND / OR CHEMICALLY TREATED WOOD IS ALLOWED.
3. ENTRANCE MUST BE MAINTAINED REGULARLY TO PREVENT SEDIMENTATION ON PUBLIC ROADWAYS. FUGITIVE ROCK OR WOOD CHIPS WILL BE REMOVED FROM ADJACENT ROADWAYS DAILY OR MORE FREQUENTLY AS NECESSARY.



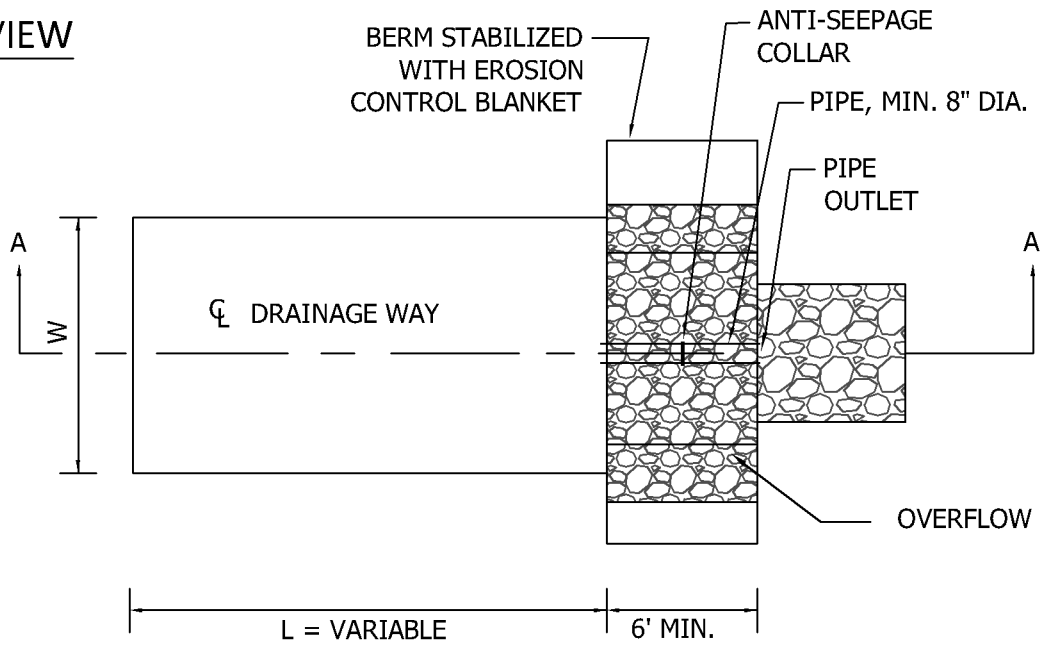
**STANDARD DETAILS**  
CONSTRUCTION ENTRANCE  
ROCK, WOOD CHIP

**FOREST LAKE, MINNESOTA**

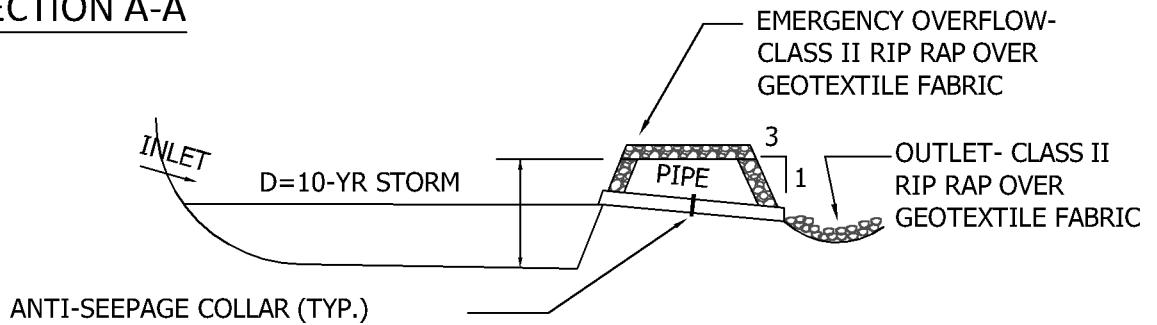
LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-7

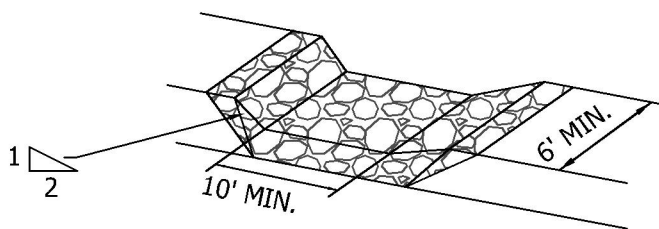
### I. PLAN VIEW



### II. SECTION A-A



### III. BASIN EMERGENCY OVERFLOW



**NOTES:**

BASIN USED FOR 10 ACRES DRAINAGE AREA OR MORE. DESIGN RUNOFF VOLUME IS FROM A 2-YR, 24-HR STORM PER ACRE DRAINED TO THE BASIN. BASIN VOLUME MUST BE A MIN. OF 1800 CUBIC FEET/ACRE. SEE PLANS/SPECIFICATIONS FOR BASIN DIMENSIONS AND PIPE SIZE AND SLOPE.



**STANDARD DETAILS**  
 TEMPORARY SEDIMENTATION BASIN  
 PIPE OUTLET

**FOREST LAKE, MINNESOTA**

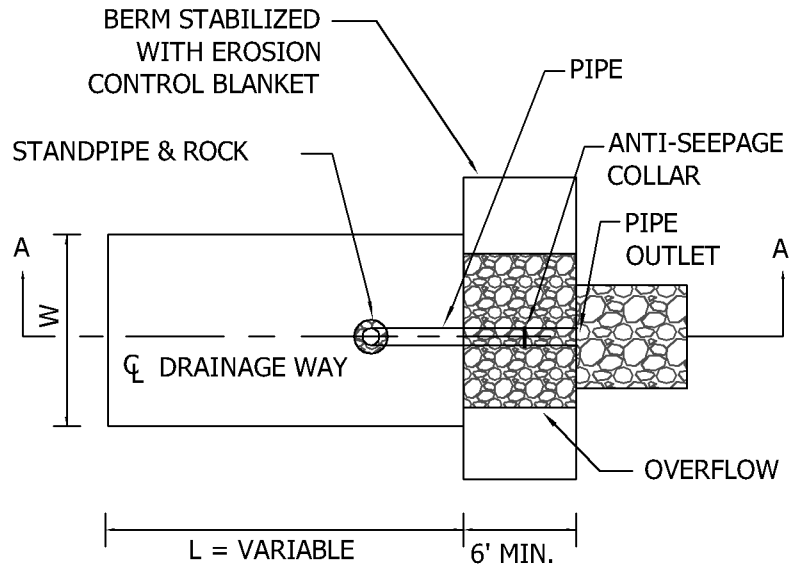
LAST REVISION:  
 MAR 2007

CITY PLATE NO.  
 ERO-8A

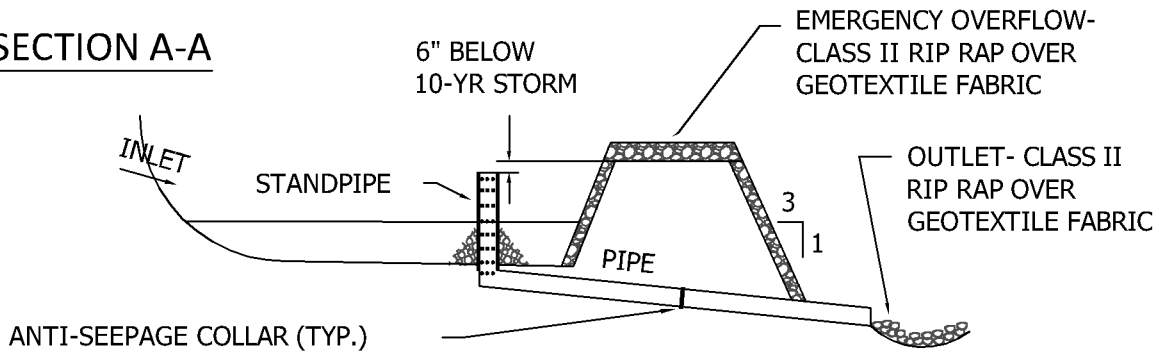


# I. PLAN VIEW

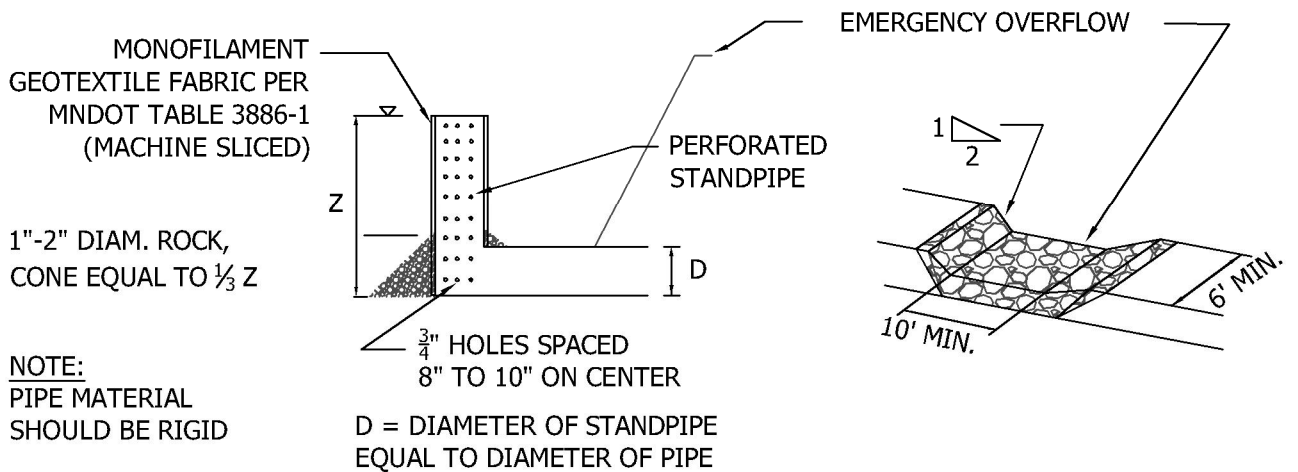
**NOTES:**  
 BASIN USED FOR 10 ACRES DRAINAGE AREA OR MORE. DESIGN RUNOFF VOLUME IS FROM A 2-YR, 24-HR STORM PER ACRE DRAINED TO THE BASIN. BASIN VOLUME MUST BE A MIN. OF 1800 CUBIC FEET/ACRE. SEE PLANS/SPECIFICATIONS FOR BASIN DIMENSIONS AND PIPE SIZE AND SLOPE.



# II. SECTION A-A



# III. BASIN STANDPIPE AND EMERGENCY OVERFLOW

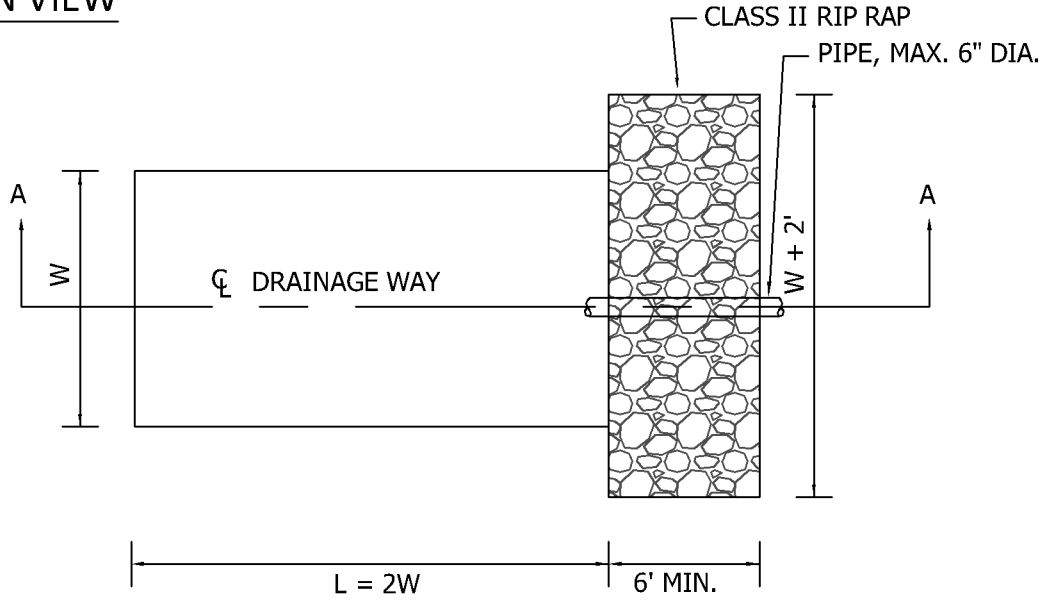


**STANDARD DETAILS**  
 TEMPORARY SEDIMENTATION BASIN  
 STANDPIPE OUTLET  
**FOREST LAKE, MINNESOTA**

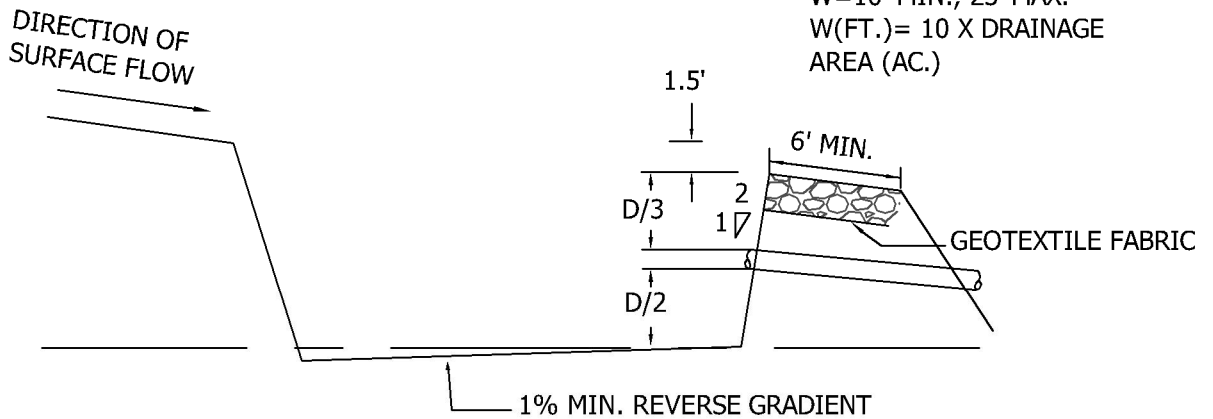
LAST REVISION:  
 MAR 2007

CITY PLATE NO.  
 ERO-8B

**I. PLAN VIEW**



**II. SECTION A-A**



**NOTE:**  
 D=3' MIN., 5' MAX.  
 W=10' MIN., 25' MAX.  
 W(FT.)= 10 X DRAINAGE  
 AREA (AC.)



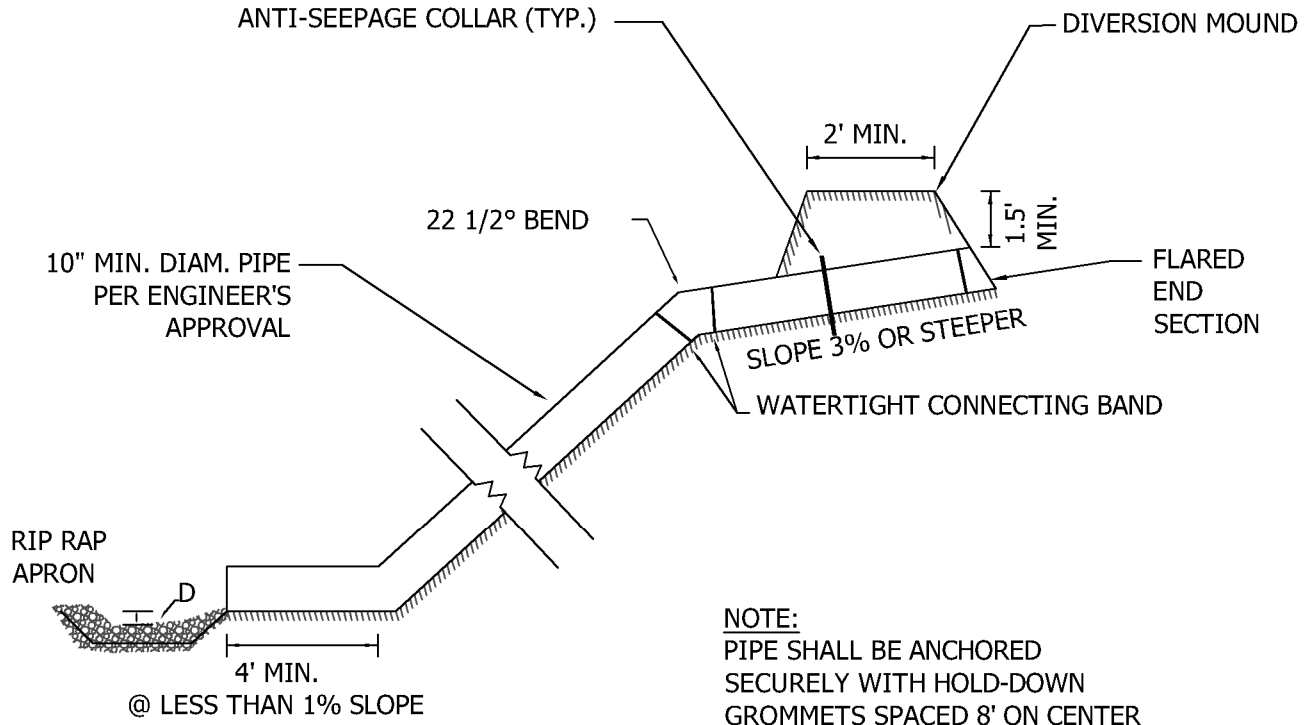
**STANDARD DETAILS**  
 TEMPORARY SEDIMENT TRAP

**FOREST LAKE, MINNESOTA**

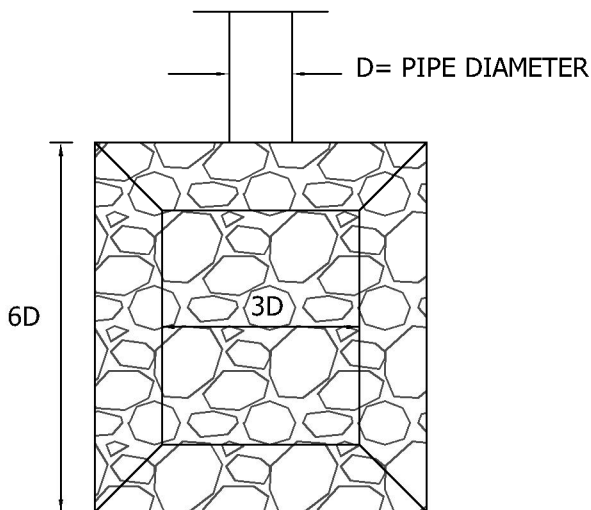
LAST REVISION:  
 MAR 2007

CITY PLATE NO.  
 ERO-9

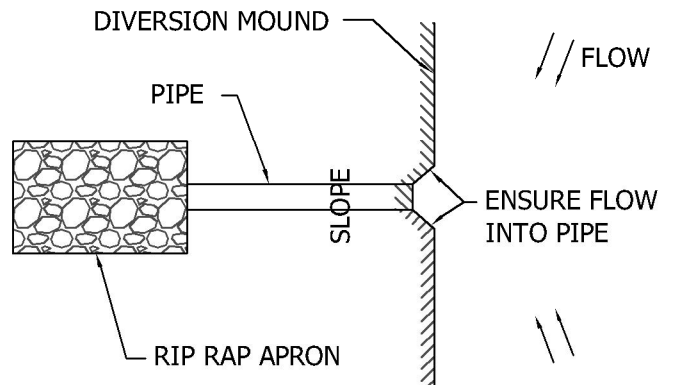
**PROFILE VIEW**



**RIP RAP APRON PLAN**



**PLAN VIEW**

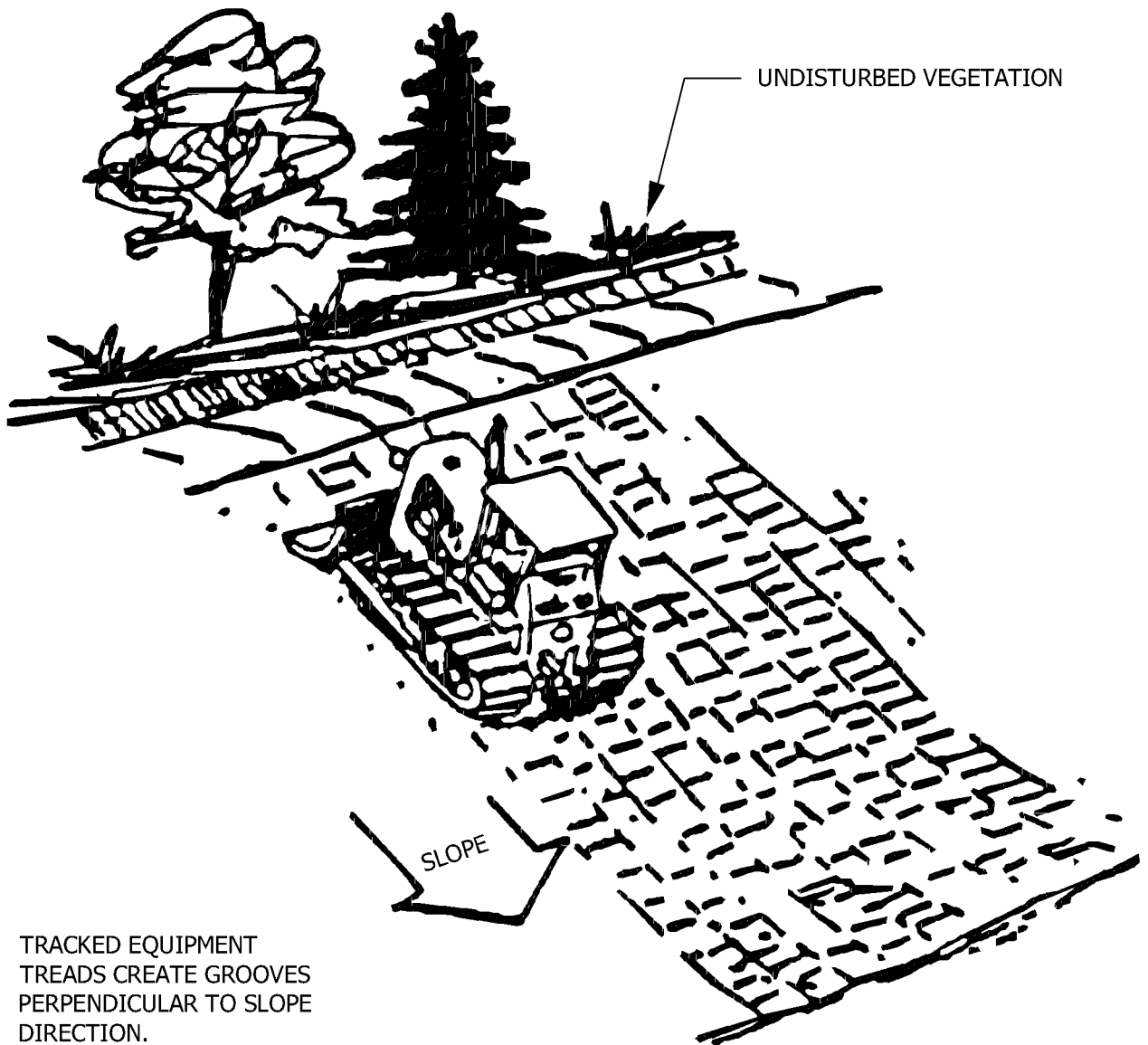


**STANDARD DETAILS**  
DIVERSION MOUND AND  
TEMPORARY PIPE DOWNDRAIN

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-10



TRACKED EQUIPMENT  
TREADS CREATE GROOVES  
PERPENDICULAR TO SLOPE  
DIRECTION.

**NOTE:**  
ALL SLOPES WITH A GRADE EQUAL TO OR STEEPER THAN 3:1  
REQUIRE SLOPE TRACKING. SLOPES WITH A GRADE MORE GRADUAL  
THAN 3:1 REQUIRE SLOPE TRACKING IF THE STABILIZATION METHOD  
IS EROSION CONTROL BLANKET OR HYDROMULCH.



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STANDARD DETAILS

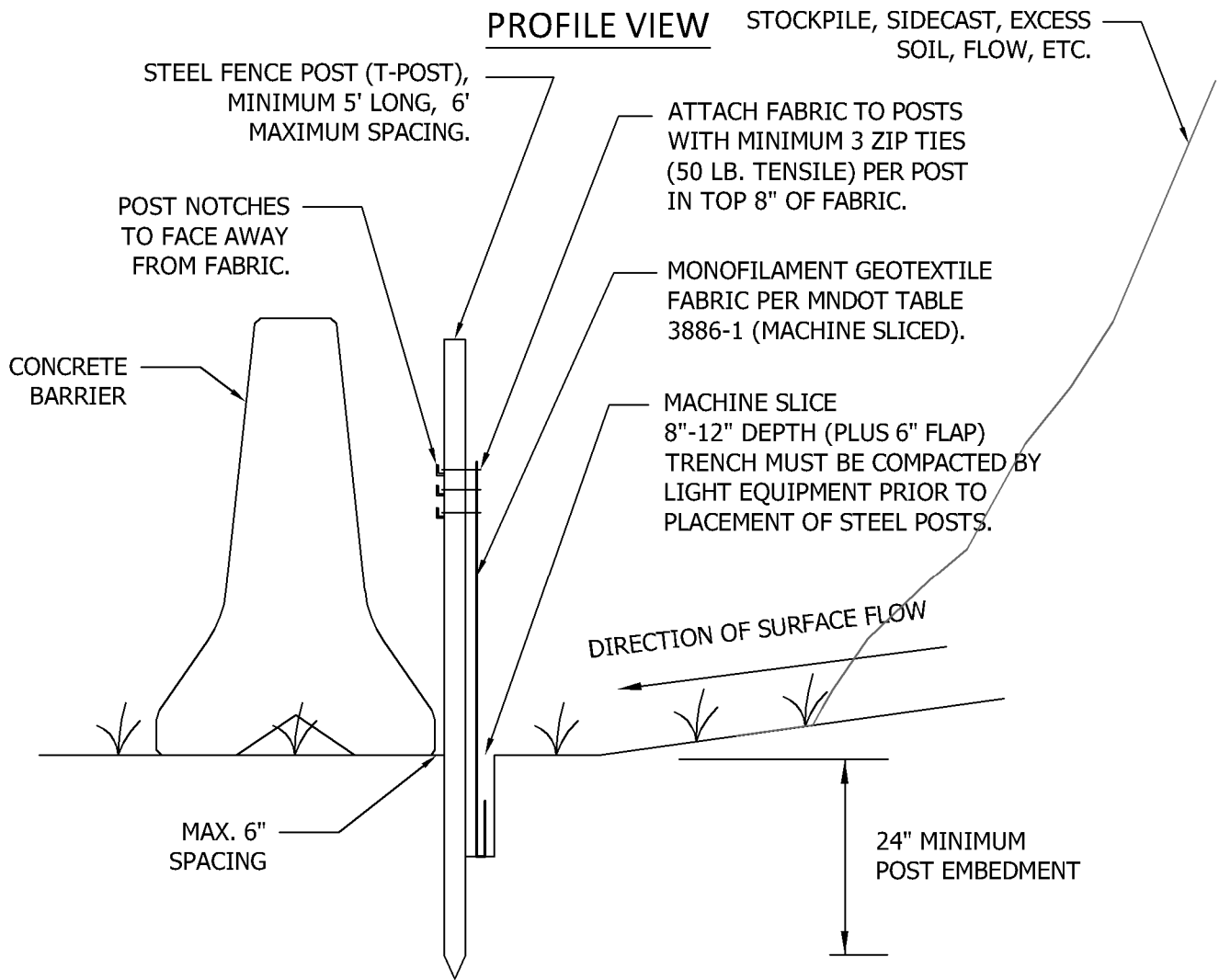
SLOPE TRACKING

FOREST LAKE, MINNESOTA

LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-11

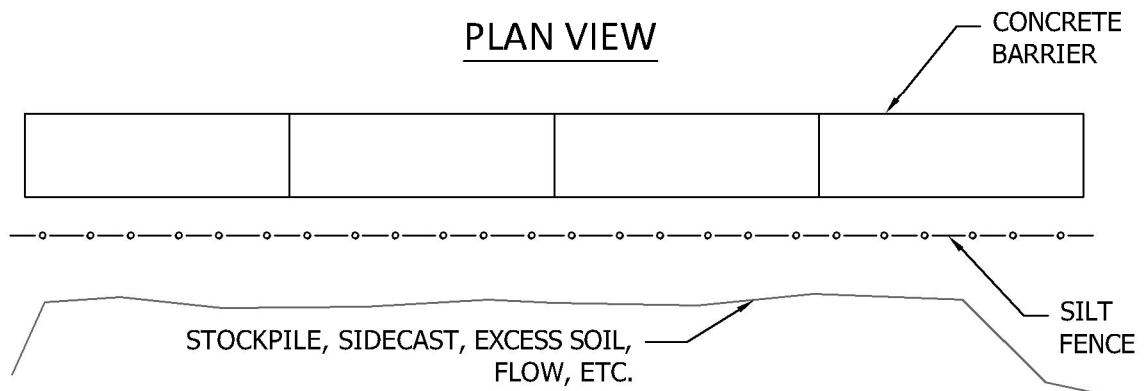
**PROFILE VIEW**



**NOTE:**

1. INSTALL SILT FENCE USING MACHINE-SLICED METHOD.
2. PLACE BARRIER ON FLAT SURFACE (PREP IF NECESSARY).

**PLAN VIEW**

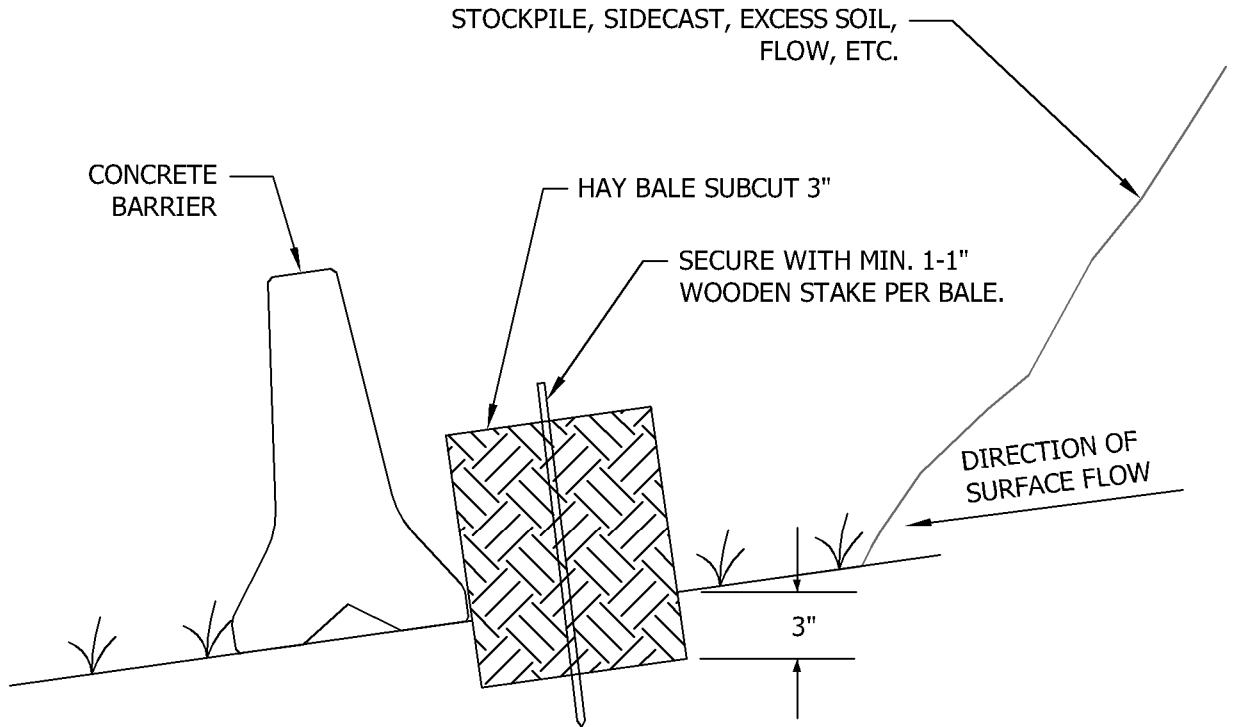


**STANDARD DETAILS**  
 SUPER DUTY PERIMETER CONTROL  
 SILT FENCE/CONCRETE BARRIER SYSTEM  
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
 MAR 2007

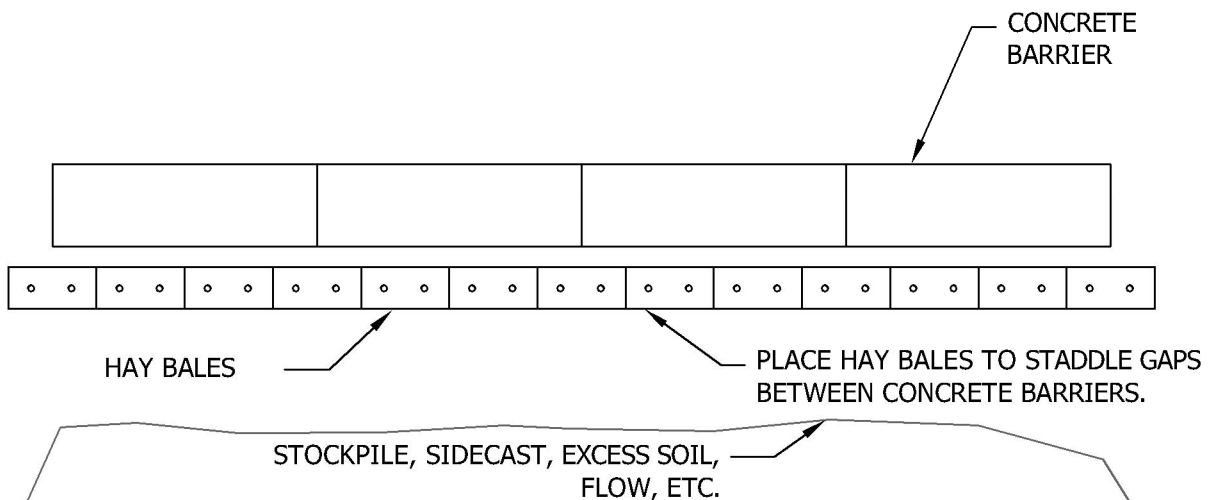
CITY PLATE NO.  
 ERO-12A

## PROFILE VIEW



NOTE:  
PLACE BARRIER ON FLAT SURFACE (PREP IF NECESSARY)

## PLAN VIEW

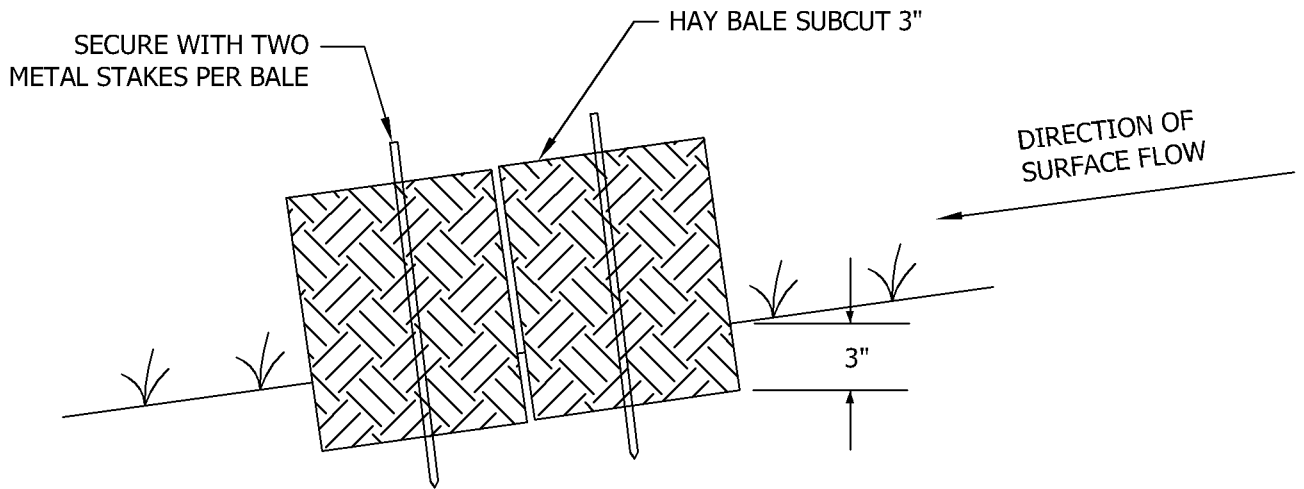


STANDARD DETAILS  
SUPER DUTY PERIMETER CONTROL  
HALE BALE/CONCRETE BARRIER SYSTEM  
**FOREST LAKE, MINNESOTA**

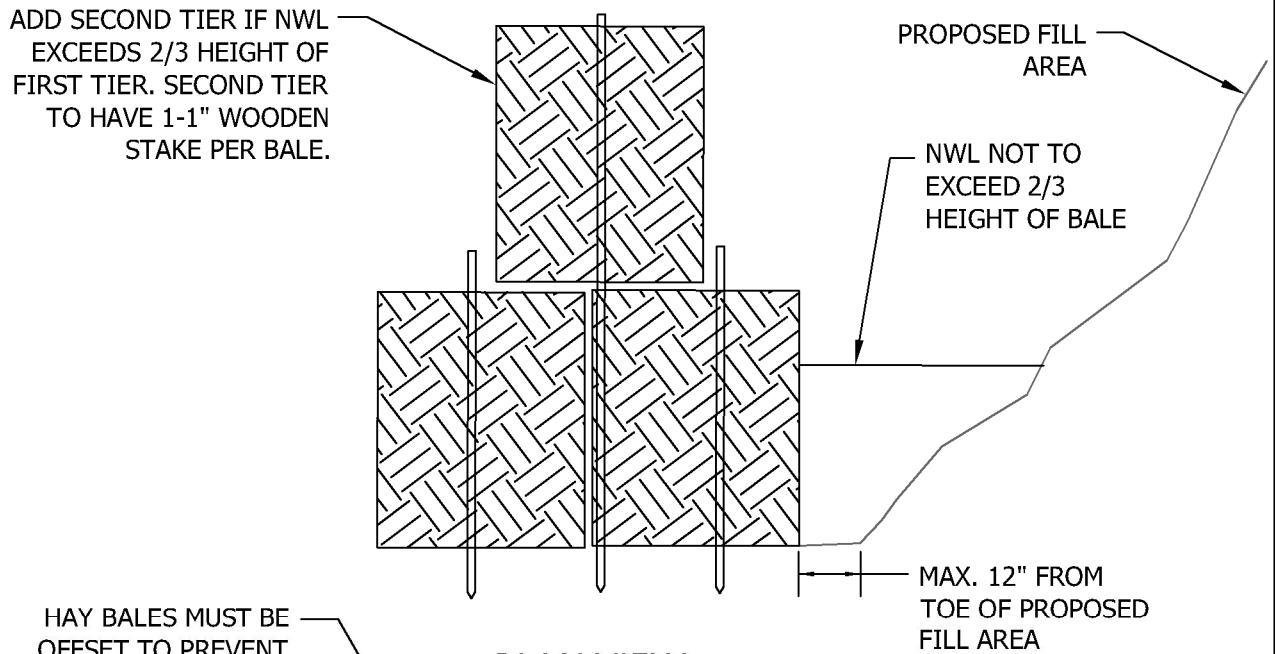
LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-12B

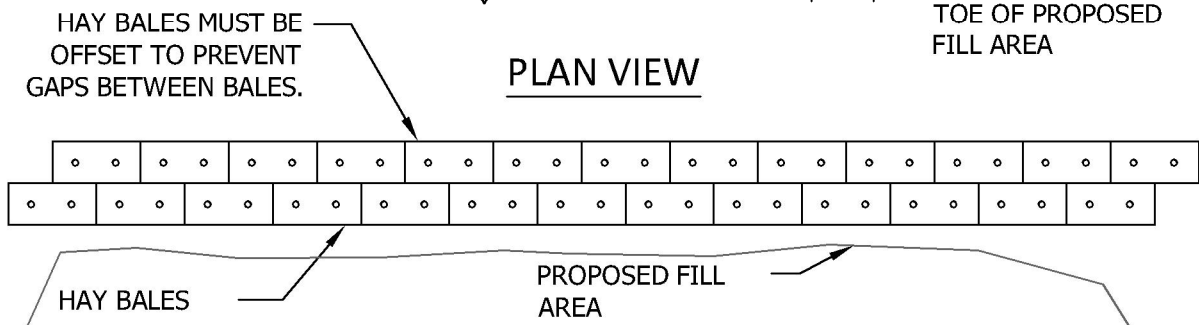
## PROFILE VIEW-UPLAND PERIMETER CONTROL



## PROFILE VIEW-PERIMETER CONTROL IN SHALLOW STANDING WATER



## PLAN VIEW



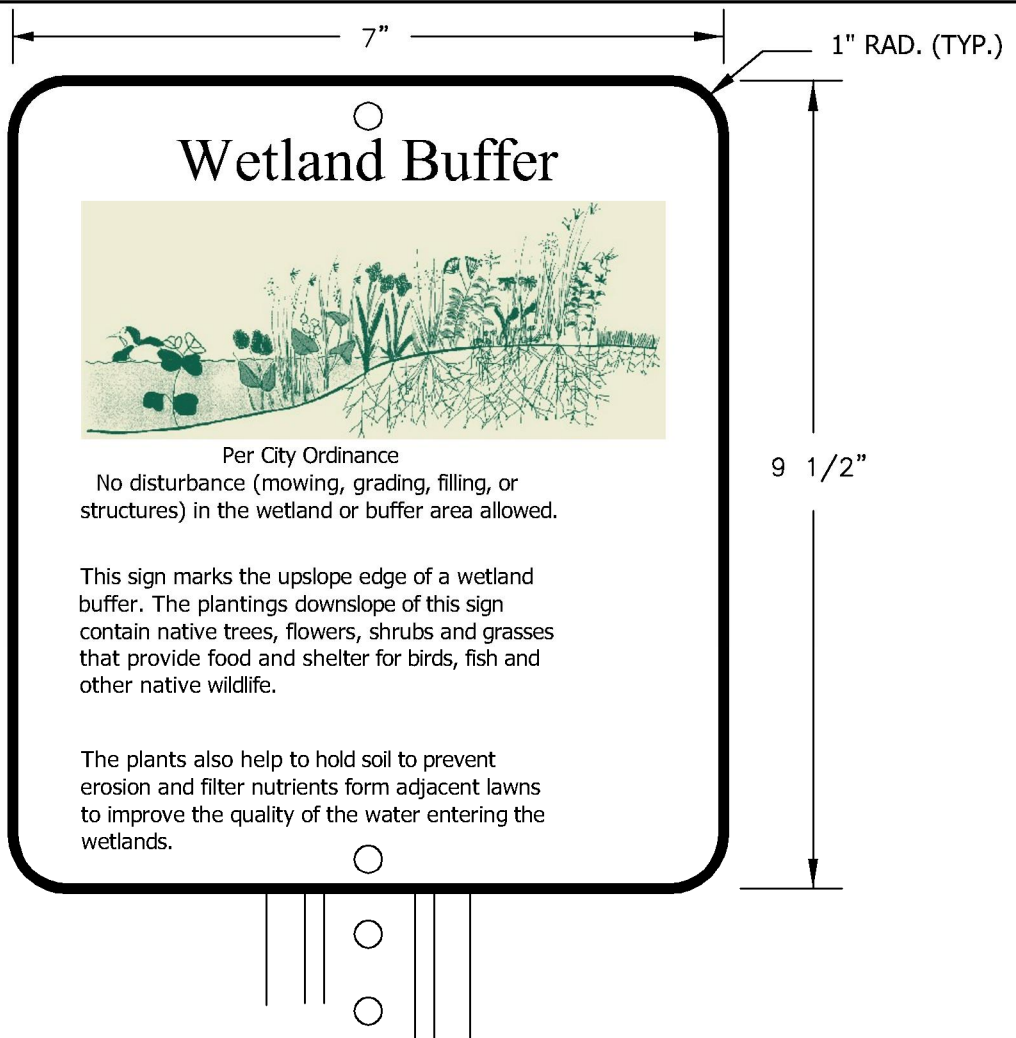
**Forest Lake**  
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**STANDARD DETAILS**  
PERIMETER / SEDIMENT CONTROL  
HAY BALES

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
MAR 2007

CITY PLATE NO.  
ERO-12C



1. THE SIGN MUST BE:
  - a. 0.063 ALUMINUM BLANK,
  - b. BACKGROUND PANTONE: 155 (TAN)
  - c. BLACK VERBIAGE AND LOGO PRINTED ONE SIDE
  - d. PRE-DRILL HOLES IN MIDDLE TOP AND BOTTOM (AVOID VERBIAGE)
  - e. TRIM TO BORDER AS SHOWN ON SIGN ARTWORK TO INSURE ROUNDED CORNERS
2. THE MARKER SHALL CONSIST OF A FOUR INCH SQUARE TREATED, OR CEDAR POST, OR GREEN STEEL POST INSTALLED TO A HEIGHT OF FOUR FEET ABOVE GRADE, AND SET AT LEAST 42" INTO GROUND.
3. BOLT OR SCREW SIGN TO POST.
4. ONE SIGN SHALL BE PLACED PER LOT AT THE UPSLOPE EDGE OF THE REQUIRED BUFFER STRIP FOR THE WETLAND. PROPOSED LOCATIONS OF SIGNS SHALL BE SHOWN GRADING OR SITE PLAN. IN GENERAL, THE LOCATION OF SIGNS SHALL CAPTURE THE PORTION OF THE BUFFER THAT EXTENDS THE FURTHEST UPSLOPE INTO THE LOT. A PLAN THAT SHOWS THE LOCATION OF THE SIGN SHALL BE PROVIDED TO THE CITY ENGINEER FOR REVIEW AND APPROVAL.
5. ARTWORK AND VERBIAGE SHALL FACE PROPOSED HOME (STRUCTURE).
6. CONTACT CITY FOR POTENTIAL SIGN SOURCES.



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### STANDARD DETAILS

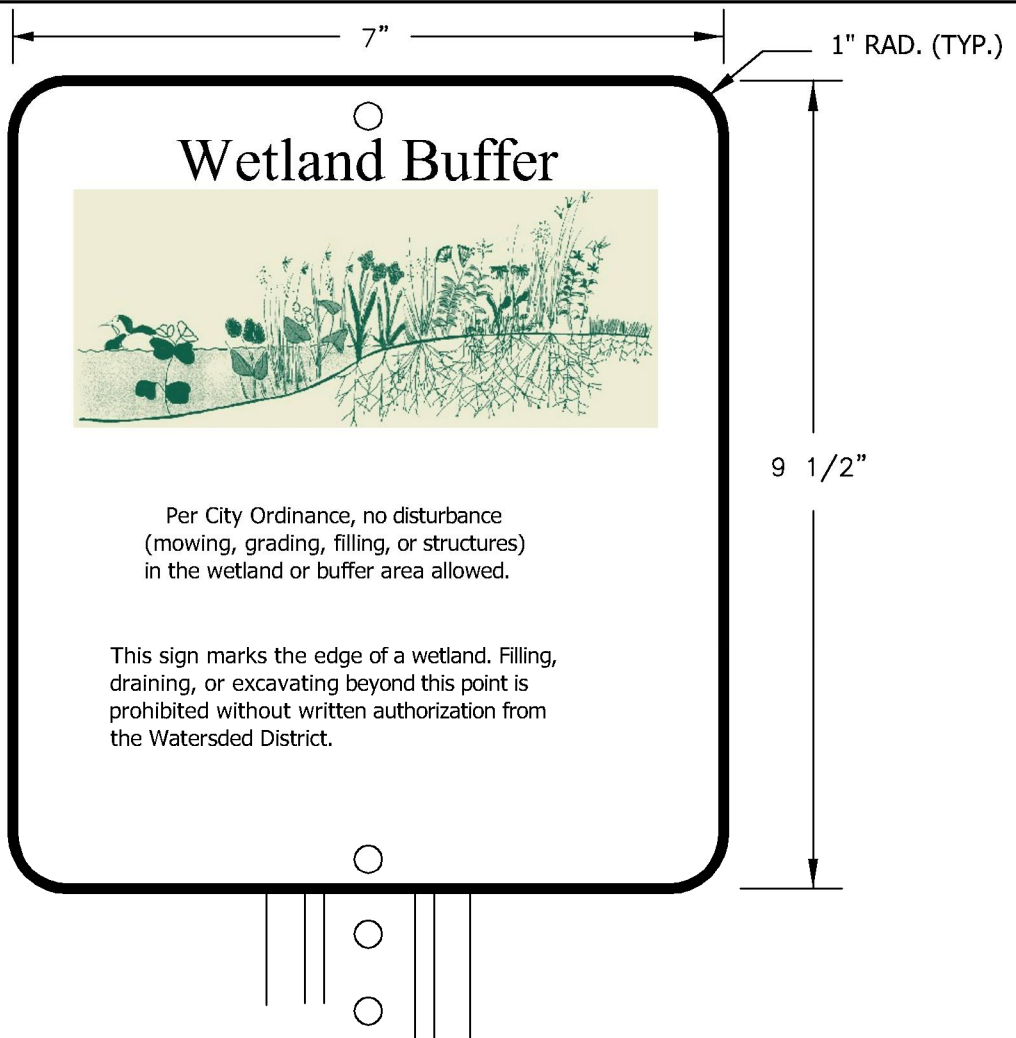
WETLAND BUFFER SIGN

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
SEPT 2005

CITY PLATE NO.  
GEN-3





1. THE SIGN MUST BE:
  - a. 0.063 ALUMINUM BLANK,
  - b. BACKGROUND PANTONE: 155 (TAN)
  - c. BLACK VERBIAGE AND LOGO PRINTED ONE SIDE
  - d. PRE-DRILL HOLES IN MIDDLE TOP AND BOTTOM (AVOID VERBIAGE)
  - e. TRIM TO BORDER AS SHOWN ON SIGN ARTWORK TO INSURE ROUNDED CORNERS
2. THE MARKER SHALL CONSIST OF A FOUR INCH SQUARE TREATED, OR CEDAR POST, OR GREEN STEEL POST INSTALLED TO A HEIGHT OF FOUR FEET ABOVE GRADE, AND SET AT LEAST 42" INTO GROUND.
3. BOLT OR SCREW SIGN TO POST.
4. ONE SIGN SHALL BE PLACED PER LOT AT THE UPSLOPE EDGE OF THE REQUIRED BUFFER STRIP FOR THE WETLAND. PROPOSED LOCATIONS OF SIGNS SHALL BE SHOWN GRADING OR SITE PLAN. IN GENERAL, THE LOCATION OF SIGNS SHALL CAPTURE THE PORTION OF THE BUFFER THAT EXTENDS THE FURTHEST UPSLOPE INTO THE LOT. A PLAN THAT SHOWS THE LOCATION OF THE SIGN SHALL BE PROVIDED TO THE CITY ENGINEER FOR REVIEW AND APPROVAL.
5. ARTWORK AND VERBIAGE SHALL FACE PROPOSED HOME (STRUCTURE).
6. CONTACT CITY FOR POTENTIAL SIGN SOURCES.



**Forest Lake**  
AS GOOD AS IT SOUNDS

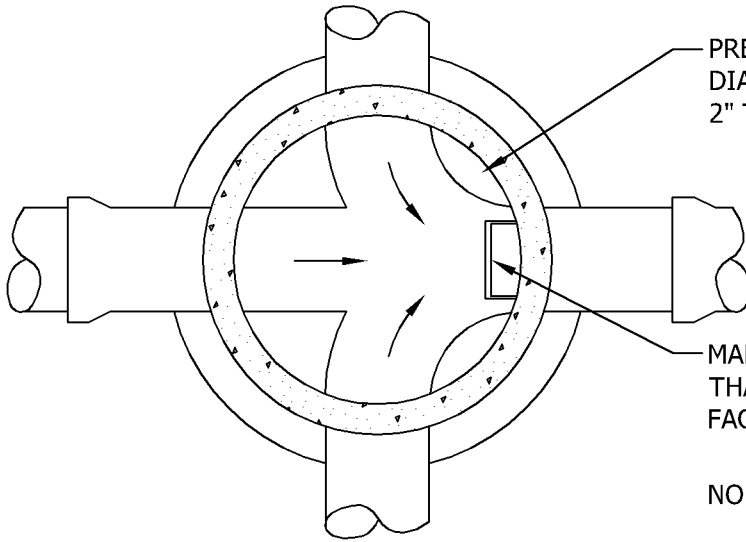
STANDARD DETAILS

WETLAND BUFFER SIGN

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2008

CITY PLATE NO.  
GEN-4

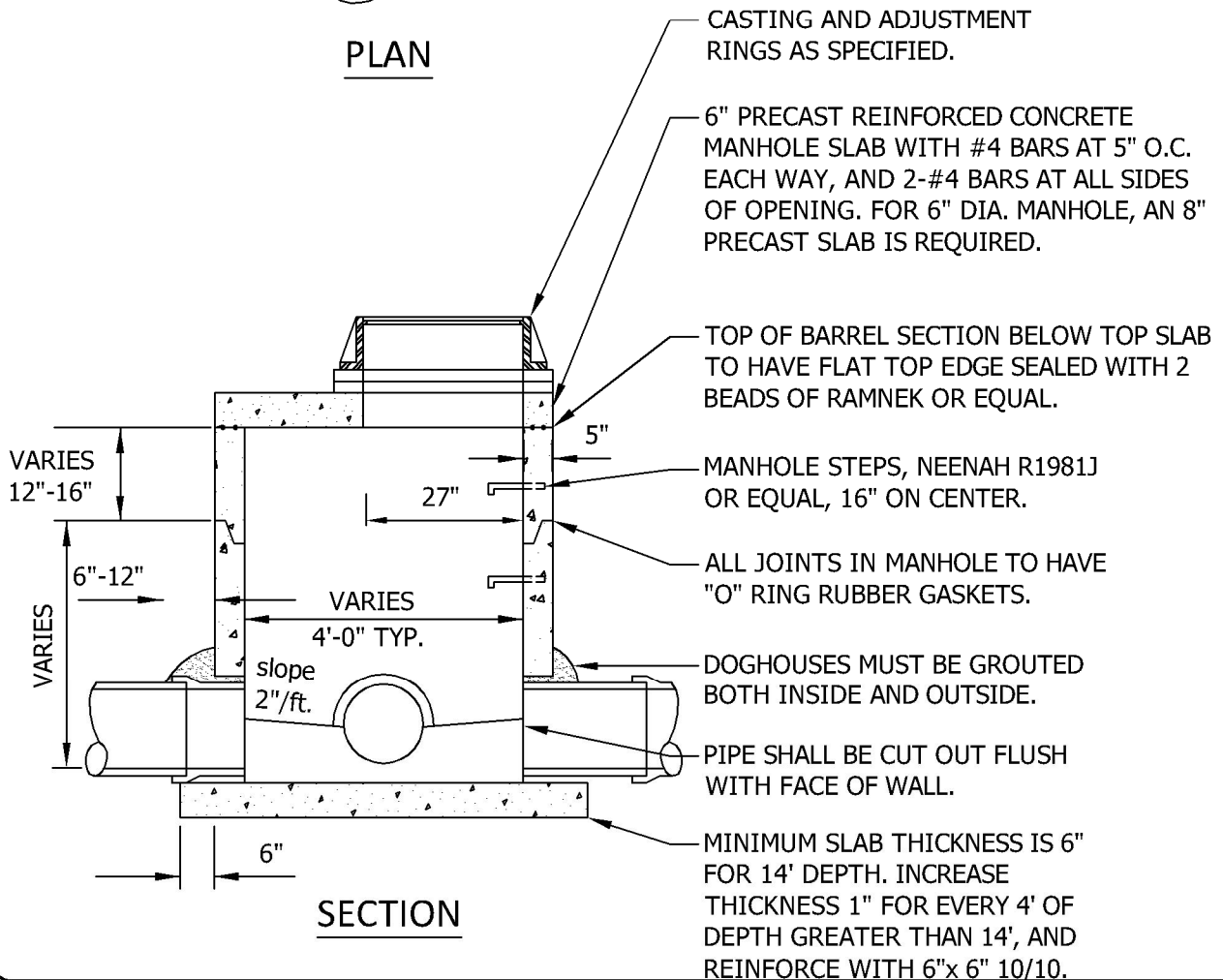


PLAN

PRECAST INVERT SHOULD BE 1/2 DIAMETER OF PIPE AND BENCHES SLOPED 2" TOWARD INVERT.

MANHOLE STEPS SHALL BE PLACED SO THAT OFFSET HOLE IN TOP SLAB IS FACING DOWNSTREAM.

NO BLOCK STRUCTURES ARE ALLOWED.



SECTION

CASTING AND ADJUSTMENT RINGS AS SPECIFIED.

6" PRECAST REINFORCED CONCRETE MANHOLE SLAB WITH #4 BARS AT 5" O.C. EACH WAY, AND 2-#4 BARS AT ALL SIDES OF OPENING. FOR 6" DIA. MANHOLE, AN 8" PRECAST SLAB IS REQUIRED.

TOP OF BARREL SECTION BELOW TOP SLAB TO HAVE FLAT TOP EDGE SEALED WITH 2 BEADS OF RAMNEK OR EQUAL.

MANHOLE STEPS, NEENAH R1981J OR EQUAL, 16" ON CENTER.

ALL JOINTS IN MANHOLE TO HAVE "O" RING RUBBER GASKETS.

DOGHOUSES MUST BE GROUTED BOTH INSIDE AND OUTSIDE.

PIPE SHALL BE CUT OUT FLUSH WITH FACE OF WALL.

MINIMUM SLAB THICKNESS IS 6" FOR 14' DEPTH. INCREASE THICKNESS 1" FOR EVERY 4' OF DEPTH GREATER THAN 14', AND REINFORCE WITH 6"x 6" 10/10.



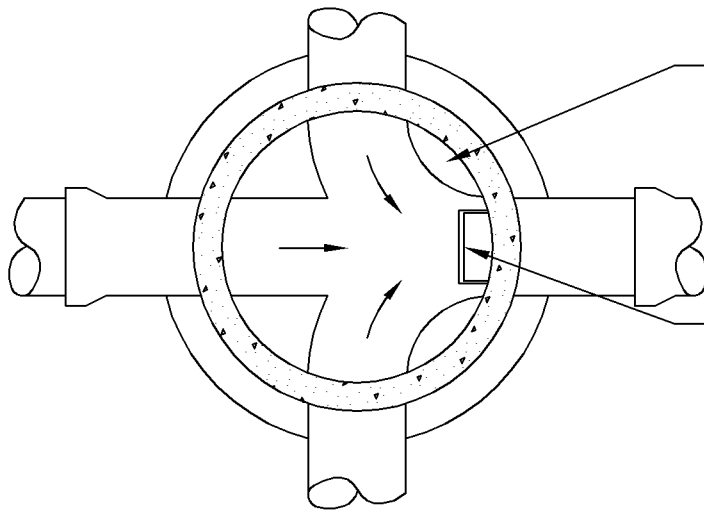
**Forest Lake**  
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STANDARD DETAILS  
STORM SEWER JUNCTION MANHOLE  
WITH REINFORCED TOP SLAB

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
DEC 2012

CITY PLATE NO.  
STO-3

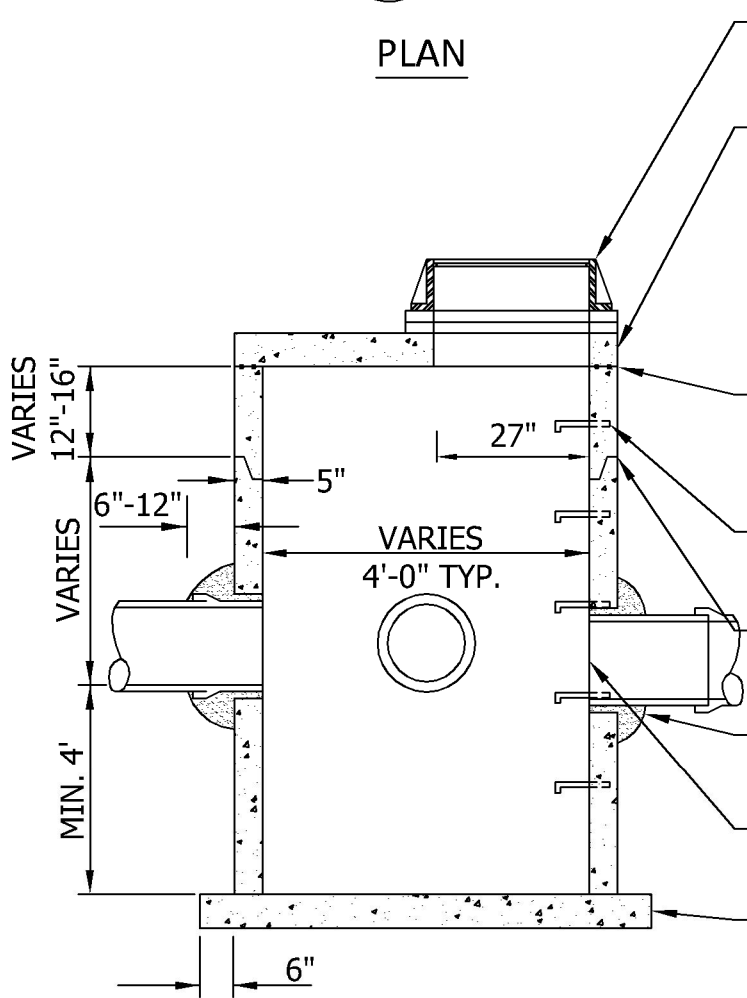


PLAN

PRECAST INVERT SHOULD BE 1/2 DIAMETER OF PIPE AND BENCHES SLOPED 2" TOWARD INVERT.

MANHOLE STEPS SHALL BE PLACED SO THAT OFFSET HOLE IN TOP SLAB IS FACING DOWNSTREAM.

NO BLOCK STRUCTURES ARE ALLOWED.



SECTION

CASTING AND ADJUSTMENT RINGS AS SPECIFIED.

6" PRECAST REINFORCED CONCRETE MANHOLE SLAB WITH #4 BARS AT 5" O.C. EACH WAY, AND 2-#4 BARS AT ALL SIDES OF OPENING. FOR 6" DIA. MANHOLE, AN 8" PRECAST SLAB IS REQUIRED.

TOP OF BARREL SECTION BELOW TOP SLAB TO HAVE FLAT TOP EDGE SEALED WITH 2 BEADS OF RAMNEK OR EQUAL.

MANHOLE STEPS, NEENAH R1981J OR EQUAL, 16" ON CENTER.

ALL JOINTS IN MANHOLE TO HAVE "O" RING RUBBER GASKETS.

DOGHOUSES MUST BE GROUTED BOTH INSIDE AND OUTSIDE.

PIPE SHALL BE CUT OUT FLUSH WITH FACE OF WALL.

MINIMUM SLAB THICKNESS IS 6" FOR 14' DEPTH. INCREASE THICKNESS 1" FOR EVERY 4' OF DEPTH GREATER THAN 14', AND REINFORCE WITH 6"x 6" 10/10.



**Forest Lake**  
AS GOOD AS IT SOUNDS

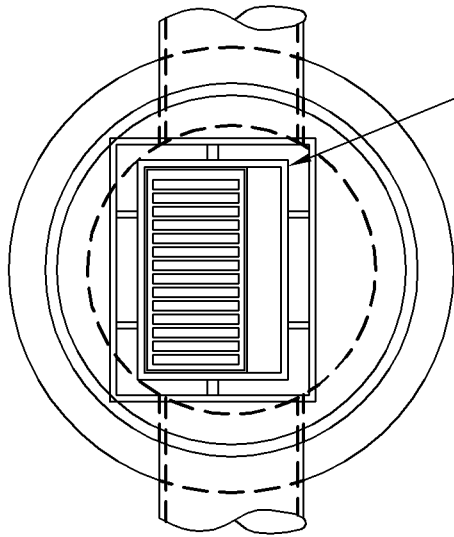
STANDARD DETAILS

STORM SEWER JUNCTION MANHOLE  
WITH REINFORCED TOP SLAB & SUMP

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2016

CITY PLATE NO.  
STO-4

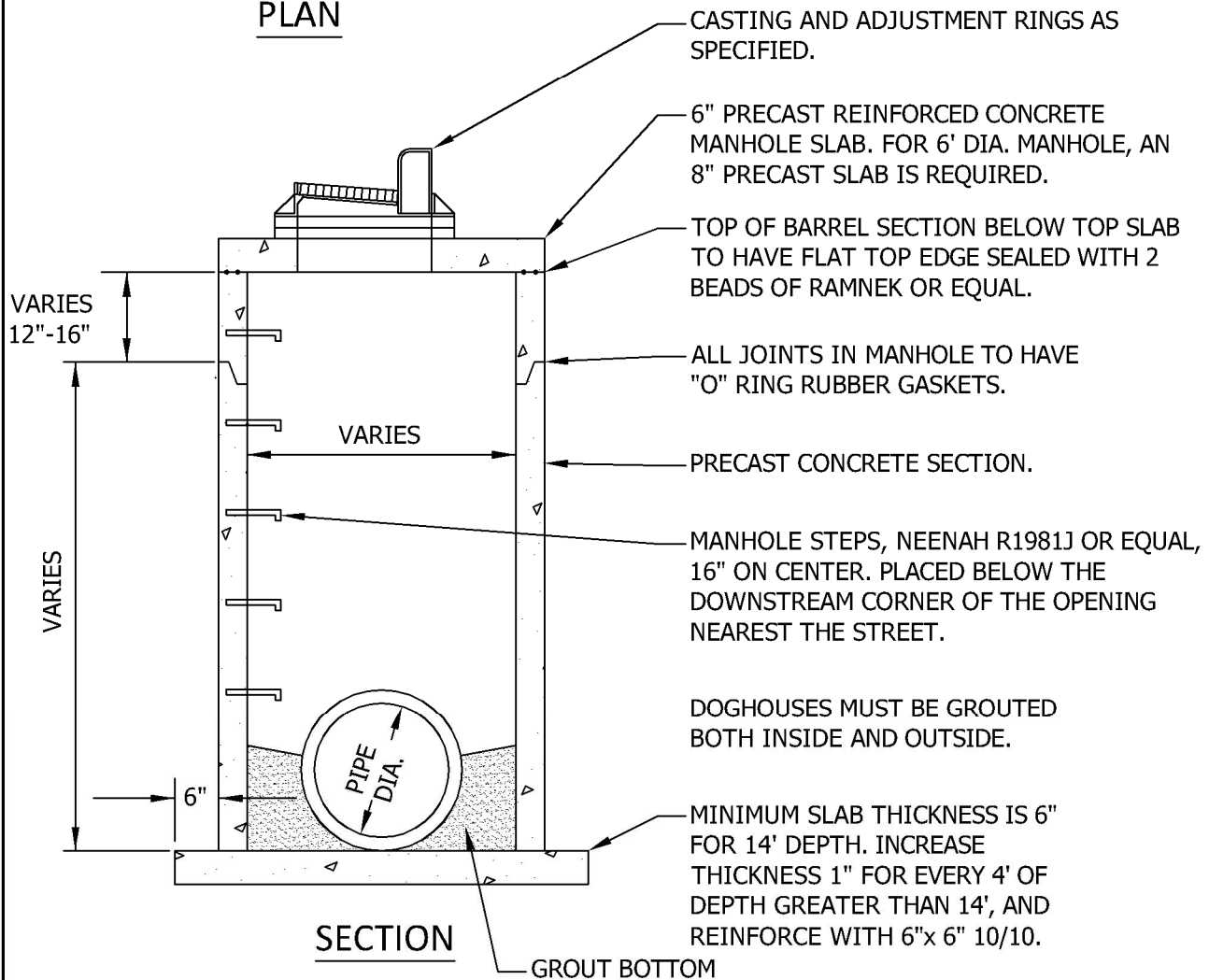


PLAN

24"X36" SLAB OPENING FOR NEENAH R3067V OR ESS. BROS. 330 HIGH CAPACITY OR EQUAL. INSTALL R3290L FOR DRIVEWAYS AND VALLEY GUTTERS. (VANE GRATE SHOWN)

DIMENSION FROM BACK OF CURB TO CENTER OF PIPE.

- 4' DIA. MH - 9" IN FROM BACK OF CURB
- 5' DIA. MH - 3" IN FROM BACK OF CURB
- 6' DIA. MH - 3" BEHIND BACK OF CURB
- 7' DIA. MH - 9" BEHIND BACK OF CURB
- 8' DIA. MH - 15" BEHIND BACK OF CURB



SECTION

CASTING AND ADJUSTMENT RINGS AS SPECIFIED.

6" PRECAST REINFORCED CONCRETE MANHOLE SLAB. FOR 6' DIA. MANHOLE, AN 8" PRECAST SLAB IS REQUIRED.

TOP OF BARREL SECTION BELOW TOP SLAB TO HAVE FLAT TOP EDGE SEALED WITH 2 BEADS OF RAMNEK OR EQUAL.

ALL JOINTS IN MANHOLE TO HAVE "O" RING RUBBER GASKETS.

PRECAST CONCRETE SECTION.

MANHOLE STEPS, NEENAH R1981J OR EQUAL, 16" ON CENTER. PLACED BELOW THE DOWNSTREAM CORNER OF THE OPENING NEAREST THE STREET.

DOGHOUSES MUST BE GROUTED BOTH INSIDE AND OUTSIDE.

MINIMUM SLAB THICKNESS IS 6" FOR 14' DEPTH. INCREASE THICKNESS 1" FOR EVERY 4' OF DEPTH GREATER THAN 14', AND REINFORCE WITH 6"x 6" 10/10.

GROUT BOTTOM



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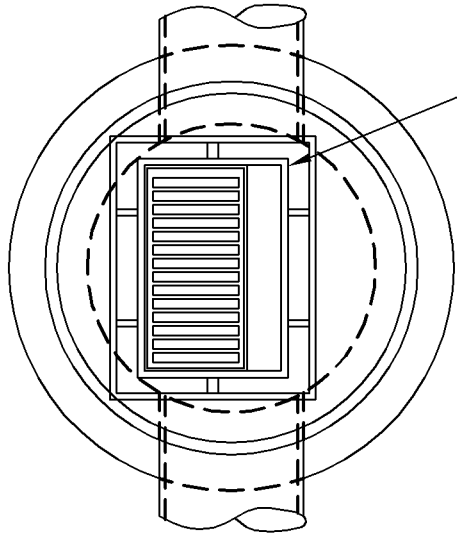
STANDARD DETAILS

TYPE II  
CATCHBASIN MANHOLE

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
DEC 2012

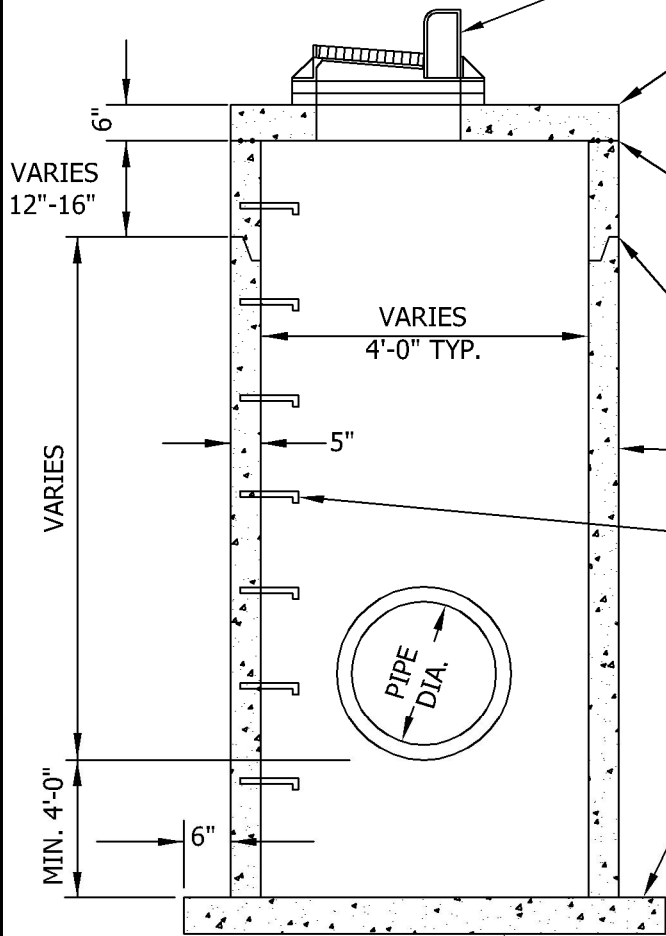
CITY PLATE NO.  
STO-5



24"X36" SLAB OPENING FOR CASTING AS SPECIFIED.

DIMENSION FROM BACK OF CURB TO CENTER OF PIPE.  
 4' DIA. MH - 9" IN FROM BACK OF CURB  
 5' DIA. MH - 3" IN FROM BACK OF CURB  
 6' DIA. MH - 3" BEHIND BACK OF CURB  
 7' DIA. MH - 9" BEHIND BACK OF CURB  
 8' DIA. MH - 15" BEHIND BACK OF CURB

**PLAN**



CASTING AND ADJUSTMENT RINGS AS SPECIFIED.

6" PRECAST REINFORCED CONCRETE MANHOLE SLAB. FOR 6' DIA. MANHOLE, AN 8" PRECAST SLAB IS REQUIRED.

TOP OF BARREL SECTION BELOW TOP SLAB TO HAVE FLAT TOP EDGE SEALED WITH 2 BEADS OF RAMNEK OR EQUAL.

ALL JOINTS IN MANHOLE TO HAVE "O" RING RUBBER GASKETS.

PRECAST CONCRETE SECTION.

MANHOLE STEPS, NEENAH R1981J OR EQUAL, 16" ON CENTER.

DOGHOUSES MUST BE GROUTED BOTH INSIDE AND OUTSIDE.

MINIMUM SLAB THICKNESS IS 6" FOR 14' DEPTH. INCREASE THICKNESS 1" FOR EVERY 4' OF DEPTH GREATER THAN 14', AND REINFORCE WITH 6"x 6" 10/10.

**SECTION**

NO DRAIN HOLES



**Forest Lake**  
 AS GOOD AS IT SOUNDS

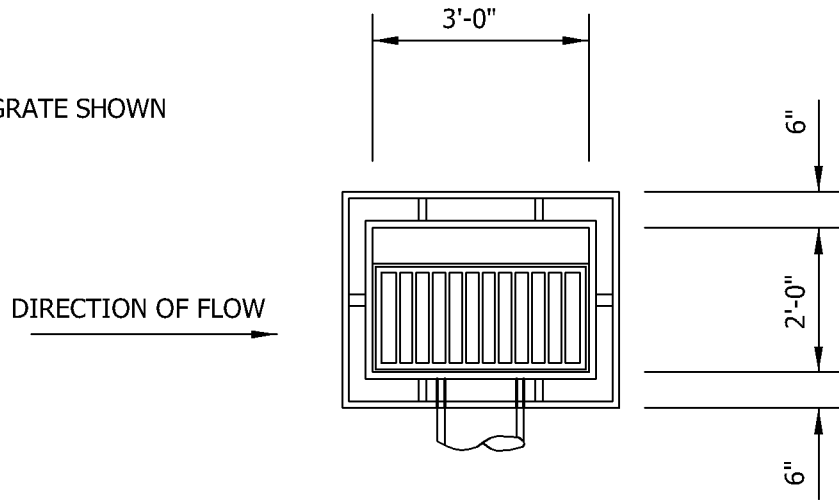
**STANDARD DETAILS**  
 CATCHBASIN MANHOLE  
 WITH SUMP

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
 DEC 2012

CITY PLATE NO.  
 STO-6

NOTE:  
VANE GRATE SHOWN



NO BLOCK STRUCTURES ARE ALLOWED.

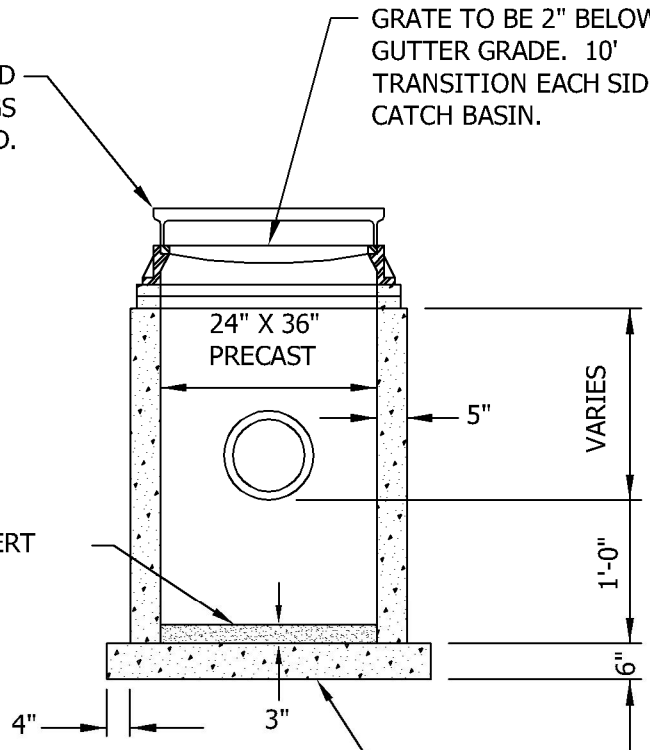
PLAN

CASTING AND ADJUSTMENT RINGS AS SPECIFIED.

GRATE TO BE 2" BELOW GUTTER GRADE. 10' TRANSITION EACH SIDE OF CATCH BASIN.

DOGHOUSES SHALL BE GROUTED ON BOTH THE INSIDE AND OUTSIDE.

GROUTED INVERT



SECTION

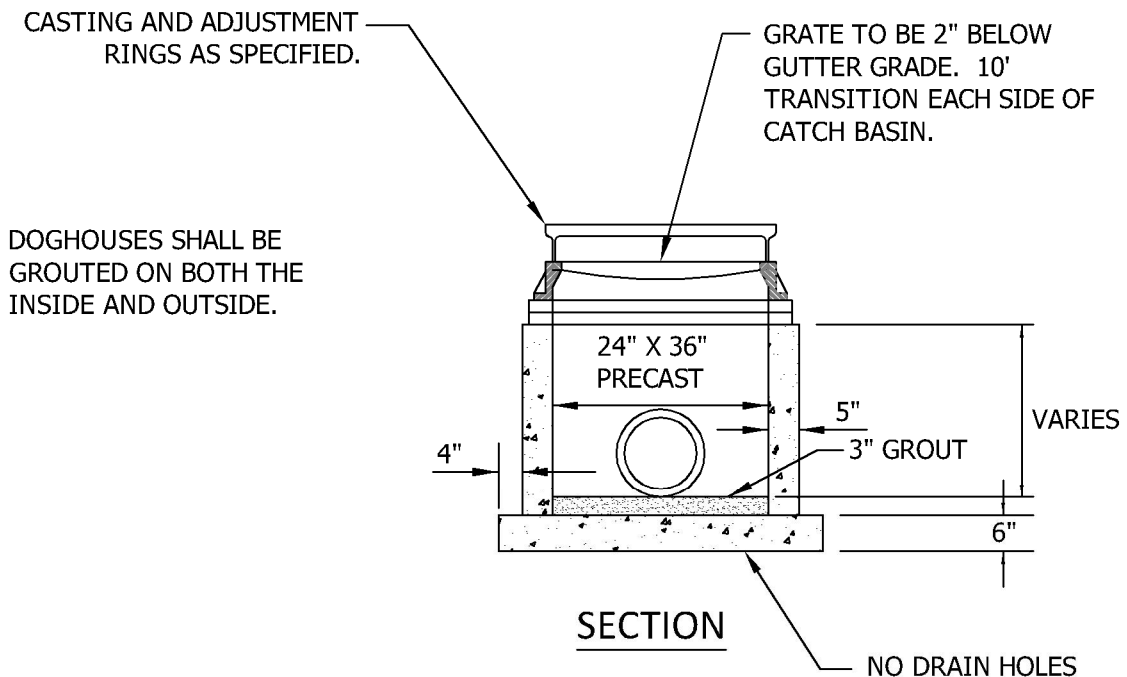
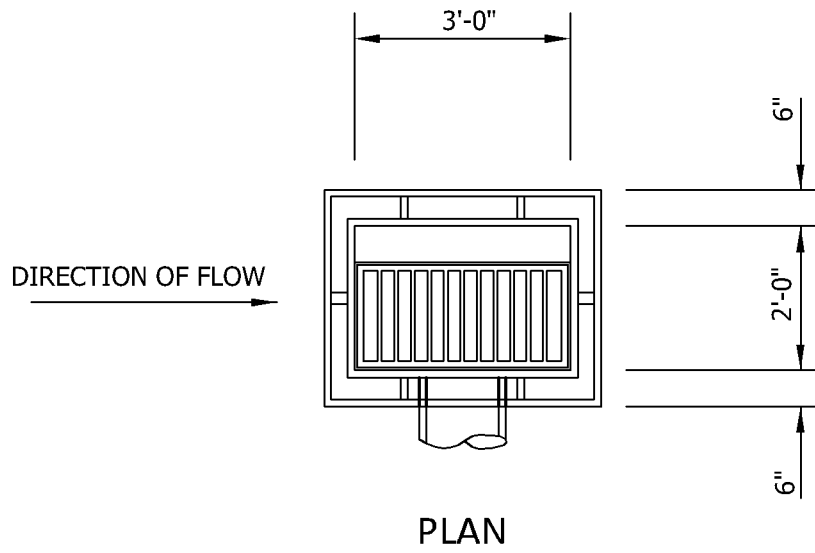


STANDARD DETAILS  
CATCHBASIN WITH SUMP

FOREST LAKE, MINNESOTA

LAST REVISION:  
DEC 2012

CITY PLATE NO.  
STO-8

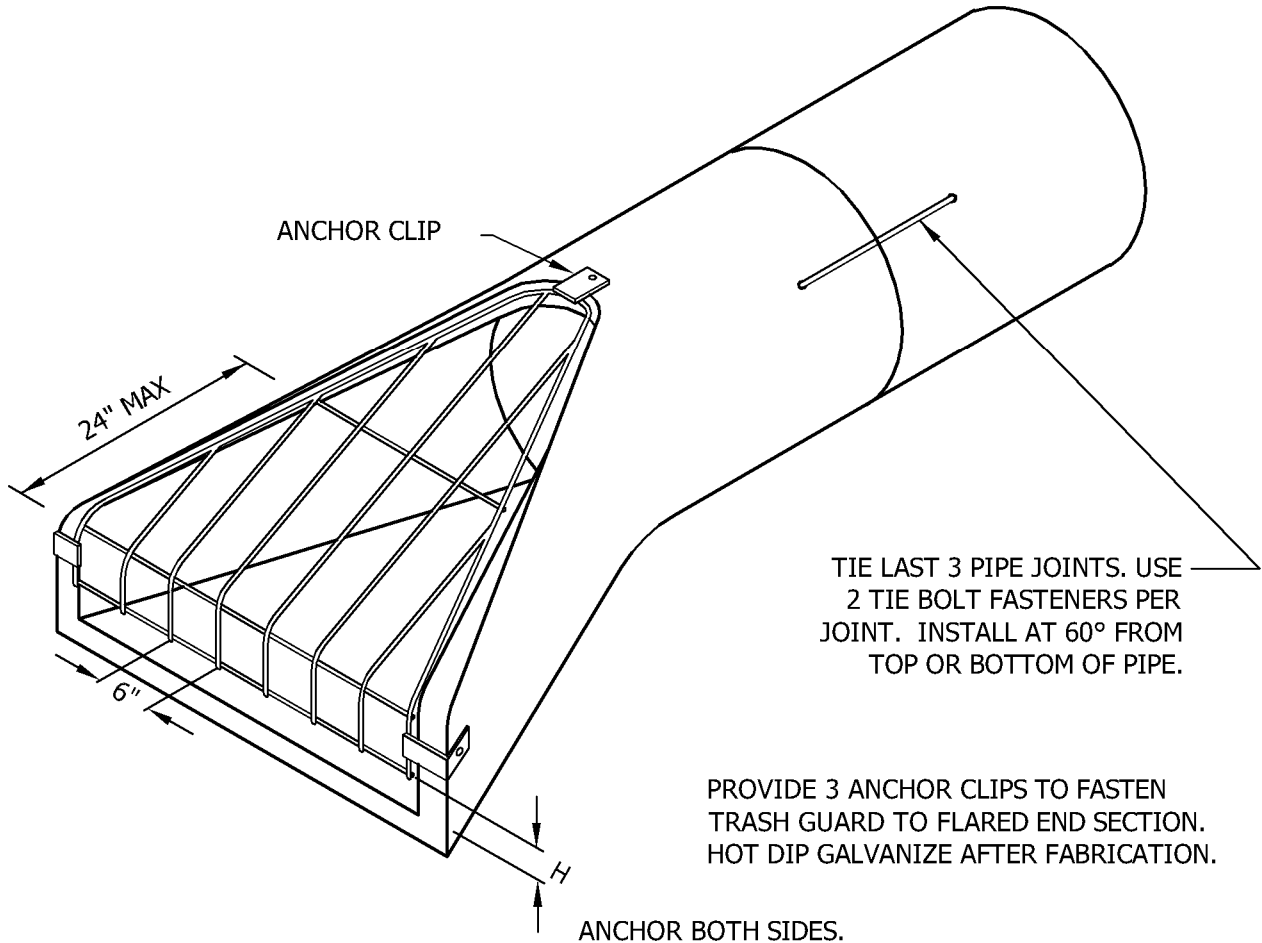


STANDARD DETAILS  
2' X 3' CATCHBASIN WITHOUT SUMP  
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
DEC 2012

CITY PLATE NO.  
STO-9

SEE CITY PLATE NO. STO-13 FOR RIPRAP PLACEMENT.



ISOMETRIC

PIPE SIZE	TRASH GUARD SIZING		
	BARS	'H'	BOLTS
12" - 18"	3/4"φ	4"	5/8"
21" - 42"	1"φ	6"	3/4"
48" - 72"	1 1/4"φ	12"	1"



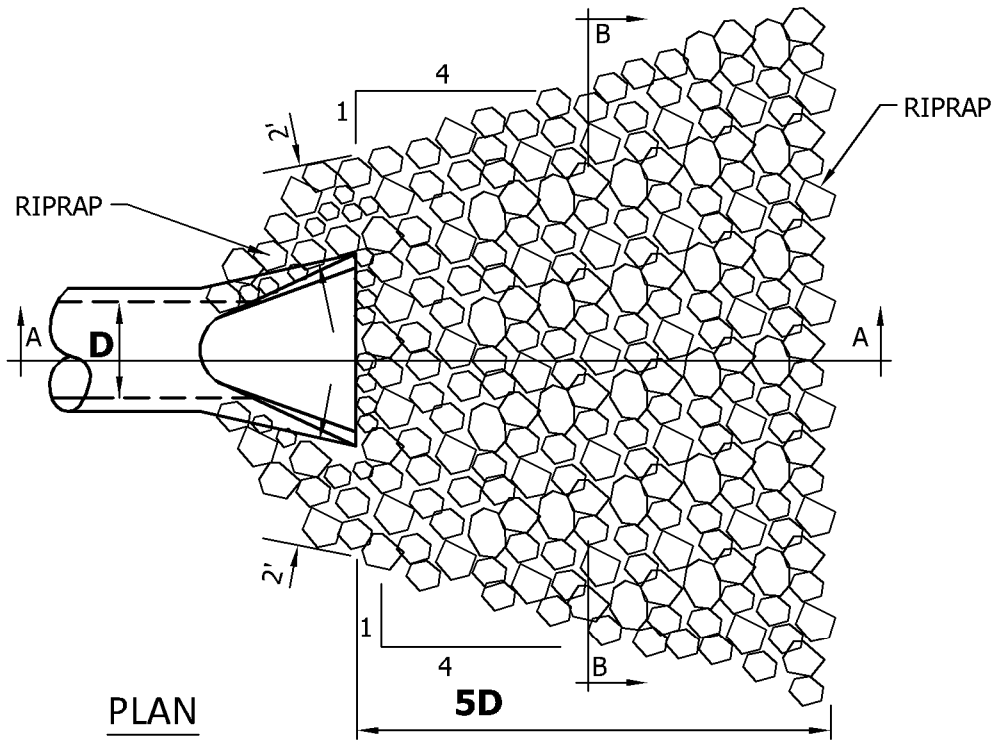
STANDARD DETAILS  
FLARED END SECTION  
AND TRASH GUARD

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2000

CITY PLATE NO.  
STO-12



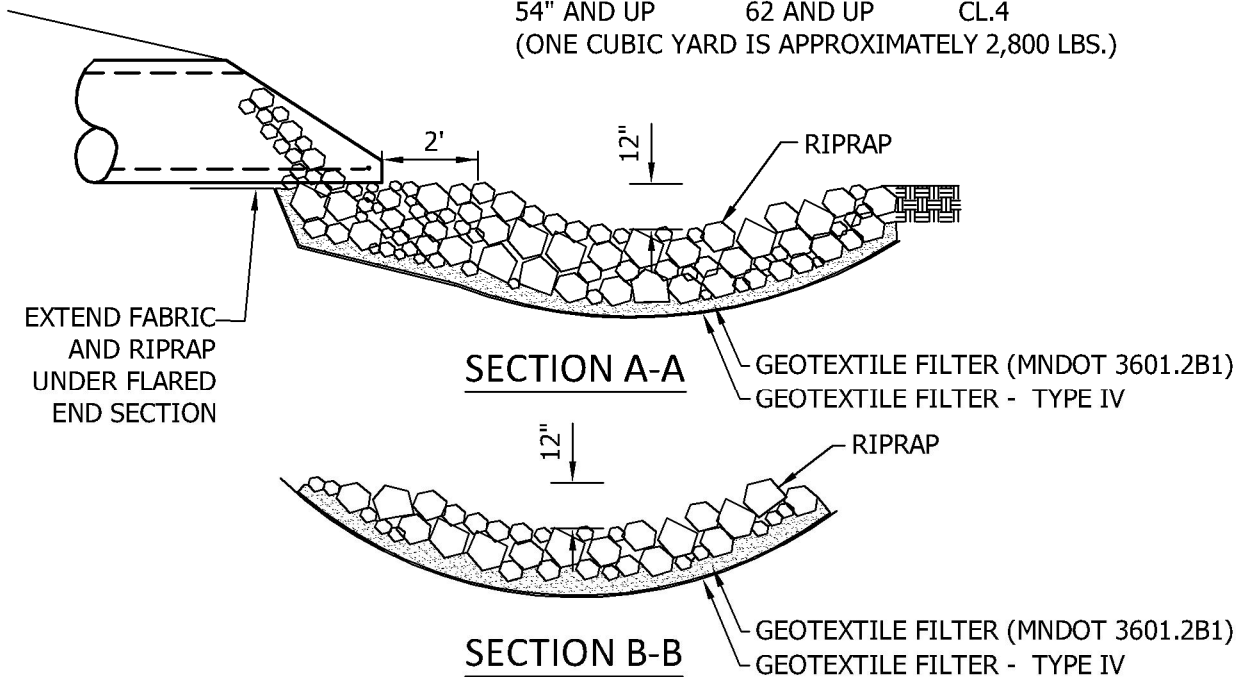


**PLAN**

**RIPRAP REQUIREMENTS**

<b>D</b>	<b>CY</b>	<b>CLASS</b>
12" TO 24"	8 TO 12	CL.3
27" TO 33"	14 TO 20	CL.3
36" TO 48"	23 TO 38	CL.3
54" AND UP	62 AND UP	CL.4

(ONE CUBIC YARD IS APPROXIMATELY 2,800 LBS.)



EXTEND FABRIC AND RIPRAP UNDER FLARED END SECTION

**SECTION A-A**

**SECTION B-B**

**STANDARD DETAILS**

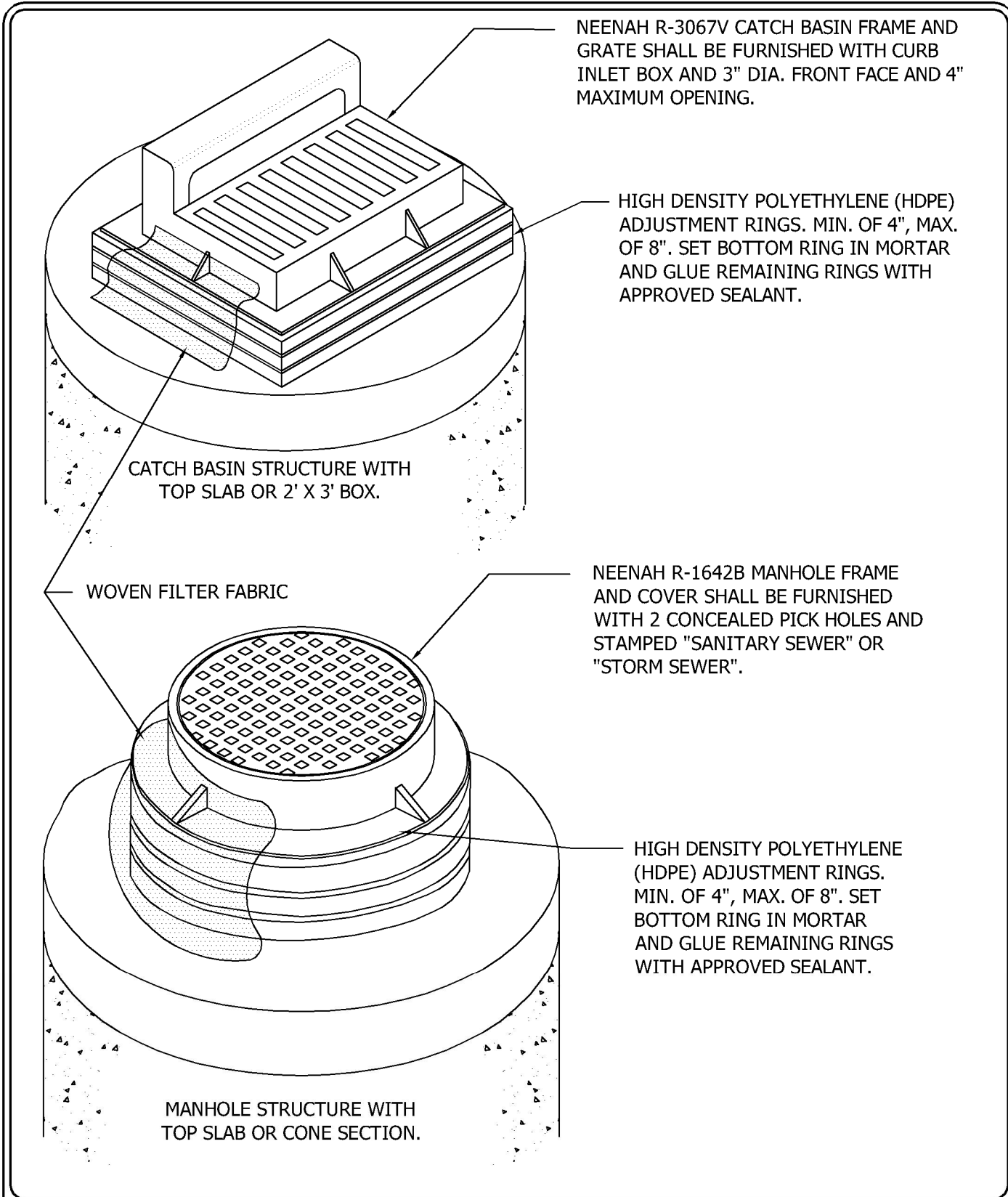
RIPRAP AT OUTLETS

**FOREST LAKE, MINNESOTA**



LAST REVISION:  
APR 2000

CITY PLATE NO.  
STO-13



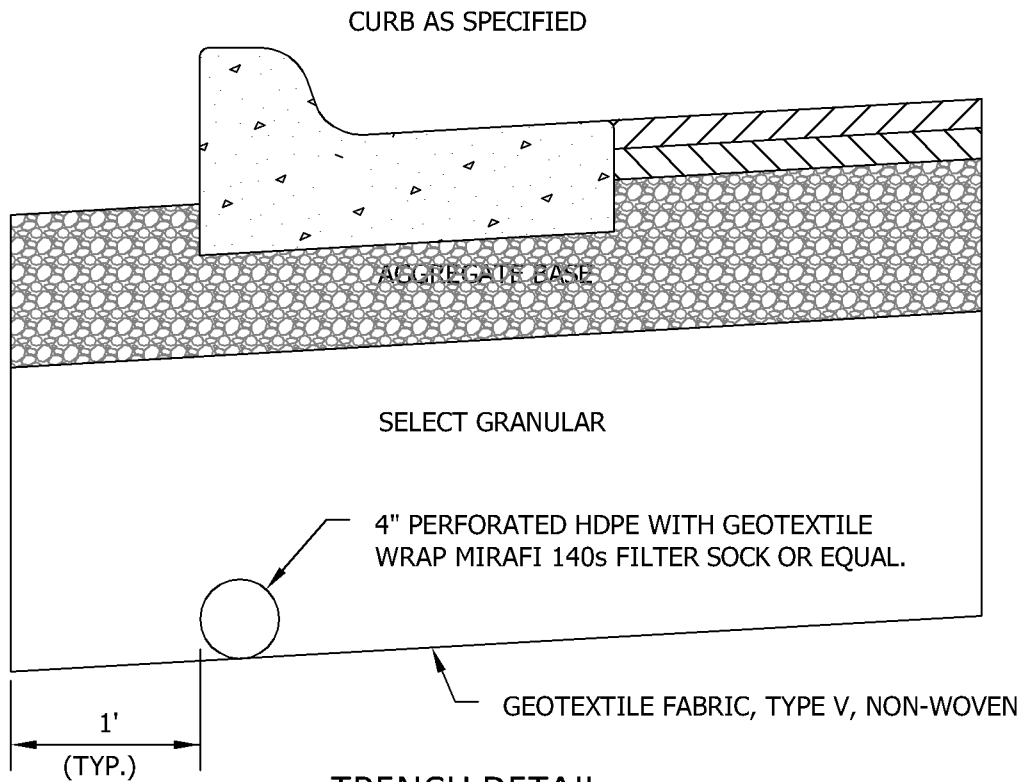
STANDARD DETAILS

CATCH BASIN AND MANHOLE ADJUSTMENT

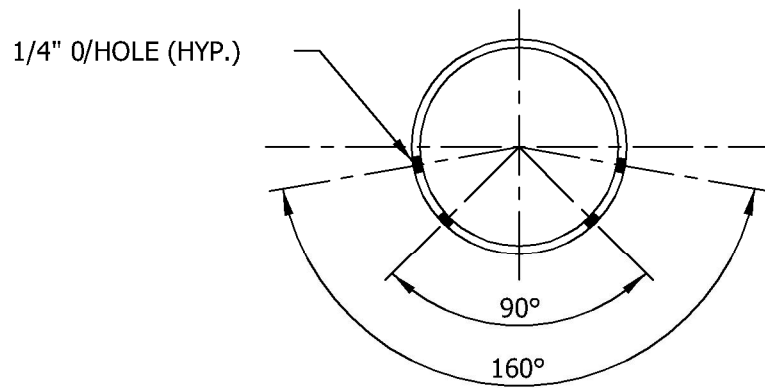
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2016

CITY PLATE NO.  
STO-18



TRENCH DETAIL



4" PERFORATED HDPE WITH GEOTEXTILE WRAP MIRAFI 140s FILTER SOCK OR EQUAL.

PIPE DETAIL

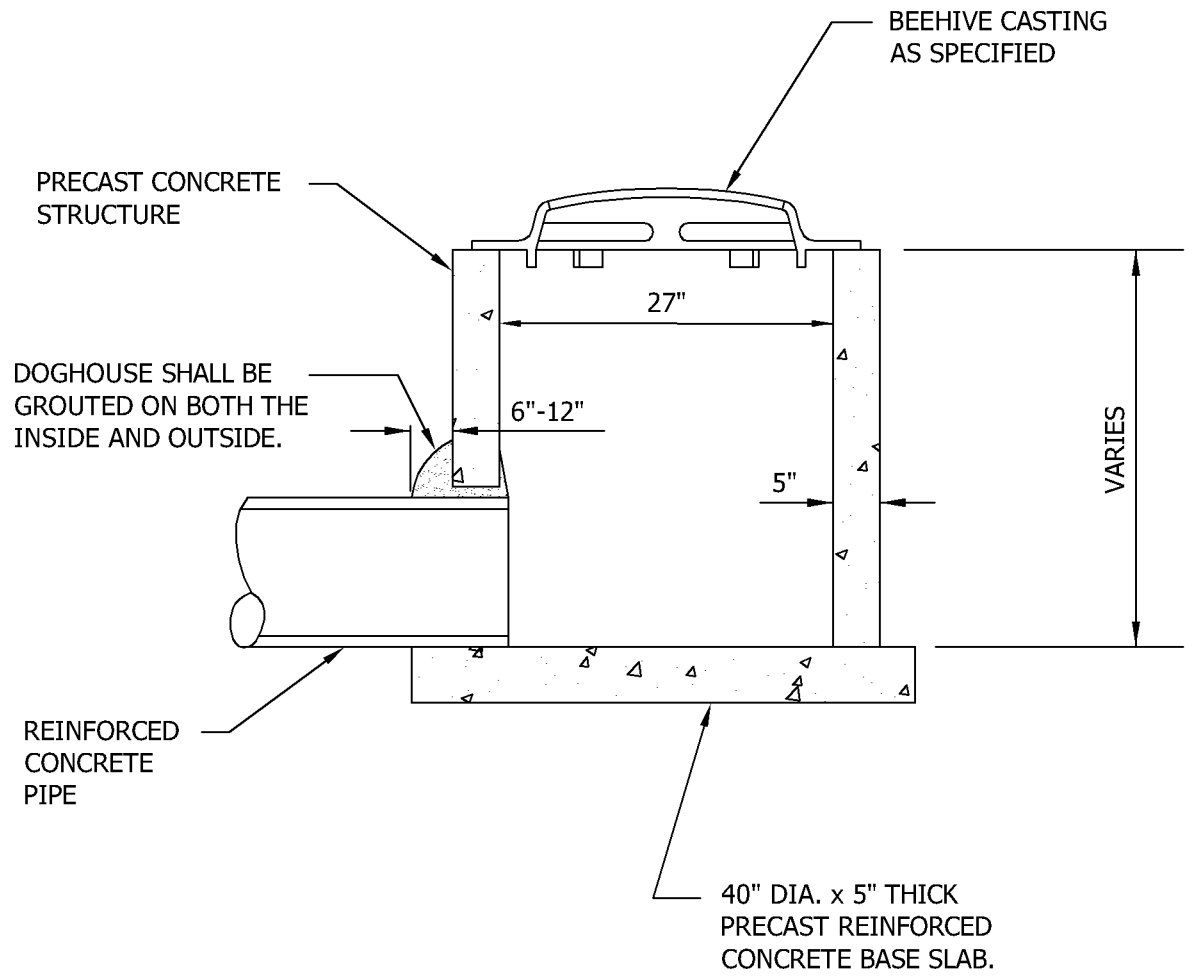


STANDARD DETAILS  
4" HDPE PERFORATED DRAINTILE  
WITH FILTER SOCK

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2016

CITY PLATE NO.  
STO-20



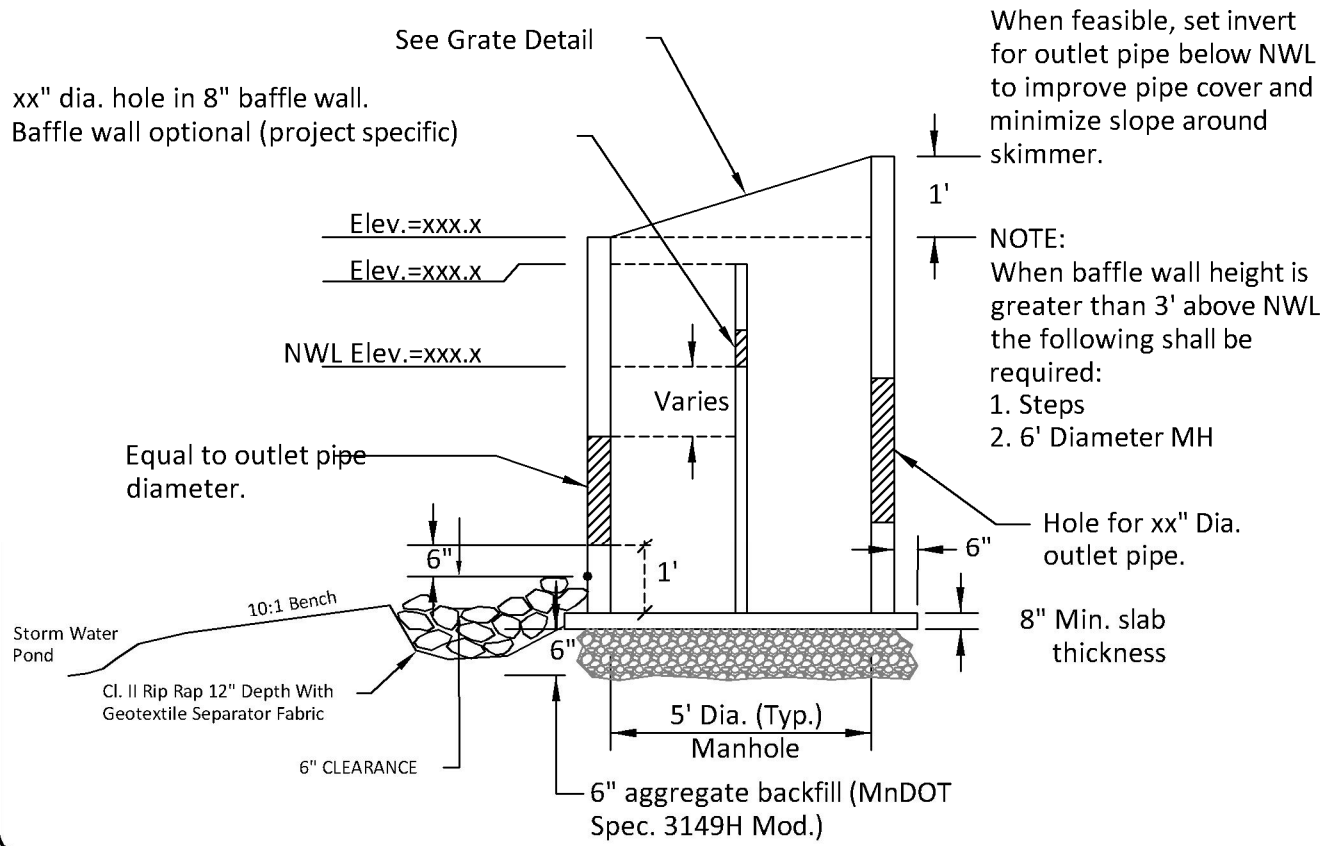
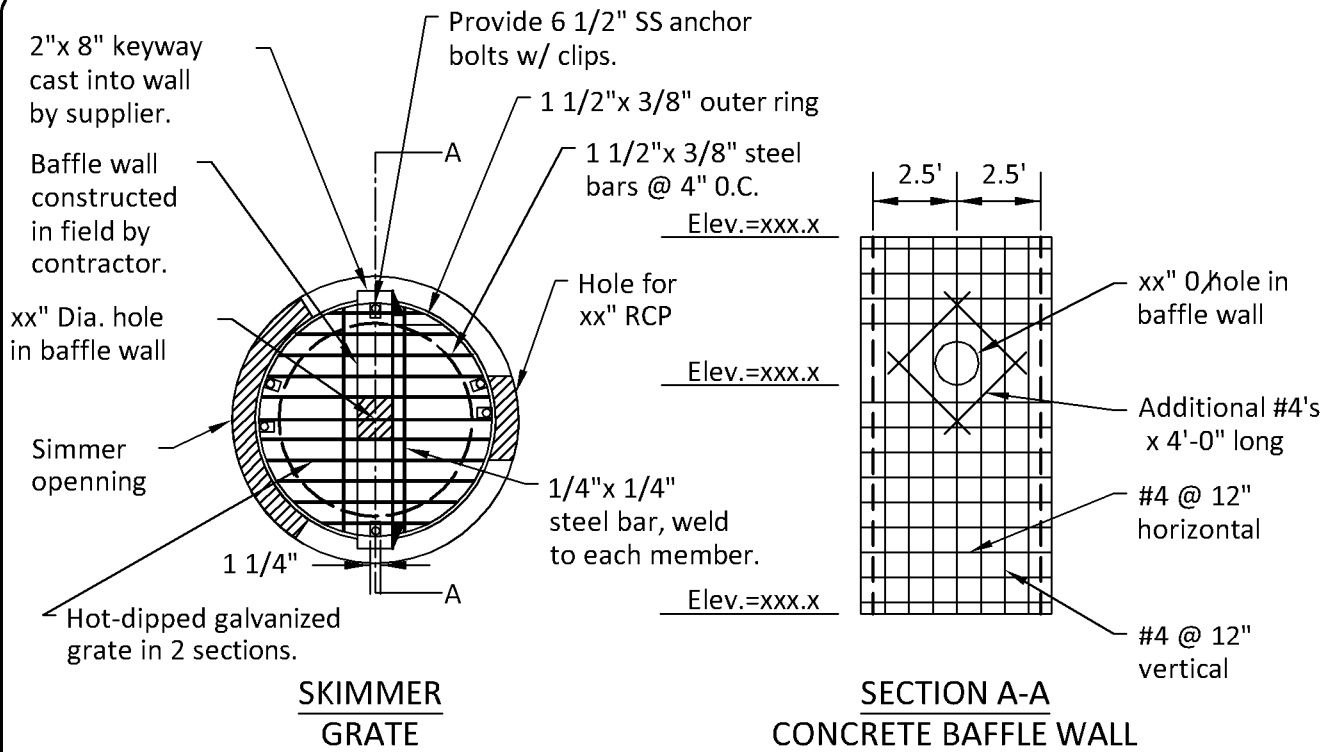
**Forest Lake**  
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STANDARD DETAILS  
PRECAST 27" SHALLOW  
DEPTH BEEHIVE

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
DEC 2012

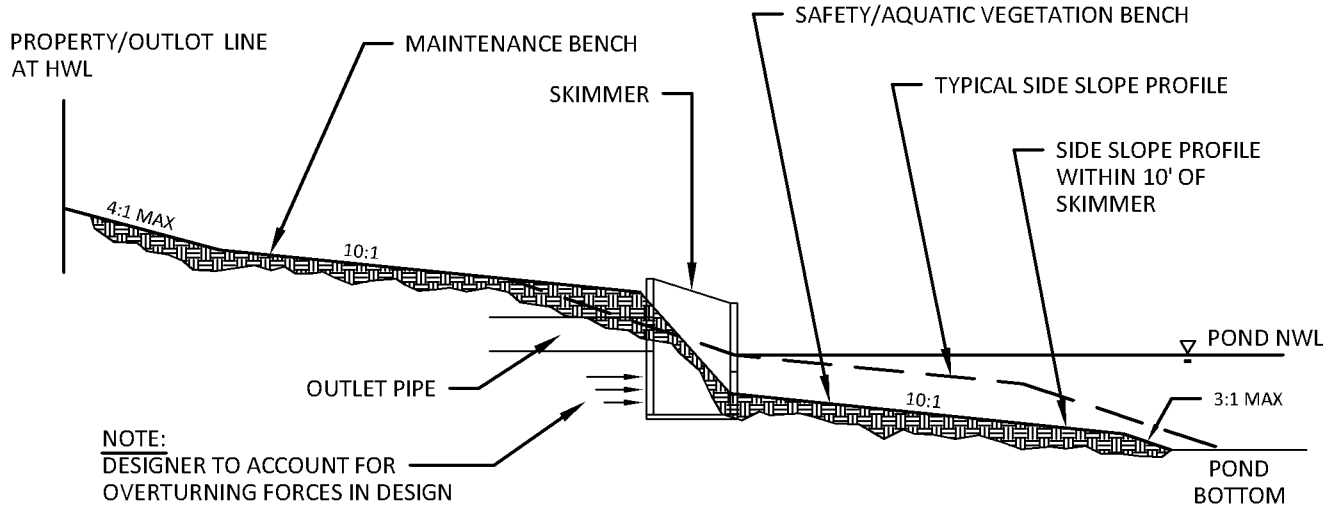
CITY PLATE NO.  
STO-28



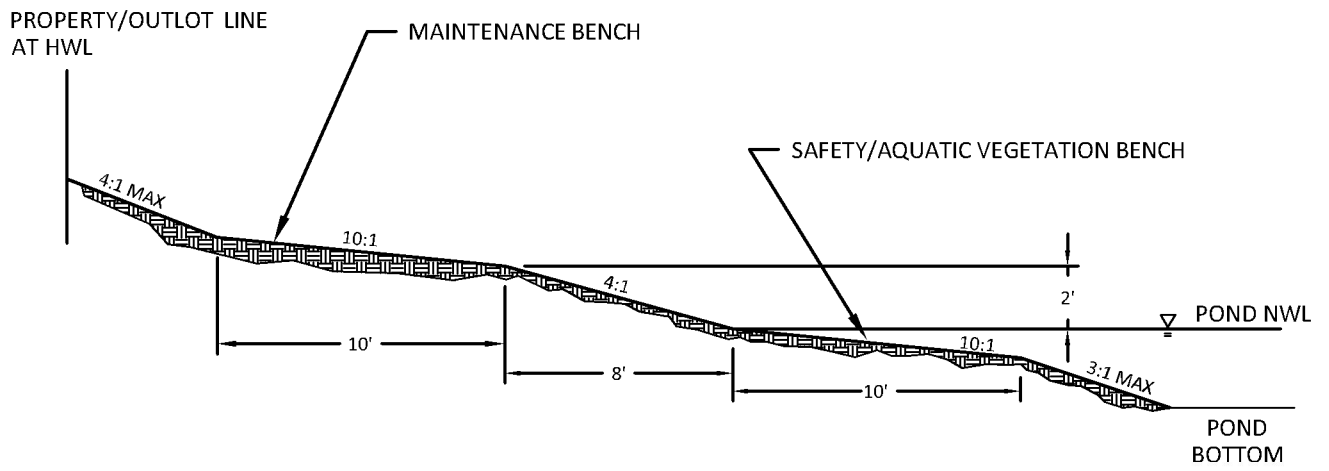
**STANDARD DETAILS**  
**POND OUTLET SKIMMER STRUCTURE**  
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
 APR 2016

CITY PLATE NO.  
 STO-31



TYPICAL BENCH DETAIL  
WITHIN 10' OF SKIMMER OUTLET



TYPICAL BENCH DETAIL



STANDARD DETAILS

TYPICAL BENCH DETAIL

FOREST LAKE, MINNESOTA

LAST REVISION:  
APR 2016

CITY PLATE NO.  
STO-32

WEHD1500 GREASE INTERCEPTER  
TANK SPECIFICATIONS:

**DIMENSIONS:**

WALL: 3.5"  
 BOTTOM: 5"  
 COVER: 6"  
 MANHOLE: 24" I.D.  
 HEIGHT: 95.5" O.D.  
 OUTSIDE DIA.: 86.5"  
 BELOW INLET: 78"  
 LIQUID LEVEL: 70"

**SPECIAL FEATURE:**

"POSITIVE SEAL"  
 V-SHAPED JOINT CONNECTION  
 BETWEEN TANK AND COVER.

**INLET AND OUTLET BAFFLES:  
 AS SHOWN**

**LIQUID CAPACITY:  
 21.48 GAL/IN**

**LOADING DESIGN: 12'-0"  
 UNSATURATED SOIL**

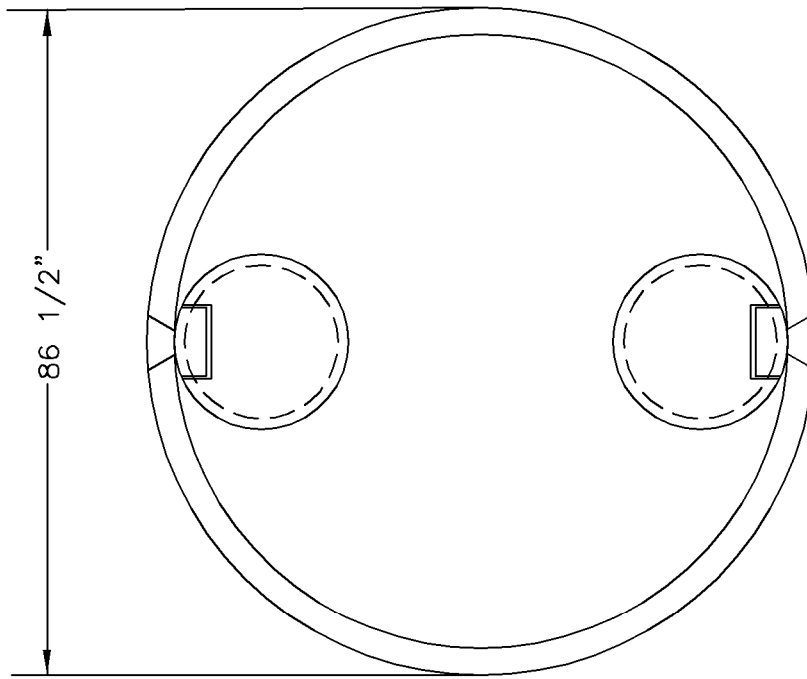
**WEIGHT: COVER 3,000 LBS  
 TANK 9,535 LBS**

**FLOATATION:**

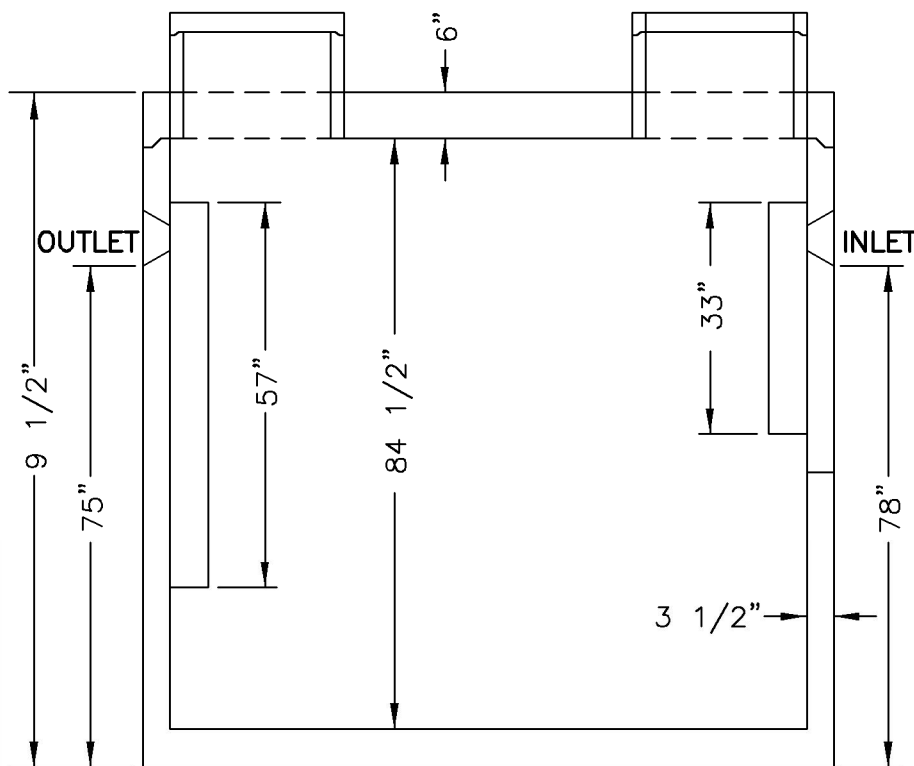
WITH SATURATED SOIL TO  
 TOP OF COVER: 1.5" OF  
 SOIL OVER COVER-NO  
 FLOTATION 3' OVER COVER  
 OFFERS 1.4 + SAFETY  
 FACTOR.

**CUSTOMIZED TANKS:**

TANKS CAN BE CUSTOMIZED.  
 CONTACT WEISER CONCRETE.



TOP VIEW



SIDE VIEW



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 AS GOOD AS IT SOUNDS

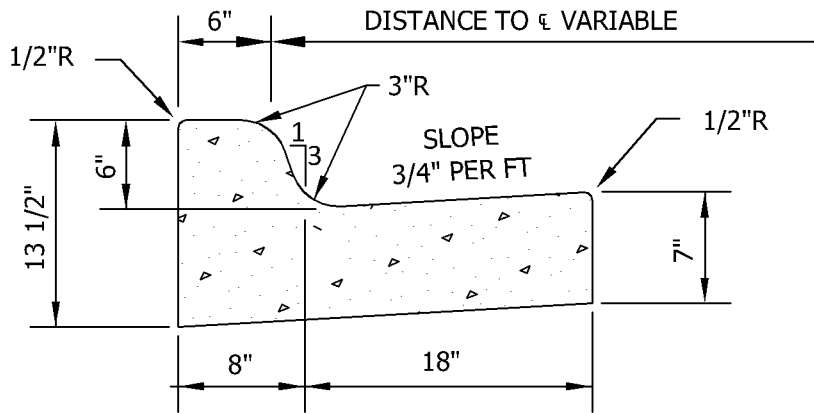
STANDARD DETAILS

GREASE INTERCEPTOR

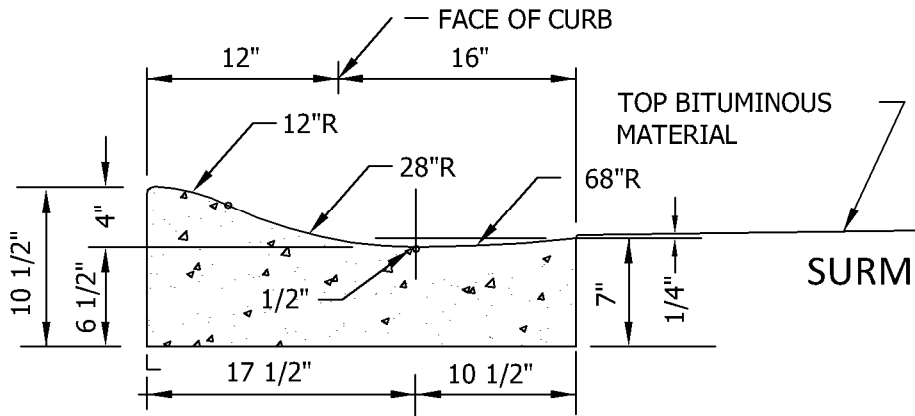
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
 MAR 2007

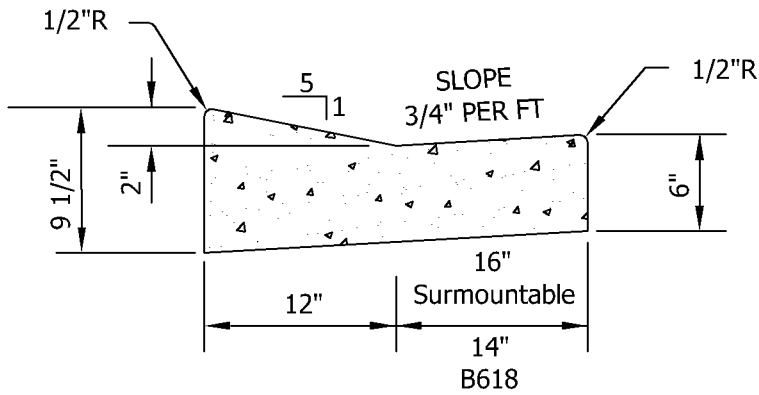
CITY PLATE NO.  
 STO-33



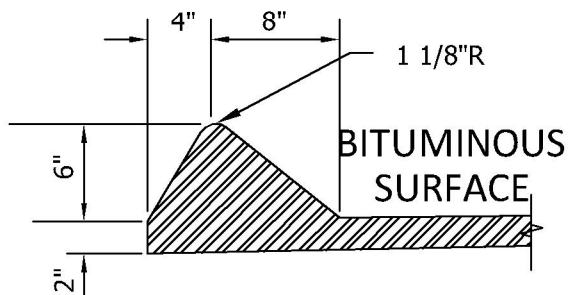
MNDOT B618



SURMOUNTABLE



DRIVEWAY



6" SHOE FORMED



**Forest Lake**  
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STANDARD DETAILS

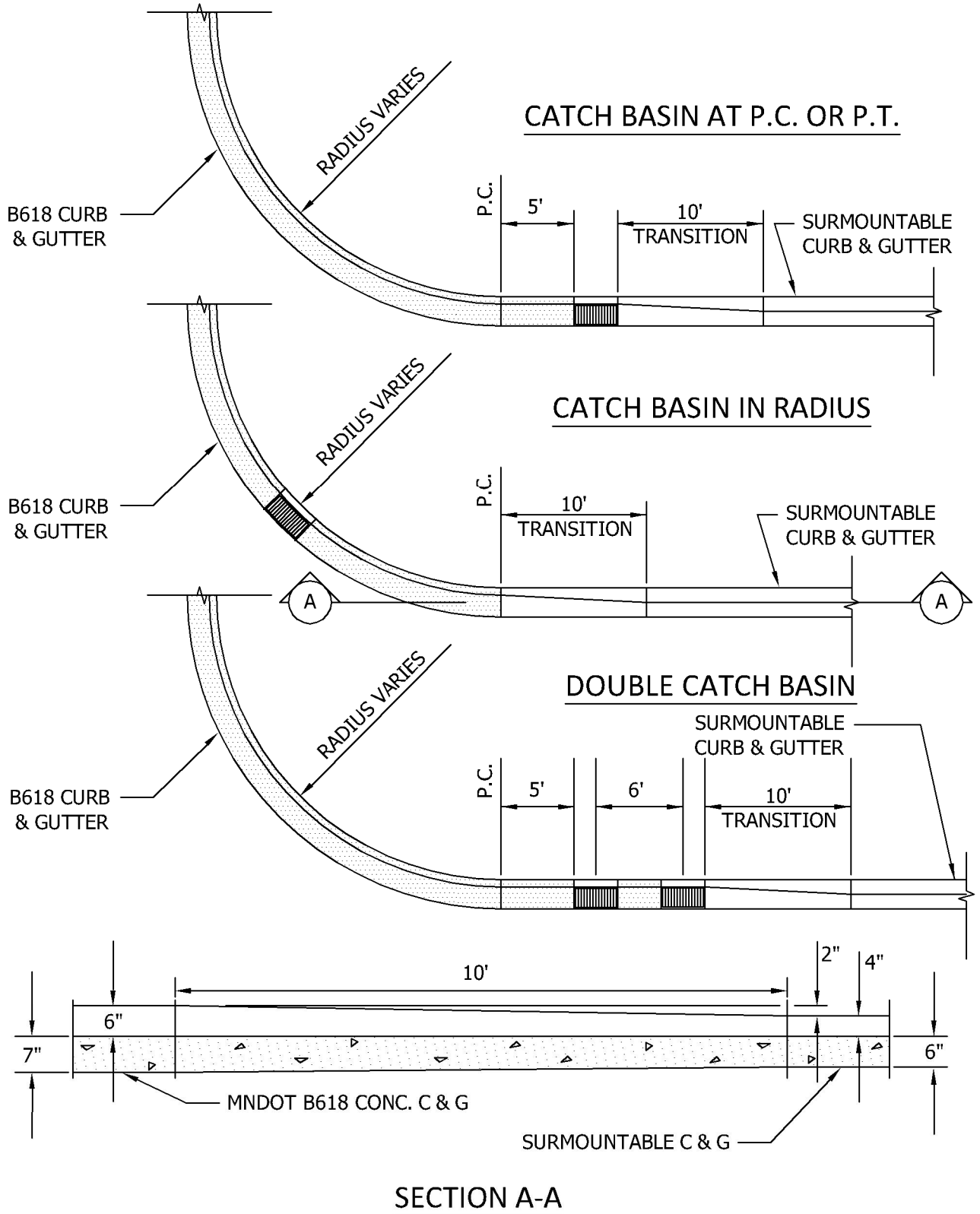
CURB AND GUTTER

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2016

CITY PLATE NO.  
STR-1





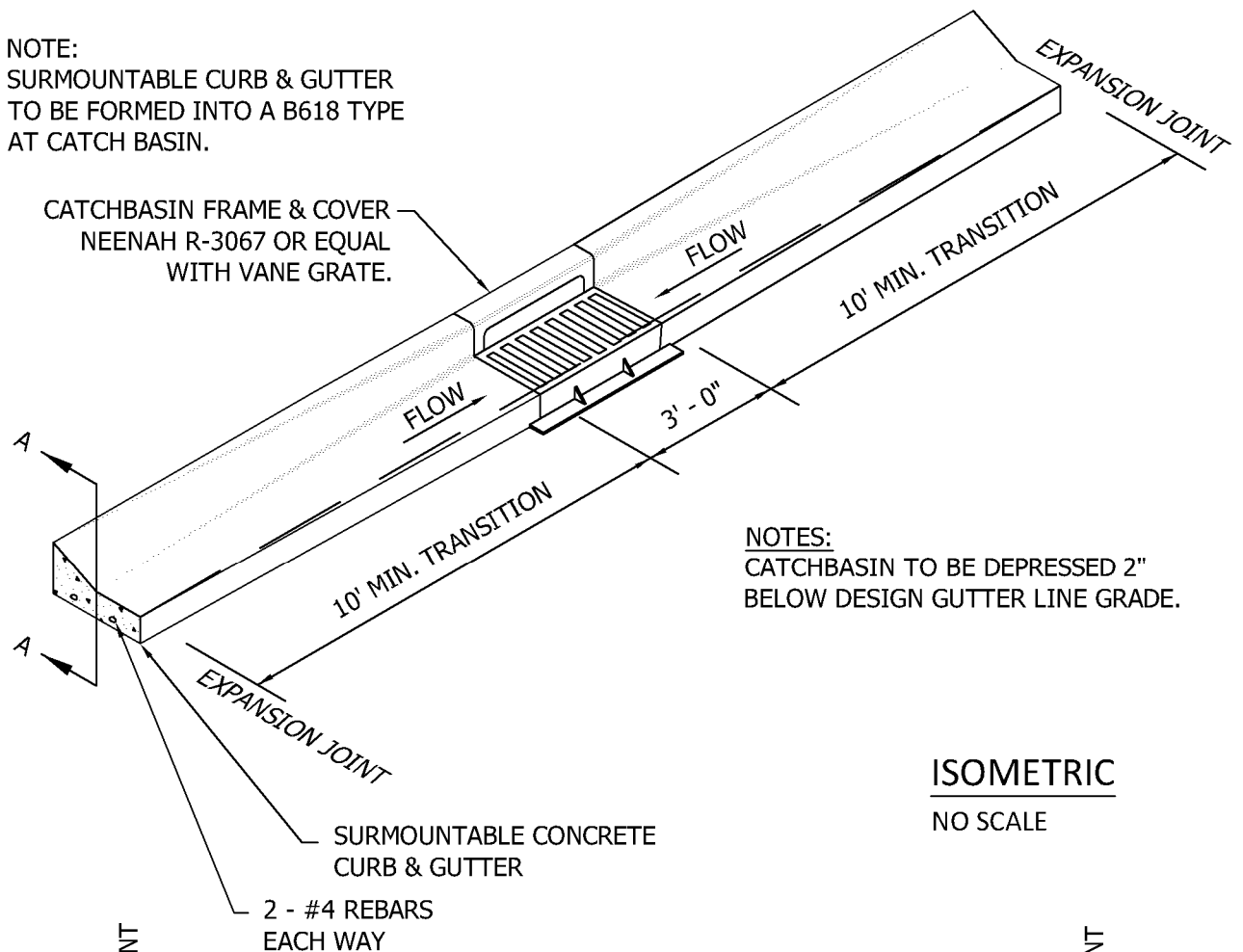
**STANDARD DETAILS**  
CONCRETE CURB & GUTTER

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2000

CITY PLATE NO.  
STR-2

NOTE:  
SURMOUNTABLE CURB & GUTTER  
TO BE FORMED INTO A B618 TYPE  
AT CATCH BASIN.

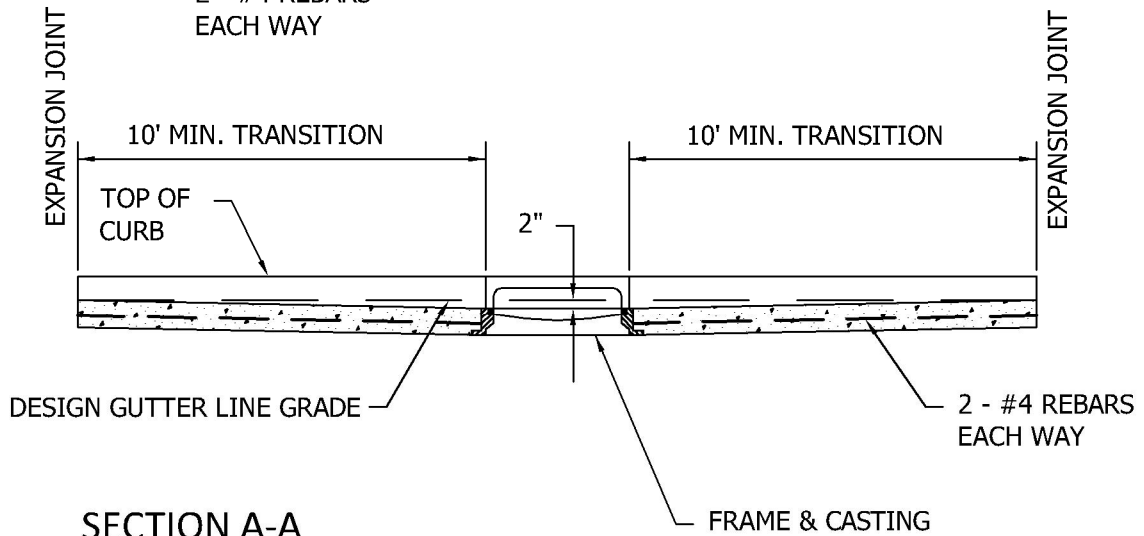


CATCHBASIN FRAME & COVER  
NEENAH R-3067 OR EQUAL  
WITH VANE GRATE.

NOTES:  
CATCHBASIN TO BE DEPRESSED 2"  
BELOW DESIGN GUTTER LINE GRADE.

ISOMETRIC

NO SCALE



SECTION A-A

NO SCALE



STANDARD DETAILS  
SURMOUNTABLE CURB & GUTTER  
CONSTRUCTION AT CATCHBASIN

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
MAR 1996

CITY PLATE NO.  
STR-3

CONCRETE CURB  
AND GUTTER  
(SEE PLATE STR-1)

EXPANSION JOINT

EXPAN. JT.  
PROPERTY LINE, SIDEWALK OR  
EXIST. DRIVEWAY

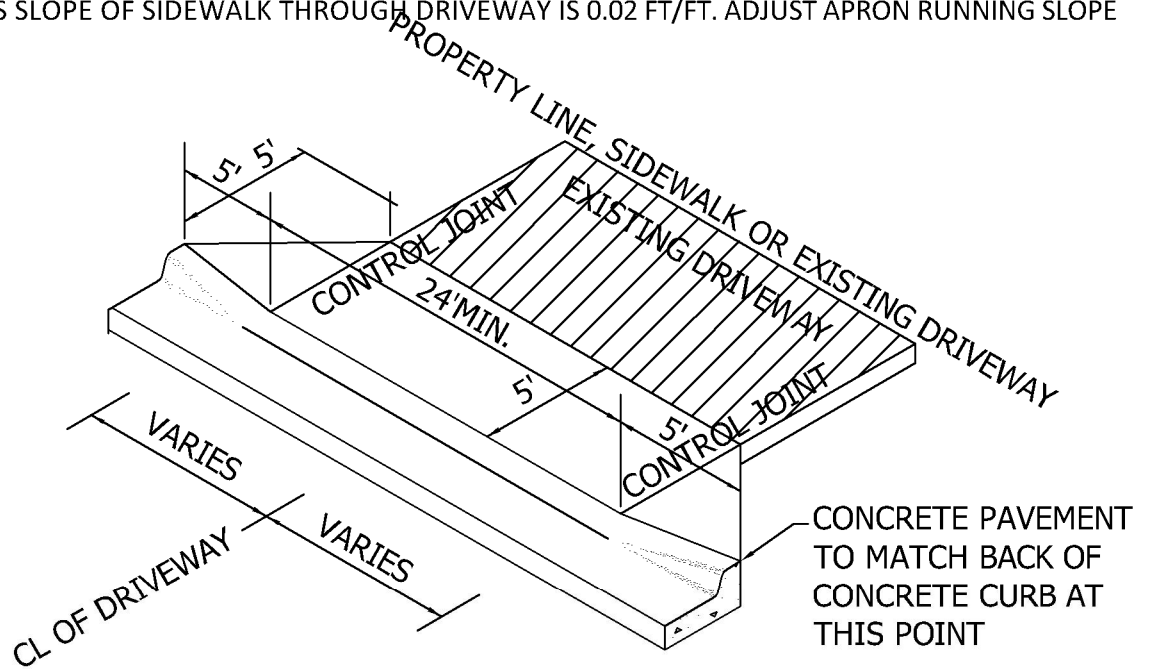


DRIVEWAY SECTION

NO SCALE

6" AGGREGATE BASE  
CLASS 5

1. PANEL WIDTH SHALL NOT EXCEED 10 FEET WITHOUT A CONTRACTION JOINT.
2. DRIVEWAY TO BE ONE COURSE CONCRETE PAVEMENT.
3. 7" THICK FOR RESIDENTIAL, 8" THICK FOR COMMERCIAL, AND ALLEY OR AS SPECIFIED.
4. DRIVEWAY WIDTH IS 24' UNLESS OTHERWISE NOTED.
5. MINIMUM DISTANCE FROM LOT LINE IS 5'.
6. NEENAH R-1914-A CASTING IS REQUIRED FOR CURBSTOPS LOCATED IN DRIVEWAYS.
7. MAX. CROSS SLOPE OF SIDEWALK THROUGH DRIVEWAY IS 0.02 FT/FT. ADJUST APRON RUNNING SLOPE AS NEEDED.



DRIVEWAY  
ISOMETRIC

NOTE:  
CONTROL JOINTS IN CONCRETE CURB  
NOT TO EXCEED 10' SPACING  
THROUGH DRIVEWAY SECTION.



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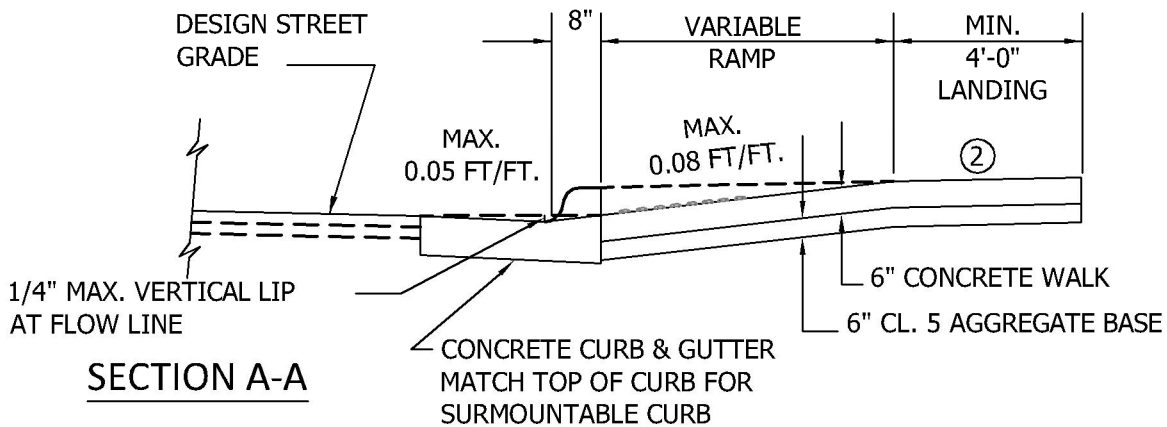
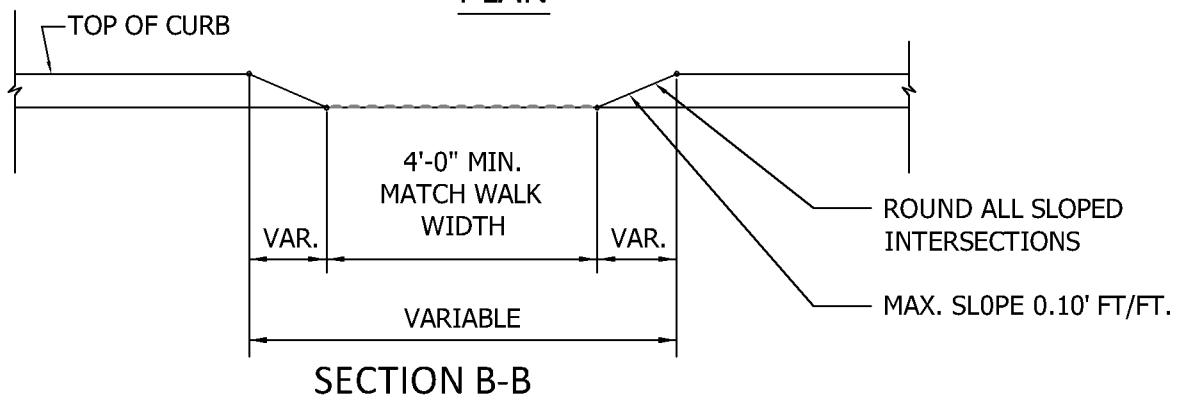
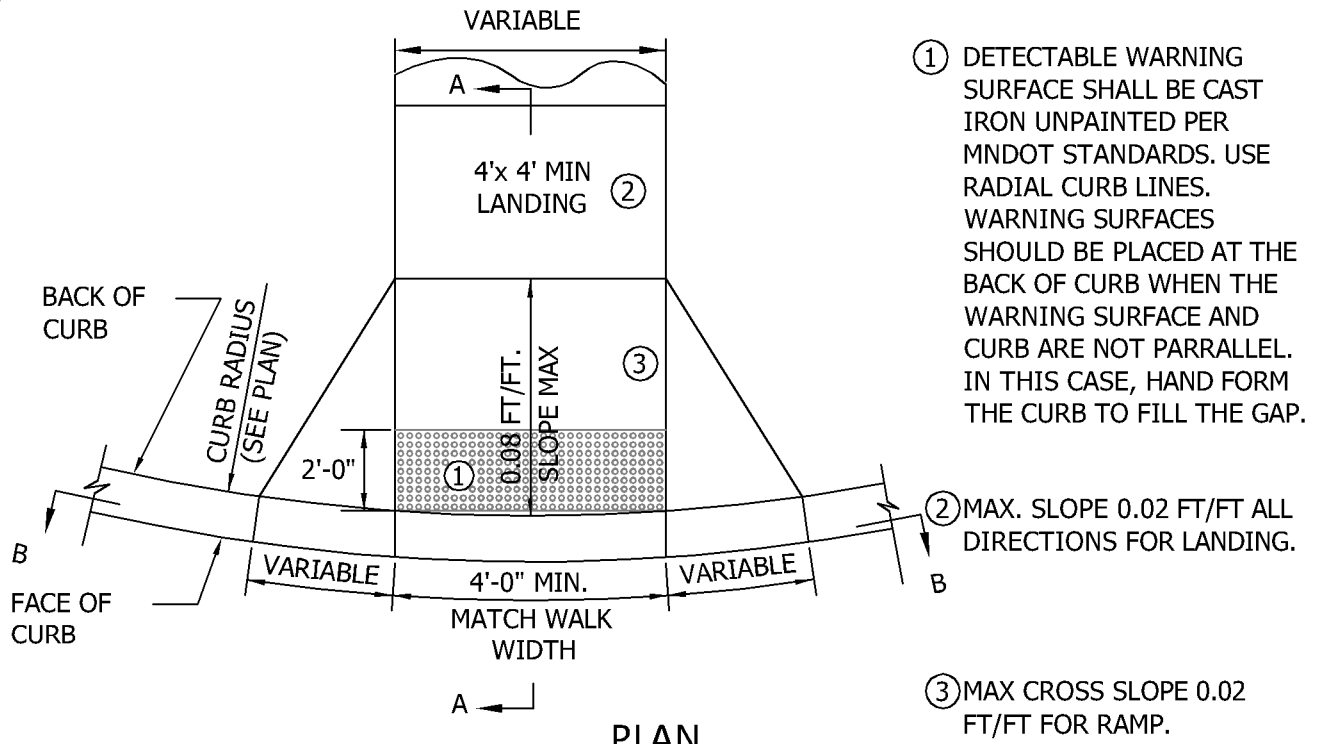
STANDARD DETAILS

CONCRETE DRIVEWAY APRON

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
DEC 2012

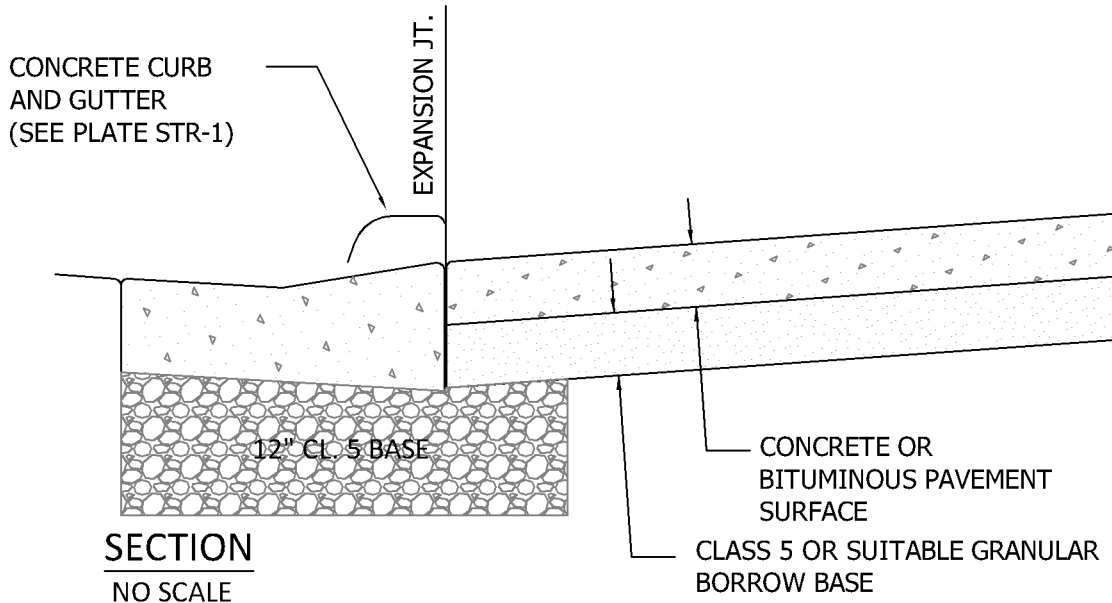
CITY PLATE NO.  
STR-4



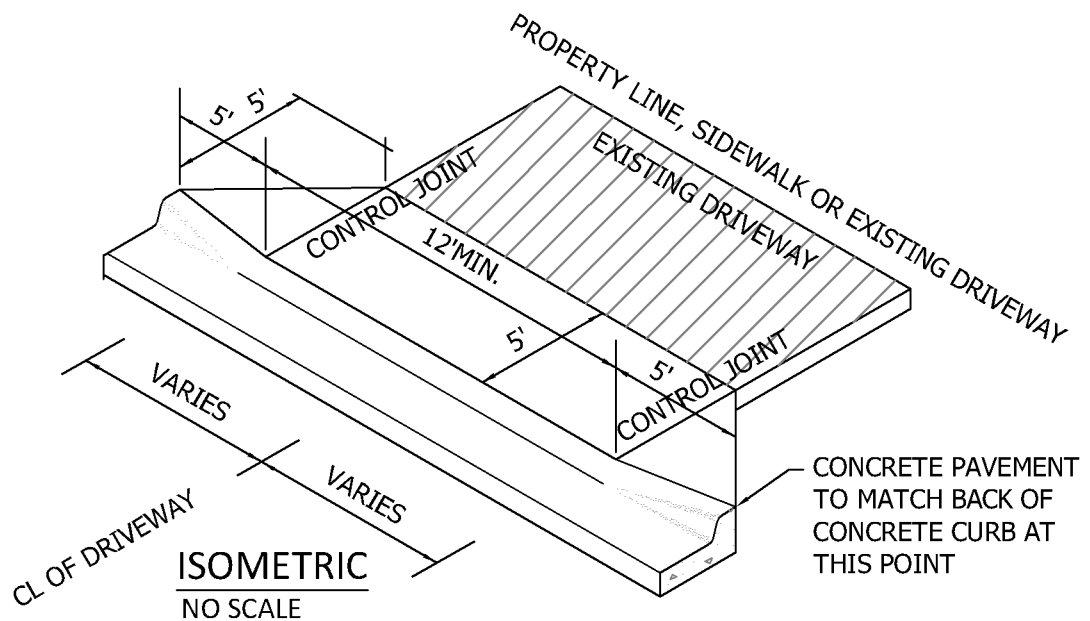
**STANDARD DETAILS**  
PEDESTRIAN CURB RAMP  
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2016

CITY PLATE NO.  
STR-7



**SECTION**  
NO SCALE



**ISOMETRIC**  
NO SCALE

**NOTE:**

1. CONTROL JOINTS IN CONCRETE CURB NOT TO EXCEED 10' SPACING THROUGH DRIVEWAY SECTION.
2. ALL DRIVEWAYS MUST BE AT LEAST 5 FEET FROM THE PROPERTY LINE AND AT LEAST 30 FEET FROM A STREET RIGHT-OF-WAY.
3. ONLY ONE DRIVEWAY ENTRANCE PER PARCEL UNLESS OTHERWISE APPROVED BY CITY.
4. NEENAH R-1914-A CASTING IS REQUIRED FOR CURB STOPS LOCATED IN DRIVEWAYS.
5. MAX. CROSS SLOPE OF SIDEWALK THROUGH DRIVEWAY IS 0.02 FT/FT. ADJUST APRON RUNNING SLOPE AS NEEDED.



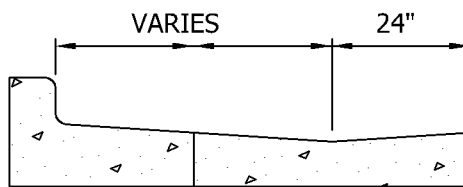
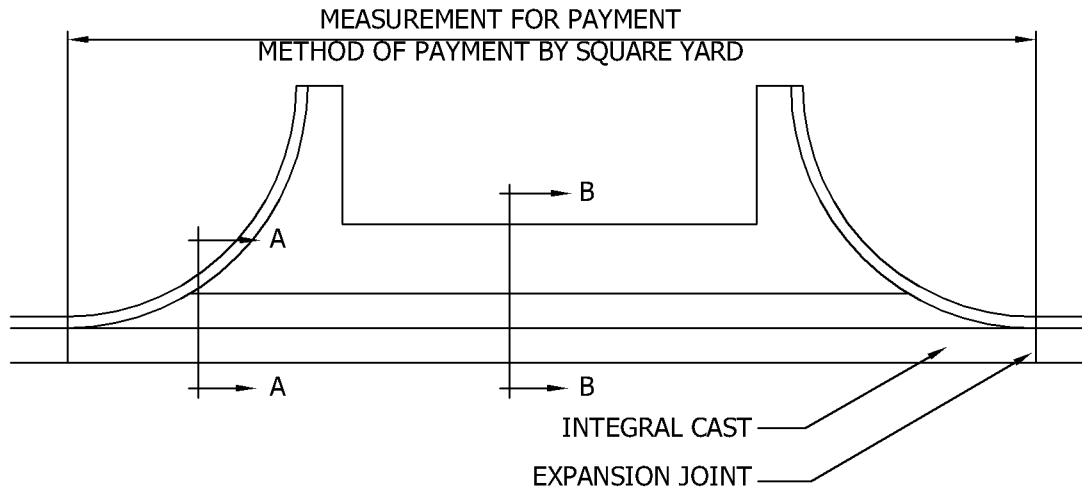
**STANDARD DETAILS**

URBAN RESIDENTIAL DRIVEWAY APRON

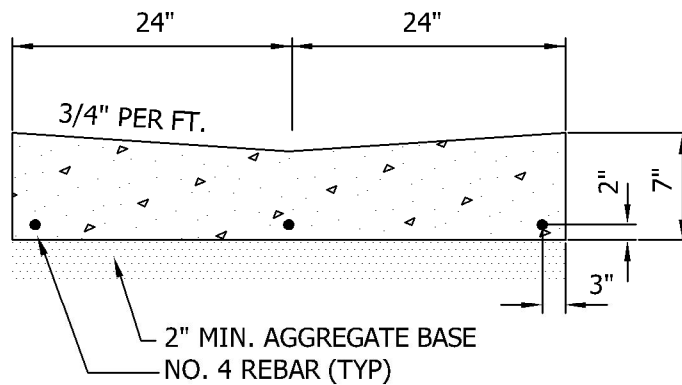
**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2016

CITY PLATE NO.  
STR-9



SECTION A-A THRU  
B618 C & G



SECTION B-B  
THRU CONCRETE GUTTER



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STANDARD DETAILS  
CONCRETE VALLEY GUTTER

**FOREST LAKE, MINNESOTA**

LAST REVISION:  
APR 2000

CITY PLATE NO.  
STR-10

## Appendix D: Agreements

## **COOPERATIVE AGREEMENT**

### **Comfort Lake-Forest Lake Watershed District and City of Forest Lake Forest Lake Wetland Treatment Basin Implementation Project**

This Cooperative Agreement (“Agreement”) is made between the Comfort Lake-Forest Lake Watershed District, a watershed district and political subdivision with powers at Minnesota Statutes Chapters 103B and 103D (“District”), and the City of Forest Lake, a statutory city and political subdivision of the State of Minnesota (“City”) (together, the “parties”).

#### **Recitals**

A. Forest Lake presently meets State water quality standards. The District, through its approved watershed management plan and in order to improve and prevent degradation of Forest Lake water quality, has set phosphorus reduction goals for each basin of Forest Lake.

B. Through statutory tax forfeit procedures, the City has assumed fee ownership of a parcel on the north shore of the eastern basin of Forest Lake known as 3<sup>rd</sup> Lake. The parcel is Washington County Parcel Number 13.032.21.24.0027 and generally described as Outlot A, Sunwood Subdivision (the “Property”). The Property contains a regional stormwater management basin located within a natural wetland that does not serve a current compliance function and is in need of rehabilitation. Evaluation by the District engineer indicates that this basin is a source of phosphorus to Forest Lake.

C. The District Board of Managers, pursuant to Minnesota Statutes §103B.251, has authorized work to improve the wetland/stormwater basin by actions including excavating nutrient-rich sediments, restoring native vegetative cover, protecting existing high quality vegetation and incorporating native buffers surrounding the basin (the “Project”).

D. The State of Minnesota, through the Board of Water and Soil Resources, has approved a Clean Water Fund grant for the Project as memorialized in the agreement attached hereto as Exhibit B, and incorporated herein (“Grant Agreement”).

E. In the mutual interest of protecting and improving the water quality of Forest Lake and downstream waters, the City wishes to afford the District the ability to undertake the Project. The parties independently have determined that the Property is not burdened by any third-party encumbrance that would impair the City’s grant to the District of any right under this Agreement.

#### **Design**

1. The City and District concur in the concept plan attached as Exhibit A hereto, and incorporated herein. The District may retain one or more consultants to prepare a project



design consistent with Exhibit A. Design is intended to occur during calendar year 2016 so that construction may occur in winter 2016-17.

2. During the design process, the City will timely advise the District as to any Project elements that the City would like to integrate into the design. If the District's design can incorporate these elements such that public efficiency or other public benefit would be realized, the parties will cooperate to do so and, by amendment to this Agreement, will establish terms to fairly assign the cost of that work.

3. With the City's cooperation and participation, the District will develop and carry out a plan for proper and effective engagement of homeowners in the vicinity of the Project and the broader public as appropriate.

4. The District will provide the City with 90 percent plans for review and approval. The City will advise the District as to its approval promptly and in any event within 20 days. The City recognizes that the District is investing in design on the basis of a mutual understanding as to the Project as indicated in Exhibit A. The City's approval determination will be based on consistency with Exhibit A and any further considerations of which it has advised the District in writing during the design process.

5. When the District transmits the 90 percent plans to the City, it will communicate to the City whether there may be excess material. At that time, the City will advise the District if it would like any excess material, and if so will designate an adequate and convenient upland area on the site for the District contractor to place the material. The City will be responsible for the condition and characteristics of the deposited material and to manage the deposited material for its further use. Nothing herein is a warranty as to any specific volume of material or prevents any adjustment to the work that may change the amount of excess material. If the City elects not to receive excess material, the District will require that its contractor remove it from the property.

6. The District will prepare final plans consistent with the 90 percent plans, which will be signed by a qualified professional engineer, and will be responsible, at its cost, to obtain all applicable approvals and permits for the work. The City will cooperate in the District's obtaining any permits for the project, including participating as a co-applicant if required by its ownership of the property. In accordance with Minnesota Statutes §103D.335, subdivision 24, the City will waive fees and costs related to any permit or approval it requires.

### **Construction**

7. The District may retain a contractor, serve as Project Owner, and construct the project in accordance with the final plans. The District's contracts with contractors will require that:

- (a) The contractor maintain general liability insurance in the amount of at least \$1.5 million. It will name the City as an additional insured thereunder, on a primary and

noncontributory basis and for both ongoing work and completed operations. The contractor may meet this policy limit by means of umbrella or excess coverage.

(b) The contractor will indemnify the City for the contractor's negligent acts and those of its subcontractors.

(c) The contractor will be responsible to determine the location of and protect all utilities.

(d) The contractor will provide performance and payment bonds to the District for project completion.

(e) The contractor will comply with local requirements for traffic and site management.

(f) The contractor will restore or repair, to substantially the same or better condition, any damage to the City's lands, equipment or facilities resulting from the contractor's activities, subject to City's responsibility to identify underground facilities under section 8, below.

8. The District, its representatives, contractors and subcontractors, may enter and occupy the Property and any contiguous lands owned by the City for construction, including but not limited to staging, stockpiling and operating equipment. Before bid solicitation, the City will identify any subsurface facilities, other than utility lines, within the construction limits, and the City and District will timely meet to set reasonable terms on construction limits, ingress and egress, road usage, work scheduling and site protections.

9. The District will give the City reasonable notice of pre-construction and construction meetings. The City and its authorized representatives may attend these meetings, inspect the project, and review all related documentation except as limited by law. The City may not exercise control over construction or direct the contractor.

10. The District in its judgment may direct adjustments of the work with or without field directive, by work change directive, or by change order. Notwithstanding, the District must secure the City's concurrence in any change to the project that does not conform to Exhibit A. The City will communicate its decision on any such proposed change as promptly as possible. The District is responsible to ensure that any project change meets the requirements of all other permitting authorities.

11. The District will notify the City in writing of substantial completion. The City may inspect the project and, within 20 days of receipt of notice, will reply in writing concurring in substantial completion or stating in detail in what respects the work does not conform to the approved plans. In the latter event, the parties will consult promptly and in good faith to resolve any City objection. Until resolution is reached, nothing herein prevents the District from administering the contract as it determines the public interest requires.

12. On the District engineer's certification of completion, all improvements, whether natural or containing artificial components, will be considered to be incorporated into the real property, as land alterations, fixtures or otherwise and, thereby, become elements of the fee owner's land interests.

### **Maintenance**

13. During the contractor warranty period, and then for 25 years from the end thereof, the District, its representatives, contractors and subcontractors, may enter the property to inspect, maintain, repair and reconstruct elements of the project. The District will give prior notice to the City for any activity that will require the overnight staging or stockpiling of materials or equipment, in which case the parties will cooperate to accommodate mutual needs. The District will repair any damage caused to the property by its entry under this paragraph.

14. The District may maintain signage as required by the Grant Agreement. Consistent therewith, the City may impose reasonable conditions on signage dimensions, content and location.

15. As the fee owner and municipal land manager, the City will be responsible for day-to-day inspection and maintenance of the Property. This responsibility encompasses all matters not specifically related to the hydrologic and ecologic function of the Project and includes, but is not limited to, sanitation; inspection for and addressing obvious hazards resulting from events such as severe weather, inappropriate or unlawful use; and law enforcement.

16. For a period of 25 years from the end of the warranty period, the City will not without written District concurrence take any action, or authorize another to take any action, that disturbs or alters the Project.

17. At the end of the period stated in section 13, above, the City will assume maintenance responsibility and thereafter will maintain the Project in accordance with its NPDES municipal stormwater permit, as amended, and to preserve its function.

### **Cost and Liability Allocation**

18. Each party will bear the cost of carrying out its tasks and responsibilities under this Agreement. The District may apply funds from its Clean Water Fund grant and otherwise seek and apply funds from third-party sources to defray its costs.

19. Each party agrees to hold harmless, defend and indemnify the other party up to the maximum liability limits of Minnesota Statutes, Section 466.04, from and against that portion of any and all liability, loss, claim, damage or expense (including reasonable attorney fees, costs and disbursements) that the indemnified party may incur as a result of the performance of this

Agreement due to any negligent or willful act or omission of the indemnifying party. Notwithstanding, this Agreement creates no right in and waives no immunity, defense or liability limit of either party with respect to any third party or the other party to this Agreement. Only contractual remedies are available for the failure of a party to fulfill the terms of this Agreement. The District does not warrant the Project's water quality performance to the City.

20. This Agreement is not a joint powers agreement under Minnesota Statutes §471.59 and nothing herein constitutes either party's agreement to be responsible for the acts or omissions of the other party pursuant to subdivision 1a of that statute. No employee, representative, contractor or consultant of either party to this Agreement acts in any respect as the agent or representative of the other party.

### Miscellaneous

21. The following are the project representatives for each party. By executing this Agreement, each party delegates to its project representative the authority to provide notice and make decisions of approval as explicitly provided for in this Agreement. All notices under this Agreement will be in writing and will be delivered to the attention of the project representative as follows:

<u>District</u>	<u>City</u>
Administrator Re: Forest Lake Wetland Treatment Basin Comfort Lake-Forest Lake WD 44 Lake Street South, Suite A Forest Lake MN 55025	Administrator Re: Forest Lake Wetland Treatment Basin City of Forest Lake, City Hall 1408 Lake Street South Forest Lake MN 55025

Either party may change its project representative or address for notice purposes by written notice to the other party given as provided above.

22. A party's failure to insist on the strict performance of any obligation under this Agreement, or to exercise any option, remedy or right herein, will not waive or relinquish that party's right in the future to insist on strict performance of that or any other obligation. A party's waiver of a breach of an obligation of this Agreement will not be construed as a waiver of any subsequent breach of that or any other obligation. A waiver must be in writing and signed by the party.

23. In exercising its rights and fulfilling its responsibilities under this Agreement, and wherever this Agreement provides for an exercise of discretion, each party will act in good faith and consistent with shared goals and interests in the Project.

24. This Agreement is effective when fully executed by the parties. It will remain in force until the District's right of entry has elapsed pursuant to paragraph 13, above, or unless terminated by mutual written agreement of the Parties.

25. This Agreement incorporates the above Recitals. The parties agree that this Agreement is made for mutual consideration and is legally binding pursuant to the terms herein.

*Approved for Form and Execution:*

  
\_\_\_\_\_  
CLFLWD Counsel

**COMFORT LAKE-FOREST LAKE WATERSHED DISTRICT**

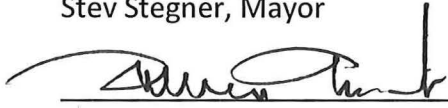
  
\_\_\_\_\_  
Jackie Anderson, President

Date: 10/27/16

**CITY OF FOREST LAKE**

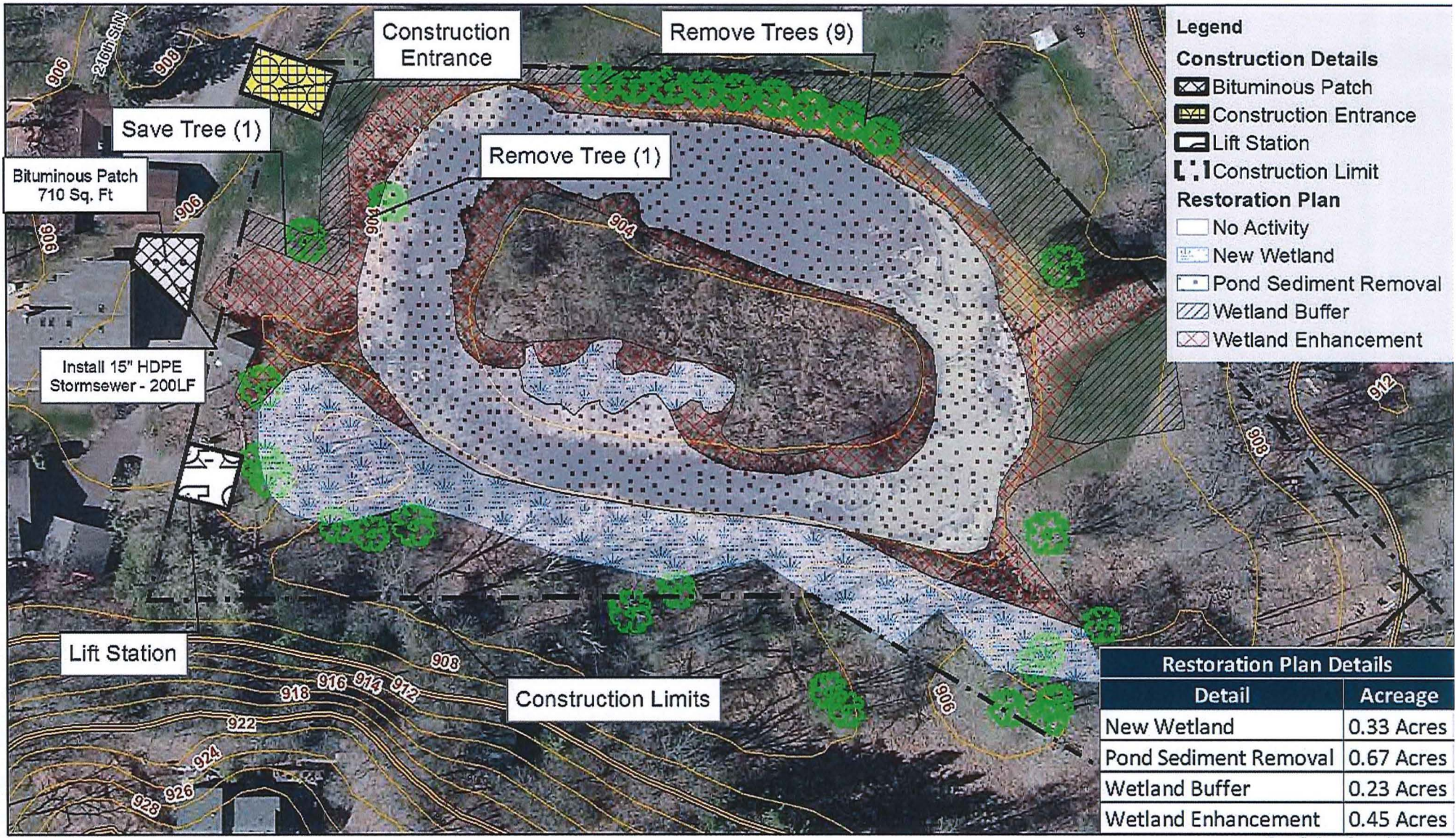
  
\_\_\_\_\_  
Stev Stegner, Mayor

Date: 10/24/2016

  
\_\_\_\_\_  
Jolleen Chaika, Clerk

Date: 10/24/16

Date: 9/2/2016 Time: 2:23:40 PM Author: X:\Clients\_WD\00376\_CLF\WD0151\_3rd\_Lake\_Pond\_imp109\_GIMS\_ProjectName\GIS\Construction Details.mxd



Restoration Plan Details	
Detail	Acreage
New Wetland	0.33 Acres
Pond Sediment Removal	0.67 Acres
Wetland Buffer	0.23 Acres
Wetland Enhancement	0.45 Acres

### 3rd Lake Pond Construction Details

Forest Lake, MN





**FY 2016 STATE OF MINNESOTA  
BOARD OF WATER and SOIL RESOURCES  
COMPETTIVE GRANTS PROGRAM  
GRANT AGREEMENT**

0000237704	
3000006619	

Amount	Fund Code	Fund Title	Project Code	Activity Code	Fiscal Year	Project Name
\$162,000	441502	2302	R9P32LWM	R9PC095	2016	Projects and Practices
\$429,284	441502	2302	R9P32LWM	R9PC095	2016	Projects and Practices

*The Above Information is For BWSR Use Only*

This Grant Agreement is between the State of Minnesota, acting through its Board of Water and Soil Resources (Board) and Comfort Lake-Forest Lake WD, 44 Lake Street South, Suite A, Forest Lake Minnesota 55025.

C16-2191	Forest Lake Wetland Treatment Basin Implementation	\$162,000
C16-7918	Moody Lake Wetland Rehabilitation	\$429,284

**Total Grant Awarded: \$591,284**

**Recitals**

1. The Laws of Minnesota 2015, 1st Special Session, Chapter 2, Article 2, Section 7(b – Projects and Practices) (c – Accelerated Implementation) and (h – Community Partners), appropriated Clean Water Fund (CWF) funds to the Board for the FY 2016 Competitive Grants Program.
2. Minnesota Statutes 103B.101, subd. 9 (1), and 103B.3369, authorize the Board to award this grant.
3. The Board has adopted the FY 2016 Clean Water Fund Competitive Grants Policy and authorized the FY 2016 Competitive Grants Program in Board Resolution 15-45.
4. The Board has adopted Board Resolution 15-91 to allocate funds for the FY 2016 Competitive Grants Programs.
5. The Grantee has submitted a BWSR approved work plan for this Program which is incorporated into this agreement by reference.
6. The Grantee represents that it is duly qualified and agrees to perform all services described in this grant agreement to the satisfaction of the State.
7. As a condition of the grant, Grantee agrees to minimize administration costs.

**Authorized Representative**

The State's Authorized Representative is Marcey Westrick, Clean Water Coordinator, BWSR, 520 Lafayette Road North, Saint Paul, MN 55155, 651-284-4153, or her successor, and has the responsibility to monitor the Grantee's performance and the authority to accept the services and performance provided under this Grant Agreement.

The Grantee's Authorized Representative is

**Mike Kinney, District Administrator  
44 Lake Street South, Suite A  
Forest Lake, MN 55025  
651-395-5855**

If the Grantee's Authorized Representative changes at any time during this grant agreement, the Grantee must immediately notify the Board.

## Grant Agreement

### 1 Term of Grant Agreement

- 1.1 **Effective date:** The date the Board obtains all required signatures under Minn. Stat. § 16B.98, Subd.5. **The Grantee must not begin work under this grant agreement until this Grant Agreement is fully executed and the Grantee has been notified by the State's Authorized Representative to begin the work.**
- 1.2 **Expiration date:** December 31, 2018, or until all obligations have been satisfactorily fulfilled, whichever comes first.
- 1.3 **Survival of Terms:** The following clauses survive the expiration or cancellation of this Agreement: 7. Liability; 8. State Audits; 9. Government Data Practices; 11. Publicity and Endorsement; 12. Governing Law, Jurisdiction, and Venue; 14. Data Disclosure; and 18. Intellectual Property Rights.

### 2 Grantee's Duties

The Grantee will comply with required grants management policies and procedures set forth through Minn. Stat. § 16B.97, Subd.4(a)(1).

The Grantee is responsible for the specific duties for the Program as follows:

- 2.1 **Implementation:** The Grantee will implement the work plan, which is incorporated into this Agreement by reference, according to the FY 2016 Clean Water Fund Competitive Grants Policy.
- 2.2 **Reporting:** All data and information provided in a Grantee's report shall be considered public.
  - 2.2.1 The Grantee will submit an annual progress report to the Board by February 1 of each year on the status of program implementation by the Grantee. Information provided must conform to the requirements and formats set by the Board.
  - 2.2.2 The Grantee will display on its website the previous calendar year's detailed information on the expenditure of these State grant funds and measurable outcomes as a result of the expenditure of these State grant funds according to the format specified by the BWSR, by March 15 of each year.
  - 2.2.3 The Grantee will submit a final progress report to the Board by February 1, 2019 or within 30 days of completion of the Project, whichever occurs sooner. Information provided must conform to the requirements and formats set by the Board.
- 2.3 **Match:** The Grantee will ensure any local match requirement will be provided as stated in Grantee's approved work plan.

### 3 Time

The Grantee must comply with all the time requirements described in this Grant Agreement. In the performance of this Grant Agreement, time is of the essence.

### 4 Terms of Payment

- 4.1 Grant funds will be distributed in three installments: 1) The first payment of 50% will be distributed after the execution of the Grant Agreement. 2) The second payment of 40% will be distributed after the first payment of 50% has been expended and reporting requirements have been met. An eLINK Interim Financial Report that summarizes expenditures of the first 50% must be signed by the Grantee and approved by BWSR. Selected grantees may be required at this point to submit documentation of the expenditures reported on the Interim Financial Report for verification. 3) The third payment of 10% will be distributed after the grant has been fully expended and reporting requirements are met. The final, 10% payment must be requested within 30 days of the expiration date of the Grant Agreement. An eLINK Final Financial Report that summarizes final expenditures for the grant must be signed by the grantee and approved by BWSR.
- 4.2 All costs must be incurred within the grant period.
- 4.3 All incurred costs must be paid before the amount of unspent grant funds is determined. Unspent grant funds must be returned within 30 days of the expiration date of the Grant Agreement.
- 4.4 The obligation of the State under this Grant Agreement will not exceed the amount stated above.
- 4.5 This grant includes an advance payment of 50 percent of the grant's total amount. Advance payments allow the grantee to have adequate operating capital for start-up costs, ensure their financial commitment to landowners and contractors, and to better schedule work into the future.



4.6 Contracting and Bidding Requirements Per Minn. Stat. §471.345, grantees that are municipalities as defined in Subd. 1 must do the following if contracting funds from this grant contract agreement for any supplies, materials, equipment or the rental thereof, or the construction, alteration, repair or maintenance of real or personal property

4.6.1 If the amount of the contract is estimated to exceed \$100,000, a formal notice and bidding process must be conducted in which sealed bids shall be solicited by public notice. Municipalities may, as a best value alternative, award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat. §16C.28, Subd. 1, paragraph (a), clause (2)

4.6.2 If the amount of the contract is estimated to exceed \$25,000 but not \$100,000, the contract may be made either upon sealed bids or by direct negotiation, by obtaining two or more quotations for the purchase or sale when possible, and without advertising for bids or otherwise complying with the requirements of competitive bidding. All quotations obtained shall be kept on file for a period of at least one year after receipt thereof. Municipalities may, as a best value alternative, award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat. §16C.28, Subd. 1, paragraph (a), clause (2) and paragraph (c).

4.6.3 If the amount of the contract is estimated to be \$25,000 or less, the contract may be made either upon quotation or in the open market, in the discretion of the governing body. If the contract is made upon quotation it shall be based, so far as practicable, on at least two quotations which shall be kept on file for a period of at least one year after their receipt. Alternatively, municipalities may award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat. §16C.28, Subd. 1, paragraph (a), clause (2)

4.6.4 Support documentation of the bidding process utilized to contract services must be included in the grantee's financial records, including support documentation justifying a single/sole source bid, if applicable.

4.6.5 For projects that include construction work of \$25,000 or more, prevailing wage rules apply per; Minn. Stat. §§177.41 through 177.44 consequently, the bid request must state the project is subject to prevailing wage. These rules require that the wages of laborers and workers should be comparable to wages paid for similar work in the community as a whole. A prevailing wage form should accompany these bid submittals.

## 5 Conditions of Payment

All services provided by the Grantee under this Grant Agreement must be performed to the State's satisfaction, as set forth in this Agreement and in the BWSR approved work plan for this program. Compliance will be determined at the sole discretion of the State's Authorized Representative and in accordance with all applicable federal, State, and local laws, policies, ordinances, rules, FY 2016 Clean Water Fund Competitive Grants Policy, and regulations. The Grantee will not receive payment for work found by the State to be unsatisfactory or performed in violation of federal, State, or local law.

The Minnesota Department of Administration's Office of Grants Management Policy on Grant Closeout Evaluation (Policy 08 – 13) requires the Board to consider a grant applicant's past performance before awarding subsequent grants to them. The Board must consider a grant applicant's performance on prior grants before making a new grant award of over \$5,000. The Board may withhold payment on this and grants from other programs if the Grantee is not in compliance with all Board reporting requirements.

## 6 Assignment, Amendments, and Waiver

6.1 **Assignment.** The Grantee may neither assign nor transfer any rights or obligations under this Grant Agreement without the prior consent of the State and a fully executed Assignment Agreement, executed and approved by the same parties who executed and approved this Grant Agreement, or their successors in

office.

- 6.2 **Amendments.** Any amendment to this Grant Agreement must be in writing and will not be effective until it has been executed and approved by the same parties who executed and approved the original Grant Agreement, or their successors in office. Amendments must be executed prior to the expiration of the original agreement or any amendments thereto.
- 6.3 **Waiver.** If the State fails to enforce any provision of this Grant Agreement, that failure does not waive the provision or its right to enforce it.

## 7 Liability

The Grantee must indemnify, save, and hold the State, its agents, and employees harmless from any claims or causes of action, including attorney's fees incurred by the State, arising from the performance of this Grant Agreement by the Grantee or the Grantee's agents or employees. This clause will not be construed to bar any legal remedies the Grantee may have for the State's failure to fulfill its obligations under this Grant Agreement.

## 8 State Audits

Under Minn. Stat. § 16B.98, subd. 8, the Grantee's books, records, documents, and accounting procedures and practices of the Grantee or other party relevant to this Grant Agreement or transaction are subject to examination by the Board and/or the State Auditor or Legislative Auditor, as appropriate, for a minimum of six years from the end of this Grant Agreement, receipt and approval of all final reports, or the required period of time to satisfy all State and program retention requirements, whichever is later.

- 8.1 The books, records, documents, accounting procedures and practices of the Grantee and its designated local units of government and contractors relevant to this grant, may be examined at any time by the Board or Board's designee and are subject to verification. The Grantee or delegated local unit of government will maintain records relating to the receipt and expenditure of grant funds.
- 8.2 The Grantee or designated local unit of government implementing this Agreement will provide for an audit that meets the standards of the Office of State Auditor. The audit must cover the duration of the Agreement Period and be performed within one year after the end of the Agreement Period or when routinely audited, whichever occurs first. Copies of the audit report must be provided to the Board if requested.

## 9 Government Data Practices

The Grantee and State must comply with the Minnesota Government Data Practices Act, Minn. Stat. Ch. 13, as it applies to all data provided by the State under this Agreement, and as it applies to all data created, collected, received, stored, used, maintained, or disseminated by the Grantee under this Grant Agreement. The civil remedies of Minn. Stat. § 13.08 apply to the release of the data referred to in this clause by either the Grantee or the State.

## 10 Workers' Compensation

The Grantee certifies that it is in compliance with Minn. Stat. § 176.181, subd. 2, pertaining to workers' compensation insurance coverage. The Grantee's employees and agents will not be considered State employees. Any claims that may arise under the Minnesota Workers Compensation Act on behalf of these employees and any claims made by any third party as a consequence of any act or omission on the part of these employees are in no way the State's obligation or responsibility.

## 11 Publicity and Endorsement

- 11.1 **Publicity.** Any publicity regarding the subject matter of this grant agreement must identify the Board as the sponsoring agency. For purposes of this provision, publicity includes notices, informational pamphlets, press releases, research, reports, signs, and similar public notices prepared by or for the Grantee individually or jointly with others, or any subcontractors, with respect to the program, publications, or services provided resulting from this grant agreement.
- 11.2 **Endorsement.** The Grantee must not claim that the State endorses its products or services.

## **12 Governing Law, Jurisdiction, and Venue**

Minnesota law, without regard to its choice-of-law provisions, governs this Grant Agreement. Venue for all legal proceedings out of this Agreement, or its breach, must be in the appropriate State or federal court with competent jurisdiction in Ramsey County, Minnesota.

## **13 Termination**

13.1 The State may cancel this Grant Agreement at any time, with or without cause, upon 30 days' written notice to the Grantee. Upon termination, the Grantee will be entitled to payment, determined on a pro rata basis, for services satisfactorily performed.

13.2 In the event of a lawsuit, an appropriation from a Clean Water Fund is canceled to the extent that a court determines that the appropriation unconstitutionally substitutes for a traditional source of funding.

## **14 Data Disclosure**

Under Minn. Stat. § 270C.65, Subd. 3, and other applicable law, the Grantee consents to disclosure of its social security number, federal employer tax identification number, and/or Minnesota tax identification number, already provided to the State, to federal and State tax agencies and State personnel involved in the payment of State obligations. These identification numbers may be used in the enforcement of federal and State tax laws which could result in action requiring the Grantee to file State tax returns and pay delinquent State tax liabilities, if any.

## **15 Prevailing Wage**

It is the responsibility of the Grantee or contractor to pay prevailing wages on construction projects to which State prevailing wage laws apply (Minn. Stat. 177.42 – 177.44). All laborers and mechanics employed by grant recipients and subcontractors funded in whole or in part with these State funds shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality.

## **16 Constitutional Compliance**

It is the responsibility of the Grantee to comply with requirements of the Minnesota Constitution regarding use of Clean Water Funds to supplement traditional sources of funding.

## **17 Signage**

It is the responsibility of the Grantee to comply with requirements for project signage, as provided in, Minnesota Laws 2010, Chapter 361, article 3, section 5 (b) for Clean Water Fund projects.

## **18 Intellectual Property Rights**

The State owns all rights, title, and interest in all of the intellectual property rights, including copyrights, patents, trade secrets, trademarks, and service marks in the Works and Documents *created and paid for under this grant*. Works means all inventions, improvements, discoveries (whether or not patentable), databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, and disks conceived, reduced to practice, created or originated by the Grantee, its employees, agents, and subcontractors, either individually or jointly with others in the performance of this grant. Works includes "Documents." Documents are the originals of any databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, disks, or other materials, whether in tangible or electronic forms, prepared by the Grantee, its employees, agents, or subcontractors, in the performance of this grant. The Documents will be the exclusive property of the State and all such Documents must be immediately returned to the State by the Grantee upon completion or cancellation of this grant at the State's request. To the extent possible, those Works eligible for copyright protection under the United States Copyright Act will be deemed to be "works made for hire." The Grantee assigns all right, title, and interest it may have in the Works and the Documents to the State. The Grantee must, at the request of the State, execute all papers and perform all other acts necessary to transfer or record the State's ownership interest in the Works and Documents.


IN WITNESS WHEREOF, the parties have caused this Grant Agreement to be duly executed intending to be bound thereby.

Approved:

Comfort Lake-Forest Lake WD

Board Of Water and Soil Resources

By : JACKIE A. ANDERSON  
(print)

By : 

  
(signature)

Title : President, CLPLWD

Title : Central Region Manager

Date : 3/17/16

Date : 3/21/16





**FUNDING AGREEMENT**  
**CITY of FOREST LAKE and the COMFORT LAKE-FOREST LAKE WATERSHED DISTRICT**

**FOREST LAKE ENHANCED STREET SWEEPING IMPLEMENTATION**

A. THIS FUNDING AGREEMENT ("Agreement") is entered into by the City of Forest Lake, Minnesota, a municipal corporation ("City") and the Comfort Lake-Forest Lake Watershed District, a special purpose unit of local government under Minnesota Statutes Chapters 103B and 103D (CLFLWD).

B. The CLFLWD's duly adopted Watershed Management Plan (2011, amended Jan. 2018) identifies water quality treatment projects and activities in the Forest Lake watershed, including increased street sweeping and other projects within the watershed; its Forest Lake North Direct Stormwater Retrofit Analysis (Jan. 2016), South Direct Stormwater Retrofit Analysis (Mar. 2014), and Draft Forest Lake Diagnostic Study & Implementation Plan (Oct. 2017) all identify actions to protect and improve water quality in Forest Lake, including increased street sweeping;

C. The City's TH61 Aesthetics and Water Quality Improvements Planning Study (April 2012) identifies priority projects within the corridor to improve water quality in Forest Lake; its capital improvement program in its duly adopted Local Water Management Plan (Sept. 2013) incorporates this study;

D. In February 2018, Emmons and Olivier Resources, Inc. completed the final City of Forest Lake Enhanced Street Sweeping Management Plan which detailed the benefits and costs of purchasing advanced street sweeping equipment and implementing an advanced street sweeping program within various drainage areas in the City of Forest Lake, including the Forest Lake, Shields Lake, Keewahtin Lake (formerly Sylvan Lake), and Sunrise River/Comfort Lake watersheds (the "Program");

E. The Board of Water and Soil Resources (BWSR) has awarded a Clean Water Fund (CWF) grant to the City for the Program, pursuant to which it has executed an agreement ("Grant Agreement").

Based on the foregoing recitals, each incorporated into this Agreement, the City and the CLFLWD, each duly authorized by its governing body, agree as follows, intending to be legally bound:

**OPERATION**

1. The City will procure all equipment, materials and labor necessary or convenient to implement the Program.
2. The City will prepare a final enhanced street sweeping management plan for watersheds located in the CLFLWD, subject to CLFLWD concurrence, not to be unreasonably withheld ("Plan"). At a minimum, the number of sweepings in the Plan for those watersheds will meet the Enhanced (Recommended) option as described on pages 24 and 25 of the February 2018 City of Forest Lake Street Sweeping Management Plan, as referenced in paragraph D above. The City will conduct that part of the Program within CLFLWD boundaries in accordance with the Plan until three full years of sweeping operations have been completed, or for the length of time prescribed by BWSR, whichever is longer.

**MONITORING and EDUCATION**

3. The City will develop a report format and content for CLFLWD concurrence, not to be unreasonably withheld, that reviews sweeping locations and frequencies and provides useful data on both sediment and phosphorus removals. The City will report on its Program activity annually to the CLFLWD.

4. The City will prepare and implement education and community outreach elements of the Program as required by the Grant Agreement.

**FUNDING**

5. The Program will be funded as follows:

- a. The CLFLWD will contribute 35.3 percent of the local match required by the Grant Agreement, not to exceed \$19,415.
- b. All remaining Program costs are the responsibility of the City. The City may defray its costs by means of its CWF grant and any other source of funds it may arrange.
- c. Otherwise, each party will bear its own administrative costs and its costs for those actions it is responsible to take under this Agreement.

6. The CLFLWD will provide its funds under paragraph 5.a, above, on a reimbursement basis within 30 days of City invoice of its sweeper purchase. If the City does not fulfill its obligations to the CLFLWD under this Agreement for a period of three full years, or for the length of time prescribed by BWSR, whichever is longer, of sweeping operations the District, after notice and a reasonable opportunity to cure, is entitled to a return of its funds.

**GRANT ADMINISTRATION and COMPLIANCE**

7. The City, as CWF grantee, is solely responsible for conformance to all terms of the Grant Agreement.

**GENERAL TERMS**

8. Any CLFLWD right of approval under this Agreement is solely for the purpose of ensuring the proper use of its public funds. The City is entirely responsible for the means, manner and method of performing the Program. This Agreement is not a joint powers agreement under Minnesota Statutes §471.59. Nothing herein constitutes one party's agreement to be responsible for the acts or omissions of another party pursuant to subdivision 1(a) of that statute. The City will hold the CLFLWD, its managers, staff and representatives, harmless and indemnify them against any claim, expense or damage, including attorney fees, arising from the City's conduct of the Program.

9. Notwithstanding any other term of this Agreement, nothing herein creates a right in any third party or waives an immunity, defense or liability limit of either party with respect to any third party. As between the parties, only contractual remedies are available for a party's failure to fulfill the terms of this Agreement.

10. The following will be used for any communication under this Agreement:

- |         |  |
|---------|--|
| City:   | City of Forest Lake<br>1408 Lake Street South<br>Forest Lake, MN 55025<br>ATTN: City Administrator |
| CLFLWD: | Comfort Lake-Forest Lake Watershed District<br>44 Lake Street South, Suite A                       |



Forest Lake, MN 55025  
ATTN: Administrator

or at such other address of which a party may, from time to time, notify the other party in writing.

11. If any party waives any default or non-performance by another party, the waiver will apply only to the cited instance and will not waive any other prior or later default.

12. This Agreement is the entire agreement between the parties as to the Program and supersedes all other prior agreements and understandings, written or oral, between the parties.

13. An alteration, variation, modification, or waiver of any provision of this Agreement is valid only when reduced to writing as an amendment to this Agreement signed by the parties hereto or their successors.

14. A party may not assign or transfer this Agreement or any right or obligation hereunder without the written consent of the other party.

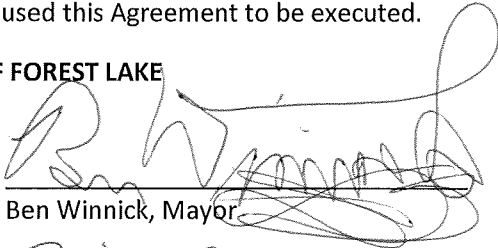
15. In participating in this Agreement, each party will act in accordance with the Minnesota Data Practices Act, Minnesota Statutes chapter 13. Each party will consult with the other as appropriate with respect to any data request it may receive. Data and documents of any kind produced by the Program, and any new information or technology developed, are subject to the intellectual property terms of the Grant Agreement and otherwise may not be copyrighted, patented, trademarked or designated as trade secret by a party.

16. This Agreement is effective on full execution by the parties and terminates four years thereafter. Notwithstanding, the terms of this Agreement will survive termination as necessary until all matters relating to performance hereunder and arising before termination are resolved.

IN TESTIMONY WHEREOF, the City of Forest Lake and the Comfort Lake-Forest Lake Watershed District have caused this Agreement to be executed.

**CITY OF FOREST LAKE**

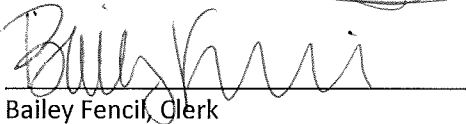
By:

  
Ben Winnick, Mayor

Date:

3/12/18

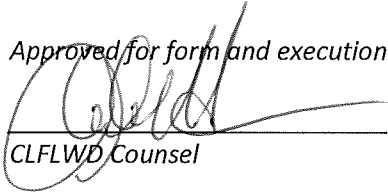
By:

  
Bailey Fencil, Clerk

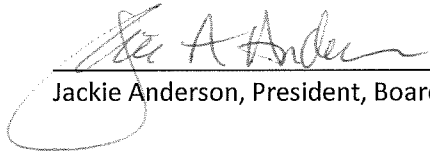
Date:

3/12/18

*Approved for form and execution*

  
CLFLWD Counsel

COMFORT LAKE-FOREST LAKE WATERSHED DISTRICT

By:   
Jackie Anderson, President, Board of Managers

Date: 5/22/18

**COOPERATIVE AGREEMENT  
FOR MAINTENANCE OF  
STORMWATER MANAGEMENT FACILITIES AND WATERCOURSE AND BASIN CROSSINGS**

**Between the Comfort Lake–Forest Lake Watershed District  
and the City of Forest Lake**

This Agreement is made by and between the Comfort Lake – Forest Lake Watershed District (CLFLWD), a watershed district with purposes and powers set forth at Minnesota Statutes Chapters 103B and 103D, and the City of Forest Lake (City), an political subdivision of the State of Minnesota.

**Recitals and Statement of Purpose**

WHEREAS pursuant to authority of Minnesota Statute §103D.345, the CLFLWD implements a permitting program under which stormwater management and watercourse and basin crossings requirements, presently referenced as Rules 2.0 and 6.0, apply to land development and redevelopment activities; and

WHEREAS City is subject to those requirements; and

WHEREAS under the Stormwater Management rule and Watercourse and Basin Crossing rule, certain land development activities require a landowner to file for recordation a declaration or similar instrument establishing the landowner's obligation in perpetuity to inspect and maintain stormwater management facilities and crossing structures; and

WHEREAS in each case a public landowner, as an alternative to a recorded instrument, may document its obligation in an unrecorded written agreement with the CLFLWD; and

WHEREAS Rule 2.5.8, Stormwater Management Facility Maintenance Instrument, further states that if a municipal facility maintenance plan has been approved by the CLFLWD and the municipality will maintain the facility, a separate maintenance instrument is not required; and

WHEREAS City has a District-approved Local Surface Water Management Plan (Plan) and a state approved Municipal Separate Storm Sewer System Permit (MS4) from the Minnesota Pollution Control Agency (MPCA) that includes a Storm Water Pollution Prevention Plan (SWPPP); and

WHEREAS the City SWPPP conforms to maintenance requirements set by the MPCA after rulemaking and a stakeholder-intensive process, and includes a number of specific best management practices addressing inspection, follow up maintenance/repair, reporting, evaluation, and vegetation management; and

WHEREAS City represents that it has the rights of property ownership and control sufficient to perform the responsibilities it assumes under this Agreement; and

WHEREAS the parties concur that it is clearer and procedurally more efficient for the CLFLWD and City to agree at this time on the acceptance of facility inspection and maintenance practices as presently set forth in the City MS4 Permit and SWPPP to serve as a municipal facility maintenance plan and standard requirements, so that this agreement may be incorporated into future permits as applicable;

THEREFORE IT IS AGREED as follows:

1. City will maintain stormwater management facilities and watercourse and basin crossings in conformance with its MPCA-approved MS4 Permit and SWPPP, specifically including but not limited to:
  - a. All stormwater retention, detention and treatment basins must be inspected at least once a year to determine that basin retention and treatment characteristics are adequate. A storage treatment basin will be considered inadequate if sediment has decreased the wet storage volume by 50 percent or dry storage volume by 25 percent of its original design volume. Based on this inspection, if a stormwater basin requires sediment cleanout, the basin will be restored to its original design contours and vegetated state within one year of the inspection date.
  - b. All grit chambers, sump catch basins, sump manholes, outlet structures, culverts, outfall structures and other stormwater facilities for which maintenance requirements are not otherwise specified herein must be inspected in the spring and fall of each year. Within 30 days of the inspection date, all accumulated sediment and debris must be removed such that each stormwater facility operates as designed and permitted. Contributing drainage areas must be kept clear of litter and vegetative debris, inflow pipes and overflow spillways kept clear, inlet areas kept clean, and undesirable vegetation removed. Erosion impairing the function or integrity of the facilities, if any, will be corrected, and any structural damage impairing or threatening to impair the function of the facilities must be repaired.
  - c. Volume control facilities and contributing drainage areas must be inspected at least twice annually during the operational period (between spring snowmelt and first substantial snowfall) and monitored after rainfall events of 1 inch or more to ensure that the contributing drainage area is clear of litter and debris, inflow pipes and overflow spillways are clear, inlet areas are clean, undesirable vegetation is removed and there is no erosion impairing or threatening to impair the function of a facility. If sediment has accumulated in an infiltration feature, within 30 days of inspection deposited sediments must be removed, the infiltration capacity of the underlying soils must be restored, and any surface disturbance must be stabilized. Inspection must ensure that sediment traps and forebays are trapping sediment and that more than 50 percent of the storage volume remains, the contributing drainage area is stable (i.e., no erosion is observed), and inlets and outlet/overflow spillways are in good condition with no erosion. Maintenance techniques used must protect the infiltration

capacity of the practice by limiting soil compaction to the greatest extent possible (e.g., by using low-impact earth-moving equipment).

- d. In addition to the applicable requirements above, rain gardens must be kept clean of excess sediment and debris. Healthy plant growth must be maintained in rain gardens by removing dead vegetation in the spring of each year, and the top two to five inches of media must be removed and replaced every three to five years so as not to impede filtration of sediment and oils.
- e. Pervious pavers and pervious concrete must be inspected at least once each year, after a storm events exceeding inch inch of rainfall in a 24 hour period, and otherwise annually; surface openings must be vacuumed in dry weather to remove dry, encrusted sediment as necessary; and broken units that impair the structural integrity of the surface must be replaced. If water stands for an more than 48 hours, base materials must be replaced within 9 months from the date of the inspection and report of the standing water occurred.
- f. Underground storage chambers must be inspected at least once a year to ensure that adequate storage capacity remains. Capacity will be considered inadequate if sediment has decreased the storage volume by 50 percent of its original design volume. Accumulated debris and sediment will be removed, and inlet and outlet structures will be cleared of any flow impediments, within 3 months from the date of the inspection and report that identified the loss of capacity or flow impediments.
- g. Any BMPs for which maintenance requirements are not otherwise provided in this Agreement or the SWPPP will be inspected and maintained to provide the function for which they were designed.
- h. Submission of the City Metro MS4 Permit annual report to the CLFLWD will be made at the same time that it is required to be submitted to the MPCA. The annual report format is available on-line and can be downloaded by CLFLWD.
- i. Watercourse and basin crossings and other conveyances shall be maintained in good repair at all times to preserve channel/bed stability, hydraulic capacity, and navigational capacity if designed for navigational capacity.

2. In addition, City will respond promptly to notice from the CLFLWD that a facility or crossing structure may require inspection or maintenance and will take action following inspection in the same manner as provided above.

3. The CLFLWD accepts City's MPCA-approved MS4 Permit and SWPPP as a municipal facility maintenance plan under Rule 2.5.8, subject to the terms of this Agreement.

4. If City conveys into private ownership a fee interest in all or any portion of the public property that is subject to this Agreement, it must require as a condition of sale, and enforce: (a) that the purchaser record a declaration on the property incorporating the stormwater management facility

maintenance requirements of this Agreement; and (b) that recordation occur either before any encumbrance is recorded on the property or, if after, only as accompanied by a subordination and consent executed by the encumbrance holder ensuring that the declaration will run with the land in perpetuity. If City conveys into public ownership a fee interest in all or any portion of the property that is subject to this Agreement, it must require as a condition of the purchase and sale agreement that the purchaser accept an assignment of all obligations vested under this Agreement.

5. The CLFLWD may include in any specific permit other or different conditions as it may determine warranted for the circumstances of that permit.

6. This Agreement is in force for five years from the date on which it is fully executed and will renew automatically for five-year terms unless terminated by the parties. This Agreement may be amended only in a writing signed by the parties. Either party may terminate this Agreement on 30 days' written notice to the other party. Maintenance obligations that have become binding by incorporation into an approved permit before termination of the Agreement will survive termination.

7. Violation of an inspection, maintenance or reporting provision is a violation of the CLFLWD permit for a project and of this Agreement for which the CLFLWD may take civil action against the City, after completion of its notice of rule violation procedures.

8. The recitals are incorporated as a part of this Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement.

**COMFORT LAKE-FOREST LAKE WATERSHED DISTRICT**

By Kurt P Danichik 11-9-12 Date:  
President, Board of Managers

**CITY OF FOREST LAKE**

By:  Date:  
MAYOR

**COOPERATIVE AGREEMENT**  
**City of Forest Lake and Comfort Lake-Forest Lake Watershed District**

**BIXBY PARK WATER QUALITY IMPROVEMENT**  
**WETLAND PROJECT**

This Cooperative Agreement (“Agreement”) is made by and between the Comfort Lake-Forest Lake Watershed District, a watershed district with purposes and powers as set forth at Minnesota Statutes Chapters 103B and 103D (CLFLWD), and the City of Forest Lake, a statutory city in the State of Minnesota (“City”).

**Recitals**

A. The CLFLWD has adopted a watershed management plan (WMP) in accordance with Minnesota Statutes §103B.231, which at category 5229 identifies capital improvement projects to improve water quality and manage flows within the area tributary to Comfort Lake.

B. With the support of the City, the CLFLWD applied for and was awarded a Clean Water Fund grant in the amount of \$360,750 for the Bixby Park Water Quality Improvement Wetland Project (“Project”), which will enhance water quality treatment and flood storage capacity of an existing wetland complex within Bixby Park by modifying the existing ditch system, outlet, berms and diversions and installing stormwater management practices.

C. Under the grant agreement, on completion of construction the Project must be maintained for a period of 25 years.

D. The Project location, Bixby Park, is land owned by the City. The City would like to promote the Project’s role in protecting regional water quality and preventing flooding while using it as a passive recreation amenity, and otherwise making use of the Bixby Park property in ways that do not interfere with the Project.

E. The CLFLWD and the City enter into this Agreement to coordinate efforts and clarify roles and responsibilities for the Project.

**THEREFORE** the City and the CLFLWD agree as follows, intending to be legally bound hereby:

**1.0 DESIGN**

1.1 The conceptual design for the Project, prepared by the CLFLWD engineer, is included as Attachment A hereto and incorporated herein. Specifically, the conceptual design provides, among other things, for:

- (a) no expansion of the 100-year floodplain boundary;

- (b) for design events, containment of channelized flow within delineated areas;
- (c) no elevation increase in surface waters above or below the Bixby Park property up to the 100--year precipitation event; and
- (d) preservation of access routes to maintain advertising signs along Interstate 35.

The CLFLWD will provide final plans to the City for review and comment. The CLFLWD's final design will be signed by a professional engineer and must be consistent with the conceptual design.

1.2 At the time the CLFLWD completes the 90-percent plans, it will communicate to the City whether there may be excess spoils. Promptly thereafter, the City will advise the CLFLWD if it would like any excess spoils, and if so will designate an adequate and convenient upland area on the site for the CLFLWD contractor to place the spoils. The City will be responsible to manage the deposited spoils and to transport them for the City's further use. Nothing herein is a warranty as to any specific volume of spoils or prevents any adjustment to the work that may change the amount of excess spoils. If the City elects not to receive excess spoils, the District will require that its contractor remove them from the property.

1.3 The parties recognize that because the Project is funded by a Clean Water Fund grant, restrictions limit the site's potential to generate wetland bank or replacement credits. Accordingly, this Agreement does not provide for the Project to generate any such credits.

## **2.0 CONSTRUCTION**

2.1 The CLFLWD may construct the Project. In doing so, the CLFLWD will provide for construction in accordance with the final plans, may enter into one or more contracts to do so, and will serve as Project Owner for the purpose of administering the contract(s). The CLFLWD will obtain all approvals and permits for the work and will provide for the work to conform to local, state and federal requirements.



2.2 The City will cooperate in the CLFLWD's preparation of contract documents and construction by timely resolving questions regarding construction access and limits, work scheduling and conditions, and other matters within its authority. The City will cooperate in the CLFLWD's obtaining any permits for the Project, including participating as a co-applicant if required by its ownership of the property. In accordance with Minnesota Statutes §103D.335, subdivision 24, the City will waive fees and costs related to any permit or approval it requires. The CLFLWD will give the City reasonable notice of pre-construction and construction meetings concerning the Project. The City and its authorized representatives may attend these meetings, inspect the Project, and review all related documentation except as limited by law. The City may not exercise control over Project construction or direct the contractor.

2.3 The CLFLWD's contracts with contractors shall require that:

- (a) The contractor name the City as an additional insured for general liability on a primary basis and for both ongoing work and completed operations;
- (b) The contractor will indemnify the City for the contractor's negligent acts and those of its subcontractors.
- (c) The contractor will be responsible to determine the location of and protect all utilities;
- (d) The contractor will provide performance and payment bonds for Project completion;
- (e) The contractor will comply with local requirements for traffic and site control; and
- (f) The contractor will restore or repair, to substantially the same or better condition, any damage to the City's lands, equipment or facilities resulting from the contractor's activities.

2.4 The CLFLWD in its judgment may direct refinements with or without field directive, or by work change directive or change order. Except for field changes, the City will be notified of proposed changes and given the opportunity to confirm that they conform to the conceptual design and the criteria of paragraph 1.1. The City must concur in any change to the Project that does not conform to the conceptual design or criteria of paragraph 1.1. The City will communicate its decision on any proposed nonconforming work change directive or change order without delay. The City Council will delegate to a city representative the authority to make decisions under this paragraph. The CLFLWD is responsible to ensure that any Project change meets the requirements of all other permitting authorities.

2.5 On the CLFLWD engineer's certification of construction completion, the Project will constitute land improvement and fixtures under ownership of the City as fee owner of the underlying property.

2.6 The CLFLWD and the City each may install and maintain informational signage within the Project at its own expense. The parties will cooperate as to signage location, size and content and

the signage will conform to the City's signage code. At a minimum, the City will allow for signage as necessary to comply with the state grant agreement.

### **3.0 MAINTENANCE**

3.1 The CLFLWD will be responsible to inspect and maintain the Project. For 25 years from the date on which construction completion is certified, the City will afford the District access and temporary staging area necessary or convenient for the CLFLWD to inspect, maintain, repair and reconstruct the Project. The CLFLWD will give prior notice to the City for any activity that will require a closing of public access or the overnight staging or stockpiling of materials or equipment. In such situations the parties will cooperate to accommodate mutual needs. The CLFLWD will repair any damage caused to the property by its entry under this paragraph.

3.2 As the fee owner and manager of the underlying land, the City will be responsible for day-to-day inspection and maintenance of the property. This responsibility encompasses all matters not specifically related to the structural soundness and performance of the Project and includes, but is not limited to, sanitation, inspection for and addressing obvious hazards resulting from events such as severe weather, inappropriate or unlawful use, and law enforcement.

3.3 For a period of 25 years from the date on which construction completion is certified, the City, including all those who act on its behalf, will not take any action that causes physical damage to the Project or impairs its performance. The City does not take responsibility for actions of the general public. However if the Project is subject to damage or threat by the authorized or unauthorized presence of the public, the parties will cooperate to determine how best to protect the Project consistent with the other public uses of the property.

3.4 The City may make public or other use of all upland on the Bixby Park property and otherwise may make all use of the property consistent with the terms of this Section 3.0. The City and CLFLWD may consult and cooperate with respect to public recreation, education or other uses that may fit within the mission of both parties.

### **4.0 COST RESPONSIBILITIES and REMEDIES**

4.1 The CLFLWD is responsible for all costs of its design, construction, inspection and maintenance activity. The CLFLWD is the grantee under the Clean Water Fund grant and is entitled to all funds thereunder.

4.2 The City will bear its own costs for its activity under paragraph 3.2, above, and any other costs that it bears for its own activities under this Agreement, including costs that it incurs for any professional services associated with its activities.

4.3 Each party agrees to hold harmless, defend and indemnify the other party from and against that portion of any and all liability, loss, claim, damage or expense (including reasonable attorney fees, costs and disbursements) that the indemnified party may incur as a result of the

performance of this Agreement due to any negligent act or omission of the indemnifying party or any other act or omission that subjects it to liability in law or equity. Notwithstanding, this Agreement creates no right in and waives no immunity, defense or liability limit of either party with respect to any third party or the other party to this Agreement. This Agreement is not a joint powers agreement under Minnesota Statutes §471.59 and nothing herein constitutes either party's agreement to be responsible for the acts or omissions of the other party pursuant to subdivision 1a of that statute.

4.4 Only contractual remedies are available for the failure of a party to fulfill the terms of this Agreement.

## 5.0 GENERAL TERMS

5.1 Each communication under this Agreement will be made to the following representatives:

CLFLWD:

Administrator, Comfort Lake-Forest Lake Watershed District  
44 Lake Street South, Suite A  
Forest Lake MN 55025  
michael.kinney@clflwd.org

Administrator, City of Forest Lake  
1408 Lake Street South  
Forest Lake MN 55025  
aaron.parrish@city.forest-lake.mn.us

Contact information will be kept current. A party may change its contact by written notice to the other party.

5.2 This Agreement is effective on execution by both parties and will remain in effect for 27 years unless earlier terminated by the parties by written amendment. Neither party may terminate this Agreement unilaterally. The terms of paragraph 4.3 will survive termination.

5.3 In exercising its rights and fulfilling its responsibilities under this Agreement, and wherever this Agreement provides for an exercise of discretion, each party will do so in good faith and consistent with shared goals and interests in the Project. The City will not take any action as owner of the property that would prevent the CLFLWD from fulfilling the terms of the grant agreement, Attachment B hereto and incorporated herein.

5.4 A party to this Agreement may not assign or transfer any right or obligation under this Agreement except by means of an assignment agreement executed by both parties. If the City conveys the property or any part thereof to a third party, it will assign to that third party all rights and responsibilities under this Agreement with respect to the property that is conveyed.

5.5 This Agreement incorporates all terms and understandings of the parties concerning the Project. An amendment to this Agreement must be in writing and executed by the parties. A party's failure to enforce a provision of this Agreement does not waive the provision or that party's right to enforce it subsequently.

5.6 The above Recitals are incorporated into this Agreement.

IN WITNESS WHEREOF the parties execute this Agreement by their authorized officers.

**CITY of FOREST LAKE [City provide signature block]**


By \_\_\_\_\_  
Its Mayor

Date: 2/23/2015

  
Its City Administrator

2/23/2015

**COMFORT LAKE-FOREST LAKE WATERSHED DISTRICT**

By \_\_\_\_\_  
Its President

Date: 2/26/2015

**Approved for form and execution:**

  
\_\_\_\_\_  
CLFLWD Counsel

**Bixby Park Cooperative Agreement- Attachment A**

Date: 2/17/2015 Time: 2:07:02 PM Author:  
 Document Path: X:\Clients\_WD\00076\_CLFLWD\0131\_Bixby\_Park\08\_GIMS\_ProjectName\GISRM\_prop\improvementsV2.mxd



Project Water Level		
Storm Event	Proposed Elev.	Existing Elev.
1 yr	893.4	893.3
2 yr	894.9	894.9
10 yr	895.6	895.7
100 yr	896.3	896.4



- Legend**
- Wetland
  - Parcel
  - Approximate Location of 892.4 OHWL
  - Estimated Trail Location
  - Channelized Flow
  - Sand Iron/Berm
  - Leveler Ditch
  - Meandering Ditch Side
  - Block Ditch
  - Signage Access Road
  - + Storm Event Monitoring Location
  - 10' Index
  - 2' Intermediate
  - Construction Limit
  - 100 yr Elev 896.3

**Bixby Park  
 CLFLWD**





FY 2014 STATE OF MINNESOTA  
 BOARD OF WATER and SOIL RESOURCES  
 COMPETITIVE GRANTS PROGRAM  
 GRANT AGREEMENT

**RECEIVED**

MAY 01 2014

Bd. of Water & Soil Resources  
 St. Paul

This grant agreement is between the State of Minnesota, acting through its Board of Water and Soil Resources (Board) and Comfort Lake-Forest Lake WD, 220 North Lake Street, Forest Lake, Minnesota 55025.

Fiscal Agent: Comfort Lake-Forest Lake WD

<i>this grant is for the following Grant Programs</i>		
C14-7210	Bixby Park Water Quality Improvement Project	\$360,750

**Total Grant Awarded: \$360,750**

**Recitals**

1. The Laws of Minnesota 2013, Chapter 137, Article 2, Section 7, appropriated Clean Water Fund (CWF) funds to the Board for the FY 2014 Competitive Grants Program.
2. The Minnesota Department of Health has transferred funds to the Board for the Well Sealing Grants Program.
3. Minnesota Statutes 103B.101, subd. 9 (1), and 103B.3369, authorize the Board to award this grant.
4. The Board has adopted the FY 2014 Clean Water Fund Competitive Grants Policy in Board Resolution 13-63 and 13-93 to authorize and implement this Program.
5. The Board has adopted Board Resolutions 14-05 and 14-06 to allocate funds for the FY 2014 Competitive Grants Programs.
6. The Grantee has submitted a BWSR approved work plan for this Program which is incorporated into this agreement by reference.
7. The Grantee represents that it is duly qualified and agrees to perform all services described in this grant contract to the satisfaction of the State.
8. As a condition of the grant, Grantee agrees to minimize administration costs.

**Authorized Representative**

The State's Authorized Representative is David Weirens, Acting Assistant Director, BWSR, 520 Lafayette Road North, Saint Paul, MN 55155, 651-297-3432, or his successor, and has the responsibility to monitor the Grantee's performance and the authority to accept the services and performance provided under this grant agreement.

The Grantee's Authorized Representative is

**Mike Kinney, District Administrator**  
**220 North Lake Street**  
**Forest Lake, MN 55025**  
**651-209-975**

If the Grantee's Authorized Representative changes at any time during this grant contract, the Grantee must immediately notify the Board.

## Grant Agreement

### 1 Term of Grant Agreement

- 1.1 **Effective date:** The date the Board obtains all required signatures under Minn. Stat. § 16B.98, Subd.5. **The Grantee must not begin work under this grant contract until this grant agreement is fully executed and the Grantee has been notified by the State's Authorized Representative to begin the work.**
- 1.2 **Expiration date:** December 31, 2016, or until all obligations have been satisfactorily fulfilled, whichever comes first.
- 1.3 **Survival of Terms:** The following clauses survive the expiration or cancellation of this Agreement: 7. Liability; 8. State Audits; 9. Government Data Practices; 11. Publicity and Endorsement; 12. Governing Law, Jurisdiction, and Venue; and 14. Data Disclosure.

### 2 Grantee's Duties

The Grantee is responsible for the specific duties for the Program as follows:

- 2.1 **Implementation:** The Grantee will implement the work plan, which is incorporated into this Agreement by reference, according to the FY 2014 Clean Water Fund Competitive Grants Policy.
- 2.2 **Reporting:** All data and information provided in a Grantee's report shall be considered public.
  - 2.2.1 The Grantee will submit an annual progress report to the Board by February 1 of each year on the status of program implementation by the Grantee. Information provided must conform to the requirements and formats set by the Board.
  - 2.2.2 The Grantee will display on its website the previous calendar year's detailed information on the expenditure of these State grant funds and measurable outcomes as a result of the expenditure of these State grant funds according to the format specified by the BWSR, by March 15 of each year.
  - 2.2.3 The Grantee will submit a final progress report to the Board by February 1, 2017 or within 30 days of completion of the Project, whichever occurs sooner. Information provided must conform to the requirements and formats set by the Board.
- 2.3 **Match:** The Grantee will ensure any local match requirement will be provided as stated in Grantee's approved work plan.

### 3 Time

The Grantee must comply with all the time requirements described in this Grant Agreement. In the performance of this Grant Agreement, time is of the essence.

### 4 Terms of Payment

- 4.1 Grant funds will be distributed in three installments: 1) The first payment of 50% will be distributed after the execution of the Grant Agreement. 2) The second payment of 40% will be distributed after the first payment of 50% has been expended and reporting requirements have been met. An eLINK Interim Financial Report that summarizes expenditures of the first 50% must be signed by the Grantee and approved by BWSR. Selected grantees may be required at this point to submit documentation of the expenditures reported on the Interim Financial Report for verification. 3) The third payment of 10% will be distributed after the grant has been fully expended and reporting requirements are met. The final, 10% payment must be requested within 30 days of the expiration date of the grant agreement. An eLINK Final Financial Report that summarizes final expenditures for the grant must be signed by the grantee and approved by BWSR
- 4.2 All costs must be incurred within the grant period.
- 4.3 All incurred costs must be paid before the amount of unspent grant funds is determined. Unspent grant funds must be returned within 30 days of the expiration date of the grant agreement.
- 4.4 The obligation of the State under this Grant Agreement will not exceed the amount stated above.
- 4.5 This grant includes an advance payment of 50 percent of the grant's total amount. Advance payments allow the grantee to have adequate operating capital for start-up costs, ensure their financial commitment to landowners and contractors, and to better schedule work into the future.

## 5 Conditions of Payment

All services provided by the Grantee under this Grant Agreement must be performed to the State's satisfaction, as set forth in this Agreement and in the BWSR approved work plan for this program. Compliance will be determined at the sole discretion of the State's Authorized Representative and in accordance with all applicable federal, state, and local laws, policies, ordinances, rules, FY 2014 Clean Water Fund Competitive Grants Policy, and regulations. The Grantee will not receive payment for work found by the State to be unsatisfactory or performed in violation of federal, State, or local law.

The Minnesota Department of Administration's Office of Grants Management Policy On Grant Closeout Evaluation (Policy 08 – 13) requires the Board to consider a grant applicant's past performance before awarding subsequent grants to them. The Board must consider a grant applicant's performance on prior grants before making a new grant award of over \$5,000. The Board may withhold payment on this and grants from other programs if the Grantee is not in compliance with all Board reporting requirements.

## 6 Assignment, Amendments, and Waiver

- 6.1 **Assignment.** The Grantee may neither assign nor transfer any rights or obligations under this grant agreement without the prior consent of the State and a fully executed Assignment Agreement, executed and approved by the same parties who executed and approved this grant agreement, or their successors in office.
- 6.2 **Amendments.** Any amendment to this grant agreement must be in writing and will not be effective until it has been executed and approved by the same parties who executed and approved the original grant agreement, or their successors in office. Amendments must be executed prior to the expiration of the original agreement or any amendments thereto.
- 6.3 **Waiver.** If the State fails to enforce any provision of this grant agreement, that failure does not waive the provision or its right to enforce it.

## 7 Liability

The Grantee must indemnify, save, and hold the State, its agents, and employees harmless from any claims or causes of action, including attorney's fees incurred by the State, arising from the performance of this Grant Agreement by the Grantee or the Grantee's agents or employees. This clause will not be construed to bar any legal remedies the Grantee may have for the State's failure to fulfill its obligations under this Grant Agreement.

## 8 State Audits

Under Minn. Stat. § 16B.98, subd. 8, the Grantee's books, records, documents, and accounting procedures and practices of the Grantee or other party relevant to this Grant Agreement or transaction are subject to examination by the Board and/or the State Auditor or Legislative Auditor, as appropriate, for a minimum of six years from the end of this Grant Agreement, receipt and approval of all final reports, or the required period of time to satisfy all State and program retention requirements, whichever is later.

- 8.1 The books, records, documents, accounting procedures and practices of the Grantee and its designated local units of government and contractors relevant to this grant, may be examined at any time by the Board or Board's designee and are subject to verification. The Grantee or delegated local unit of government will maintain records relating to the receipt and expenditure of grant funds.
- 8.2 The Grantee or designated local unit of government implementing this Agreement will provide for an audit that meets the standards of the Office of State Auditor. The audit must cover the duration of the Agreement Period and be performed within one year after the end of the Agreement Period or when routinely audited, whichever occurs first. Copies of the audit report must be provided to the Board if requested.

## 9 Government Data Practices

The Grantee and State must comply with the Minnesota Government Data Practices Act, Minn. Stat. Ch. 13, as it applies to all data provided by the State under this Agreement, and as it applies to all data created, collected, received, stored, used, maintained, or disseminated by the Grantee under this Grant Agreement. The civil remedies of Minn. Stat. § 13.08 apply to the release of the data referred to in this clause by either the Grantee or the State. If



the Grantee receives a request to release the data referred to in this Clause, the Grantee must immediately notify the State.

#### **10 Workers' Compensation**

The Grantee certifies that it is in compliance with Minn. Stat. § 176.181, subd. 2, pertaining to workers' compensation insurance coverage. The Grantee's employees and agents will not be considered State employees. Any claims that may arise under the Minnesota Workers Compensation Act on behalf of these employees and any claims made by any third party as a consequence of any act or omission on the part of these employees are in no way the State's obligation or responsibility.

#### **11 Governing Law, Jurisdiction, and Venue**

**11.1 Publicity.** Any publicity regarding the subject matter of this grant contract must identify the Board as the sponsoring agency. For purposes of this provision, publicity includes notices, informational pamphlets, press releases, research, reports, signs, and similar public notices prepared by or for the Grantee individually or jointly with others, or any subcontractors, with respect to the program, publications, or services provided resulting from this grant contract.

**11.2 Endorsement.** The Grantee must not claim that the State endorses its products or services.

#### **12 Governing Law, Jurisdiction, and Venue**

Minnesota law, without regard to its choice-of-law provisions, governs this Grant Agreement. Venue for all legal proceedings out of this Agreement, or its breach, must be in the appropriate State or federal court with competent jurisdiction in Ramsey County, Minnesota.

#### **13 Termination**

**13.1** The State may cancel this Grant Agreement at any time, with or without cause, upon 30 days' written notice to the Grantee. Upon termination, the Grantee will be entitled to payment, determined on a pro rata basis, for services satisfactorily performed.

**13.2** In the event of a lawsuit, an appropriation from a Clean Water Fund is canceled to the extent that a court determines that the appropriation unconstitutionally substitutes for a traditional source of funding.

#### **14 Data Disclosure**

Under Minn. Stat. § 270C.65, Subd. 3, and other applicable law, the Grantee consents to disclosure of its social security number, federal employer tax identification number, and/or Minnesota tax identification number, already provided to the State, to federal and state tax agencies and state personnel involved in the payment of state obligations. These identification numbers may be used in the enforcement of federal and State tax laws which could result in action requiring the Grantee to file State tax returns and pay delinquent state tax liabilities, if any.

#### **15 Prevailing Wage**

It is the responsibility of the Grantee or contractor to pay prevailing wages on construction projects to which State prevailing wage laws apply (Minn. Stat. 177.42 – 177.44). All laborers and mechanics employed by grant recipients and subcontractors funded in whole or in part with these State funds shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality.

#### **16 Constitutional Compliance**

It is the responsibility of the Grantee to comply with requirements of the Minnesota Constitution regarding use of Clean Water Funds to supplement traditional sources of funding.

#### **17 Signage**

It is the responsibility of the Grantee to comply with requirements for project signage, as provided in, Minnesota Laws 2010, chapter 361, article 3, section 5 (b) for Clean Water Fund projects.

**18 Intellectual Property Rights**

The State owns all rights, title, and interest in all of the intellectual property rights, including copyrights, patents, trade secrets, trademarks, and service marks in the Works and Documents *created and paid for under this grant*. Works means all inventions, improvements, discoveries (whether or not patentable), databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, and disks conceived, reduced to practice, created or originated by the Grantee, its employees, agents, and subcontractors, either individually or jointly with others in the performance of this grant. Works includes "Documents." Documents are the originals of any databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, disks, or other materials, whether in tangible or electronic forms, prepared by the Grantee, its employees, agents, or subcontractors, in the performance of this grant. The Documents will be the exclusive property of the State and all such Documents must be immediately returned to the State by the Grantee upon completion or cancellation of this grant at the State's request. To the extent possible, those Works eligible for copyright protection under the United States Copyright Act will be deemed to be "works made for hire." The Grantee assigns all right, title, and interest it may have in the Works and the Documents to the State. The Grantee must, at the request of the State, execute all papers and perform all other acts necessary to transfer or record the State's ownership interest in the Works and Documents.

*IN WITNESS WHEREOF, the parties have caused this Grant Agreement to be duly executed intending to be bound thereby.*

Approved :

Comfort Lake-Forest Lake WD :

Board Of Water and Soil Resources

By : *Rudd Damschik* By : *David W*

Title : *President, Board of Managers* Title : Acting Assistant Director

Date : *April 24, 2014* Date : *6/5/14*

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John J. ...  
President of ...  
1870





# Grant Workplan Projects and Practices 2014

**Grant Title** - Bixby Park Water Quality Improvement Project

**Grant ID** - C14-7210

**Organization** - Comfort Lake-Forest Lake WD

<b>Grant Awarded Amount</b>	<b>\$360,750.00</b>	<b>Grant Execution Date</b>	
<b>Required Match Amount</b>	\$90,187.50	<b>Grant End Date</b>	12/31/2016
<b>Required Match %</b>	25%	<b>Grant Day To Day Contact</b>	Mike Kinney

## Budget Summary

	Budgeted	Spent	Balance Remaining
Total Grant Amount	\$360,750.00	\$43,724.86	\$317,025.14
Total Match Amount	\$120,250.00	\$0.00	\$120,250.00
Total Other Funds	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$481,000.00</b>	<b>\$43,724.86</b>	<b>\$437,275.14</b>

*\*Grant balance remaining is the difference between the Awarded Amount and the Spent Amount. Other values compare budgeted and spent amounts.*

## Budget Details

Activity Name	Activity Category	Source Type	Source Description	Budgeted	Spent	Last Transaction Date	Matching Fund
Project Administration	Administration /Coordination	Current State Grant	Bixby Park Water Quality Improvement Project	\$4,000.00			N
Project Administration	Administration /Coordination	Local Fund	CLFLWD	\$4,000.00			Y

Activity Name	Activity Category	Source Type	Source Description	Budgeted	Spent	Last Transaction Date	Matching Fund
Project Construction	Urban Stormwater Management Practices	Current State Grant	Bixby Park Water Quality Improvement Project	\$301,750.00			N
Project Construction	Urban Stormwater Management Practices	Local Fund	CLFLWD	\$95,000.00			Y
Project Development & Support	Project Development	Current State Grant	Bixby Park Water Quality Improvement Project	\$4,000.00	\$3,214.98	6/30/2015	N
Project Development & Support	Project Development	Local Fund	CLFLWD	\$4,000.00			Y
Project Final Design - Technical and Engineering	Technical/Engineering Assistance	Current State Grant	Bixby Park Water Quality Improvement Project	\$51,000.00	\$40,509.88	7/9/2015	N
Project Final Design - Technical and Engineering	Technical/Engineering Assistance	Local Fund	CLFLWD	\$17,250.00			Y

### Activity Details Summary

Activity Details	Total Action Count	Total Activity Mapped	Proposed Size / Unit	Actual Size / Unit
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### Proposed Activity Indicators

Activity Name	Indicator Name	Value & Units	Waterbody	Calculation Tool	Comments
Project Construction	PHOSPHORUS (EST. REDUCTION)	206 LBS/YR	Sunrise/Comfort Lake/St. Croix	P8 Urban Catchment Model	
Project Construction	SEDIMENT (TSS)	55000 TONS/YR	Sunrise/Comfort	P8 Urban	

Activity Name	Indicator Name	Value & Units	Waterbody	Calculation Tool	Comments
			t Lake/St. Croix	Catchment Model	

### Grant Activity

#### Grant Activity - Project Administration

<b>Description</b>	Grant administration tasks including grant tracking, grant agreement management, grant reporting to BWSR as required, and project management and oversight of activities included in the work plan. This Activity is primarily carried out by the CLFLWD Administrator. Tasks include budgeting, reporting and grant management. Minor support roles may be needed by the District Engineer and Legal Counsel.
<b>Category</b>	ADMINISTRATION/COORDINATION
<b>Has Rates and Hours?</b>	Yes

#### Grant Activity - Project Construction

<b>Description</b>	On-the-ground construction of project components as designed during the technical and engineering phase of this project. Components installed as part of this project will include installation of lightweight aggregate filter berm, modifications to the existing ditch system to increase natural floodplain and wetland interaction, modification of existing outlet structure to increase storage capacity and water quality improvement, restoration of disturbed wetland areas with appropriate native vegetation and other activities as defined through final project design. This Activity will be carried out by a contractor awarded the construction project through a public bidding process.
<b>Category</b>	URBAN STORMWATER MANAGEMENT PRACTICES
<b>Has Rates and Hours?</b>	No

## Grant Activity - Project Development & Support

### Description

Work with the City of Forest Lake on development of land access agreements, project implementation agreements, and maintenance agreements to maintain project function throughout its 25-year lifespan to ensure the long term success of the project. A draft of the proposed agreement is attached. The final draft agreement will be submitted to the BWSR for review and acceptance prior to execution. This agreement will be in place prior to the start of any significant work on other grant activities. Additional tasks include coordinating amongst project partners and on-going involvement throughout the project period. Work with all permitting agencies to obtain all permits required to implement project.

The District will engage the community through the City of Forest Lake City Council, Park Board, and through local press releases and newsletter articles. The District will also work with the City to engage local schools which may be able to use the area for future outdoor learning activities. The District also plans to install interpretive signage in cooperation with the City of Forest Lake when park development occurs to engage and educate the public on the need for water quality improvement projects in the area.

This Activity is primarily carried out by the CLFLWD Administrator with assistance as needed from the District Engineer and Legal Counsel.

### Category

PROJECT DEVELOPMENT

### Has Rates and Hours?

Yes



## Grant Activity - Project Final Design - Technical and Engineering

<b>Description</b>	<p>This activity includes final design, construction supervision and inspections of the project to be implemented. The project components are identified in the attached conceptual design figure. An amendment to the project design was necessary due to unexpected soil conditions in the proposed berm area. The iron enhanced sand filter component of the berm has been replaced with a lightweight aggregate filter berm due to excessive peat depths. The proposed aggregate is expected to remove an additional 20 lbs/yr of soluble "P" (similar to what was expected from the IESF). Additional tasks include Project start-up, Additional Data Collection, Permitting, Modeling, Project Design, Contract Documents, Bidding and Construction Oversight. This Activity is primarily carried out by Emmons &amp; Olivier Resources (EOR) currently serving as the watershed district engineer.</p> <p>EOR staff dedicated to the project and their individual roles are identified below.</p> <ul style="list-style-type: none"> <li>*Greg Graska PE- District Engineer, Client Manager</li> <li>*Brett Emmons, PE- Principal Oversight-</li> <li>*Jason Naber - Natural Resources and Permitting</li> <li>*Derek Lash PE - Design Engineer</li> <li>*Jay Hill PE, RLS- Land Surveyor</li> <li>*Steve Pellinen - replacement for Jay Hill</li> <li>*Mike Talbot, EIT- H&amp;H Modeling</li> <li>*Annie Weeks- Restoration Ecologist &amp; Permitting</li> <li>*Sonya Carel- Graphic Design &amp; Media</li> <li>*Mike Majeski- Field Services</li> </ul>
<b>Category</b>	TECHNICAL/ENGINEERING ASSISTANCE
<b>Has Rates and Hours?</b>	No

## Grant Attachments

Document Name	Document Type	Description
<b>2014 Competitive Grant</b>	Grant Agreement	2014 Competitive Grant - Comfort Lake-Forest Lake WD
<b>2014 Competitive Grant executed</b>	Grant Agreement	2014 Competitive Grant - Comfort Lake-Forest Lake WD
<b>All Details Report</b>	Workflow Generated	Workflow Generated - All Details Report - 05/15/2015
<b>All Details Report</b>	Workflow Generated	Workflow Generated - All Details Report - 08/01/2014
<b>Application</b>	Workflow Generated	Workflow Generated - Application - 10/03/2013

Document Name	Document Type	Description
<b>Bixby Park Project</b>	Grant	Bixby Park Water Quality Improvement Project
<b>Comments on Revised Wrok Plan</b>	Journal	Journal Dated - 08/05/2015
<b>DRAFT - CLFLWD and City of Forest Lake agreement</b>	Grant	Bixby Park Water Quality Improvement Project
<b>Draft City-CLFLWD Draft Agreement Comments</b>	Grant	Bixby Park Water Quality Improvement Project
<b>SR_loc_10038.jpg</b>	Grant	Bixby Park Water Quality Improvement Project
<b>Work Plan</b>	Workflow Generated	Workflow Generated - Work Plan - 08/04/2015
<b>Work Plan</b>	Workflow Generated	Workflow Generated - Work Plan - 03/24/2014
<b>Work Plan</b>	Workflow Generated	Workflow Generated - Work Plan - 01/23/2014
<b>Work Plan Revision Request #1</b>	Journal	Journal Dated - 08/05/2015
<b>grantmap_10038_2013-09-25_12-07-16-PM.jpg</b>	Grant	Bixby Park Water Quality Improvement Project

INTERGOVERNMENTAL AGREEMENT BETWEEN THE  
RICE CREEK WATERSHED DISTRICT AND THE  
CITY OF FOREST LAKE

THIS AGREEMENT is made and entered into by and between the Rice Creek Watershed District (the "District") and the City of Forest Lake (the "City") each acting by and through its duly authorized officers.

THE ABOVE-NAMED PARTIES hereby agree as follows:

I. GENERAL SCOPE OF AGREEMENT

1.01 The District and the City agree to undertake the development of a Feasibility Study (the "Study") to identify and analyze potential water quality improvement and groundwater use reduction best management practices in the 11<sup>th</sup> Avenue SW subwatershed of Clear Lake. The Study will include feasibility review of potential projects, including construction cost estimates for each potential project.

II. SPECIFIC SCOPE OF SERVICES

2.01 The District and the City agree that it is mutually beneficial to jointly undertake the Study as a way to support the selection and development of future capital improvement projects to protect and/or improve the water quality of Clear Lake.

- a. Specific Tasks Involved. The scope of the Study will include the specific tasks described in the Bolton & Menk proposal, dated September 25, 2017, found in Attachment A.
- b. Study Scheduling. All work necessary to complete the Study shall be completed no later than December 15, 2017.

2.02 District Responsibilities. The District agrees to:

- a. Provide to the City previous reports, surveys, data, and/or models for the Study area and contributing watershed if requested, pursuant to standard licensing as applicable.
- b. Participate in all meetings associated with the Study.
- c. Make available their staff to serve as advisors to the Study team.
- d. Reimburse the City for contracted costs associated with the completion of the Study, not to exceed \$32,910, upon District acceptance of the Study's final report, which will not be unreasonably withheld.

2.03 City Responsibilities. The City agrees to:

- a. Contract for the necessary professional services to support the Study and the completion of tasks and subtasks identified in Attachment A. The contract will identify the District as a beneficiary of the contract with respect to contractor duty of care and indemnification obligations, and will reserve ownership rights in work product to the City and District.
- b. Participate in all meetings associated with the Study.
- c. Make available their staff to serve as advisors to the Study team.
- d. Assume any additional costs required to complete the Study beyond the District contribution described in Section 2.02d, above.

III. COMPENSATION; METHOD OF PAYMENT

3.01 Upon the District's acceptance of the Study's final report by, and within 30 days of receipt of an invoice and supporting documentation of eligible

costs incurred, the District will reimburse the City for its share of costs incurred for the completion of the Study.

#### IV. GENERAL CONDITIONS

4.01 Term of Agreement. This agreement is effective when fully executed by the parties and expires March 31, 2018.

4.02 Amendments. The terms of this agreement may be changed only by mutual agreement of the parties. Such changes will be effective only on the execution of written amendment(s) signed by duly authorized officers of the parties to this agreement.

4.03 District Personnel. Phil Belfiori, or such other person as may be designated in writing by the District, will serve as the District's authorized representative and will assume primary responsibility for coordinating all services with the City.

4.04 City Personnel. The City Contract Manager for purposes of administration of this agreement is Aaron Parrish, or such other person as may be designated in writing by the City. The City Contract Manager will be responsible for coordinating services under this agreement.

4.05 Equal Employment Opportunity; Affirmative Action. The City and the District agree to comply with all applicable laws relating to nondiscrimination and affirmative action. In particular, the City and the District agree not to discriminate against any employee, applicant for employment, or participant in this study because of race, color, creed, religion, national origin, sex, marital status, status with regard to public assistance, membership or activity in a local commission, disability, sexual orientation, or age; and further agree to take action to assure that applicants and employees are treated equally with respect to all aspects of employment, including rates of pay, selection for training, and other forms of compensation.

4.06 Independent Relationship. No employee, representative, contractor or consultant of either party to this agreement acts in any respect as the agent or representative of the other party.

4.07 Liability. Each party to this agreement shall be liable for the acts and omissions of itself and its officers, employees, and agents, to the extent authorized by law. Neither party shall be liable for the acts or omissions of the other party or the other party's officers, employees or agents. Nothing in this agreement shall be deemed to be a waiver by either party of any applicable immunities or limits of liability including, without limitation, Minnesota Statutes, sections 3.736 (State Tort Claims) and chapter 466 (Municipal Tort Claims).

4.08 Copyright. No reports or documents produced in whole or in part under this agreement will be the subject of an application for or assertion of copyright by or on behalf of the City or District.

4.09 Use of Work Products. The City and District may use and distribute, without restriction, the work products of the Study, including but not limited to reports and documents.

4.10 Termination of Agreement. The City and the District will both have the right to terminate this agreement at any time and for any reason by submitting written notice of the intention to do so to the other party. A party that terminates without cause before the contractor's completion of work will be responsible for its full funding obligation under this agreement.

IN WITNESS WHEREOF, the parties have caused this agreement to be executed by their duly authorized representatives on the dates set forth below. This agreement is effective upon final execution by, and delivery to, both parties.

RICE CREEK WATERSHED DISTRICT

Date \_\_\_\_\_

By \_\_\_\_\_

Name \_\_\_\_\_

Its \_\_\_\_\_

CITY OF FOREST LAKE

Date \_\_\_\_\_

By  \_\_\_\_\_

Name John \_\_\_\_\_

Its City Administrator \_\_\_\_\_

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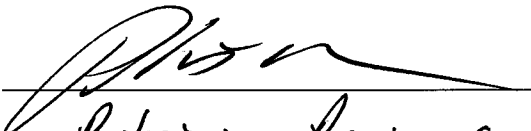
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RICE CREEK WATERSHED DISTRICT

Date 10-11-2017

By   
Name Patricia Preiner  
Its President

CITY OF FOREST LAKE

Date \_\_\_\_\_

By \_\_\_\_\_  
Name \_\_\_\_\_  
Its \_\_\_\_\_

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RICE CREEK WATERSHED DISTRICT

Date \_\_\_\_\_

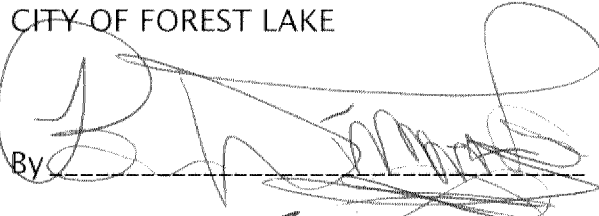
By \_\_\_\_\_

Name \_\_\_\_\_

Its \_\_\_\_\_

CITY OF FOREST LAKE

Date \_\_\_\_\_

By 

Name *John*

Its *City Administrator*



## ATTACHMENT A

September 29<sup>th</sup>, 2017

Phil Belfiori  
Administrator, Rice Creek Watershed District  
4325 Pheasant Ridge Drive NE #61  
Blaine, MN 55449-4539

RE: Clear Lake Water Quality Improvements  
8<sup>th</sup> Street Pond Drainage Channel Feasibility Report and Preliminary Cost Estimate  
Rice Creek Watershed District and City of Forest Lake

Dear Mr. Belfiori:

Bolton & Menk, Inc. is pleased to present this proposal for professional services to prepare a feasibility study and preliminary engineering to analyze best management practices in the watershed served by a culvert under 11<sup>th</sup> Avenue SW. The watershed discharges into the north side of Clear Lake and contains Forest Lake and Forest View Elementary Schools (hereby referred to as “Elementary Schools”), parts of the downtown commercial area, and single and multi-family residential land uses. The Clear Lake Diagnostics Study also identified the 11<sup>th</sup> Avenue SW sampling location (CL2) as a critical pollutant discharge point. In continued dedication to environmental stewardship in the Clear Lake Watershed, the City of Forest Lake has identified several potential projects in the 11<sup>th</sup> Avenue SW watershed that could reduce phosphorus loading and bring Clear Lake closer to a sustainable water quality goal. Please refer to Exhibit 1 for a watershed location map. The scope described herein will analyze several projects which include, but are not limited to, the following.

- Stormwater Reuse from the 8<sup>th</sup> Street Pond at the Elementary Schools in partnership with Forest Lake Area Schools.
- Iron Enhanced Sand Filtration, or other phosphorus capture BMPs along the ditch from the 8<sup>th</sup> Street Pond to 11<sup>th</sup> Avenue SW. The City currently maintains easement over the channel.
- Improvements to the stormwater treatment basin on the Gaughan Apartment Complexes.

This study will identify best management practices (BMPs) and estimate construction costs to be incorporated into the City of Forest Lake’s Local Surface Water Management Plan, the Rice Creek Watershed District’s (RCWD) Comprehensive Plan, and the Forest Lake Area Schools Facilities Plan to better align future projects with local and state funding.

Thank you for your consideration of this exciting project. If you have any questions, please contact me at your convenience by phone at 651-724-0404 or [timol@bolton-menk.com](mailto:timol@bolton-menk.com).

Sincerely,

**Bolton & Menk, Inc.**

**Timothy J. Olson, PE, CFM**  
Water Resources Project Manager





## Project Understanding

We have prepared the following scope of services to develop a feasibility study and preliminary engineering to analyze water quality improvement BMPs in the 11<sup>th</sup> Avenue SW watershed. This will include, but is not limited to, stormwater reuse at the Elementary School sites, improvements along the channel between the 8<sup>th</sup> Street Pond and 11<sup>th</sup> Avenue SW, and retrofits to the existing stormwater pond at the Gaughan Apartment Complex. The following Scope of Services and associated Fees will result in a feasibility study that can be incorporated into local planning documents and align future projects with water quality funding opportunities.

We understand that the Feasibility Study and Preliminary Engineering Analysis will be funded through Rice Creek Watershed District's (RCWD) Clear Lake Fund and the work must be performed in 2017. Bolton & Menk is prepared to begin work immediately upon notice to proceed and will deliver a final report prior to December 15, 2017.

## Scope of Services

### Task 1: Project Communication

#### Subtask 1.1: Kickoff Meeting

A kick-off meeting with RCWD, City of Forest Lake Staff, and Bolton & Menk team members will be scheduled immediately after Notice-to-Proceed. The goals of the meeting are to:

- Understand project limits and constraints.
- Brainstorm potential projects to be analyzed.
- Establish communication protocols associated with various project aspects.
- Formulate a mutually acceptable milestone schedule.

#### Subtask 1.2: Project Update Meetings

We anticipate one additional coordination meeting to present the preliminary feasibility study and engineering analysis. We will maintain consistent contact with RCWD and provide updates as necessary through the project.

#### Subtask 1.3: Partnership Meetings

We anticipate one Partnership Meeting (each) with the Gaughan Property Owners and Forest Lake Area Schools to brainstorm potential projects and to fully understand the needs of all stakeholders. The input from these meetings will be utilized in the feasibility report and preliminary design options.

### Task 2: Topographic and Boundary Survey

Light detection and ranging (LiDAR) surface topography and City as-built construction plans will be utilized where possible to develop the existing conditions. However, we anticipate needing some additional survey along the channel to identify appropriate boundary corners, storm sewer infrastructure and other key topographic features not otherwise evident in the LiDAR surface.

### **Task 3: Hydraulic and Water Quality Modeling**

#### **Subtask 3.1: Delineate Subwatershed Areas**

Bolton & Menk will review available subwatershed delineations from RCWD and previous City of Forest Lake projects to refine delineations according to the appropriate project resolution. We will keep anticipated project locations and the Clear Lake Diagnostic Study in mind while refining the subwatershed areas.

#### **Subtask 3.2: Develop Hydrologic and Hydraulic Modeling**

Bolton & Menk will review available hydraulic modeling from RCWD and previous City of Forest Lake projects to develop a comprehensive hydraulic model of the 11<sup>th</sup> Avenue SW watershed. This will include significant drainage features, ponding areas, and culvert conveyances to understand the quantity of water discharging to specific areas and the corresponding flood elevations. Hydraulic modeling will include:

- Existing drainage conditions.
- Proposed conditions, limited to the following scenarios.
  - One Stormwater Reuse analysis at the Elementary Schools using the Met Council Stormwater Reuse Calculator and guidance in the RCWD Stormwater Re-use for Irrigation Assessment Methodology.
  - Two alternatives for improvements to the channel between the 8<sup>th</sup> Street pond and 11<sup>th</sup> Avenue SW.
  - Two alternatives for retrofits to the Gaughan stormwater detention pond.

Bolton & Menk has developed significant hydraulic modeling in the City of Forest Lake using Autodesk Storm and Sanitary Analysis (SSA). We intend to continue this effort using SSA to add to the City's overall modeling philosophy. That said, SSA is completely interoperable with the same GIS data used to develop SSA models and is built on the EPA SWMM platform. Therefore, the SSA model can be exported to XPSWMM to ensure compatibility with the RCWD hydraulic modeling.

#### **Subtask 3.3: Water Quality Modeling**

We will utilize resulting hydraulic modeling and water quality sampling results detailed in the Clear Lake Diagnostics Study to develop Minimal Impact Design Standards (MIDS) modeling for the scenarios described above. This will determine the anticipated total suspended solids (TSS) and total phosphorus (TP) removals and help establish the project cost per pound of constituent removed.

### **Task 4: Feasibility Report and Preliminary Cost Estimate**

#### **Subtask 4.1: Develop Feasibility Report**

The data, methods, assumptions, and recommendations will be compiled in a feasibility report. The report will summarize the potential water quality improvement options and associated pollutant reduction goals. A draft report will be presented to the Rice Creek Watershed District and City of Forest Lake for review. We will incorporate any final comments and present a final report to the District.

We will include a preliminary assessment of the proposed project sites' sensitivity to soil conditions and the feasibility of infiltration. This will include estimated infiltration rates based on Hydraulic Soils Group designations, known contamination sites, ground water susceptibility, well head protection, and other factors that may impede a project's success.

The feasibility report will include discussion of anticipated project permitting through, but not necessarily limited to, the MPCA, MnDNR, US Army Corps of Engineers and Rice Creek Watershed District.

#### **Subtask 4.2: Develop Preliminary Cost Estimates**

Based on preliminary engineering analyses, we will assemble opinions of probable cost for each option for capital improvement planning purposes and for alignment with future funding programs.

### Estimated Project Fees

The following is a cost proposal for the scope of work described. The proposal is intended to be **hourly not-to-exceed** for the scope of work outlined in this proposal. If the scope changes as project requirements are learned, we welcome an opportunity to alter the cost of services.

CLIENT: RCWD and City of Forest Lake						
PROJECT: 8th Street Pond Drainage Channel Feasibility Report and Preliminary Engineers Estimate						
TASK NO.	WORK TASK DESCRIPTION	Project Engineer	Design Engineer	Survey	Total Hours	Total Cost
1.0	Communication, Meetings and Project Management	16	16	0	32	\$3,888
2.0	Topographic Boundary Survey	6	0	18	24	\$3,198
3.0	Hydraulic and Water Quality Modeling	38	110	0	148	\$17,514
4.0	Feasibility Report and Preliminary Cost Estimate	20	50	0	70	\$8,310
<b>TOTAL HOURS</b>		80	176	18	274	
<b>SUBTOTAL</b>		\$10,240	\$20,240	\$2,430		
<b>TOTAL FEE</b>					<b>\$32,910</b>	



**FY 2017 STATE OF MINNESOTA  
BOARD OF WATER and SOIL RESOURCES  
COMPETITIVE GRANTS PROGRAM  
GRANT AGREEMENT**

Vendor:	0000201515	VN#:	
PO#:	3000007762	Date Paid:	

This Grant Agreement is between the State of Minnesota, acting through its Board of Water and Soil Resources (Board) and **Forest Lake, City of, 1408 Lake St S Forest Lake Minnesota 55025** (Grantee).

<i>This grant is for the following Grant Programs :</i>		
C17-7163	Forest Lake High School Stormwater Reuse Project	\$505,000
<b>Total Grant Awarded: \$505,000</b>		

**Recitals**

1. Minnesota Statutes 103B.101, subd. 9 (1), and 103B.3369, authorize the Board to award this grant.
2. The Laws of Minnesota 2015, 1st Special Session, Chapter 2, Article 2, Section 7(b – Projects and Practices) (c – Accelerated Implementation) (h – Community Partners) and (k – multi-purpose drainage), appropriated Clean Water Fund (CWF) funds to the Board for the FY 2017 Competitive Grants Program.
3. The Minnesota Department of Health transferred funds to the Board for the Well Sealing Grant Program.
4. The Board adopted the FY 2017 Clean Water Fund Competitive Grants Policy and authorized the FY 2017 Competitive Grants Program in Board Resolution 16-52.
5. The Board adopted Board Resolution 16-98 to allocate funds for the FY 2017 Competitive Grants Programs.
6. The Grantee has submitted a BWSR approved work plan for this Program which is incorporated into this agreement by reference.
7. The Grantee represents that it is duly qualified and agrees to perform all services described in this grant agreement to the satisfaction of the State.
8. As a condition of the grant, Grantee agrees to minimize administration costs.

**Authorized Representative**

The State's Authorized Representative is Marcey Westrick, Clean Water Coordinator, BWSR, 520 Lafayette Road North, Saint Paul, MN 55155, 651-284-4153, or her successor, and has the responsibility to monitor the Grantee's performance and the authority to accept the services and performance provided under this Grant Agreement.

The Grantee's Authorized Representative is: **Dave Adams  
1408 Lake Street South  
Forest Lake, MN  
651-755-1207**

If the Grantee's Authorized Representative changes at any time during this Grant Agreement, the Grantee must immediately notify the Board.

**Grant Agreement**

1. **Term of Grant Agreement**
  - 1.1. **Effective date:** The date the Board obtains all required signatures under Minn. Stat. § 16B.98, Subd.5. **The State's Authorized Representative will notify the Grantee when this grant agreement has been executed. The Grantee must not begin work under this grant agreement until it is executed.**
  - 1.2. **Expiration date:** December 31, 2019, or until all obligations have been satisfactorily fulfilled, whichever comes first.

- 1.3. **Survival of Terms:** The following clauses survive the expiration or cancellation of this Agreement: 7. Liability; 8. State Audits; 9. Government Data Practices; 11. Publicity and Endorsement; 12. Governing Law, Jurisdiction, and Venue; 14. Data Disclosure; and 18. Intellectual Property Rights.

## 2. Grantee's Duties

The Grantee will comply with required grants management policies and procedures set forth through Minn. Stat. § 16B.97, Subd. 4(a)(1). The Grantee is responsible for the specific duties for the Program as follows:

- 2.1. **Implementation:** The Grantee will implement their work plan, which is incorporated into this Agreement by reference.
- 2.2. **Reporting:** All data and information provided in a Grantee's report shall be considered public.
  - 2.2.1. The Grantee will submit an annual progress report to the Board by February 1 of each year on the status of program implementation by the Grantee. Information provided must conform to the requirements and formats set by the Board.
  - 2.2.2. The Grantee will display on its website the previous calendar year's detailed information on the expenditure of these State grant funds and measurable outcomes as a result of the expenditure of these State grant funds according to the format specified by the BWSR, by March 15 of each year.
  - 2.2.3. Final Progress Report: The Grantee will submit a final progress report to the Board by February 1, 2020 or within 30 days of completion of the project, whichever occurs sooner. Information provided must conform to the requirements and formats set by the Board.
- 2.3. **Match:** The Grantee will ensure any local match requirement will be provided as stated in Grantee's approved work plan.

## 3. Time

The Grantee must comply with all the time requirements described in this Grant Agreement. In the performance of this Grant Agreement, time is of the essence.

## 4. Terms of Payment

- 4.1. Grant funds will be distributed in three installments: 1) The first payment of 50% will be distributed after the execution of the Grant Agreement. 2) The second payment of 40% will be distributed after the first payment of 50% has been expended and reporting requirements have been met. An eLINK Interim Financial Report that summarizes expenditures of the first 50% must be signed by the Grantee and approved by BWSR. Selected grantees may be required at this point to submit documentation of the expenditures reported on the Interim Financial Report for verification. 3) The third payment of 10% will be distributed after the grant has been fully expended and reporting requirements are met. The final, 10% payment must be requested within 30 days of the expiration date of the Grant Agreement. An eLINK Final Financial Report that summarizes final expenditures for the grant must be signed by the grantee and approved by BWSR.
- 4.2. All costs must be incurred within the grant period.
- 4.3. All incurred costs must be paid before the amount of unspent grant funds is determined. Unspent grant funds must be returned within 30 days of the expiration date of the Grant Agreement.
- 4.4. The obligation of the State under this Grant Agreement will not exceed the amount stated above.
- 4.5. This grant includes an advance payment of 50 percent of the grant's total amount. Advance payments allow the grantee to have adequate operating capital for start-up costs, ensure their financial commitment to landowners and contractors, and to better schedule work into the future.
- 4.6. Contracting and Bidding Requirements per Minn. Stat. §471.345, Grantees that are municipalities as defined in Subd. 1 must do the following if contracting funds from this grant contract agreement for any supplies, materials, equipment or the rental thereof, or the construction, alteration, repair or maintenance of real or personal property.
  - 4.6.1. If the amount of the contract is estimated to exceed \$100,000, a formal notice and bidding process must be conducted in which sealed bids shall be solicited by public notice. Municipalities may, as a best value alternative, award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat. §16C.28, Subd. 1, paragraph (a), clause (2).
  - 4.6.2. If the amount of the contract is estimated to exceed \$25,000 but not \$100,000, the contract may be made either upon sealed bids or by direct negotiation, by obtaining two or more quotations for the purchase or sale when possible, and without advertising for bids or otherwise complying with the requirements of competitive bidding. All quotations obtained shall be kept on file for a period of at least one year after receipt thereof. Municipalities may, as a best value alternative, award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat. §16C.28, Subd. 1, paragraph (a), clause (2) and paragraph (c).

- 4.6.3. If the amount of the contract is estimated to be \$25,000 or less, the contract may be made either upon quotation or in the open market, in the discretion of the governing body. If the contract is made upon quotation, it shall be based, so far as practicable, on at least two quotations which shall be kept on file for a period of at least one year after their receipt. Alternatively, municipalities may award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat. §16C.28, Subd. 1, paragraph (a), clause (2).
- 4.6.4. Support documentation of the bidding process utilized to contract services must be included in the Grantee's financial records, including support documentation justifying a single/sole source bid, if applicable.
- 4.6.5. For projects that include construction work of \$25,000 or more, prevailing wage rules apply per Minn. Stat. §§177.41 through 177.44. Consequently, the bid request must state the project is subject to prevailing wage. These rules require that the wages of laborers and workers should be comparable to wages paid for similar work in the community as a whole. A prevailing wage form should accompany these bid submittals.

## 5. Conditions of Payment

All services provided by the Grantee under this Grant Agreement must be performed to the State's satisfaction, as set forth in this Agreement and in the BWSR approved work plan for this program. Compliance will be determined at the sole discretion of the State's Authorized Representative and in accordance with all applicable federal, State, and local laws, policies, ordinances, rules, FY 2017 Clean Water Fund Competitive Grants Policy, and regulations. All Grantees must follow the Grants Administration manual policy. Minnesota Statutes §103C.401 (2014) establishes BWSR's obligation to assure program compliance. If the noncompliance is severe, or if work under the grant agreement is found by BWSR to be unsatisfactory or performed in violation of federal, state, or local law, BWSR has the authority to require the repayment of grant funds, or an additional penalty. Penalties can be assessed at a rate up to 150% of the grant agreement.

The Minnesota Department of Administration's Office of Grants Management Policy on Grant Closeout Evaluation (Policy 08 – 13) requires the Board to consider a grant applicant's past performance before awarding subsequent grants to them. The Board must consider a grant applicant's performance on prior grants before making a new grant award of over \$5,000. The Board may withhold payment on this and grants from other programs if the Grantee is not in compliance with all Board reporting requirements.

## 6. Assignment, Amendments, and Waiver

- 6.1. **Assignment.** The Grantee may neither assign nor transfer any rights or obligations under this Grant Agreement without the prior consent of the State and a fully executed Assignment Agreement, executed and approved by the same parties who executed and approved this Grant Agreement, or their successors in office.
- 6.2. **Amendments.** Any amendment to this Grant Agreement must be in writing and will not be effective until it has been executed and approved by the same parties who executed and approved the original Grant Agreement, or their successors in office. Amendments must be executed prior to the expiration of the original agreement or any amendments thereto.
- 6.3. **Waiver.** If the State fails to enforce any provision of this Grant Agreement, that failure does not waive the provision or its right to enforce it.

## 7. Liability

The Grantee must indemnify, save, and hold the State, its agents, and employees harmless from any claims or causes of action, including attorney's fees incurred by the State, arising from the performance of this Grant Agreement by the Grantee or the Grantee's agents or employees. This clause will not be construed to bar any legal remedies the Grantee may have for the State's failure to fulfill its obligations under this Grant Agreement.

## 8. State Audits

Under Minn. Stat. § 16B.98, subd. 8, the Grantee's books, records, documents, and accounting procedures and practices of the Grantee or other party relevant to this Grant Agreement or transaction are subject to examination by the Board and/or the State Auditor or Legislative Auditor, as appropriate, for a minimum of six years from the end of this Grant Agreement, receipt and approval of all final reports, or the required period of time to satisfy all State and program retention requirements, whichever is later.

- 8.1. The books, records, documents, accounting procedures and practices of the Grantee and its designated local units of government and contractors relevant to this grant, may be examined at any time by the Board or Board's designee and are subject to verification. The Grantee or delegated local unit of government will maintain records relating to the receipt and expenditure of grant funds.



8.2. The Grantee or designated local unit of government implementing this Agreement will provide for an audit that meets the standards of the Office of State Auditor. The audit must cover the duration of the Agreement Period and be performed within one year after the end of the Agreement Period or when routinely audited, whichever occurs first. Copies of the audit report must be provided to the Board if requested.

**9. Government Data Practices**

The Grantee and State must comply with the Minnesota Government Data Practices Act, Minn. Stat. Ch. 13, as it applies to all data provided by the State under this Agreement, and as it applies to all data created, collected, received, stored, used, maintained, or disseminated by the Grantee under this Grant Agreement. The civil remedies of Minn. Stat. § 13.08 apply to the release of the data referred to in this clause by either the Grantee or the State.

**10. Workers' Compensation**

The Grantee certifies that it is in compliance with Minn. Stat. § 176.181, subd. 2, pertaining to workers' compensation insurance coverage. The Grantee's employees and agents will not be considered State employees. Any claims that may arise under the Minnesota Workers' Compensation Act on behalf of these employees and any claims made by any third party as a consequence of any act or omission on the part of these employees are in no way the State's obligation or responsibility.

**11. Publicity and Endorsement**

11.1. **Publicity.** Any publicity regarding the subject matter of this Grant Agreement must identify the Board as the sponsoring agency. For purposes of this provision, publicity includes notices, informational pamphlets, press releases, research, reports, signs, and similar public notices prepared by or for the Grantee individually or jointly with others, or any subcontractors, with respect to the program, publications, or services provided resulting from this Grant Agreement.

11.2. **Endorsement.** The Grantee must not claim that the State endorses its products or services.

**12. Governing Law, Jurisdiction, and Venue**

Minnesota law, without regard to its choice-of-law provisions, governs this Grant Agreement. Venue for all legal proceedings out of this Agreement, or its breach, must be in the appropriate State or federal court with competent jurisdiction in Ramsey County, Minnesota.

**13. Termination**

13.1. The State may cancel this Grant Agreement at any time, with or without cause, upon 30 days' written notice to the Grantee. Upon termination, the Grantee will be entitled to payment, determined on a pro rata basis, for services satisfactorily performed.

13.2. In the event of a lawsuit, an appropriation from a Clean Water Fund is canceled to the extent that a court determines that the appropriation unconstitutionally substitutes for a traditional source of funding.

**14. Data Disclosure**

Under Minn. Stat. § 270C.65, Subd. 3, and other applicable law, the Grantee consents to disclosure of its social security number, federal employer tax identification number, and/or Minnesota tax identification number, already provided to the State, to federal and State tax agencies and State personnel involved in the payment of State obligations. These identification numbers may be used in the enforcement of federal and State tax laws which could result in action requiring the Grantee to file State tax returns and pay delinquent State tax liabilities, if any.

**15. Prevailing Wage**

It is the responsibility of the Grantee or contractor to pay prevailing wages on construction projects to which State prevailing wage laws apply (Minn. Stat. 177.42 – 177.44). All laborers and mechanics employed by grant recipients and subcontractors funded in whole or in part with these State funds shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality.

**16. Constitutional Compliance**

It is the responsibility of the Grantee to comply with requirements of the Minnesota Constitution regarding use of Clean Water Funds to supplement traditional sources of funding.

**17. Signage**

It is the responsibility of the Grantee to comply with requirements for project signage as provided in Minnesota Laws 2010, Chapter 361, article 3, section 5 (b) for Clean Water Fund projects.

**18. Intellectual Property Rights**

The State owns all rights, title, and interest in all of the intellectual property rights, including copyrights, patents, trade secrets, trademarks, and service marks in the Works and Documents *created and paid for under this grant*. Works means all inventions, improvements, discoveries (whether or not patentable), databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, and disks conceived, reduced to practice, created or originated by the Grantee, its employees, agents, and subcontractors, either individually or jointly with others in the performance of this grant. Works includes "Documents." Documents are the originals of any databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, disks, or other materials, whether in tangible or electronic forms, prepared by the Grantee, its employees, agents, or subcontractors, in the performance of this grant. The Documents will be the exclusive property of the State and all such Documents must be immediately returned to the State by the Grantee upon completion or cancellation of this grant at the State's request. To the extent possible, those Works eligible for copyright protection under the United States Copyright Act will be deemed to be "works made for hire." The Grantee assigns all right, title, and interest it may have in the Works and the Documents to the State. The Grantee must, at the request of the State, execute all papers and perform all other acts necessary to transfer or record the State's ownership interest in the Works and Documents.

*IN WITNESS WHEREOF, the parties have caused this Grant Agreement to be duly executed intending to be bound thereby.*

Approved:

Forest Lake, City of

Board of Water and Soil Resources

By: Bene Winovich  
(print)  
[Signature]  
(signature)

By: \_\_\_\_\_

Title: Mayor

Title: \_\_\_\_\_

Date: 3/27/17

Date: \_\_\_\_\_

[Signature]  
City Administrator

**COOPERATIVE AGREEMENT AMONG  
the CITY of FOREST LAKE, the RICE CREEK WATERSHED DISTRICT  
and the INDEPENDENT SCHOOL DISTRICT NO. 831  
FOR the CONSTRUCTION, OPERATION and MAINTENANCE of  
the FOREST LAKE HIGH SCHOOL STORMWATER REUSE PROJECT**

A. THIS COOPERATIVE AGREEMENT (“Agreement”) is entered into by and among the City of Forest Lake, Minnesota, a municipal corporation (“City”), the Rice Creek Watershed District, a special purpose unit of local government under Minnesota Statutes Chapters 103B and 103D (RCWD) and the Independent School District No. 831, a political subdivision of the State of Minnesota (ISD).

B. The RCWD’s duly adopted Watershed Management Plan (2010, amended Nov. 2016) identifies for implementation water quality treatment projects in the Clear Lake watershed, including water reuse and other projects within the TH61 corridor;

C. The RCWD’s Clear Lake Diagnostic Study and Management Plan (Feb. 2012) identifies implementation actions to protect and improve water quality in Clear Lake;

D. The City’s TH61 Aesthetics and Water Quality Improvements Planning Study (April 2012) identifies priority projects within the corridor to improve water quality in Clear Lake;

E. The City’s duly adopted Local Water Management Plan (Sept. 2013) includes implementation of the TH61 Aesthetics and Water Quality Improvements Planning Study within its capital improvement program;

F. In July 2016, ISD prepared a Stormwater Reuse for Irrigation Feasibility Report detailing potential stormwater reuse at four Forest Lake Area Schools including, specifically, a stormwater reuse project at Forest Lake High School (“Project”);

G. The City, the RCWD and ISD entered into an intergovernmental agreement in August 2016 to cooperate on the submittal of a Clean Water Fund grant application to the Board of Water and Soil Resources (“BWSR”) for the Project, pursuant to which the City has been awarded a grant for the Project, the agreement for which (“Grant Agreement”) is incorporated into this Agreement as Attachment A hereto;

H. The City, the RCWD and ISD have worked cooperatively to develop goals and objectives, a concept construction design, a construction cost allocation, and a maintenance plan for the Project;

I. For the purpose of the Grant Agreement, ISD must assure the City as to design and performance standards for the Project, including an annual total phosphorus load reduction of 19.5 pounds, and must provide to the City a 25-year access agreement so that the City may inspect and maintain the Project as necessary, if ISD fails to do so;

THEREFORE, based on the foregoing recitals, which are incorporated fully into this Agreement, the City, the RCWD and ISD, each duly authorized by its governing body, agree as follows, intending to be legally bound:

## **DESIGN**

1. If environmental review is performed pursuant to Minnesota Statutes chapter 116D, the City will serve as the responsible government unit (RGU).
2. ISD will retain professional services to design the Project, and is responsible to obtain all applicable permits and approvals. The City and RCWD will process all permits and approvals that they administer promptly and will not charge permit fees.
3. ISD will consult with the City and RCWD during the design process. ISD will provide the final design to the City for written approval, not to be unreasonably withheld.

## **CONSTRUCTION**

4. ISD will prepare solicitation documents and procure a contractor for the Project in accordance with all applicable laws and requirements, including the requirements of the Grant Agreement. The contract must require the following:
  - a. The contractor will maintain customary commercial general liability (CGL) and automobile liability insurance on an occurrence basis, each with an occurrence and an aggregate liability limit of at least \$2 million. The CGL policy will include contract liability coverage and will cover contractor's work and completed operations.
  - b. The City and RCWD will be named as additional insureds under the CGL policy with primary, non-contributory coverage for both contractor's work and completed operations. ISD will review endorsements to confirm coverage.
  - c. The contractor will supply and maintain performance and payment bonds in the amount of the contract.
  - d. The Project specifications must include Non-discrimination and Prevailing Wages provisions as required by the Grant Agreement, and otherwise incorporate all terms of that Agreement.
5. ISD will obtain City approval of any work change that might materially affect removal of total phosphorus. The City will review any such request promptly and will not withhold consent unless performance may be substantially reduced or the change may jeopardize grant funds. Neither the City nor the RCWD may direct the contractor.
6. The ISD engineer must certify the Project as complete and all expenses must be paid out by ISD by November 22, 2019. ISD will transmit to the City all final financial records and outcome information that the City requires by December 20, 2019. The Project representatives of the parties as identified below may amend this Agreement to extend either date on BWSR's written extension of the corresponding date in the Grant Agreement.

## **MAINTENANCE**

7. The parties will cooperate to develop an operations and maintenance plan for the Project. ISD, at its cost, will operate and maintain the Project for 25 years after certification of Project completion, in accordance with the terms of this operations and maintenance plan.

8. If ISD fails to perform required maintenance, the City, after notice to ISD and an opportunity to correct, not to exceed 60 days, may enter and perform maintenance. ISD will reimburse the City for its reasonable costs incurred in doing so.

9. For a period of 25 years from the certification of Project completion, ISD grants the City reasonable and convenient access to the Project for inspection, monitoring and maintenance purposes, and grants the RCWD reasonable and convenient access for inspection and monitoring. The parties will coordinate in good faith to establish and, as needed, adjust a mutually agreeable route of access. The City and the RCWD each will repair any disturbance or damage resulting from its entry.

### **MONITORING and EDUCATION**

10. ISD is responsible for all monitoring required under an applicable Department of Natural Resources appropriations permit or approval.

11. The parties will cooperate to develop and implement a plan to monitor the Project for water quality performance. ISD will bear the cost of all monitoring required under the Grant Agreement and the monitoring plan otherwise will allocate responsibility and cost.

12. ISD, with RCWD assistance as it may request, will prepare and implement education and community outreach elements of the Project

### **FUNDING**

13. The Project will be funded as follows:

a. ISD will conform to all requirements of the Grant Agreement and will cooperate with City requirements with respect to City requests for grant disbursements. The City will disburse grant proceeds to ISD promptly and in any case within 30 days of receipt. The City will disburse all grant proceeds to ISD on a reimbursement basis to be applied to eligible Project costs.

b. The City will contribute \$25,000 to ISD.

c. The RCWD will contribute 33 percent of the local match required by the Grant Agreement, not to exceed \$50,000.

d. All remaining Project costs, including local share not provided by the City or the RCWD per paragraphs 13.b and 13.c above, are the responsibility of ISD.

14. In-kind costs incurred by the RCWD under paragraphs 12 and 16 will constitute a portion of the RCWD's required contribution. RCWD employee hourly rates for computing in-kind costs will be burdened rates. No more than \$15,000 of the RCWD contribution will be in-kind without ISD agreement. The RCWD will provide an accounting of such costs, and the RCWD and City each will provide its remaining cash contribution, within 30 days of receipt of the Project engineer's certification of completion in accordance with the plans and specifications.

15. Notwithstanding paragraph 13.a, above, the City only will reimburse ISD once (a) the design is completed and the City engineer determines that the Project is designed to meet the above performance standard; and (b) ISD has issued a Notice to Proceed to the selected contractor.

## **GRANT ADMINISTRATION**

16. As the grantee, the City is responsible to complete all grant reporting activities. ISD will provide any and all information about the Project, without limitation, as the City may require to carry out this function. On City request, RCWD staff will assist with grant administration.

17. Reflecting the limited role of the City as formal grantee, and of the RCWD as project partner:

a. ISD and the City will cooperate to ensure that: (i) the terms of the Grant Agreement are met; and (ii) the administrative costs and resource burdens incurred by the City as grantee are minimized.

b. As among the Parties, ISD will fully bear: (i) Project cost increases; (ii) the risk that, for any reason, BWSR does not provide the full grant amount; and (iii) the obligation to return or repay any grant amount, as either may arise under the Grant Agreement.

c. ISD will hold the City and the RCWD harmless with respect to any first-party claim, proceeding, cost, liability or damage arising out of the Grant Agreement or the City's role as grantee thereunder. ISD will indemnify the City and the RCWD with respect to any claim, proceeding, cost, damage or liability (including reasonable attorney fees) arising out of the Grant Agreement or the City's role as grantee thereunder, including but not limited to any City cost or liability arising out of any obligation under the Grant Agreement to defend, hold harmless and indemnify the grantor.

d. In any proceeding arising under the Grant Agreement, ISD and the City will cooperate to substitute or add ISD as party in interest, both to minimize City cost and to allow ISD to fully protect its interests.

## **GENERAL TERMS**

18. Notwithstanding any other term of this Agreement, nothing herein creates a right in any third party or waives an immunity, defense or liability limit of a party hereto with respect to any third party. As among the parties hereto, only contractual remedies are available for a party's failure to fulfill the terms of this Agreement.

19. This Agreement is not a joint powers agreement under Minnesota Statutes §471.59. Nothing herein constitutes one party's agreement to be responsible for the acts or omissions of another party pursuant to subdivision 1(a) of that statute.

20. The results of the Project, reports submitted under the Grant Agreement, and any new information or technology developed with the assistance of the grant are in the public domain and may not be copyrighted, patented, trademarked or designated as trade secret by a party.

21. The parties will comply with all applicable laws and regulations in performing their obligations under this Agreement. The Agreement will be construed and enforced according to the laws of Minnesota.

22. The following will be used for any communication under this Agreement:

City: City of Forest Lake  
1408 Lake Street South  
Forest Lake, MN 55025  
ATTN: City Administrator  
email: aaron.parrish@ci.froest-lake.mn.us

RCWD: Rice Creek Watershed District  
4325 Pheasant Ridge Dr. NE #611  
Blaine, MN 55449-4539  
ATTN: Administrator  
email: pbelfiori@ricecreek.org

ISD: Forest Lake Area Schools (ISD #831)  
6100 North 210<sup>th</sup> Street  
Forest Lake, MN 55025  
ATTN: Director of Business Services  
email: lmartini@flaschools.org

or at such other address of which a party may, from time to time, notify the other parties in writing.

23. In the event that any provision of this Agreement is held to be invalid, illegal or unenforceable by a court of competent jurisdiction, the holding will pertain only to the indicated provision and will not invalidate or render unenforceable any other provision of this Agreement.

24. If any party waives any default or non-performance by another party, the waiver will apply only to the cited instance and will not waive any other prior or later default.

25. This Agreement, including Attachment A, constitutes the entire agreement among the parties relating to the subject matter addressed herein and supersedes all other prior agreements and understandings, written or oral, among the parties.

26. An alteration, variation, modification, or waiver of any provision of this Agreement is valid only when reduced to writing as an amendment to this Agreement signed by the parties hereto or their successors.

27. A party will not assign, sublet, transfer or pledge this Agreement or any right or obligation hereunder, in whole or in part, without the written consent of the other parties.

28. For the convenience of the parties, any number of counterparts hereof may be executed and each executed counterpart is deemed an original, but all counterparts together constitute one Agreement.

29. In its participation in this Agreement, each party will act in accordance with the Minnesota Government Data Practices Act, Minnesota Statutes chapter 13. Each party will consult with the others as appropriate with respect to any data request it may receive.

30. This Agreement is effective on execution by all parties and terminates 25 years from the date that completion is certified under paragraph 6, above. Notwithstanding, the terms of this Agreement will survive termination as necessary until all matters relating to performance hereunder and arising before termination are resolved.


*[Signature pages follow.]*

IN TESTIMONY WHEREOF, the City of Forest Lake has caused this Agreement to be executed.

**CITY OF FOREST LAKE**

By:   
Ben Winnick, Mayor

Date: 3/27/17

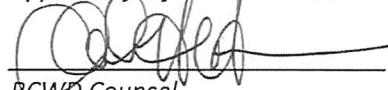
By:   
Aaron Parrish, City Administrator

Date: 3/27/17

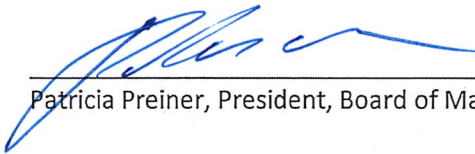


IN TESTIMONY WHEREOF, the Rice Creek Watershed District has caused this Agreement to be executed.

*Approved for form and execution*

  
\_\_\_\_\_  
RCWD Counsel

**RICE CREEK WATERSHED DISTRICT**

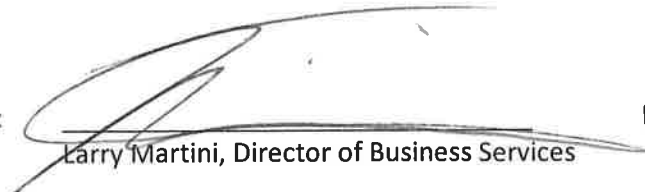
By:   
\_\_\_\_\_  
Patricia Preiner, President, Board of Managers

Date: 7.28.2017

IN TESTIMONY WHEREOF, the Independent School District #831 has caused this Agreement to be executed.

**INDEPENDENT SCHOOL DISTRICT #831**

By:

A handwritten signature in black ink, appearing to read 'Larry Martini', is written over a horizontal line. The signature is fluid and cursive.

Larry Martini, Director of Business Services

Date: March 31, 2017

**EXHIBIT A**

**BWSR Clean Water Fund Grant Agreement**



**FY 2017 STATE OF MINNESOTA  
BOARD OF WATER and SOIL RESOURCES  
COMPETITIVE GRANTS PROGRAM  
GRANT AGREEMENT**

Vendor:	0000201515	VN#:	14298
PO#:	3000007762	Date Paid:	4/10/17

This Grant Agreement is between the State of Minnesota, acting through its Board of Water and Soil Resources (Board) and **Forest Lake, City of, 1408 Lake St S Forest Lake Minnesota 55025** (Grantee).

This grant is for the following Grant Programs :		
C17-7163	Forest Lake High School Stormwater Reuse Project	\$505,000
<b>Total Grant Awarded: \$505,000</b>		

**Recitals**

1. Minnesota Statutes 103B.101, subd. 9 (1), and 103B.3369, authorize the Board to award this grant.
2. The Laws of Minnesota 2015, 1st Special Session, Chapter 2, Article 2, Section 7(b – Projects and Practices) (c – Accelerated Implementation) (h – Community Partners) and (k – multi-purpose drainage), appropriated Clean Water Fund (CWF) funds to the Board for the FY 2017 Competitive Grants Program.
3. The Minnesota Department of Health transferred funds to the Board for the Well Sealing Grant Program.
4. The Board adopted the FY 2017 Clean Water Fund Competitive Grants Policy and authorized the FY 2017 Competitive Grants Program in Board Resolution 16-52.
5. The Board adopted Board Resolution 16-98 to allocate funds for the FY 2017 Competitive Grants Programs.
6. The Grantee has submitted a BWSR approved work plan for this Program which is incorporated into this agreement by reference.
7. The Grantee represents that it is duly qualified and agrees to perform all services described in this grant agreement to the satisfaction of the State.
8. As a condition of the grant, Grantee agrees to minimize administration costs.

**Authorized Representative**

The State's Authorized Representative is Marcey Westrick, Clean Water Coordinator, BWSR, 520 Lafayette Road North, Saint Paul, MN 55155, 651-284-4153, or her successor, and has the responsibility to monitor the Grantee's performance and the authority to accept the services and performance provided under this Grant Agreement.

The Grantee's Authorized Representative is: **Dave Adams**  
**1408 Lake Street South**  
**Forest Lake, MN**  
**651-755-1207**

If the Grantee's Authorized Representative changes at any time during this Grant Agreement, the Grantee must immediately notify the Board.

**Grant Agreement**

**1. Term of Grant Agreement**

- 1.1. **Effective date:** The date the Board obtains all required signatures under Minn. Stat. § 16B.98, Subd.5. **The State's Authorized Representative will notify the Grantee when this grant agreement has been executed. The Grantee must not begin work under this grant agreement until it is executed.**
- 1.2. **Expiration date:** December 31, 2019, or until all obligations have been satisfactorily fulfilled, whichever comes first.

- 1.3. **Survival of Terms:** The following clauses survive the expiration or cancellation of this Agreement: 7. Liability; 8. State Audits; 9. Government Data Practices; 11. Publicity and Endorsement; 12. Governing Law, Jurisdiction, and Venue; 14. Data Disclosure; and 18. Intellectual Property Rights.

## 2. Grantee's Duties

The Grantee will comply with required grants management policies and procedures set forth through Minn. Stat. § 16B.97, Subd. 4(a)(1). The Grantee is responsible for the specific duties for the Program as follows:

- 2.1. **Implementation:** The Grantee will implement their work plan, which is incorporated into this Agreement by reference.
- 2.2. **Reporting:** All data and information provided in a Grantee's report shall be considered public.
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## 3. Time

The Grantee must comply with all the time requirements described in this Grant Agreement. In the performance of this Grant Agreement, time is of the essence.

## 4. Terms of Payment

- 4.1. Grant funds will be distributed in three installments: 1) The first payment of 50% will be distributed after the execution of the Grant Agreement. 2) The second payment of 40% will be distributed after the first payment of 50% has been expended and reporting requirements have been met. An eLINK Interim Financial Report that summarizes expenditures of the first 50% must be signed by the Grantee and approved by BWSR. Selected grantees may be required at this point to submit documentation of the expenditures reported on the Interim Financial Report for verification. 3) The third payment of 10% will be distributed after the grant has been fully expended and reporting requirements are met. The final, 10% payment must be requested within 30 days of the expiration date of the Grant Agreement. An eLINK Final Financial Report that summarizes final expenditures for the grant must be signed by the grantee and approved by BWSR.
- 4.2. All costs must be incurred within the grant period.
- 4.3. All incurred costs must be paid before the amount of unspent grant funds is determined. Unspent grant funds must be returned within 30 days of the expiration date of the Grant Agreement.
- 4.4. The obligation of the State under this Grant Agreement will not exceed the amount stated above.
- 4.5. This grant includes an advance payment of 50 percent of the grant's total amount. Advance payments allow the grantee to have adequate operating capital for start-up costs, ensure their financial commitment to landowners and contractors, and to better schedule work into the future.
- 4.6. Contracting and Bidding Requirements per Minn. Stat. §471.345, Grantees that are municipalities as defined in Subd. 1 must do the following if contracting funds from this grant contract agreement for any supplies, materials, equipment or the rental thereof, or the construction, alteration, repair or maintenance of real or personal property.
  - 4.6.1. If the amount of the contract is estimated to exceed \$100,000, a formal notice and bidding process must be conducted in which sealed bids shall be solicited by public notice. Municipalities may, as a best value alternative, award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat. §16C.28, Subd. 1, paragraph (a), clause (2).
  - 4.6.2. If the amount of the contract is estimated to exceed \$25,000 but not \$100,000, the contract may be made either upon sealed bids or by direct negotiation, by obtaining two or more quotations for the purchase or sale when possible, and without advertising for bids or otherwise complying with the requirements of competitive bidding. All quotations obtained shall be kept on file for a period of at least one year after receipt thereof. Municipalities may, as a best value alternative, award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat. §16C.28, Subd. 1, paragraph (a), clause (2) and paragraph (c).

- 4.6.3. If the amount of the contract is estimated to be \$25,000 or less, the contract may be made either upon quotation or in the open market, in the discretion of the governing body. If the contract is made upon quotation, it shall be based, so far as practicable, on at least two quotations which shall be kept on file for a period of at least one year after their receipt. Alternatively, municipalities may award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat. §16C.28, Subd. 1, paragraph (a), clause (2).
- 4.6.4. Support documentation of the bidding process utilized to contract services must be included in the Grantee's financial records, including support documentation justifying a single/sole source bid, if applicable.
- 4.6.5. For projects that include construction work of \$25,000 or more, prevailing wage rules apply per Minn. Stat. §§177.41 through 177.44. Consequently, the bid request must state the project is subject to prevailing wage. These rules require that the wages of laborers and workers should be comparable to wages paid for similar work in the community as a whole. A prevailing wage form should accompany these bid submittals.

## 5. Conditions of Payment

All services provided by the Grantee under this Grant Agreement must be performed to the State's satisfaction, as set forth in this Agreement and in the BWSR approved work plan for this program. Compliance will be determined at the sole discretion of the State's Authorized Representative and in accordance with all applicable federal, State, and local laws, policies, ordinances, rules, FY 2017 Clean Water Fund Competitive Grants Policy, and regulations. All Grantees must follow the Grants Administration manual policy. Minnesota Statutes §103C.401 (2014) establishes BWSR's obligation to assure program compliance. If the noncompliance is severe, or if work under the grant agreement is found by BWSR to be unsatisfactory or performed in violation of federal, state, or local law, BWSR has the authority to require the repayment of grant funds, or an additional penalty. Penalties can be assessed at a rate up to 150% of the grant agreement.

The Minnesota Department of Administration's Office of Grants Management Policy on Grant Closeout Evaluation (Policy 08 – 13) requires the Board to consider a grant applicant's past performance before awarding subsequent grants to them. The Board must consider a grant applicant's performance on prior grants before making a new grant award of over \$5,000. The Board may withhold payment on this and grants from other programs if the Grantee is not in compliance with all Board reporting requirements.

## 6. Assignment, Amendments, and Waiver

- 6.1. **Assignment.** The Grantee may neither assign nor transfer any rights or obligations under this Grant Agreement without the prior consent of the State and a fully executed Assignment Agreement, executed and approved by the same parties who executed and approved this Grant Agreement, or their successors in office.
- 6.2. **Amendments.** Any amendment to this Grant Agreement must be in writing and will not be effective until it has been executed and approved by the same parties who executed and approved the original Grant Agreement, or their successors in office. Amendments must be executed prior to the expiration of the original agreement or any amendments thereto.
- 6.3. **Waiver.** If the State fails to enforce any provision of this Grant Agreement, that failure does not waive the provision or its right to enforce it.

## 7. Liability

The Grantee must indemnify, save, and hold the State, its agents, and employees harmless from any claims or causes of action, including attorney's fees incurred by the State, arising from the performance of this Grant Agreement by the Grantee or the Grantee's agents or employees. This clause will not be construed to bar any legal remedies the Grantee may have for the State's failure to fulfill its obligations under this Grant Agreement.

## 8. State Audits

Under Minn. Stat. § 16B.98, subd. 8, the Grantee's books, records, documents, and accounting procedures and practices of the Grantee or other party relevant to this Grant Agreement or transaction are subject to examination by the Board and/or the State Auditor or Legislative Auditor, as appropriate, for a minimum of six years from the end of this Grant Agreement, receipt and approval of all final reports, or the required period of time to satisfy all State and program retention requirements, whichever is later.

- 8.1. The books, records, documents, accounting procedures and practices of the Grantee and its designated local units of government and contractors relevant to this grant, may be examined at any time by the Board or Board's designee and are subject to verification. The Grantee or delegated local unit of government will maintain records relating to the receipt and expenditure of grant funds.

8.2. The Grantee or designated local unit of government implementing this Agreement will provide for an audit that meets the standards of the Office of State Auditor. The audit must cover the duration of the Agreement Period and be performed within one year after the end of the Agreement Period or when routinely audited, whichever occurs first. Copies of the audit report must be provided to the Board if requested.

**9. Government Data Practices**

The Grantee and State must comply with the Minnesota Government Data Practices Act, Minn. Stat. Ch. 13, as it applies to all data provided by the State under this Agreement, and as it applies to all data created, collected, received, stored, used, maintained, or disseminated by the Grantee under this Grant Agreement. The civil remedies of Minn. Stat. § 13.08 apply to the release of the data referred to in this clause by either the Grantee or the State.

**10. Workers' Compensation**

The Grantee certifies that it is in compliance with Minn. Stat. § 176.181, subd. 2, pertaining to workers' compensation insurance coverage. The Grantee's employees and agents will not be considered State employees. Any claims that may arise under the Minnesota Workers' Compensation Act on behalf of these employees and any claims made by any third party as a consequence of any act or omission on the part of these employees are in no way the State's obligation or responsibility.

**11. Publicity and Endorsement**

11.1. **Publicity.** Any publicity regarding the subject matter of this Grant Agreement must identify the Board as the sponsoring agency. For purposes of this provision, publicity includes notices, informational pamphlets, press releases, research, reports, signs, and similar public notices prepared by or for the Grantee individually or jointly with others, or any subcontractors, with respect to the program, publications, or services provided resulting from this Grant Agreement.

11.2. **Endorsement.** The Grantee must not claim that the State endorses its products or services.

**12. Governing Law, Jurisdiction, and Venue**

Minnesota law, without regard to its choice-of-law provisions, governs this Grant Agreement. Venue for all legal proceedings out of this Agreement, or its breach, must be in the appropriate State or federal court with competent jurisdiction in Ramsey County, Minnesota.

**13. Termination**

13.1. The State may cancel this Grant Agreement at any time, with or without cause, upon 30 days' written notice to the Grantee. Upon termination, the Grantee will be entitled to payment, determined on a pro rata basis, for services satisfactorily performed.

13.2. In the event of a lawsuit, an appropriation from a Clean Water Fund is canceled to the extent that a court determines that the appropriation unconstitutionally substitutes for a traditional source of funding.

**14. Data Disclosure**

Under Minn. Stat. § 270C.65, Subd. 3, and other applicable law, the Grantee consents to disclosure of its social security number, federal employer tax identification number, and/or Minnesota tax identification number, already provided to the State, to federal and State tax agencies and State personnel involved in the payment of State obligations. These identification numbers may be used in the enforcement of federal and State tax laws which could result in action requiring the Grantee to file State tax returns and pay delinquent State tax liabilities, if any.

**15. Prevailing Wage**

It is the responsibility of the Grantee or contractor to pay prevailing wages on construction projects to which State prevailing wage laws apply (Minn. Stat. 177.42 – 177.44). All laborers and mechanics employed by grant recipients and subcontractors funded in whole or in part with these State funds shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality.

**16. Constitutional Compliance**

It is the responsibility of the Grantee to comply with requirements of the Minnesota Constitution regarding use of Clean Water Funds to supplement traditional sources of funding.

**17. Signage**

It is the responsibility of the Grantee to comply with requirements for project signage as provided in Minnesota Laws 2010, Chapter 361, article 3, section 5 (b) for Clean Water Fund projects.

**18. Intellectual Property Rights**


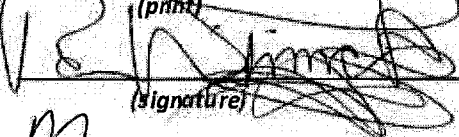
The State owns all rights, title, and interest in all of the intellectual property rights, including copyrights, patents, trade secrets, trademarks, and service marks in the Works and Documents *created and paid for under this grant*. Works means all inventions, improvements, discoveries (whether or not patentable), databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, and disks conceived, reduced to practice, created or originated by the Grantee, its employees, agents, and subcontractors, either individually or jointly with others in the performance of this grant. Works includes "Documents." Documents are the originals of any databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, disks, or other materials, whether in tangible or electronic forms, prepared by the Grantee, its employees, agents, or subcontractors, in the performance of this grant. The Documents will be the exclusive property of the State and all such Documents must be immediately returned to the State by the Grantee upon completion or cancellation of this grant at the State's request. To the extent possible, those Works eligible for copyright protection under the United States Copyright Act will be deemed to be "works made for hire." The Grantee assigns all right, title, and interest it may have in the Works and the Documents to the State. The Grantee must, at the request of the State, execute all papers and perform all other acts necessary to transfer or record the State's ownership interest in the Works and Documents.

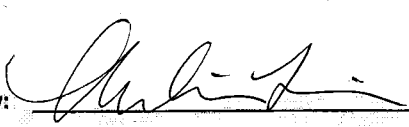
*IN WITNESS WHEREOF, the parties have caused this Grant Agreement to be duly executed intending to be bound thereby.*

Approved:

Forest Lake, City of

Board of Water and Soil Resources

By:   
(print)  
  
(signature)


By: 

Title: Mayor

Title: Assist. Sec. Agr.

Date: 3/27/17

Date: April 5, 2017

  
City Administrator





## Grant Workplan Projects and Practices 2017

**Grant Title** - Forest Lake High School Stormwater Reuse Project

**Grant ID** - C17-7163

**Organization** - Forest Lake, City of

<b>Grant Awarded Amount</b>	<b>\$505,000.00</b>	<b>Grant Execution Date</b>	
<b>Required Match Amount</b>	\$126,250.00	<b>Grant End Date</b>	12/31/2019
<b>Required Match %</b>	25%	<b>Grant Day To Day Contact</b>	Dave Adams

### Budget Summary

	Budgeted	Spent	Balance Remaining
Total Grant Amount	\$505,000.00	\$0.00	\$505,000.00
Total Match Amount	\$126,250.00	\$0.00	\$126,250.00
Total Other Funds	\$0.00	\$0.00	\$0.00
<b>Total</b>	<b>\$631,250.00</b>	<b>\$0.00</b>	<b>\$631,250.00</b>

*\*Grant balance remaining is the difference between the Awarded Amount and the Spent Amount. Other values compare budgeted and spent amounts.*

### Budget Details

Activity Name	Activity Category	Source Type	Source Description	Budgeted	Spent	Last Transaction Date	Matching Fund
Construction of Stormwater Reuse Practices	Urban Stormwater Management Practices	Current State Grant	Forest Lake High School Stormwater Reuse Project	\$490,000.00	0		N

Activity Name	Activity Category	Source Type	Source Description	Budgeted	Spent	Last Transaction Date	Matching Fund
Engineering and Design	Technical/Engineering Assistance	Local Fund	City of Forest Lake	\$25,000.00			Y
Engineering and Design	Technical/Engineering Assistance	Local Fund	Forest Lake Area Schools	\$43,250.00			Y
Engineering and Design	Technical/Engineering Assistance	Local Fund	Rice Creek WD	\$50,000.00			Y
Grant Administration	Administration/Coordination	Local Fund	Forest Lake Area Schools	\$8,000.00			Y
Project Education and Outreach	Education/Information	Current State Grant	Forest Lake High School Stormwater Reuse Project	\$15,000.00			N

### Activity Details Summary

Activity Details	Total Action Count	Total Activity Mapped	Proposed Size / Unit	Actual Size / Unit
636 - Water Reuse	1	1	14 AC	0 AC

### Proposed Activity Indicators

Activity Name	Indicator Name	Value & Units	Waterbody	Calculation Tool	Comments
<b>Design and Implement Stormwater Reuse Practice</b>	VOLUME REDUCED (ACRE-FEET/YEAR)	12.6 ACRE-FEET/YR	Clear Lake	Other	Met Council Stormwater Reuse Tool was used to develop total volume reduction.
<b>Design and Implement Stormwater Reuse Practice</b>	PHOSPHORUS (EST. REDUCTION)	20 LBS/YR	Clear Lake	MIDS	

Activity Name	Indicator Name	Value & Units	Waterbody	Calculation Tool	Comments
<b>Design and Implement Stormwater Reuse Practice</b>	SEDIMENT (TSS)	2.2 TONS/YR	Clear Lake	MIDS	

### Grant Activity

#### Grant Activity - Construction of Stormwater Reuse Practices

<b>Description</b>	<p>Construction of Stormwater Reuse Project at Forest Lake High School</p> <p>Improvements on the High School site are currently being constructed under a contract. The Reuse project will be advertised and bid under a separate contract with specific value contracting taken into consideration.</p> <p>This activity includes construction of the stormwater pond retrofits and new stormwater reuse irrigation infrastructure which will reduce potable groundwater usage at the High School by over 4 million gallons per year</p> <p>The stormwater reuse project will reduce the pollutant load to Clear Lake, including reductions in total suspended solids by 4654 pounds and total phosphorus by 19.5 pounds annually. The project budget is \$505,000.</p>
<b>Category</b>	URBAN STORMWATER MANAGEMENT PRACTICES
<b>Has Rates and Hours?</b>	No

#### Activity Action - Stormwater Reuse Facility

<b>Practice</b>	636 - Water Reuse	<b>Count of Activities</b>	1
<b>Description</b>	Project will collect 12.6 acre-feet per year stormwater and use for irrigation of 14 acres.		
<b>Proposed Size / Units</b>	14 AC	<b>Lifespan</b>	25 Years

### Grant Activity - Engineering and Design

Description	Engineering and Design, Plans and Specifications, Bidding Award. Bolton & Menk will perform all design and construction administration on behalf of Forest Lake Area Schools. Bolton & Menk developed the Clear Lake Improvements Project in conjunction with the City of Forest Lake and RCWD, which resides in the same watershed as the Forest Lake Reuse Project. Bolton & Menk also has extensive experience designing and administering other stormwater reuse projects around the state of Minnesota. Tim Olson, PE (Reg. No. 49129) from Bolton & Menk will be the lead engineer.
Category	TECHNICAL/ENGINEERING ASSISTANCE
Has Rates and Hours?	No

### Grant Activity - Grant Administration

Description	Grant Administration  Primary parties responsible include: Tim Olson, PE (Bolton & Menk) Dave Adams (City of Forest Lake) Kyle Axtell (RCWD)
Category	ADMINISTRATION/COORDINATION
Has Rates and Hours?	No

### Grant Activity - Project Education and Outreach

Description	Community outreach and education, Coordinate and lead BMP tours, Develop on-site signage and educational materials, Develop curriculum for Biology, Agriculture and Earth Sciences departments. The Forest Lake Area Schools, RCWD and Bolton & Menk will collaborate to develop curriculum that will support the project and engage the students and faculty.  Primary persons responsible for this activity include Tim Olson, PE (Bolton & Menk), Steve Massey (Forest Lake Schools), Beth Carreno (Communications and Outreach Coordinator, RCWD), Teaching Staff at Forest Lake High School and other staff at RCWD.
Category	EDUCATION/INFORMATION
Has Rates and Hours?	No

## Grant Attachments

Document Name	Document Type	Description
<b>2017 Competitive Grant</b>	Grant Agreement	2017 Competitive Grant - Forest Lake, City of
<b>Agency Agreement</b>	Grant	Forest Lake High School Stormwater Reuse Project
<b>Application</b>	Workflow Generated	Workflow Generated - Application - 08/08/2016
<b>BC_Comments_03-21-2017</b>	Journal	Journal Dated - 03/21/2017
<b>Forest Lake Area Schools Stormwater Reuse Feasibility Study</b>	Grant	Forest Lake High School Stormwater Reuse Project
<b>Work Plan</b>	Workflow Generated	Workflow Generated - Work Plan - 12/14/2016
<b>Work Plan</b>	Workflow Generated	Workflow Generated - Work Plan - 03/16/2017
<b>grantmap_16892_2016-07-22_07-21-49-AM.jpg</b>	Grant	Forest Lake High School Stormwater Reuse Project



**FY 2017 STATE OF MINNESOTA  
BOARD OF WATER and SOIL RESOURCES  
COMPETITIVE GRANTS PROGRAM  
GRANT AGREEMENT**

Vendor:	0000201515	VN#:	14298
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**Forest Lake, MN**  
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The Grantee must comply with all the time requirements described in this Grant Agreement. In the performance of this Grant Agreement, time is of the essence.

## 4. Terms of Payment

- 4.1. Grant funds will be distributed in three installments: 1) The first payment of 50% will be distributed after the execution of the Grant Agreement. 2) The second payment of 40% will be distributed after the first payment of 50% has been expended and reporting requirements have been met. An eLINK Interim Financial Report that summarizes expenditures of the first 50% must be signed by the Grantee and approved by BWSR. Selected grantees may be required at this point to submit documentation of the expenditures reported on the Interim Financial Report for verification. 3) The third payment of 10% will be distributed after the grant has been fully expended and reporting requirements are met. The final, 10% payment must be requested within 30 days of the expiration date of the Grant Agreement. An eLINK Final Financial Report that summarizes final expenditures for the grant must be signed by the grantee and approved by BWSR.
- 4.2. All costs must be incurred within the grant period.
- 4.3. All incurred costs must be paid before the amount of unspent grant funds is determined. Unspent grant funds must be returned within 30 days of the expiration date of the Grant Agreement.
- 4.4. The obligation of the State under this Grant Agreement will not exceed the amount stated above.
- 4.5. This grant includes an advance payment of 50 percent of the grant's total amount. Advance payments allow the grantee to have adequate operating capital for start-up costs, ensure their financial commitment to landowners and contractors, and to better schedule work into the future.
- 4.6. Contracting and Bidding Requirements per Minn. Stat. §471.345, Grantees that are municipalities as defined in Subd. 1 must do the following if contracting funds from this grant contract agreement for any supplies, materials, equipment or the rental thereof, or the construction, alteration, repair or maintenance of real or personal property.
  - 4.6.1. If the amount of the contract is estimated to exceed \$100,000, a formal notice and bidding process must be conducted in which sealed bids shall be solicited by public notice. Municipalities may, as a best value alternative, award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat. §16C.28, Subd. 1, paragraph (a), clause (2).
  - 4.6.2. If the amount of the contract is estimated to exceed \$25,000 but not \$100,000, the contract may be made either upon sealed bids or by direct negotiation, by obtaining two or more quotations for the purchase or sale when possible, and without advertising for bids or otherwise complying with the requirements of competitive bidding. All quotations obtained shall be kept on file for a period of at least one year after receipt thereof. Municipalities may, as a best value alternative, award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat. §16C.28, Subd. 1, paragraph (a), clause (2) and paragraph (c).

- 4.6.3. If the amount of the contract is estimated to be \$25,000 or less, the contract may be made either upon quotation or in the open market, in the discretion of the governing body. If the contract is made upon quotation, it shall be based, so far as practicable, on at least two quotations which shall be kept on file for a period of at least one year after their receipt. Alternatively, municipalities may award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat. §16C.28, Subd. 1, paragraph (a), clause (2).
- 4.6.4. Support documentation of the bidding process utilized to contract services must be included in the Grantee's financial records, including support documentation justifying a single/sole source bid, if applicable.
- 4.6.5. For projects that include construction work of \$25,000 or more, prevailing wage rules apply per Minn. Stat. §§177.41 through 177.44. Consequently, the bid request must state the project is subject to prevailing wage. These rules require that the wages of laborers and workers should be comparable to wages paid for similar work in the community as a whole. A prevailing wage form should accompany these bid submittals.

## 5. Conditions of Payment

All services provided by the Grantee under this Grant Agreement must be performed to the State's satisfaction, as set forth in this Agreement and in the BWSR approved work plan for this program. Compliance will be determined at the sole discretion of the State's Authorized Representative and in accordance with all applicable federal, State, and local laws, policies, ordinances, rules, FY 2017 Clean Water Fund Competitive Grants Policy, and regulations. All Grantees must follow the Grants Administration manual policy. Minnesota Statutes §103C.401 (2014) establishes BWSR's obligation to assure program compliance. If the noncompliance is severe, or if work under the grant agreement is found by BWSR to be unsatisfactory or performed in violation of federal, state, or local law, BWSR has the authority to require the repayment of grant funds, or an additional penalty. Penalties can be assessed at a rate up to 150% of the grant agreement.

The Minnesota Department of Administration's Office of Grants Management Policy on Grant Closeout Evaluation (Policy 08 – 13) requires the Board to consider a grant applicant's past performance before awarding subsequent grants to them. The Board must consider a grant applicant's performance on prior grants before making a new grant award of over \$5,000. The Board may withhold payment on this and grants from other programs if the Grantee is not in compliance with all Board reporting requirements.

## 6. Assignment, Amendments, and Waiver

- 6.1. **Assignment.** The Grantee may neither assign nor transfer any rights or obligations under this Grant Agreement without the prior consent of the State and a fully executed Assignment Agreement, executed and approved by the same parties who executed and approved this Grant Agreement, or their successors in office.
- 6.2. **Amendments.** Any amendment to this Grant Agreement must be in writing and will not be effective until it has been executed and approved by the same parties who executed and approved the original Grant Agreement, or their successors in office. Amendments must be executed prior to the expiration of the original agreement or any amendments thereto.
- 6.3. **Waiver.** If the State fails to enforce any provision of this Grant Agreement, that failure does not waive the provision or its right to enforce it.

## 7. Liability

The Grantee must indemnify, save, and hold the State, its agents, and employees harmless from any claims or causes of action, including attorney's fees incurred by the State, arising from the performance of this Grant Agreement by the Grantee or the Grantee's agents or employees. This clause will not be construed to bar any legal remedies the Grantee may have for the State's failure to fulfill its obligations under this Grant Agreement.

## 8. State Audits

Under Minn. Stat. § 16B.98, subd. 8, the Grantee's books, records, documents, and accounting procedures and practices of the Grantee or other party relevant to this Grant Agreement or transaction are subject to examination by the Board and/or the State Auditor or Legislative Auditor, as appropriate, for a minimum of six years from the end of this Grant Agreement, receipt and approval of all final reports, or the required period of time to satisfy all State and program retention requirements, whichever is later.

- 8.1. The books, records, documents, accounting procedures and practices of the Grantee and its designated local units of government and contractors relevant to this grant, may be examined at any time by the Board or Board's designee and are subject to verification. The Grantee or delegated local unit of government will maintain records relating to the receipt and expenditure of grant funds.



8.2. The Grantee or designated local unit of government implementing this Agreement will provide for an audit that meets the standards of the Office of State Auditor. The audit must cover the duration of the Agreement Period and be performed within one year after the end of the Agreement Period or when routinely audited, whichever occurs first. Copies of the audit report must be provided to the Board if requested.

**9. Government Data Practices**

The Grantee and State must comply with the Minnesota Government Data Practices Act, Minn. Stat. Ch. 13, as it applies to all data provided by the State under this Agreement, and as it applies to all data created, collected, received, stored, used, maintained, or disseminated by the Grantee under this Grant Agreement. The civil remedies of Minn. Stat. § 13.08 apply to the release of the data referred to in this clause by either the Grantee or the State.

**10. Workers' Compensation**

The Grantee certifies that it is in compliance with Minn. Stat. § 176.181, subd. 2, pertaining to workers' compensation insurance coverage. The Grantee's employees and agents will not be considered State employees. Any claims that may arise under the Minnesota Workers' Compensation Act on behalf of these employees and any claims made by any third party as a consequence of any act or omission on the part of these employees are in no way the State's obligation or responsibility.

**11. Publicity and Endorsement**

11.1. **Publicity.** Any publicity regarding the subject matter of this Grant Agreement must identify the Board as the sponsoring agency. For purposes of this provision, publicity includes notices, informational pamphlets, press releases, research, reports, signs, and similar public notices prepared by or for the Grantee individually or jointly with others, or any subcontractors, with respect to the program, publications, or services provided resulting from this Grant Agreement.

11.2. **Endorsement.** The Grantee must not claim that the State endorses its products or services.

**12. Governing Law, Jurisdiction, and Venue**

Minnesota law, without regard to its choice-of-law provisions, governs this Grant Agreement. Venue for all legal proceedings out of this Agreement, or its breach, must be in the appropriate State or federal court with competent jurisdiction in Ramsey County, Minnesota.

**13. Termination**

13.1. The State may cancel this Grant Agreement at any time, with or without cause, upon 30 days' written notice to the Grantee. Upon termination, the Grantee will be entitled to payment, determined on a pro rata basis, for services satisfactorily performed.

13.2. In the event of a lawsuit, an appropriation from a Clean Water Fund is canceled to the extent that a court determines that the appropriation unconstitutionally substitutes for a traditional source of funding.

**14. Data Disclosure**

Under Minn. Stat. § 270C.65, Subd. 3, and other applicable law, the Grantee consents to disclosure of its social security number, federal employer tax identification number, and/or Minnesota tax identification number, already provided to the State, to federal and State tax agencies and State personnel involved in the payment of State obligations. These identification numbers may be used in the enforcement of federal and State tax laws which could result in action requiring the Grantee to file State tax returns and pay delinquent State tax liabilities, if any.

**15. Prevailing Wage**

It is the responsibility of the Grantee or contractor to pay prevailing wages on construction projects to which State prevailing wage laws apply (Minn. Stat. 177.42 – 177.44). All laborers and mechanics employed by grant recipients and subcontractors funded in whole or in part with these State funds shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality.

**16. Constitutional Compliance**

It is the responsibility of the Grantee to comply with requirements of the Minnesota Constitution regarding use of Clean Water Funds to supplement traditional sources of funding.

**17. Signage**

It is the responsibility of the Grantee to comply with requirements for project signage as provided in Minnesota Laws 2010, Chapter 361, article 3, section 5 (b) for Clean Water Fund projects.

**18. Intellectual Property Rights**


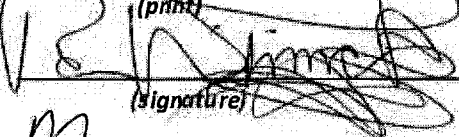
The State owns all rights, title, and interest in all of the intellectual property rights, including copyrights, patents, trade secrets, trademarks, and service marks in the Works and Documents *created and paid for under this grant*. Works means all inventions, improvements, discoveries (whether or not patentable), databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, and disks conceived, reduced to practice, created or originated by the Grantee, its employees, agents, and subcontractors, either individually or jointly with others in the performance of this grant. Works includes "Documents." Documents are the originals of any databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, disks, or other materials, whether in tangible or electronic forms, prepared by the Grantee, its employees, agents, or subcontractors, in the performance of this grant. The Documents will be the exclusive property of the State and all such Documents must be immediately returned to the State by the Grantee upon completion or cancellation of this grant at the State's request. To the extent possible, those Works eligible for copyright protection under the United States Copyright Act will be deemed to be "works made for hire." The Grantee assigns all right, title, and interest it may have in the Works and the Documents to the State. The Grantee must, at the request of the State, execute all papers and perform all other acts necessary to transfer or record the State's ownership interest in the Works and Documents.

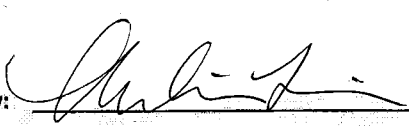
*IN WITNESS WHEREOF, the parties have caused this Grant Agreement to be duly executed intending to be bound thereby.*

Approved:

Forest Lake, City of

Board of Water and Soil Resources

By:   
(print)  
  
(signature)


By: 

Title: Mayor

Title: Assist. Sec. Agr.

Date: 3/27/17

Date: April 5, 2017

  
City Administrator

**PROGRAMMATIC STORMWATER MANAGEMENT FACILITY  
MAINTENANCE AGREEMENT**

**Rice Creek Watershed District and  
the City of Forest Lake**

This Agreement is by and between the Rice Creek Watershed District, a special purpose unit of government with powers set forth in Minnesota Statutes Chapters 103B and 103D (RCWD), and the City of Forest Lake, a political subdivision of the State of Minnesota (CITY).

**Recitals**

WHEREAS pursuant to Minnesota Statutes § 103D.345, the RCWD has adopted and implements Rule C, Stormwater Management Plans;

WHEREAS under Rule C, certain land development activity requires a landowner to record a declaration establishing the landowner's perpetual obligation to inspect and maintain stormwater management facilities;

WHEREAS a public landowner may memorialize its obligations in an unrecorded written agreement with the RCWD instead of a recorded instrument;

WHEREAS from time to time CITY is subject to stormwater facility maintenance requirements pursuant to the terms of an RCWD permit;

WHEREAS CITY, as a Municipal Separate Storm Sewer System (MS4), is obligated to inspect and maintain its stormwater management facilities in accordance with the terms of a Clean Water Act permit administered by the Minnesota Pollution Control Agency, and the parties desire to promote consistency in facility management requirements consistent with RCWD authority to set requirements necessary to meet its rules; and

WHEREAS the RCWD and CITY concur that it is more effective and procedurally more efficient for the RCWD and CITY to agree on standard requirements for stormwater facility inspection and maintenance, and to memorialize these requirements in this Agreement for incorporation into future permits.

**THEREFORE:**

1. CITY agrees to inspect and maintain all stormwater best management practices (BMPs), owned by the City or maintained by the City under another intergovernmental agreement, that have been permitted by the RCWD under Rule C as follows:

- a. Outfalls, sediment basins, retention/detention ponds will be inspected at least once every five years. If warranted by required sediment removal or maintenance needs, inspections will be conducted at a greater frequency.
- b. Structural stormwater management facilities including, but not limited to, grit chambers, sump catch basins, sump manholes and appurtenant conveyances, as well as infiltration and

biofiltration BMPs including, but not limited to, vegetated swales, rain gardens and filtration features, will be inspected annually to ensure structural integrity, proper function and treatment effectiveness. If, after the first two annual inspections, maintenance or sediment removal is not required then the frequency will be reduced to once every two (2) years. Should a subsequent inspection indicate the need for sediment removal or maintenance, the inspection schedule will revert to annual inspections following the completion of the maintenance work. If, after the first two post-maintenance annual inspections, no additional maintenance or sediment removal is required, then the inspection frequency will be reduced to once every two (2) years.

c. Proprietary devices will be inspected per manufacturer/installer recommendations, and at least annually.

d. All inspections will occur at a time that allows CITY to determine if the facility is functioning as designed.

e. In addition, CITY will respond promptly to notice from the RCWD that a facility may require inspection or maintenance. Within one month of notice, CITY will inspect and advise the RCWD on the results of the inspection.

2. CITY will maintain, repair and replace BMPs when inspection indicates this is necessary to restore design performance. Maintenance necessity will be as recommended in Minnesota Stormwater Manual guidance. CITY will complete work within six (6) months of inspection, except that periodic sediment removal from basins will be completed within eighteen (18) months of inspection. Alternatively, an RCWD-approved maintenance schedule may be used as a work timeline.

3. CITY will submit a copy of its MS4 permit annual report to the RCWD at the same time that it is required to be submitted to the MPCA, with any supplement as needed to briefly describe dates, locations and descriptions of inspection and maintenance activities.

4. RCWD permits for specific projects may contain additional inspection and maintenance conditions as the RCWD may find warranted under the circumstances of a specific permit.

5. If CITY conveys into private ownership a fee interest in any property that has become subject to this Agreement, it shall require as a condition of sale, and enforce: (a) that the purchaser record a declaration on the property incorporating the stormwater management facility maintenance requirements of this Agreement; and (b) that recordation occur either before any encumbrance is recorded on the property or, if after, only as accompanied by a subordination and consent executed by the encumbrance holder ensuring that the declaration will run with the land in perpetuity. If CITY conveys into public ownership a fee interest in any property that has become subject to this Agreement, it shall require as a condition of the purchase and sale agreement that before closing, the purchaser execute an agreement with the RCWD assuming the obligations of this agreement and releasing CITY from same.

6. This Agreement may be amended only in a writing signed by the parties.


7. This Agreement is in force for five years from the date on which it is fully executed and will renew automatically for five-year terms unless terminated. Either party may terminate the

Agreement on 30 days' written notice to the other. The terms of this Agreement are incorporated into any future permit issued to the CITY by explicit reference to this Agreement under the maintenance conditions of that permit. Any obligations vested in CITY through incorporation into an issued permit before the effective date of termination of this Agreement will survive expiration.

8. The recitals above are incorporated as a part of this Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement.

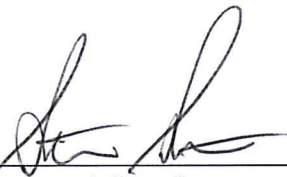
**RICE CREEK WATERSHED DISTRICT**

By  Date: 8/15/16  
(Print name:) Phil Belfiori  
Its Administrator

*Approved as to form and execution*

By \_\_\_\_\_  
Its Attorney

**[CITY]**

By  Date: 8/8/2016  
(Print name:) Stev Stegner

Its Mayor

By  Date: 8/8/16  
(Print name:) Aaron Parrish

Its City Administrator



- 4.6.2.If the amount of the contract is estimated to exceed \$25,000 but not \$100,000, the contract may be made either upon sealed bids or by direct negotiation, by obtaining two or more quotations for the purchase or sale when possible, and without advertising for bids or otherwise complying with the requirements of competitive bidding. All quotations obtained shall be kept on file for a period of at least one year after receipt thereof. Municipalities may, as a best value alternative, award a contract for construction, alteration, repair, or maintenance work to the vendor or contractor offering the best value under a request for proposals as described in Minn. Stat.§16C.28, Subd. 1, paragraph (a), clause (2) and paragraph (c).
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subject to examination by the Board and/or the State Auditor or Legislative Auditor, as appropriate, for a minimum of six years from the end of this Grant Agreement, receipt and approval of all final reports, or the required period of time to satisfy all State and program retention requirements, whichever is later.

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9. **Government Data Practices.** The Grantee and State must comply with the Minnesota Government Data Practices Act, Minn. Stat. Ch. 13, as it applies to all data provided by the State under this Agreement, and as it applies to all data created, collected, received, stored, used, maintained, or disseminated by the Grantee under this Grant Agreement. The civil remedies of Minn. Stat. § 13.08 apply to the release of the data referred to in this clause by either the Grantee or the State.

10. **Workers' Compensation.** The Grantee certifies that it is in compliance with Minn. Stat. § 176.181, subd. 2, pertaining to workers' compensation insurance coverage. The Grantee's employees and agents will not be considered State employees. Any claims that may arise under the Minnesota Workers' Compensation Act on behalf of these employees and any claims made by any third party as a consequence of any act or omission on the part of these employees are in no way the State's obligation or responsibility.

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11.1. **Publicity.** Any publicity regarding the subject matter of this Grant Agreement must identify the Board as the sponsoring agency. For purposes of this provision, publicity includes notices, informational pamphlets, press releases, research, reports, signs, and similar public notices prepared by or for the Grantee individually or jointly with others, or any subcontractors, with respect to the program, publications, or services provided resulting from this Grant Agreement.

11.2. **Endorsement.** The Grantee must not claim that the State endorses its products or services.

12. **Governing Law, Jurisdiction, and Venue.** Minnesota law, without regard to its choice-of-law provisions, governs this Grant Agreement. Venue for all legal proceedings out of this Agreement, or its breach, must be in the appropriate State or federal court with competent jurisdiction in Ramsey County, Minnesota.

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13.1. The State may cancel this Grant Agreement at any time, with or without cause, upon 30 days' written notice to the Grantee. Upon termination, the Grantee will be entitled to payment, determined on a pro rata basis, for services satisfactorily performed.

13.2. In the event of a lawsuit, an appropriation from a Clean Water Fund is canceled to the extent that a court determines that the appropriation unconstitutionally substitutes for a traditional source of funding.

14. **Data Disclosure.** Under Minn. Stat. § 270C.65, Subd. 3, and other applicable law, the Grantee consents to disclosure of its social security number, federal employer tax identification number, and/or Minnesota tax identification number, already provided to the State, to federal and State tax agencies and State personnel involved in the payment of State obligations. These identification numbers may be used in the enforcement of federal and State tax laws which could result in action requiring the Grantee to file State tax returns and pay delinquent State tax liabilities, if any.

15. **Prevailing Wage.** It is the responsibility of the Grantee or contractor to pay prevailing wages on construction projects to which State prevailing wage laws apply (Minn. Stat. 177.42 – 177.44). All laborers and mechanics



employed by grant recipients and subcontractors funded in whole or in part with these State funds shall be paid wages at rates not less than those prevailing on projects of a character similar in the locality.

- 16. **Constitutional Compliance.** It is the responsibility of the Grantee to comply with requirements of the Minnesota Constitution regarding use of Clean Water Funds to supplement traditional sources of funding.
- 17. **Signage.** It is the responsibility of the Grantee to comply with requirements for project signage as provided in Minnesota Laws 2010, Chapter 361, article 3, section 5 (b) for Clean Water Fund projects.
- 18. **Intellectual Property Rights.** The State owns all rights, title, and interest in all of the intellectual property rights, including copyrights, patents, trade secrets, trademarks, and service marks in the Works and Documents *created and paid for under this grant*. Works means all inventions, improvements, discoveries (whether or not patentable), databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, and disks conceived, reduced to practice, created or originated by the Grantee, its employees, agents, and subcontractors, either individually or jointly with others in the performance of this grant. Works includes "Documents." Documents are the originals of any databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, disks, or other materials, whether in tangible or electronic forms, prepared by the Grantee, its employees, agents, or subcontractors, in the performance of this grant. The Documents will be the exclusive property of the State and all such Documents must be immediately returned to the State by the Grantee upon completion or cancellation of this grant at the State's request. To the extent possible, those Works eligible for copyright protection under the United States Copyright Act will be deemed to be "works made for hire." The Grantee assigns all right, title, and interest it may have in the Works and the Documents to the State. The Grantee must, at the request of the State, execute all papers and perform all other acts necessary to transfer or record the State's ownership interest in the Works and Documents.

*IN WITNESS WHEREOF, the parties have caused this Grant Agreement to be duly executed intending to be bound thereby.*

Approved:

Forest Lake, City of

Board of Water and Soil Resources

By:  Daniel Under   
(print)

By: \_\_\_\_\_

[Signature]   
(signature)

Title:  Interim City Administrator

Title: \_\_\_\_\_

Date:  2-27-18

Date: \_\_\_\_\_

**FUNDING AGREEMENT**  
**CITY of FOREST LAKE and the RICE CREEK WATERSHED DISTRICT**  
**FOREST LAKE ENHANCED STREET SWEEPING IMPLEMENTATION**

A. THIS FUNDING AGREEMENT ("Agreement") is entered into by the City of Forest Lake, Minnesota, a municipal corporation ("City") and the Rice Creek Watershed District, a special purpose unit of local government under Minnesota Statutes Chapters 103B and 103D (RCWD).

B. The RCWD's duly adopted Watershed Management Plan (2010, amended Nov. 2016) identifies water quality treatment projects and activities in the Clear Lake watershed, including increased street sweeping and other projects within the TH61 corridor; its Clear Lake Diagnostic Study and Management Plan (Feb. 2012) identifies actions to protect and improve water quality in Clear Lake;

C. The City's TH61 Aesthetics and Water Quality Improvements Planning Study (April 2012) identifies priority projects within the corridor to improve water quality in Clear Lake; its capital improvement program in its duly adopted Local Water Management Plan (Sept. 2013) incorporates this study;

D. In February 2018, Emmons and Olivier Resources, Inc. completed the final City of Forest Lake Enhanced Street Sweeping Management Plan which detailed the benefits and costs of purchasing advanced street sweeping equipment and implementing an advanced street sweeping program within various drainage areas in the City of Forest Lake, including the Clear Lake watershed (the "Program");

E. The Board of Water and Soil Resources (BWSR) has awarded a Clean Water Fund (CWF) grant to the City for the Program, pursuant to which it has executed an agreement ("Grant Agreement").

Based on the foregoing recitals, each incorporated into this Agreement, the City and the RCWD, each duly authorized by its governing body, agree as follows, intending to be legally bound:

**OPERATION**

1. The City will procure all equipment, materials and labor necessary or convenient to implement the Program.
2. The City will prepare a final enhanced street sweeping management plan for watersheds located in the RCWD, subject to RCWD concurrence, not to be unreasonably withheld ("Plan"). At a minimum, the number of sweepings in the Plan for those watersheds will meet the Enhanced (Recommended) option as described on pages 24 and 25 of the February 2018 City of Forest Lake Street Sweeping Management Plan, as referenced in paragraph D above. The City will conduct that part of the Program within RCWD boundaries in accordance with the Plan until three full years of sweeping operations have been completed, or for the length of time prescribed by BWSR, whichever is longer.

**MONITORING and EDUCATION**

3. The City will develop a report format and content for RCWD concurrence, not to be unreasonably withheld, that reviews sweeping locations and frequencies and provides useful data on both sediment and phosphorus removals. The City will report on its Program activity annually to the RCWD.
4. The City will prepare and implement education and community outreach elements of the Program as required by the Grant Agreement.

**FUNDING**

5. The Program will be funded as follows:

- a. The RCWD will contribute 14.7 percent of the local match required by the Grant Agreement, not to exceed \$8,085.
- b. All remaining Program costs are the responsibility of the City. The City may defray its costs by means of its CWF grant and any other source of funds it may arrange.
- c. Otherwise, each party will bear its own administrative costs and its costs for those actions it is responsible to take under this Agreement.

6. The RCWD will provide its funds under paragraph 5.a, above, on a reimbursement basis within 30 days of City invoice of its sweeper purchase. If the City does not fulfill its obligations to the RCWD under this Agreement for a period of three full years of sweeping operations the District, after notice and a reasonable opportunity to cure, is entitled to a return of its funds.

**GRANT ADMINISTRATION and COMPLIANCE**

7. The City, as CWF grantee, is solely responsible for conformance to all terms of the Grant Agreement.

**GENERAL TERMS**

8. Any RCWD right of approval under this Agreement is solely for the purpose of ensuring the proper use of its public funds. The City is entirely responsible for the means, manner and method of performing the Program. This Agreement is not a joint powers agreement under Minnesota Statutes §471.59. Nothing herein constitutes one party's agreement to be responsible for the acts or omissions of another party pursuant to subdivision 1(a) of that statute. The City will hold the RCWD, its managers, staff and representatives, harmless and indemnify them against any claim, expense or damage, including attorney fees, arising from the City's conduct of the Program.

9. Notwithstanding any other term of this Agreement, nothing herein creates a right in any third party or waives an immunity, defense or liability limit of either party with respect to any third party. As between the parties, only contractual remedies are available for a party's failure to fulfill the terms of this Agreement.

10. The following will be used for any communication under this Agreement:

- |       |  |
|-------|--|
| City: | City of Forest Lake<br>1408 Lake Street South<br>Forest Lake, MN 55025<br>ATTN: City Administrator               |
| RCWD: | Rice Creek Watershed District<br>4325 Pheasant Ridge Dr. NE #611<br>Blaine, MN 55449-4539<br>ATTN: Administrator |

or at such other address of which a party may, from time to time, notify the other party in writing.

11. If any party waives any default or non-performance by another party, the waiver will apply only to the cited instance and will not waive any other prior or later default.

12. This Agreement is the entire agreement between the parties as to the Program and supersedes all other prior agreements and understandings, written or oral, between the parties.

13. An alteration, variation, modification, or waiver of any provision of this Agreement is valid only when reduced to writing as an amendment to this Agreement signed by the parties hereto or their successors.

14. A party may not assign or transfer this Agreement or any right or obligation hereunder without the written consent of the other party.

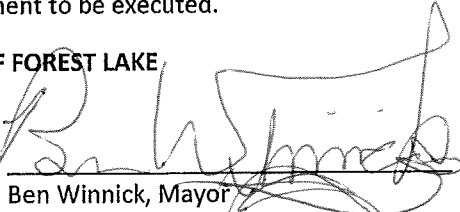
15. In participating in this Agreement, each party will act in accordance with the Minnesota Data Practices Act, Minnesota Statutes chapter 13. Each party will consult with the other as appropriate with respect to any data request it may receive. Data and documents of any kind produced by the Program, and any new information or technology developed, are subject to the intellectual property terms of the Grant Agreement and otherwise may not be copyrighted, patented, trademarked or designated as trade secret by a party.

16. This Agreement is effective on full execution by the parties and terminates four years thereafter. Notwithstanding, the terms of this Agreement will survive termination as necessary until all matters relating to performance hereunder and arising before termination are resolved.

IN TESTIMONY WHEREOF, the City of Forest Lake and the Rice Creek Watershed District have caused this Agreement to be executed.

**CITY OF FOREST LAKE**

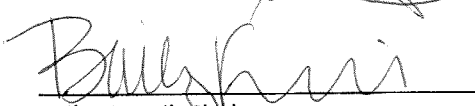
By:

  
Ben Winnick, Mayor

Date:

3/12/18

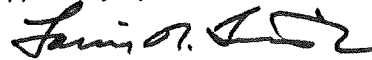
By:

  
Bailey Fencil, Clerk

Date:

3/12/18

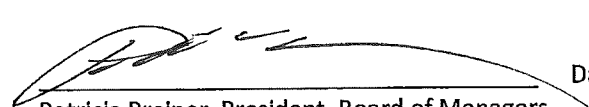
*Approved for form and execution*



*RCWD Counsel*

**RICE CREEK WATERSHED DISTRICT**

By:

  
Patricia Preiner, President, Board of Managers

Date:

2-28-2018



## VI. Executive Summary

Include a brief Executive Summary (100 words or less) that summarizes the main goals and activities of the project and the expected environmental outcomes that will be achieved. Identification of the total amount of funds being requested along with the required match must be included in the Executive Summary. The summaries will be used in the grant review process and on the RCWD website, for projects that are funded.

The Mccullough/Moore properties is situated adjacent to a series of small wetlands, drainage ditches and public water wetlands that serve a mixed land use drainage area approximately 490 acres in size. The area has a history of surface flooding issues. Prior to the construction of the Airport Hangars along TH 61, the property was served by a drain tile that discharged across the airport property. The tile ceased to function around the time the airport utility construction were constructed, which led to routine rises in water surface elevations on the Moore property. The City and Rice Creek Watershed District have offered several solutions to flooding through the installation of a drain tile to serve surface storage areas during the construction of the Headwaters Development. However, due to very flat topography, the drain tile was too high to serve the Mccullough/Moore properties. Therefore, the City of Forest Lake is proposing to construct a new intake structure and drain tile to mitigate surface flooding on the Mccullough/Moore properties.

## VII. Project Description & Justification

The RCWD has established guidelines for prioritizing projects based on location. Water quality improvement projects should be located to benefit a RCWD Tier I or II lake (see Figure 4.2 in the RCWD's Watershed Management Plan), or a waterbody with an approved Total Maximum Daily Load (TMDL) study. Flood storage and runoff rate control projects should focus on reducing flood peaks in known regional flood hazard and problem areas. Describe the specific watershed management, water quality or quantity need(s) that the project will address and its impact on the target water resource within the District.

- Name the target waterbody benefitting from this project: Clear Lake
- List and describe the Best Management Practices (BMPs) that will be incorporated into this project, including any stormwater reuse components.

A nyloplast catch basin structure and approximately 1250 feet of 6" PVC drain tile will provide an adequate gravity outlet to the flooded area. This will also create additional reserve capacity in the existing driveway culvert and storm sewer system along TH 61.

- If applicable, describe how the project impacts or protects groundwater resources within the RCWD.

- Describe how long-term operation and maintenance of the project will be accomplished.

The City will inspect the structure and pipe aligned with the requirements of its MS4 Permit Program. This includes periodic visual inspections of the nyloplast structure and jet-cleaning the tile as needed to maintain proper pipe capacity.

- If applicable, describe how the project minimizes impervious surface and/or maximizes infiltration.

- Address how the project relates to and supports existing regional planning such as the RCWD Watershed Management Plan, municipal local surface water management plans, and/or others.

This project will mitigate flooding in an area that is subject to periodic flooding.

- List all project partners and their respective roles in implementing and/or supporting the project.

The City of Forest Lake intends to construct this project with local cost share dollars only. There are no additional project partners.

### VIII. Conceptual Design

Provide drawings, maps and/or schematics which graphically illustrate the location and conceptual design of the project. **(Attach separate sheets.)**

### IX. Pollutant Reduction Estimates & Other Benefits

Provide a detailed estimate and description of the anticipated pollutant reduction, stormwater rate/volume reduction, groundwater withdrawal reduction, and/or other environmental or natural resource benefits associated with the project. Describe the methods and cite the sources (i.e. P8 model, HydroCAD, MN Stormwater Manual, etc.) used to calculate or estimate the pollutant reductions. **(NOTE: Mandatory for RCWD to consider your proposal!)**

The new surface intake structure and 6" PVC drain tile will help mitigate a known surface flooding issue at the Mccullough/Moore properties by providing a much needed gravity outfall pipe from the area.

#### X. Detailed Cost Estimate

Provide a detailed and reasonable budget that lists each item for which funding is being requested. You must also list the required local matching contributions and their sources. **(Attach separate sheets.)**

#### XI. Evaluation

Describe the strategy for monitoring and/or evaluating the results or effectiveness of the project, including how success will be defined and measured.

The City will monitor surface flooding in the vicinity of the project site and adjacent parcels after rainfall events to ensure that surface flooding drains in an appropriate time frame. The City will also monitor and clean the drain tile as need as part of its general infrastructure maintenance strategy.

#### XII. Education & Demonstration

Demonstrate any potential for education and demonstration and describe what methods will be used to ensure that the purpose and success of the project are made known to the public. **(Applicants must include a public education component into the project.)**

#### XIII. Key Personnel

List the lead personnel on the project including any known contractors that will be working on the project. Please include contact information.



**RICE CREEK WATERSHED DISTRICT  
COST-SHARE AGREEMENT**

COST-SHARE AGREEMENT between the Rice Creek Watershed District, 4325 Pheasant Ridge Drive NE, Suite 611, Blaine, Minnesota 55449 and the City of Forest Lake.

**RECITALS**

- A. The City of Forest Lake (City) intends to construct a project titled "TH 61 West Ditch Drain Tile Extension" ("Project").
- B. The Rice Creek Watershed District (District) has a cost-share program for the improvement and remediation of stormwater management systems in developed urban environments.
- C. In accordance with Program guidelines, the District desires to provide the City cost-share assistance for the Project.

THEREFORE, in consideration of mutual promises set forth herein and other good and valuable consideration, the District and the City agree as follows:

**I. CITY RESPONSIBILITIES.**

- A. Design Plans and Maintenance Plan. The City will submit (1) final Project plans and specifications, and (2) a maintenance plan, to the District for the Administrator's written approval. The Project plans and specifications must include a public education component. The District, in its discretion, may approve a non-structural public education component.
- B. Construction and Maintenance. The City, through its own personnel and/or contractors, will construct the Project in accordance with the approved Project plans and specifications and maintain it indefinitely in accordance with the approved maintenance plan. In doing so, the City will comply with all applicable laws and regulations and will be responsible for acquiring all permits, approvals and temporary and permanent rights of access or easement.
- C. Completion of Construction. The City staff or consulting engineer will certify the completion of Project construction no later than December 31, 2019. The City will submit to the District documentation of Project expenditures and the certification of completion no later than March 31, 2020.

**II. DISTRICT RESPONSIBILITIES.**

- A. Cost-Share Funds. To defray the Project cost to the City, the District will provide the City cost-share assistance in the amount of 50 percent of the Project's eligible costs, as determined by the District, not to exceed \$24,800.00.
- B. Payment Schedule. On District approval of the Project plans and specifications and maintenance plan, certification by the City that it has obtained all necessary permits and approvals, and receipt of the City's issued notice to proceed, the District will disburse 50 percent of the RCWD Board approved cost-share amount to the City. On District receipt of the certification of completion and review of such

Project documentation as it may require, the District will disburse the remaining RCWD Board approved funds.

C. Contingencies. The District's obligation to provide cost-share funds is contingent on the City's compliance with the terms of this agreement, including but not limited to Project completion in accordance with the District-approved plans and specifications by December 31, 2019. The City will return to the District any cost-share funds already received if this condition is not satisfied.

**III. MISCELLANEOUS.**

A. Relationship of Parties. Nothing in this agreement creates or establishes a partnership, joint venture or agency relationship between the parties. District review or approval of design plans and specifications, a maintenance plan and any other Project-related documents is solely for the District's own accounting for funds expended. As between the parties, the City is solely responsible for selection of the Project design and the means, method and manner of construction. Nothing in this agreement creates any right in any third party or affects any immunity, defense or liability limitation enjoyed by either party.

B. Employees. The City represents that it has or will secure, at its own expense, all personnel and/or contractors required for the performance of this agreement. No City personnel or contractor will be considered an agent, representative or employee of the District.

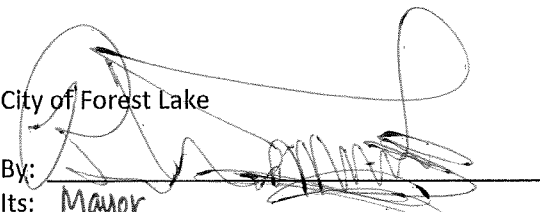
C. Liability. The City agrees to hold harmless and indemnify the District, and its managers, staff and representatives, against any claim, expense or damage, including attorney fees, arising from the performance of this agreement.

D. Assignment or Modification. This agreement binds and inures to the benefit of the City and the District, and their respective successors and assigns. Neither party may assign this agreement without the prior written consent of the other. Any modification of the agreement must be in writing and signed by both parties.

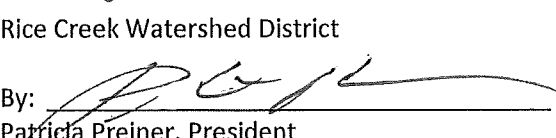
E. Public Documents. All submitted information, including application, conceptual design, cost estimates, bid tabulations, final designs and specifications, copies of permits and proof of expenditures will become a part of the public record.

F. Effective Date. This agreement is effective as of the date all of the signatures below have been provided.

Dated: 11-13, 2017

City of Forest Lake  
By:   
Its: Mayor

Dated: 10-25, 2017

Rice Creek Watershed District  
By:   
Patricia Preiner, President

# Appendix E: Stormwater Pollution Prevention Plan (SWPPP)



# MS4 SWPPP Application for Reauthorization

for the NPDES/SDS General Small Municipal Separate Storm Sewer System (MS4) Permit MNR040000 reissued with an effective date of August 1, 2013 Stormwater Pollution Prevention Program (SWPPP) Document

Doc Type: Permit Application

**Instructions:** This application is for authorization to discharge stormwater associated with Municipal Separate Storm Sewer Systems (MS4s) under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) Permit Program. **No fee** is required with the submittal of this application. Please refer to "Example" for detailed instructions found on the Minnesota Pollution Control Agency (MPCA) MS4 website at <http://www.pca.state.mn.us/ms4>.

**Submittal:** This MS4 SWPPP Application for Reauthorization form must be submitted electronically via e-mail to the MPCA at [ms4permitprogram.pca@state.mn.us](mailto:ms4permitprogram.pca@state.mn.us) from the person that is duly authorized to certify this form. All questions with an asterisk (\*) are required fields. All applications will be returned if required fields are not completed.

**Questions:** Contact Claudia Hochstein at 651-757-2881 or [claudia.hochstein@state.mn.us](mailto:claudia.hochstein@state.mn.us), Dan Miller at 651-757-2246 or [daniel.miller@state.mn.us](mailto:daniel.miller@state.mn.us), or call toll-free at 800-657-3864.

## General Contact Information (\*Required fields)

### MS4 Owner (with ownership or operational responsibility, or control of the MS4)

\*MS4 permittee name: City of Forest Lake \*County: Washington  
*(city, county, municipality, government agency or other entity)*

\*Mailing address: 220 Lake Street North

\*City: Forest Lake \*State: MN \*Zip code: 55025

\*Phone (including area code): 651-464-3500 \*E-mail: chantal@ci.forest-lake.mn.us

### MS4 General contact (with Stormwater Pollution Prevention Program [SWPPP] implementation responsibility)

\*Last name: Borglund \*First name: Doug  
*(department head, MS4 coordinator, consultant, etc.)*

\*Title: Community Development Director

\*Mailing address: 21350 Forest Lake Blvd N.

\*City: Forest Lake \*State: MN \*Zip code: 55025

\*Phone (including area code): 651-209-9734 \*E-mail: Doug.Borglund@ci.forest-lake.mn.us

### Preparer information (complete if SWPPP application is prepared by a party other than MS4 General contact)

Last name: Olson First name: Timothy  
*(department head, MS4 coordinator, consultant, etc.)*

Title: PE, CFM

Mailing address: 2035 County Road D East, Suite B

City: Maplewood State: MN Zip code: 55109

Phone (including area code): 651-704-9970 E-mail: timol@bolton-menk.com

## Verification

- I seek to continue discharging stormwater associated with a small MS4 after the effective date of this Permit, and shall submit this MS4 SWPPP Application for Reauthorization form, in accordance with the schedule in Appendix A, Table 1, with the SWPPP document completed in accordance with the Permit (Part II.D.).  Yes
- I have read and understand the NPDES/SDS MS4 General Permit and certify that we intend to comply with all requirements of the Permit.  Yes

## Certification (All fields are required)

---

- Yes - I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted.

*I certify that based on my inquiry of the person, or persons, who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.*

*I am aware that there are significant penalties for submitting false information, including the possibility of civil and criminal penalties.*

This certification is required by Minn. Stat. §§ 7001.0070 and 7001.0540. The authorized person with overall, MS4 legal responsibility must certify the application (principal executive officer or a ranking elected official).

By typing my name in the following box, I certify the above statements to be true and correct, to the best of my knowledge, and that this information can be used for the purpose of processing my application.

Name: Doug Borglund  
*(This document has been electronically signed)*

Title: Community Development Director Date (mm/dd/yyyy): 12/18/2013

Mailing address: 21350 Forest Lake Blvd N.

City: Forest Lake State: MN Zip code: 55038

Phone (including area code): 651-209-9734 E-mail: Doug.Borglund@ci.forest-lake.mn.us

**Note:** *The application will not be processed without certification.*

# Stormwater Pollution Prevention Program Document

## I. Partnerships: (Part II.D.1)

- A. List the **regulated small MS4(s)** with which you have established a partnership in order to satisfy one or more requirements of this Permit. Indicate which Minimum Control Measure (MCM) requirements or other program components that each partnership helps to accomplish (List all that apply). Check the box below if you currently have no established partnerships with other regulated MS4s. If you have more than five partnerships, hit the tab key after the last line to generate a new row.

No partnerships with regulated small MS4s

Name and description of partnership	MCM/Other permit requirements involved
Rice Creek Watershed District	MCM 1 – Public Education and Outreach
Comfort Lake Forest Lake Watershed District	MCM 1 – Public Education and Outreach
Washington County Conservation District	MCM 1 – Public Education and Outreach

- B. If you have additional information that you would like to communicate about your partnerships with other regulated small MS4(s), provide it in the space below, or include an attachment to the SWPPP Document, with the following file naming convention: *MS4NameHere\_Partnerships*.

## II. Description of Regulatory Mechanisms: (Part II.D.2)

### Illicit discharges

- A. Do you have a regulatory mechanism(s) that effectively prohibits non-stormwater discharges into your small MS4, except those non-stormwater discharges authorized under the Permit (Part III.D.3.b.)?  Yes  No

1. If **yes**:

- a. Check which *type* of regulatory mechanism(s) your organization has (check all that apply):

- Ordinance                       Contract language  
 Policy/Standards             Permits  
 Rules  
 Other, explain: \_\_\_\_\_

- b. Provide either a direct link to the mechanism selected above or attach it as an electronic document to this form; or if your regulatory mechanism is either an Ordinance or a Rule, you may provide a citation:

Citation:

*City of Forest Lake Ordinance No. 581*

Direct link:

*<http://www.ci.forest-lake.mn.us/vertical/sites/%7BAFEB969B-C92D-4FE4-A096-00560D784D07%7D/uploads/%7B18F4722D-772D-43A2-B251-9B36695958E4%7D.PDF>*

- Check here if attaching an electronic copy of your regulatory mechanism, with the following file naming convention: *MS4NameHere\_IDDEreg*.

2. If **no**:

Describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, this permit requirement is met:

*The City of Forest Lake currently has ordinances in place that effectively prohibit non-stormwater discharges but does not define the term "non-stormwater." The City will include a definition of the term in the ordinance within 12 months of application approval.*

**Construction site stormwater runoff control**

A. Do you have a regulatory mechanism(s) that establishes requirements for erosion and sediment controls and waste controls?  Yes  No

1. If yes:

a. Check which type of regulatory mechanism(s) your organization has (check all that apply):

- Ordinance  Contract language
- Policy/Standards  Permits
- Rules
- Other, explain: \_\_\_\_\_

b. Provide either a direct link to the mechanism selected above or attach it as an electronic document to this form; or if your regulatory mechanism is either an Ordinance or a Rule, you may provide a citation:

Citation:

*City of Forest Lake Ordinance - 151.08 Minimum Construction Site Best Management Practices*

Direct link:

<http://www.ci.forest-lake.mn.us/vertical/sites/%7BAFEB969B-C92D-4FE4-A096-00560D784D07%7D/uploads/%7BE2F31879-F829-4A02-AEAB-DB1D921EFE35%7D.PDF>

Check here if attaching an electronic copy of your regulatory mechanism, with the following file naming convention: *MS4NameHere\_CSWreg.*

B. Is your regulatory mechanism at least as stringent as the MPCA general permit to Discharge Stormwater Associated with Construction Activity (as of the effective date of the MS4 Permit)?  Yes  No

If you answered **yes** to the above question, proceed to C.

If you answered **no** to either of the above permit requirements listed in A. or B., describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

*The City's existing ordinance will be reviewed to determine what changes need to be made in order to bring the code up to compliance with the 2013 general construction permit. This action will occur within 12 months from the approval date of this application*

C. Answer **yes** or **no** to indicate whether your regulatory mechanism(s) requires owners and operators of construction activity to develop site plans that incorporate the following erosion and sediment controls and waste controls as described in the Permit (Part III.D.4.a.(1)-(8)), and as listed below:

- 1. Best Management Practices (BMPs) to minimize erosion.  Yes  No
- 2. BMPs to minimize the discharge of sediment and other pollutants.  Yes  No
- 3. BMPs for dewatering activities.  Yes  No
- 4. Site inspections and records of rainfall events  Yes  No
- 5. BMP maintenance  Yes  No
- 6. Management of solid and hazardous wastes on each project site.  Yes  No
- 7. Final stabilization upon the completion of construction activity, including the use of perennial vegetative cover on all exposed soils or other equivalent means.  Yes  No
- 8. Criteria for the use of temporary sediment basins.  Yes  No

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

*The City will follow MPCA Construction Stormwater Permit to update the Construction Site Stormwater Management ordinance within 12 months of the approval date of this application.*

**Post-construction stormwater management**

A. Do you have a regulatory mechanism(s) to address post-construction stormwater management activities?  Yes  No

1. If yes:

a. Check which type of regulatory mechanism(s) your organization has (check all that apply):

- Ordinance  Contract language
- Policy/Standards  Permits

Rules

Other, explain: \_\_\_\_\_

- b. Provide either a direct link to the mechanism selected above or attach it as an electronic document to this form; or if your regulatory mechanism is either an Ordinance or a Rule, you may provide a citation:

Citation:

*City of Forest Lake Ordinance - 151.08.1 Storm water management criteria for permanent facilities*

Direct link:

<http://www.ci.forest-lake.mn.us/vertical/sites/%7BAFEB969B-C92D-4FE4-A096-00560D784D07%7D/uploads/%7BE2F31879-F829-4A02-AEAB-DB1D921EFE35%7D.PDF>

Check here if attaching an electronic copy of your regulatory mechanism, with the following file naming convention: *MS4NameHere\_PostCSWreg*.

- B. Answer **yes** or **no** below to indicate whether you have a regulatory mechanism(s) in place that meets the following requirements as described in the Permit (Part III.D.5.a.):

1. **Site plan review:** Requirements that owners and/or operators of construction activity submit site plans with post-construction stormwater management BMPs to the permittee for review and approval, prior to start of construction activity.  Yes  No

2. **Conditions for post construction stormwater management:** Requires the use of any combination of BMPs, with highest preference given to Green Infrastructure techniques and practices (e.g., infiltration, evapotranspiration, reuse/harvesting, conservation design, urban forestry, green roofs, etc.), necessary to meet the following conditions on the site of a construction activity to the Maximum Extent Practicable (MEP):

a. For new development projects – no net increase from pre-project conditions (on an annual average basis) of:  Yes  No

- 1) Stormwater discharge volume, unless precluded by the stormwater management limitations in the Permit (Part III.D.5.a(3)(a)).
- 2) Stormwater discharges of Total Suspended Solids (TSS).
- 3) Stormwater discharges of Total Phosphorus (TP).

b. For redevelopment projects – a net reduction from pre-project conditions (on an annual average basis) of:  Yes  No

- 1) Stormwater discharge volume, unless precluded by the stormwater management limitations in the Permit (Part III.D.5.a(3)(a)).
- 2) Stormwater discharges of TSS.
- 3) Stormwater discharges of TP.

3. **Stormwater management limitations and exceptions:**

a. Limitations

1) Prohibit the use of infiltration techniques to achieve the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)) when the infiltration structural stormwater BMP will receive discharges from, or be constructed in areas:  Yes  No

- a) Where industrial facilities are not authorized to infiltrate industrial stormwater under an NPDES/SDS Industrial Stormwater Permit issued by the MPCA.
- b) Where vehicle fueling and maintenance occur.
- c) With less than three (3) feet of separation distance from the bottom of the infiltration system to the elevation of the seasonally saturated soils or the top of bedrock.
- d) Where high levels of contaminants in soil or groundwater will be mobilized by the infiltrating stormwater.

2) Restrict the use of infiltration techniques to achieve the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)), without higher engineering review, sufficient to provide a functioning treatment system and prevent adverse impacts to groundwater, when the infiltration device will be constructed in areas:  Yes  No

- a) With predominately Hydrologic Soil Group D (clay) soils.
- b) Within 1,000 feet up-gradient, or 100 feet down-gradient of active karst features.
- c) Within a Drinking Water Supply Management Area (DWSMA) as defined in Minn. R. 4720.5100, subp. 13.
- d) Where soil infiltration rates are more than 8.3 inches per hour.

3) For linear projects where the lack of right-of-way precludes the installation of volume control practices that meet the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)), the permittee's regulatory mechanism(s) may allow  Yes  No



exceptions as described in the Permit (Part III.D.5.a(3)(b)). The permittee's regulatory mechanism(s) shall ensure that a reasonable attempt be made to obtain right-of-way during the project planning process.

4. **Mitigation provisions:** The permittee's regulatory mechanism(s) shall ensure that any stormwater discharges of TSS and/or TP not addressed on the site of the original construction activity are addressed through mitigation and, at a minimum, shall ensure the following requirements are met:
- a. Mitigation project areas are selected in the following order of preference:  Yes  No
    - 1) Locations that yield benefits to the same receiving water that receives runoff from the original construction activity.
    - 2) Locations within the same Minnesota Department of Natural Resource (DNR) catchment area as the original construction activity.
    - 3) Locations in the next adjacent DNR catchment area up-stream
    - 4) Locations anywhere within the permittee's jurisdiction.
  - b. Mitigation projects must involve the creation of new structural stormwater BMPs or the retrofit of existing structural stormwater BMPs, or the use of a properly designed regional structural stormwater BMP.  Yes  No
  - c. Routine maintenance of structural stormwater BMPs already required by this permit cannot be used to meet mitigation requirements of this part.  Yes  No
  - d. Mitigation projects shall be completed within 24 months after the start of the original construction activity.  Yes  No
  - e. The permittee shall determine, and document, who will be responsible for long-term maintenance on all mitigation projects of this part.  Yes  No
  - f. If the permittee receives payment from the owner and/or operator of a construction activity for mitigation purposes in lieu of the owner or operator of that construction activity meeting the conditions for post-construction stormwater management in Part III.D.5.a(2), the permittee shall apply any such payment received to a public stormwater project, and all projects must be in compliance with Part III.D.5.a(4)(a)-(e).  Yes  No
5. **Long-term maintenance of structural stormwater BMPs:** The permittee's regulatory mechanism(s) shall provide for the establishment of legal mechanisms between the permittee and owners or operators responsible for the long-term maintenance of structural stormwater BMPs not owned or operated by the permittee, that have been implemented to meet the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)). This only includes structural stormwater BMPs constructed after the effective date of this permit and that are directly connected to the permittee's MS4, and that are in the permittee's jurisdiction. The legal mechanism shall include provisions that, at a minimum:
- a. Allow the permittee to conduct inspections of structural stormwater BMPs not owned or operated by the permittee, perform necessary maintenance, and assess costs for those structural stormwater BMPs when the permittee determines that the owner and/or operator of that structural stormwater BMP has not conducted maintenance.  Yes  No
  - b. Include conditions that are designed to preserve the permittee's right to ensure maintenance responsibility, for structural stormwater BMPs not owned or operated by the permittee, when those responsibilities are legally transferred to another party.  Yes  No
  - c. Include conditions that are designed to protect/preserve structural stormwater BMPs and site features that are implemented to comply with the Permit (Part III.D.5.a(2)). If site configurations or structural stormwater BMPs change, causing decreased structural stormwater BMP effectiveness, new or improved structural stormwater BMPs must be implemented to ensure the conditions for post-construction stormwater management in the Permit (Part III.D.5.a(2)) continue to be met.  Yes  No

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within twelve (12) months of the date permit coverage is extended, these permit requirements are met:

*A post-construction storm water ordinance that addresses the requirements of Minimum Control Measure 5 will be prepared within 12 months from the date of application approval.*

### III. Enforcement Response Procedures (ERPs): (Part II.D.3)

- A. Do you have existing ERPs that satisfy the requirements of the Permit (Part III.B.)?  Yes  No

1. If **yes**, attach them to this form as an electronic document, with the following file naming convention: *MS4NameHere\_ERPs*.
2. If **no**, describe the tasks and corresponding schedules that will be taken to assure that, with twelve (12) months of the date permit coverage is extended, these permit requirements are met:  
*Within 12 months from the date of application approval the City will develop ERPs that address illicit discharge.*

B. Describe your ERPs:

#### IV. Storm Sewer System Map and Inventory: (Part II.D.4.)

A. Describe how you manage your storm sewer system map and inventory:

*The storm sewer map is updated annually as new development or redevelopment occurs.*

B. Answer **yes** or **no** to indicate whether your storm sewer system map addresses the following requirements from the Permit (Part III.C.1.a-d), as listed below:

1. The permittee's entire small MS4 as a goal, but at a minimum, all pipes 12 inches or greater in diameter, including stormwater flow direction in those pipes.  Yes  No
2. Outfalls, including a unique identification (ID) number assigned by the permittee, and an associated geographic coordinate.  Yes  No
3. Structural stormwater BMPs that are part of the permittee's small MS4.  Yes  No
4. All receiving waters.  Yes  No

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

*Most of the existing system has been inventoried, but is incomplete in newly developed areas. The City will complete the inventory of its pipes 12 inches or larger and system outfalls, including a unique ID number, from recent development within 12 months from the date of application approval.*

C. Answer **yes** or **no** to indicate whether you have completed the requirements of 2009 Minnesota Session Law, Ch. 172, Sec. 28: with the following inventories, according to the specifications of the Permit (Part III.C.2.a.-b.), including:

1. All ponds within the permittee's jurisdiction that are constructed and operated for purposes of water quality treatment, stormwater detention, and flood control, and that are used for the collection of stormwater via constructed conveyances.  Yes  No
2. All wetlands and lakes, within the permittee's jurisdiction, that collect stormwater via constructed conveyances.  Yes  No

D. Answer **yes** or **no** to indicate whether you have completed the following information for each feature inventoried.

1. A unique identification (ID) number assigned by the permittee.  Yes  No
2. A geographic coordinate.  Yes  No
3. Type of feature (e.g., pond, wetland, or lake). This may be determined by using best professional judgment.  Yes  No

If you have answered **yes** to all above requirements, and you have already submitted the Pond Inventory Form to the MPCA, then you do not need to resubmit the inventory form below.

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

*Most of the existing system has been inventoried, but is incomplete in newly developed areas. The City will complete the inventory of its ponds, including a unique ID number, from recent development within 12 months from the date of application approval.*

E. Answer **yes** or **no** to indicate if you are attaching your pond, wetland and lake inventory to the MPCA on the form provided on the MPCA website at: <http://www.pca.state.mn.us/ms4>, according to the specifications of Permit (Part III.C.2.b.(1)-(3)). Attach with the following file naming convention: *MS4NameHere\_inventory*.  Yes  No

If you answered **no**, the inventory form must be submitted to the MPCA MS4 Permit Program within 12 months of the date permit coverage is extended.

## V. Minimum Control Measures (MCMs) (Part II.D.5)

### A. MCM1: Public education and outreach

1. The Permit requires that, within 12 months of the date permit coverage is extended, existing permittees revise their education and outreach program that focuses on illicit discharge recognition and reporting, as well as other specifically selected stormwater-related issue(s) of high priority to the permittee during this permit term. Describe your **current** educational program, including **any high-priority topics included**:

*The City's goal is to educate the public regarding the value of the surrounding natural resources, to connect the people with stormwater management system, provide a sense of BMP ownership through interactive programs, and improve the health and well being of its citizens.*

2. List the categories of BMPs that address your public education and outreach program, including the distribution of educational materials and a program implementation plan. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the U.S. Environmental Protection Agency's (EPA) *Measurable Goals Guidance for Phase II Small MS4s* (<http://www.epa.gov/npdes/pubs/measurablegoals.pdf>).

**If you have more than five categories**, hit the tab key after the last line to generate a new row.

Established BMP categories	Measurable goals and timeframes
Local Access Cable Channel	Number of times annually City Council Meetings are aired, Ongoing and existing, updated and revised as necessary
City Website – Stormwater Information Posted on City Website	Number of stormwater related articles and links generated annually, Review existing website to ensure most current information is available, solicit additional information to ensure any educational gaps are closed, ongoing and existing, updated and revised as necessary
Stormwater Educational Brochures	Number of brochures distributed annually, types of brochures distributed, Ongoing and existing, distribute brochures and update and revise as necessary
City News Letter	Number of stormwater articles distributed annually, distribution frequency, number of households, distribute articles, update and revise and necessary
BMP categories to be implemented	Measurable goals and timeframes
Update City Website with new MS4 information, SWPPP, and TMDL goals	Newly linked articles, ongoing updates and revision as needed, Update website with new MS4 information upon approval of the reapplication and public comment, Post updated SWPPP on website within 3 months of reapplication approval
Update brochures	MS4 sections updated, updated sections, ongoing updates and revisions as needed, Track number of brochures distributed annually

3. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

*Doug Borglund, Community Development Director*

### B. MCM2: Public participation and involvement

1. The Permit (Part III.D.2.a.) requires that, within 12 months of the date permit coverage is extended, existing permittees shall revise their current program, as necessary, and continue to implement a public participation/involvement program to solicit public input on the SWPPP. Describe your current program:

*The City hosts an annual public meeting to discuss the MS4 permit, the activities that have occurred to improve water quality over the previous year, and details regarding future activities. The public is invited to attend where they are given the opportunity to provide input. Notice of the meeting is distributed 30-days prior. The City provides its citizens to submit written responses to the SWPPP and other water quality activities. There are numerous volunteer programs in place to connect the community to its natural and environmental resources. The City also has programs in place to track community*

complaints and methods for resolving those issues.

- List the categories of BMPs that address your public participation/involvement program, including solicitation and documentation of public input on the SWPPP. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (<http://www.epa.gov/npdes/pubs/measurablegoals.pdf>). **If you have more than five categories**, hit the tab key after the last line to generate a new row.

Established BMP categories	Measurable goals and timeframes
Annual Home Show	Number of citizens contacted annually, number of brochures distributed annually, other stormwater related materials distributed annually, review information to be displayed and distributed, ongoing and existing, update and revise as necessary
Annual Stormwater Meeting, 30-day Public Notice	Public Notice 30 days prior to annual meeting, locations of posted notice, Annually, posted 30-days prior to annual meeting
Joint Educational Programs with Outside Entities	Coordination with outside entities, ongoing and existing, review and update as necessary
Complaint Tracking Program	Number of complaints and resolutions annually, ongoing as complaints are submitted, resolution as soon as possible
Volunteer Program	Number of people participating at stormwater events annually
Consideration of Written and Oral Public Input	Public comment received annually, SWPPP/policy revisions based on public comment, ongoing and existing based on comments received
SWPPP Availability	The SWPPP is currently available via the City's website,
BMP categories to be implemented	Measurable goals and timeframes
SWPPP Availability	Provide hard copy of SWPPP document at public library and City Hall, within 12 months of approval

- Do you have a process for receiving and documenting citizen input?  Yes  No

If you answered **no** to the above permit requirement, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, this permit requirement is met:

- Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

*Doug Borglund, Community Development Director*

### C. MCM 3: Illicit discharge detection and elimination

- The Permit (Part III.D.3.) requires that, within 12 months of the date permit coverage is extended, existing permittees revise their current program as necessary, and continue to implement and enforce a program to detect and eliminate illicit discharges into the small MS4. Describe your current program:

*The City currently regulates illicit discharge using their current City Ordinance and in the Illicit Discharge Detection and Elimination Plan. There are educational opportunities provided to the public regarding illicit discharges and illegal storm sewer connections. The City has enforcement practices in place. A storm sewer map has been generated and is continuously updated that locates pipes, ditches, streams, lakes, ponds, structural pollution control devices, outfalls and discharge points.*

- Does your Illicit Discharge Detection and Elimination Program meet the following requirements, as found in the Permit (Part III.D.3.c.-g.)?

- Incorporation of illicit discharge detection into all inspection and maintenance activities conducted  Yes  No under the Permit (Part III.D.6.e.-f.) Where feasible, illicit discharge inspections shall be conducted

during dry-weather conditions (e.g., periods of 72 or more hours of no precipitation).

- b. Detecting and tracking the source of illicit discharges using visual inspections. The permittee may also include use of mobile cameras, collecting and analyzing water samples, and/or other detailed procedures that may be effective investigative tools.  Yes  No
- c. Training of all field staff, in accordance with the requirements of the Permit (Part III.D.6.g.(2)), in illicit discharge recognition (including conditions which could cause illicit discharges), and reporting illicit discharges for further investigation.  Yes  No
- d. Identification of priority areas likely to have illicit discharges, including at a minimum, evaluating land use associated with business/industrial activities, areas where illicit discharges have been identified in the past, and areas with storage of large quantities of significant materials that could result in an illicit discharge.  Yes  No
- e. Procedures for the timely response to known, suspected, and reported illicit discharges.  Yes  No
- f. Procedures for investigating, locating, and eliminating the source of illicit discharges.  Yes  No
- g. Procedures for responding to spills, including emergency response procedures to prevent spills from entering the small MS4. The procedures shall also include the immediate notification of the Minnesota Department of Public Safety Duty Officer, if the source of the illicit discharge is a spill or leak as defined in Minn. Stat. § 115.061.  Yes  No
- h. When the source of the illicit discharge is found, the permittee shall use the ERPs required by the Permit (Part III.B.) to eliminate the illicit discharge and require any needed corrective action(s).  Yes  No

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

*Within 12 months of permit approval, the City will finalize it's stormwater management system to identify locations that have a higher potential for illicit discharges and ensure that ERPs are fully established, update ordinances for proper response procedures for stormwater, and develop ERPs to eliminate illicit dishacrges and develop required corrective actions.*

3. List the categories of BMPs that address your illicit discharge, detection and elimination program. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (<http://www.epa.gov/npdes/pubs/measurablegoals.pdf>).

**If you have more than five categories**, hit the tab key after the last line to generate a new row.

Established BMP categories	Measurable goals and timeframes
Storm Sewer System Map	Percentage of system mapped, number of updates completed to date, Current and ongoing updates to map based on new development
Hazardous Waste Disposal Ordinance	Hazardous waste related articles distributed, ordinance language, adoption of new or updated ordinances,
Nuisance/Illegal Dumping, Illicit Discharge, Detection, and Enforcement Procedure	
Individual Sewage Treatment System Ordinance	Number of systems installed, inspected, and septic systems pumped, ongoing and existing installations
Stormwater System Inspection and Maintenance Program	Number of sediment/pollution control structures cleaned, inspected, and maintained annually, Continuous inspection and record keeping
Public and Employee Illicit Discharge Information Program	Implement programs as described in Public Involvement and Education MCMs
BMP categories to be implemented	Measurable goals and timeframes

4. Do you have procedures for record-keeping within your Illicit Discharge Detection and Elimination (IDDE) program as specified within the Permit (Part III.D.3.h.)?  Yes  No

If you answered **no**, indicate how you will develop procedures for record-keeping of your Illicit Discharge, Detection and Elimination Program, within 12 months of the date permit coverage is extended:

5. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

*Doug Borglund, Community Development Director*

**D. MCM 4: Construction site stormwater runoff control**

1. The Permit (Part III.D.4) requires that, within 12 months of the date permit coverage is extended, existing permittees shall revise their current program, as necessary, and continue to implement and enforce a construction site stormwater runoff control program. Describe your current program:

*The City currently has two ordinances for construction site stormwater runoff controls. Every applicant for a building permit, subdivision approval, or a permit to allow land disturbing activities must submit a SWPPP to the City. Construction will not begin until the plan has been approved by the City.*

2. Does your program address the following BMPs for construction stormwater erosion and sediment control as required in the Permit (Part III.D.4.b.):

- a. Have you established written procedures for site plan reviews that you conduct prior to the start of construction activity?  Yes  No
- b. Does the site plan review procedure include notification to owners and operators proposing construction activity that they need to apply for and obtain coverage under the MPCA's general permit to *Discharge Stormwater Associated with Construction Activity No. MN R100001*?  Yes  No
- c. Does your program include written procedures for receipt and consideration of reports of noncompliance or other stormwater related information on construction activity submitted by the public to the permittee?  Yes  No
- d. Have you included written procedures for the following aspects of site inspections to determine compliance with your regulatory mechanism(s):
  - 1) Does your program include procedures for identifying priority sites for inspection?  Yes  No
  - 2) Does your program identify a frequency at which you will conduct construction site inspections?  Yes  No
  - 3) Does your program identify the names of individual(s) or position titles of those responsible for conducting construction site inspections?  Yes  No
  - 4) Does your program include a checklist or other written means to document construction site inspections when determining compliance?  Yes  No
- e. Does your program document and retain construction project name, location, total acreage to be disturbed, and owner/operator information?  Yes  No
- f. Does your program document stormwater-related comments and/or supporting information used to determine project approval or denial?  Yes  No
- g. Does your program retain construction site inspection checklists or other written materials used to document site inspections?  Yes  No

If you answered **no** to any of the above permit requirements, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met.

3. List the categories of BMPs that address your construction site stormwater runoff control program. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (<http://www.epa.gov/npdes/pubs/measurablegoals.pdf>). **If you have more than five categories**, hit the tab key after the last line to generate a new row.

Established BMP categories	Measurable goals and timeframes
Erosion and Sediment Control Ordinance (Codified and Revised)	Examination of existing ordinances, development of new ordinances based on current MS4 permit, implementation of new and revised ordinances, ongoing implementation of current applicable ordinances, number of ordinance changes tracked annually based on specific regulatory needs, revise and update as needed
Construction Site Waste Control (Ordinance)	Ordinance implementation, revise and update

Erosion and Sediment Control Inspection and Enforcement	Number of inspections annually, program revisions, number of enforcement actions taken based on number of violations found annually, Examine current program, update and revise as needed
Minimum Erosion and Sediment Control BMPs	Number of BMPs developed based on number of regulated construction projects annually, number of contractors provided with list of BMPs, guidance details, revise list based on current BMP guidance, ongoing and existing, review and update as needed
Erosion and Sediment Control Plan Review Process	Number of plans reviewed annually, site plan review requirements, ongoing and existing, update and revise as needed
Pre-Construction Meeting	Number of meetings held annually, number of attendees, ongoing as construction occurs, update agenda items as required
<b>BMP categories to be implemented</b>	<b>Measurable goals and timeframes</b>
Procedures for noncompliance	Write procedures for noncompliance within 12 months from the date of application approval
Identification of priority sites	Update program to include procedures for identifying priority sites for inspection within 12 months from the date of application approval
Frequency of site inspections	Expand program language to include inspection frequency beyond the rainfall driven inspection requirements, update within 12 months from the date of application approval
Checklist for site inspections	Include in program a checklist for conducting site inspections within 12 months from the date of application approval

4. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

Doug Borglund, Community Development Director

Mike Tate, Public Works Director

#### E. MCM 5: Post-construction stormwater management

1. The Permit (Part III.D.5.) requires that, within 12 months of the date permit coverage is extended, existing permittees shall revise their current program, as necessary, and continue to implement and enforce a post-construction stormwater management program. Describe your current program:

*The City's ordinance for Stormwater Management Criteria for Permanent Facilities and Stormwater Management Plan defines the requirements for post-construction stormwater management for land disturbing, development and redevelopment activities.*

2. Have you established written procedures for site plan reviews that you will conduct prior to the start of construction activity?  Yes  No
3. Answer **yes** or **no** to indicate whether you have the following listed procedures for documentation of post-construction stormwater management according to the specifications of Permit (Part III.D.5.c.):
- a. Any supporting documentation that you use to determine compliance with the Permit (Part III.D.5.a), including the project name, location, owner and operator of the construction activity, any checklists used for conducting site plan reviews, and any calculations used to determine compliance?  Yes  No
- b. All supporting documentation associated with mitigation projects that you authorize?  Yes  No
- c. Payments received and used in accordance with Permit (Part III.D.5.a.(4)(f))?  Yes  No
- d. All legal mechanisms drafted in accordance with the Permit (Part III.D.5.a.(5)), including date(s) of the agreement(s) and names of all responsible parties involved?  Yes  No

If you answered **no** to any of the above permit requirements, describe the steps that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met.

4. List the categories of BMPs that address your post-construction stormwater management program. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. Refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (<http://www.epa.gov/npdes/pubs/measurablegoals.pdf>). **If you have more than five categories**, hit the tab key after the last line to generate a new row.

<b>Established BMP categories</b>	<b>Measurable goals and timeframes</b>
Structural and Non-structural BMP List	Completed list, number of contractors supplied with list, number and type of BMPs installed annually, List updated with newly accepted BMPs within 12 months of permit approval, based on design guidance from MPCA and other organizations
Zoning Ordinance	Completed review and adoption of ordinance within 12 months of permit approval, updated as needed
Shoreland Overlay District	Number of plans reviewed annually, ongoing and existing, reviewed and updated as needed
Woodland Preservation (Ordinance)	Woodlands preserved annually, number of plans reviewed annually, ongoing and existing, reviewed and updated as needed
Lawn Fertilizer and Pesticide Application Control	Number of commercial licenses obtained tracked annually, ordinance enforced, ongoing and existing, reviewed and updated as needed
Stormwater Management Ordinance	Examination of existing ordinances immediately upon permit approval, development of new ordinances to meet current permit regulations within 12 months of permit approval, implementation, ongoing and existing, reviewed and updated as needed
Long-term Operation and Maintenance of Stormwater System	Number of inspections performed annually, number of repairs, replacements, or maintenance measures, number of employees trained for proper O&M annually, Implement corrective measures to MEP, review procedures and revise annually
<b>BMP categories to be implemented</b>	<b>Measurable goals and timeframes</b>
LID and Green Infrastructure	Encourage implementation of LID practices, give highest preference to Green Infrastructure as defined in MS4 and Construction Stormwater Permits, implement within 12 months from the date of application approval
Existing BMP retrofits	Consider modification of existing BMPs to ensure compliance with new permit requirements, enhance existing BMPs with retrofits to improve water quality, develop plan for future BMP retrofits, implement within 12 months from the date of application approval
MN Stormwater Manual and MIDS	Encourage developers to consult the Stormwater Manual on a per-project basis and utilize MIDS calculator for BMP design guidance, enforce immediately upon permit approval

5. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

*Doug Borglund, Community Development Director*

*Aaron Buffington, City Planner*

*Mike Tate, Public Works Director*

#### **F. MCM 6: Pollution prevention/good housekeeping for municipal operations**



1. The Permit (Part III.D.6.) requires that, within 12 months of the date permit coverage is extended, existing permittees shall revise their current program, as necessary, and continue to implement an operations and maintenance program that prevents or reduces the discharge of pollutants from the permittee owned/operated facilities and operations to the small MS4. Describe your current program:

*The City has an operation and maintenance program that includes a training program for municipal operations that is aimed at reducing pollutants from MS4 operations. The City inspects all structural pollution control devices on an annual basis. The City also inspects all MS4 outfalls, sediment basins, and other ponds at a rate of 20% per year.*

2. Do you have a facilities inventory as outlined in the Permit (Part III.D.6.a.)?  Yes  No
3. If you answered **no** to the above permit requirement in question 2, describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, this permit requirement is met:
4. List the categories of BMPs that address your pollution prevention/good housekeeping for municipal operations program. Use the first table for categories of BMPs that you have established and the second table for categories of BMPs that you plan to implement over the course of the permit term.

Include the measurable goals with appropriate timeframes that each BMP category will be implemented and completed. In addition, provide interim milestones and the frequency of action in which the permittee will implement and/or maintain the BMPs. For an explanation of measurable goals, refer to the EPA's *Measurable Goals Guidance for Phase II Small MS4s* (<http://www.epa.gov/npdes/pubs/measurablegoals.pdf>).

**If you have more than five categories**, hit the tab key after the last line to generate a new row.

Established BMP categories	Measurable goals and timeframes
Municipal Employee Training Program	Type of training, number of employees trained annually, Current and ongoing, annually
Street De-icing Program	New de-icing processes adopted, number attending training annually, evaluate de-icing applications tracked annually, current and ongoing
Municipal Lawn Care Program	Number of employees trained and certified annually, amount of fertilizer applied each year, annual reductions, current and ongoing
Municipal Street Maintenance Program	Length of street swept per sweeping, total tracked annually, evaluate program priority areas and adjust if necessary, implement revised programs when necessary, current and ongoing
Annual Inspection of All Structural BMPs	Number of devices cleaned, inspected, and maintained annually, complete 20% per year, revise inspection and cleaning schedule based on existing MS4 permit implementation, annual
Quarterly Inspection of All Exposed Stockpiles, Storage and Material Handling Areas	Identify stockpiles and other facilities owned and operated by City, conduct quarterly inspections
BMP categories to be implemented	Measurable goals and timeframes
Facility Inventory	Continue to inventory City-owned facilities, Develop and implement BMPs for inventoried facilities and municipal operations, Implement within 12 months of application approval
Pond Assessment Procedures and Schedule	Develop procedures for determining TSS and TP treatment effectiveness of city-owned ponds within 12 months of application approval, implement in years 2-5.

5. Does discharge from your MS4 affect a Source Water Protection Area (Permit Part III.D.6.c.)?  Yes  No
- a. If **no**, continue to 6.
- b. If **yes**, the Minnesota Department of Health (MDH) is in the process of mapping the following items. Maps are available at <http://www.health.state.mn.us/divs/eh/water/swp/maps/index.htm>. Is a map including the following items available for your MS4:

- 1) Wells and source waters for drinking water supply management areas identified as vulnerable under Minn. R. 4720.5205, 4720.5210, and 4720.5330?  Yes  No
- 2) Source water protection areas for surface intakes identified in the source water assessments conducted by or for the Minnesota Department of Health under the federal Safe Drinking Water Act, U.S.C. §§ 300j – 13?  Yes  No
- c. Have you developed and implemented BMPs to protect any of the above drinking water sources?  Yes  No
6. Have you developed procedures and a schedule for the purpose of determining the TSS and TP treatment effectiveness of all permittee owned/operated ponds constructed and used for the collection and treatment of stormwater, according to the Permit (Part III.D.6.d.)?  Yes  No
7. Do you have inspection procedures that meet the requirements of the Permit (Part III.D.6.e.(1)-(3)) for structural stormwater BMPs, ponds and outfalls, and stockpile, storage and material handling areas?  Yes  No
8. Have you developed and implemented a stormwater management training program commensurate with each employee's job duties that:
- a. Addresses the importance of protecting water quality?  Yes  No
- b. Covers the requirements of the permit relevant to the duties of the employee?  Yes  No
- c. Includes a schedule that establishes initial training for new and/or seasonal employees and recurring training intervals for existing employees to address changes in procedures, practices, techniques, or requirements?  Yes  No
9. Do you keep documentation of inspections, maintenance, and training as required by the Permit (Part III.D.6.h.(1)-(5))?  Yes  No

If you answered **no** to any of the above permit requirements listed in **Questions 5 – 9**, then describe the tasks and corresponding schedules that will be taken to assure that, within 12 months of the date permit coverage is extended, these permit requirements are met:

*Inspection procedures for structural BMPs, ponds and outfalls, and stockpile, storage, and material handling areas will be generated. Procedures for determining the TSS and TP treatment effectiveness of all City-owned ponds will be implemented and procedures for tracking TSS and TP removal effectiveness for all newly constructed BMPs will be implemented. Record keeping procedures associated with these activities will be implemented. City Staff will be trained annually for proper inspection procedures and newly listed BMPs. All items will be accomplished within 12 months of the date of permit coverage.*

10. Provide the name or the position title of the individual(s) who is responsible for implementing and/or coordinating this MCM:

*Mike Tate, Public Works Director*

## VI. Compliance Schedule for an Approved Total Maximum Daily Load (TMDL) with an Applicable Waste Load Allocation (WLA) (Part II.D.6.)

- A. Do you have an approved TMDL with a Waste Load Allocation (WLA) prior to the effective date of the Permit?  Yes  No
1. If **no**, continue to section VII.
2. If **yes**, fill out and attach the MS4 Permit TMDL Attachment Spreadsheet with the following naming convention: *MS4NameHere\_TMDL*.

This form is found on the MPCA MS4 website: <http://www.pca.state.mn.us/ms4>.

## VII. Alum or Ferric Chloride Phosphorus Treatment Systems (Part II.D.7.)

- A. Do you own and/or operate any Alum or Ferric Chloride Phosphorus Treatment Systems which are regulated by this Permit (Part III.F.)?  Yes  No
1. If **no**, this section requires no further information.
2. If **yes**, you own and/or operate an Alum or Ferric Chloride Phosphorus Treatment System within your small MS4, then you must submit the Alum or Ferric Chloride Phosphorus Treatment Systems Form supplement to this document, with the following naming convention: *MS4NameHere\_TreatmentSystem*.

This form is found on the MPCA MS4 website: <http://www.pca.state.mn.us/ms4>.

## VIII. Add any Additional Comments to Describe Your Program

## Appendix F: Wetland Inventory and Assessment (2012)

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# **MUSA 2020**

# **Wetland Inventory and Assessment**

## **Project Methodology**

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## 4. PROJECT METHODOLOGY



### 4.1 GENERAL SEQUENCE

The Wetland Inventory & Assessment process involved the following steps:

1. Identification of wetlands within the study area
2. Field inventory and assessment of each site
3. Qualitative ranking of each community according to criteria established by MnRAM
4. Stormwater susceptibility rating for each site, based on community type and quality
5. Qualitative ranking of each site, based on community types and community qualities
6. Identification and remote delineation of agricultural wetlands



### 4.2 DRAINAGE DISTRICTS

The study area was divided into four different drainage districts for this project, and further subdivided into fourteen separate sub-districts based on topography, watershed divides, and current land use. District W is a large wetland basin along the western edge of the study area. District IP is immediately east of it, bound by Highway 61 on the east. District HS covers much of the eastern half of the area. The two developed areas on the very eastern end of the study area comprise District E. Drainage districts are shown in Figure 2.

**Note - District W is not actually a separated drainage district. It was separated from District IP because 1) the size of the wetland complex of which W1.1 is a part, 2) the higher quality communities present in W1.1, and 3) the likelihood that there will NOT be any further development in this district.**



### 4.3 IDENTIFICATION OF WETLAND SITES

#### 4.3.1 PRELIMINARY IDENTIFICATION

Prior to beginning field assessments, preliminary wetland determinations were made by transferring data from the National Wetlands Inventory (NWI) onto recent (1997) Digital Orthographic Quad (DOQ) maps from the U.S. Geological Survey. This was supplemented by a review of Color Infra-Red (CIR) photographs to identify any potential non-NWI wetlands within the study area. All of the NWI and potential wetlands were then drawn onto clear Mylar overlays on the CIR's, for use in the field, as well as onto a large DOQ for use as a base planning map. Figure 3 shows the location of NWI wetlands.

### 4.3.2 SITE NUMBERING

Within each drainage district, wetlands were numbered progressing from west to east, north to south. The final wetland identification number is a combination of the sub-district name and the wetland number. For example, the number "HS-3.9w" indicates that the site is in the HS-3 (High School 3) sub-district, and that it is the 9<sup>th</sup> wetland in the series. The "w" indicates that it was an existing basin at the time of this survey.

In order to create a uniform numbering system, sites evaluated for the following previous projects were redesignated as part of this project. A table summarizing old and new identification numbers for the previously surveyed basins is presented in Appendix 1.

- ❖ High School/ Industrial Park Drainage Study
- ❖ Airport Area AUAR
- ❖ Airport Industrial Park Wetland Delineation



## 4.4 FIELD ASSESSMENT

### 4.4.1 ASSESSMENT PROCESS

#### Non-agricultural Wetlands

Each non-agricultural wetland was field checked and evaluated according to a modified Minnesota Routine Assessment Methodology (MnRAM). MnRAM is a system designed to capture certain information about the condition of a wetland basin based on hydrologic condition, vegetation, adjacent land uses, and certain other functions and values that wetlands provide. A copy of the field data sheet is included in Appendix 2. The following MnRAM parameters were selected for use in this project:

- ❖ Cowardin and C-39 Type
  - ❖ Alterations to the site and its immediate watershed
  - ❖ Source of and current hydrology
  - ❖ Inlet and outlet characteristics, if any
  - ❖ Adjacent land uses
  - ❖ Vegetation community type, quality, and species composition
- \* The restoration potential for hydrology and vegetation were also evaluated at each site.

#### Agricultural Wetlands

Because of some of the difficulties associated with identifying wetlands in highly disturbed areas such as agricultural fields, an FSA slide review was used to make wetland determinations in agricultural areas. Using aerial photos of croplands, the reviewer analyzed each potential site for specific indicators of wetland hydrology. These indicators include:

- ❖ Flooded or drowned out crops
- ❖ Presence of surface water
- ❖ Inclusion of non-cropped areas within a crop field (if supported by other evidence)
- ❖ Color of crop in wet or dry years
- ❖ Stressed crop production due to wetness
- ❖ Difference in color due to different planting dates

In order to be considered a wetland, a site must exhibit criteria in six out of ten years. All sites that exhibit wetland criteria under these standards are included in the database. All wetlands and those basins found to be non-wetlands are mapped in Figures 4.1 - 4.4.

## Areas Under Development

With a few exceptions, wetlands in areas that were actively under construction were not surveyed for this project. In these areas, earth-moving activities were taking place in and around them and wetlands were not yet at equilibrium with their new environment. Therefore, evaluation of their final conditions would be speculative. This includes sites that were in the process of being converted to storm ponds as well as those that are being filled, reshaped, or otherwise altered. This includes Summerfields, Sterling Oaks, and portions of Bridle Pass. To determine wetland status in these areas, a field review within five years of construction completion is recommended. Sites that were not surveyed due to construction activities are noted in Figures 4.1 - 4.4.

### 4.4.2 COMMUNITY TYPE DETERMINATION

The community types used in this survey are those defined in Wetland Plants and Plant Communities of Minnesota and Wisconsin (Eggers and Reed, US Army Corps of Engineers, 1997), with the exception of Lowland Hardwood Forest. This community occurs regularly in the study area and is defined in MnDNR methodology. The vegetation and hydrologic regimes of this wetland community are clearly distinct from the two types of forested wetland recognized by the Corps of Engineers (Floodplain Forest and Wooded Swamps), and thus the descriptions for those communities do not encompass Lowland Hardwood Forest communities.

To determine the community type at each basin, both the dominant and subdominant vegetation in each community, as well as hydrologic regime, were noted. These criteria are sufficient to make a community type determination, according to the community descriptions included in Section 3.1. See Appendix 3 for information on the communities present at each wetland site.



## 4.5 WETLAND RANKING

### 4.5.1 WETLAND COMMUNITY QUALITY

Wetland quality was determined using criteria established by MnRAM. While these criteria vary for different community types, the levels of native plant diversity, exotic/invasive species infestations, adjacent land use, and other disturbance indicators form the basis for this determination. A summary of the criteria used for each community type is presented in Appendix 4.

### 4.5.2 WETLAND SITE QUALITY

Because a given wetland site may contain more than one community type, and because the communities are unlikely to be distributed evenly within a basin, it is not possible to derive the overall quality of the site directly from the information about a site's plant communities. Instead, a "weighted" system that considers the *quality* of each community within a site in conjunction with the *percent* of the site that a given community occupies was used. Further information about wetland community quality determination is available in Appendix 4.



**Table 4.1 – Sample Wetland Ranking Method**

Wetland	Community Quality <sup>1</sup>	Percent of Site <sup>2</sup>	Community Rank Value <sup>3</sup>	Total Score <sup>4</sup>	Wetland Ranking <sup>5</sup>
IP-xxx	5	.40	2.0		
	2	.60	1.2	3.2	III
HS-xx	2	1.0			
IP-xx					

<sup>1</sup>Based on modified MnRAM methodology:

High or Exceptional = 5; Medium High = 4; Medium = 3; Medium Low = 2; Low = 1

<sup>2</sup>From field evaluation

<sup>3</sup>Community Quality x Percent of site

<sup>4</sup>Sum of “community rank values for a specific wetland site

<sup>5</sup>Wetland ranking based on total score:

Total score	Rank	Description
5+	V	High
4-4.9	IV	Medium/High
3.0-3.9	III	Medium
2-2.9	ii	Medium/Low
0-1.9	i	Low

### 4.5.3 STORMWATER SUSCEPTIBILITY

Two factors determine a wetland’s susceptibility to damage from stormwater input: community type and community quality (as measured by floral diversity). Some communities such as sedge meadows have a very low tolerance for repeated and/or fluctuations in water levels (bounce) during the growing season. Native species in these communities can quickly die out if runoff impacts their basin, leaving opportunities for exotic or aggressive species to invade. Other community types, such as floodplain forests, contain species that are adapted to this type of “bounce” in water levels and can tolerate stormwater impacts with less effect on the vegetation.

Similarly, the overall quality of the community affects how susceptible an area is to stormwater impacts. Because a high quality area is more diverse, it is likely to contain species that are somewhat conservative in habitat. These conservative species have a lower tolerance for disturbance, and usually drop out of a community as disturbance pressures increase. Thus, stormwater impacts can reduce the diversity at a site and alter the condition of good quality areas. Since low quality areas, by definition, have reduced species diversity and tend to be dominated by disturbance-adapted species, stormwater impacts are unlikely to cause further degradation of the site.

The State of Minnesota Stormwater Advisory Group has prepared a technical paper “Stormwater and Wetlands: Planning and Evaluation Guidelines for Addressing Potential Impacts of Urban Storm-Water and Snow-Melt Runoff on Wetlands” that divides wetlands into the categories of highly susceptible, moderately susceptible, slightly susceptible, and least susceptible, according to the following guidelines. Stormwater susceptibility was determined for all of the non-

agricultural wetlands surveyed in the MUSA 2020 project. A summary of community types for each susceptibility ranking is provided in Table 4.2.

**Highly Susceptible**

A wetland is considered highly susceptible if forty percent or more of the wetland complex has one or more highly susceptible wetland communities and has medium to exceptional floral diversity/integrity within the susceptible wetland community or communities.

**Moderately Susceptible**

A wetland is considered moderately susceptible if forty percent or more of the wetland complex has one or more of the following communities and the wetland has medium to exceptional floral diversity/integrity within the susceptible community or communities.

**Slightly and Least Susceptible Wetlands**

Wetlands with low floral diversity as determined by MN RAM were considered to be least susceptible wetlands. Wetlands that do not fall under the high or moderate categories are considered slightly susceptible.

**Table 4.2 Wetland Community Susceptibility Ratings**

Susceptibility Rating	Highly Susceptible*	Moderately Susceptible	Slightly Susceptible	Least Susceptible**	
<b>Wetland Community</b>	Sedge Meadow	Shrub Carr <sup>1</sup>	Floodplain Forest <sup>4</sup>	Gravel Pit	
	Bog	Alder Thicket <sup>1</sup>	Wet Meadow <sup>5</sup>	Cultivated Hydric Soil	
	Calcareous Fen	Wet Meadow <sup>1,2</sup>	Shallow Marsh <sup>5</sup>	Dredge/Fill Disposal Site	
	Low Prairie	Shallow Marsh <sup>2,3</sup>	Deep Marsh <sup>5</sup>		
	Coniferous Swamp	Deep Marsh <sup>2,3</sup>	<b>Notes: A)</b> All scientific and natural areas, and pristine wetlands should be considered highly susceptible; <b>B)</b> There will always be exceptions to the general categories listed above.		
	Lowland Hardwood	<sup>1</sup> These can tolerate inundation of 6-12" for short periods; may be completely dry in drought or late summer conditions.			
	Seasonally Flooded Basin	<sup>2</sup> These can tolerate inundation of >12 ", and are adversely affected by sediment and/or nutrient loading and prolonged high water level			
	<sup>3</sup> There are some exceptions to wet meadow and marsh communities				
	<sup>4</sup> These communities can tolerate inundation of 1-6+ feet, possibly more than once per year				
	<sup>5</sup> Wet meadows that are dominated by reed canary grass				
	<sup>6</sup> Marshes dominated by reed canary grass, cattail, giant reed or purple loosestrife.				

\* Special consideration must be given to avoid altering these wetland types. Inundation must be avoided. Water chemistry changes due to alteration by storm water impact can also cause adverse impacts.

\*\* These wetlands are usually so degraded that input of urban storm water may not have adverse impacts.

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**MUSA 2020**  
**Wetland Inventory and Assessment**

**Stormwater Susceptibility**  
**Figures 5-1 through 5-4**

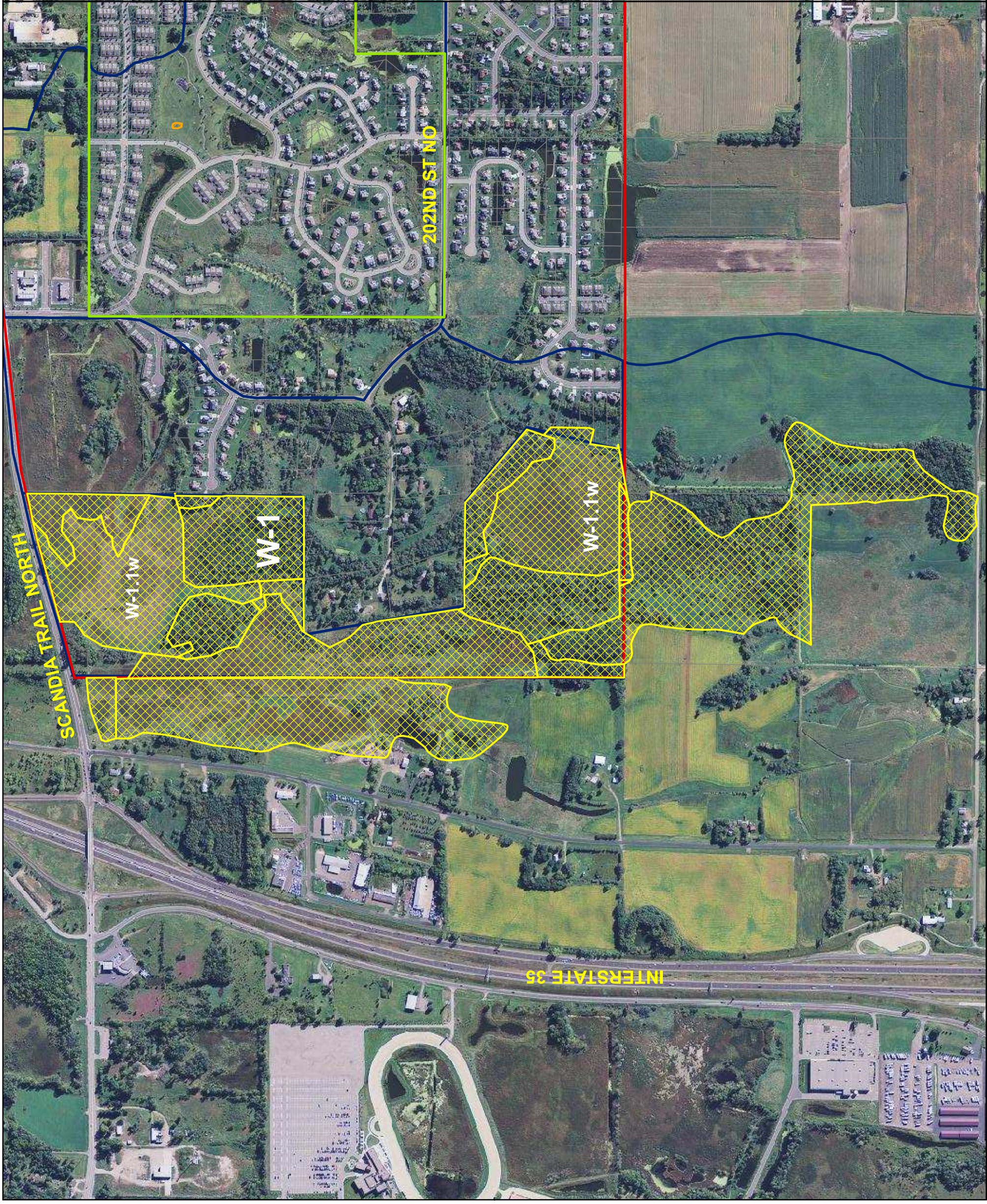


**Forest Lake**  
AS GOOD AS IT SOUNDS

# MUSA 2020 Wetland Inventory and Assessment

Figure 5.1

## Stormwater Susceptibility Area W



### Susceptibility Rating



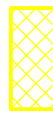
Highly Susceptible



Moderately Susceptible



Slightly Susceptible



Least Susceptible

### Other



Drainage Area Boundary



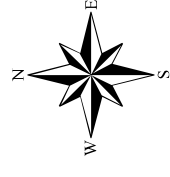
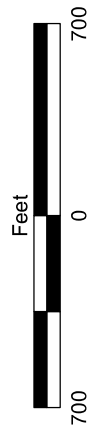
Study Area Boundary



Summerfield Development



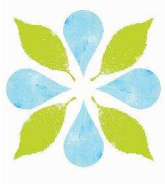
Parcel Base Map



**Stantec**

April 2012

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**Forest Lake**  
AS GOOD AS IT SOUNDS

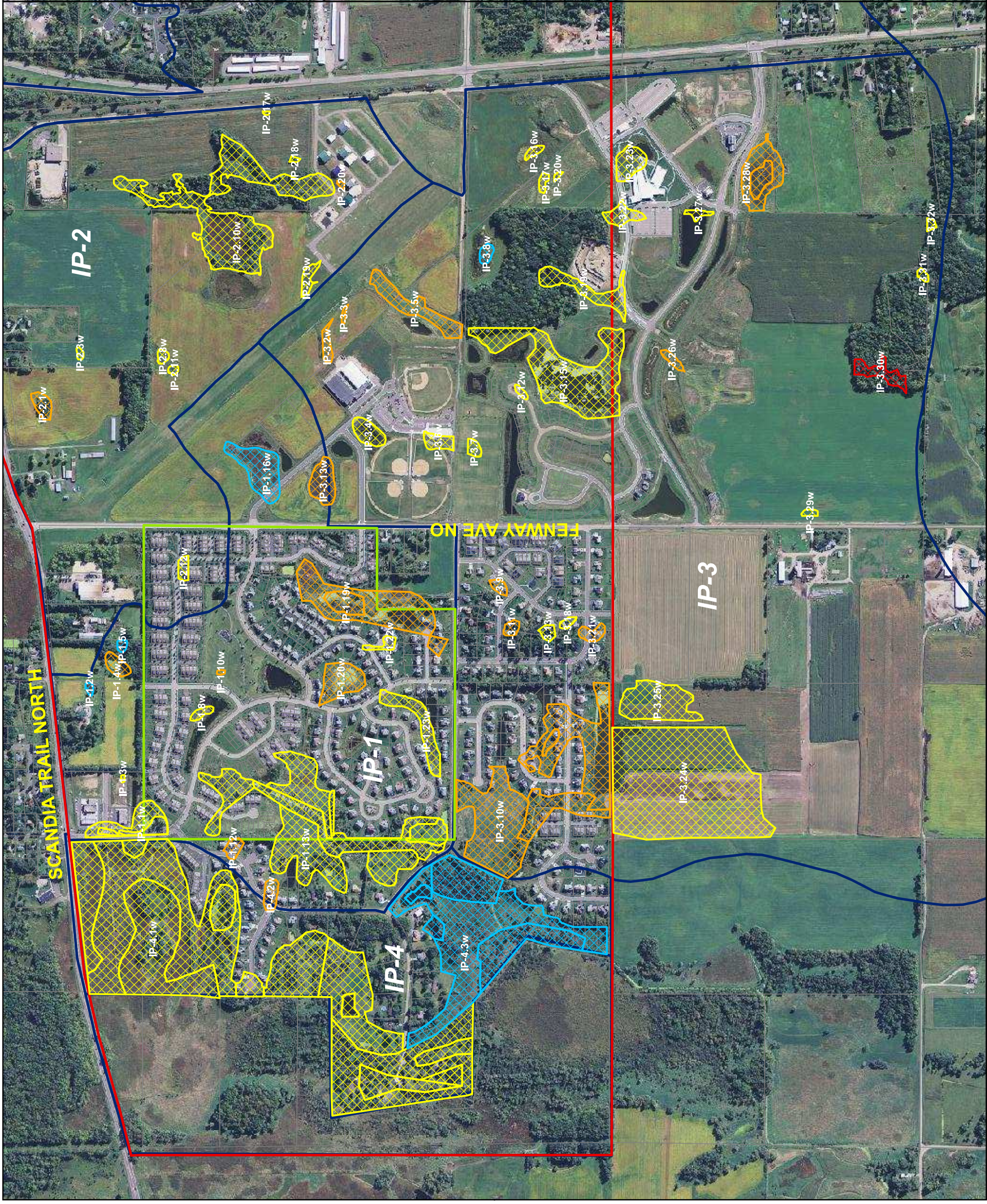
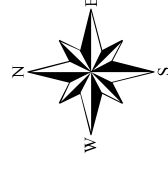
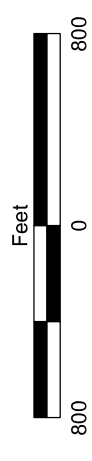
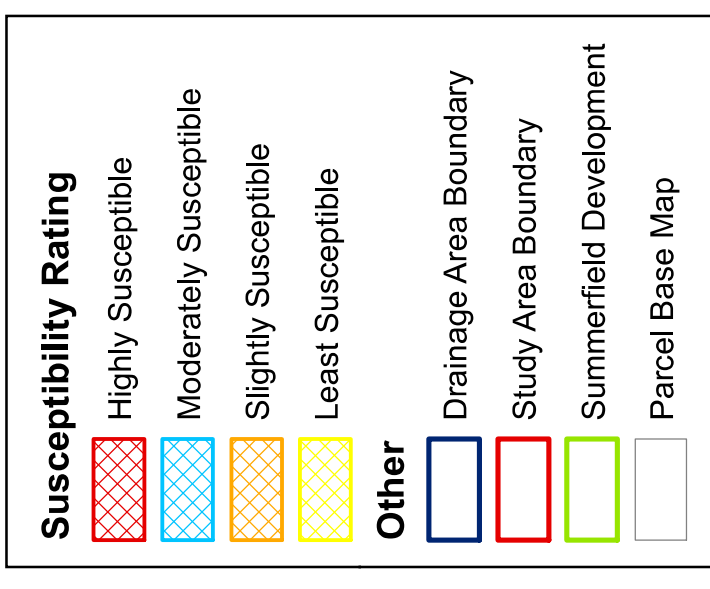
**MUSA 2020**

# Wetland Inventory and Assessment

Figure 5.2

## Stormwater Susceptibility

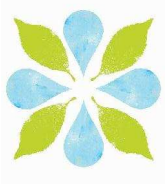
### Area IP



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April 2012

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**Forest Lake**  
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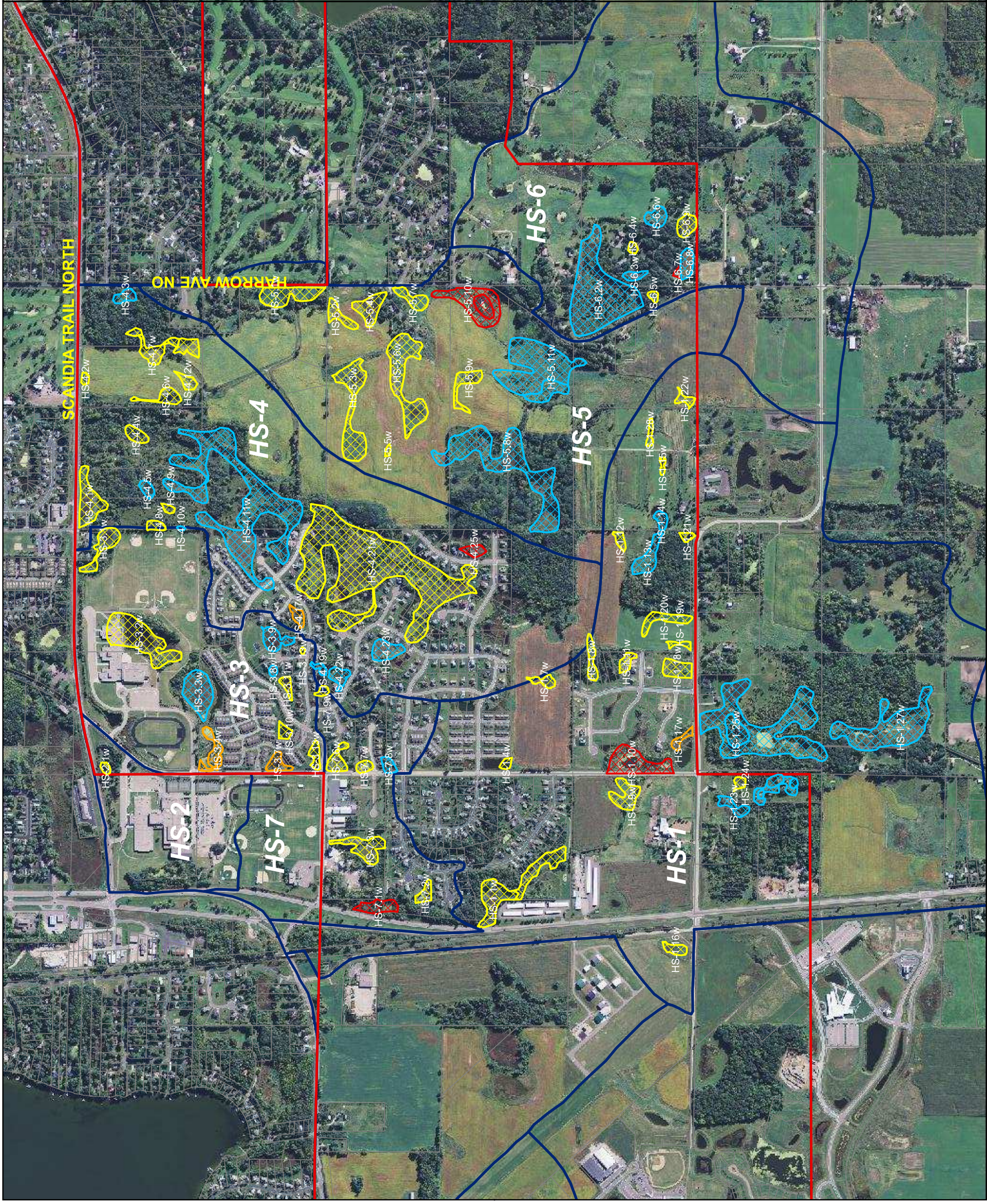
**MUSA 2020**

# Wetland Inventory and Assessment

Figure 5.3

## Stormwater Susceptibility

### Area HS

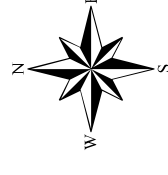
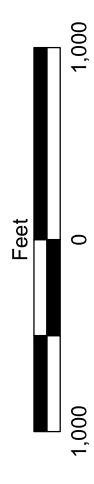


#### Susceptibility Rating

- Highly Susceptible
- Moderately Susceptible
- Slightly Susceptible
- Least Susceptible

#### Other

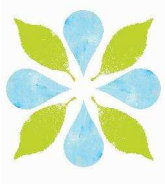
- Drainage Area Boundary
- Study Area Boundary
- Parcel Base Map



**Stantec**

April 2012

k:\1651165112710\GIS\IP\Projects\MUSA2020\_AreaHS.mdx

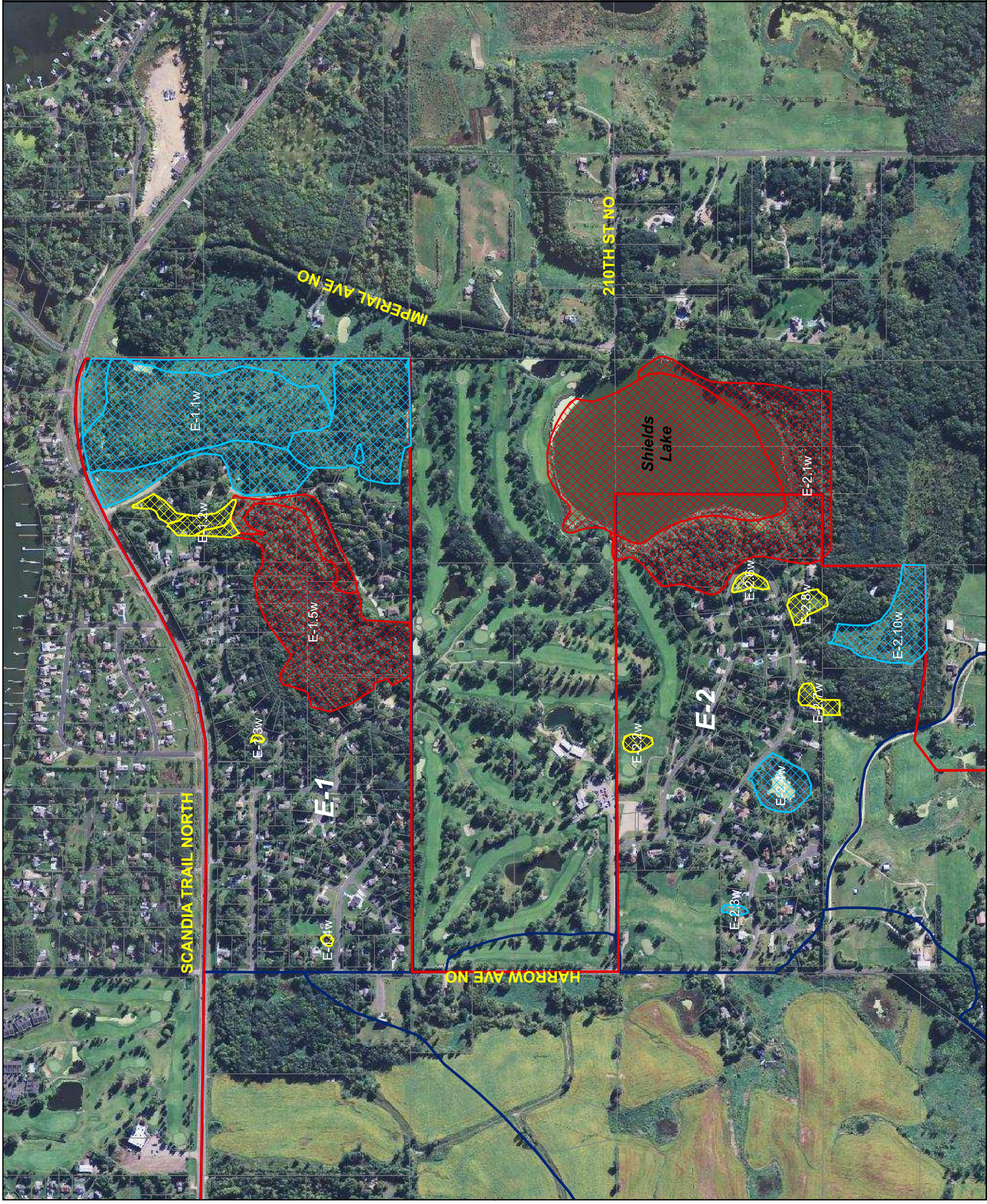


**Forest Lake**  
AS GOOD AS IT SOUNDS

# MUSA 2020 Wetland Inventory and Assessment

Figure 5.4

## Stormwater Susceptibility Area E



Susceptibility Rating	
	Highly Susceptible
	Moderately Susceptible
	Slightly Susceptible
	Least Susceptible

Other	
	Drainage Area Boundary
	Study Area Boundary
	Parcel Base Map

Feet

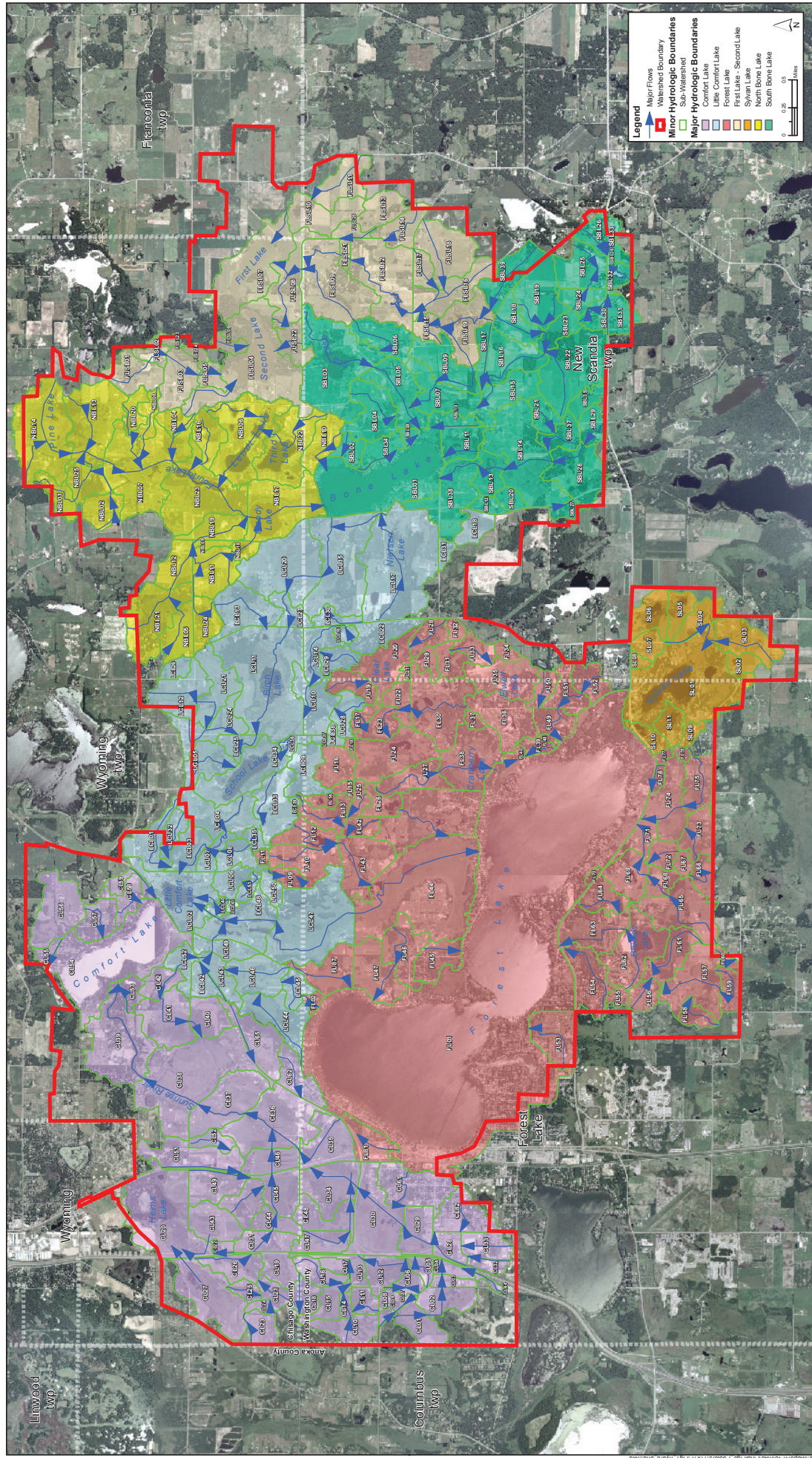
600 0 600



**Stantec**

## Appendix G: Hydraulic Modeling Output





**MAJOR AND MINOR HYDROLOGIC BOUNDARIES**  
 FLOODPLAIN DELINEATION  
 Comfort Lake - Forest Lake Watershed District

**Figure 1**

TABLE 5  
 BASE FLOOD LEVELS – EXISTING AND CRITICAL EVENT  
 (100-Year / 24-Hour SCS Type II Storm, Back-to-back 100-Year / 24-Hour SCS Type II Storm, and 100-Year / 10-Day Snowmelt)

Name	Node Name	Landlocked	Approximate Outlet/Overflow Elevation (ft)	MnDNR Lake Finder Data		100-Year		100-Year Critical Event		Change (Critical-Existing)
				OHW (ft)	Recorded High (ft)	Existing Conditions <sup>(a)</sup>	Ultimate Conditions <sup>(a)</sup>	10-day Snowmelt 100% Impervious		
<b>COMFORT LAKE WATERSHED</b>										
Heims Lake	CL20		896.8			898.4	898.6	898.6	898.6	0.2
Comfort Lake	CL54		885.4	887.20	886.32	888.5	888.9	888.9	889.5	1.0
Wetland	CL34		888.4			893.9	894.4	893.9	893.9	0.4
Wetland	CL30		888.7			894.8	895.2	894.4	894.4	0.4
<b>LITTLE COMFORT LAKE WATERSHED</b>										
Little Comfort Lake	LCL02		885.7	887.20	887.81	889.3	890.3	892.1	892.1	2.8
Nielsen Lake	LCL17-L	X	941.0			932.6	933.9	933.4	933.4	1.3
Birch Lake	LCL11		894.5			896.9	897.2	897.9	897.9	1.0
Clear Lake	FL20-L	X	939.0			912.1	912.3	911.5	911.5	0.3
School Lake	LCL34		889.5			891.1	891.6	892.8	892.8	1.7
<b>FOREST LAKE WATERSHED</b>										
Elwell Lake	FL35-L	X	924.0			923.0	924.8	923.2	923.2	1.7
Shields Lake	FL62		901.4	902.50	903.99	902.9	903.4	903.3	903.3	0.5
Cranberry Lake	FL38		901.9	903.00	903.30	903.3	903.5	903.1	903.1	0.2
Sylvan Lake	SL01	X	948.0	937.10	938.00	939.4	939.9	939.2	939.2	0.5
Forest Lake	FL01		901.4	901.80	902.60	902.4	902.5	902.7	902.7	0.3
<b>BONE LAKE WATERSHED</b>										
First Lake	FLSL07	X	914.0			908.5	908.8	908.5	908.5	0.3
Moody Lake	NBL17		912.3			914.3	914.7	915.0	915.0	0.7
Second Lake	FLSL04		906.6			908.9	909.5	909.7	909.7	0.8
Bone Lake	SBL01		907.3	909.10	910.97	910.6	911.3	913.7	913.7	3.2
Sea Lake	SBL03	X	927.6			927.1	927.3	926.8	926.8	0.2
Third Lake	NBL22		925.3	923.60		925.9	926.0	925.9	925.9	0.1
Pine Lake	NBL14		925.5			926.5	926.7	926.7	926.7	0.3

(a) Elevations for the land-locked basins are from the back-to-back 100-yr, 24-hour event and the elevations for the other basins are from the 100-yr, 24-hr event.

**TABLE 4**  
**100-YEAR DISCHARGES - CREEK PROFILES**

XP-SWMM Link	Scenario	Upstream XP-SWMM Node	Max Flow (cfs) <sup>(a)</sup>
<b>Sunrise River</b>			
CL35A out	Existing 100-yr	CL35A	144
	10-day Snow Event	CL35A	140
	Ultimate 100-yr	CL35A	-347
CL36 out	Existing 100-yr	CL36	140
	10-day Snow Event	CL36	137
	Ultimate 100-yr	CL36	-199
CL36A out	Existing 100-yr	CL36A	-186
	10-day Snow Event	CL36A	135
	Ultimate 100-yr	CL36A	-369
L232	Existing 100-yr	CL37	143
	10-day Snow Event	CL37	136
	Ultimate 100-yr	CL37	294
L233	Existing 100-yr	CL37A	126
	10-day Snow Event	CL37A	139
	Ultimate 100-yr	CL37A	-159
CL38 out	Existing 100-yr	CL38	117
	10-day Snow Event	CL38	137
	Ultimate 100-yr	CL38	-135
CL38A out	Existing 100-yr	CL38A	117
	10-day Snow Event	CL38A	137
	Ultimate 100-yr	CL38A	-158
CL38B out	Existing 100-yr	CL38B	-117
	10-day Snow Event	CL38B	137
	Ultimate 100-yr	CL38B	-271
CL38C out	Existing 100-yr	CL38C	-251
	10-day Snow Event	CL38C	137
	Ultimate 100-yr	CL38C	-710
CL39 out	Existing 100-yr	CL39	344
	10-day Snow Event	CL39	202
	Ultimate 100-yr	CL39	536
CL54 out	Existing 100-yr	CL54	147
	10-day Snow Event	CL54	211
	Ultimate 100-yr	CL54	175
CL54A out	Existing 100-yr	CL54A	147
	10-day Snow Event	CL54A	211
	Ultimate 100-yr	CL54A	175
CL54C out	Existing 100-yr	CL54C	147
	10-day Snow Event	CL54C	211
	Ultimate 100-yr	CL54C	175
L271	Existing 100-yr	N518	77
	10-day Snow Event	N518	102
	Ultimate 100-yr	N518	86
L272	Existing 100-yr	N519	77
	10-day Snow Event	N519	102
	Ultimate 100-yr	N519	86

**TABLE 4 CONTINUED**  
**100-YEAR DISCHARGES - CREEK PROFILES**

<b>XP-SWMM Link</b>	<b>Scenario</b>	<b>Upstream XP-SWMM Node</b>	<b>Max Flow (cfs)<sup>(a)</sup></b>
L273	Existing 100-yr	N520	77
	10-day Snow Event	N520	102
	Ultimate 100-yr	N520	86
L274	Existing 100-yr	N521	77
	10-day Snow Event	N521	102
	Ultimate 100-yr	N521	86
CL35 out	Existing 100-yr	CL35	190
	10-day Snow Event	CL35	159
	Ultimate 100-yr	CL35	213
<b>Comfort Lake to Bone Lake</b>			
L115	Existing 100-yr	SBL01	34
	10-day Snow Event	SBL01	57
	Ultimate 100-yr	SBL01	41
BONELKWEIR	Existing 100-yr	NBL106	34
	10-day Snow Event	NBL106	57
	Ultimate 100-yr	NBL106	41
L222	Existing 100-yr	NBL106A	34
	10-day Snow Event	NBL106A	57
	Ultimate 100-yr	NBL106A	-46
LBRL-1	Existing 100-yr	BRL-1	-97
	10-day Snow Event	BRL-1	57
	Ultimate 100-yr	BRL-1	-219
LBRL-2	Existing 100-yr	BRL-2	-194
	10-day Snow Event	BRL-2	57
	Ultimate 100-yr	BRL-2	-409
LBRL-3	Existing 100-yr	BRL-3	-243
	10-day Snow Event	BRL-3	58
	Ultimate 100-yr	BRL-3	-495
LBRL-4	Existing 100-yr	LCL15	226
	10-day Snow Event	LCL15	103
	Ultimate 100-yr	LCL15	396
LBRL-5	Existing 100-yr	BRL-5	106
	10-day Snow Event	BRL-5	83
	Ultimate 100-yr	BRL-5	160
L223	Existing 100-yr	LCL20	174
	10-day Snow Event	LCL20	128
	Ultimate 100-yr	LCL20	321
LBRL-7	Existing 100-yr	BRL-7	105
	10-day Snow Event	BRL-7	104
	Ultimate 100-yr	BRL-7	116
LBRL-8	Existing 100-yr	BRL-8	104
	10-day Snow Event	BRL-8	105
	Ultimate 100-yr	BRL-8	116
LCL27 out	Existing 100-yr	LCL27	104
	10-day Snow Event	LCL27	109
	Ultimate 100-yr	LCL27	119

**TABLE 4 CONTINUED**  
**100-YEAR DISCHARGES - CREEK PROFILES**

<b>XP-SWMM Link</b>	<b>Scenario</b>	<b>Upstream XP-SWMM Node</b>	<b>Max Flow (cfs)<sup>(a)</sup></b>
L225	Existing 100-yr	BRL-10	104
	10-day Snow Event	BRL-10	108
	Ultimate 100-yr	BRL-10	118
LCL11 out	Existing Snow	LCL11	47
	10-day Snow Event	LCL11	75
	Ultimate 100-yr	LCL11	57
LCL11A out	Existing 100-yr	LCL11A	47
	10-day Snow Event	LCL11A	75
	Ultimate 100-yr	LCL11A	57
LCL11B out	Existing 100-yr	LCL11B	47
	10-day Snow Event	LCL11B	75
	Ultimate 100-yr	LCL11B	57
LCL25 out	Existing 100-yr	LCL25	333
	10-day Snow Event	LCL25	209
	Ultimate 100-yr	LCL25	449
LCL34 out	Existing 100-yr	LCL34	-76
	10-day Snow Event	LCL34	85
	Ultimate 100-yr	LCL34	-250
L231	Existing 100-yr	LCL04	236
	10-day Snow Event	LCL04	147
	Ultimate 100-yr	LCL04	553
LLCL-1	Existing 100-yr	LCL-1	214
	10-day Snow Event	LCL-1	141
	Ultimate 100-yr	LCL-1	484
LLCL-2	Existing 100-yr	LCL-2	187
	10-day Snow Event	LCL-2	132
	Ultimate 100-yr	LCL-2	396
LLCL-3	Existing 100-yr	LCL-3	206
	10-day Snow Event	LCL-3	141
	Ultimate 100-yr	LCL-3	387
LLCL-4	Existing 100-yr	LCL-4	183
	10-day Snow Event	LCL-4	132
	Ultimate 100-yr	LCL-4	332
LLCL-5	Existing 100-yr	LCL-5	141
	10-day Snow Event	LCL-5	117
	Ultimate 100-yr	LCL-5	238
LLCL-6	Existing 100-yr	LCL07	135
	10-day Snow Event	LCL07	117
	Ultimate 100-yr	LCL07	183
LLCL-7	Existing 100-yr	LCL-7	116
	10-day Snow Event	LCL-7	115
	Ultimate 100-yr	LCL-7	-304
LLCL-8	Existing 100-yr	LCL-8	-211
	10-day Snow Event	LCL-8	116
	Ultimate 100-yr	LCL-8	-520

**TABLE 4 CONTINUED**  
**100-YEAR DISCHARGES - CREEK PROFILES**

<b>XP-SWMM Link</b>	<b>Scenario</b>	<b>Upstream XP-SWMM Node</b>	<b>Max Flow (cfs)<sup>(a)</sup></b>
LLCL-9	Existing 100-yr	LCL-9	-250
	10-day Snow Event	LCL-9	116
	Ultimate 100-yr	LCL-9	-583
LCL03 out	Existing 100-yr	LCL03	147
	10-day Snow Event	LCL03	145
	Ultimate 100-yr	LCL03	178
LCL02 out	Existing 100-yr	LCL02	51
	10-day Snow Event	LCL02	77
	Ultimate 100-yr	LCL02	68

(a) Negative flow values are caused by back-flow conditions or reaches/pipes at adverse grades.

**TABLE 3**  
**100-YEAR SURFACE WATER ELEVATIONS - CREEK PROFILES**

<b>XP-SWMM Node</b>	<b>Existing Max Water Elevation (ft)</b>	<b>Ultimate Water Elevation (ft)</b>	<b>NODETYPE</b>
CL20	898.4	898.6	LAKE
CL35	894.2	894.9	REACH
CL38	891.3	891.8	REACH
CL38B	890.2	891.7	REACH
CL39	890.7	893.3	REACH
CL54	888.5	888.9	LAKE
FL01	902.4	902.5	LAKE
FL20-L	912.1	912.3	LAKE
FL35-L	923.0	924.8	LAKE
FL38	903.3	903.5	LAKE
FL62	902.9	903.4	LAKE
LCL17-L	932.6	933.9	LAKE
FLSL04	908.9	909.5	LAKE
FLSL07	908.5	908.5	LAKE
SBL03	927.2	907.3	LAKE
NBL22	925.9	926.0	LAKE
NBL17	914.3	914.7	LAKE
SBL01	910.6	911.3	LAKE
LCL15	906.8	907.5	REACH
BRL7	906.4	907.0	REACH
BRL8	905.6	906.5	REACH
LCL27	905.5	906.5	REACH
LCL11	896.9	897.2	LAKE
LCL11B	894.0	894.2	REACH
LCL25	892.6	893.0	REACH
LCL34	891.1	891.6	LAKE
LCL07	890.9	892.1	REACH
LCL03	890.8	892.1	REACH
LCL02	889.3	890.3	LAKE
SL01	939.4	939.9	LAKE

**TABLE 2  
SUBWATERSHED DRAINAGE AREAS**

<b>XP-SWMM Name</b>	<b>Land Area - Subcatch 1 (acres)</b>	<b>Water Area - Subcatch 2 (acres)</b>
CL01	68.3	0.0
CL02	71.7	0.0
CL03	25.3	0.0
CL04	25.9	0.0
CL05	27.9	0.0
CL06	24.0	0.0
CL07	10.3	0.0
CL08	26.7	0.0
CL09	9.1	0.0
CL10	74.9	0.0
CL11	34.7	0.0
CL12	62.1	0.0
CL13	36.0	0.0
CL14	16.2	0.0
CL15	50.8	0.0
CL16	48.7	0.0
CL17	23.1	0.0
CL18	44.3	0.0
CL19	57.7	0.0
CL20	198.4	89.5
CL21	37.9	0.0
CL22-L	14.9	0.0
CL23	47.8	0.0
CL24	14.6	0.0
CL25	25.8	0.0
CL26	68.5	0.0
CL27	152.6	27.6
CL28	45.3	0.0
CL29	79.5	0.0
CL30	191.6	0.0
CL31	62.1	0.0
CL32	26.4	0.0
CL33	63.8	0.0
CL34	126.2	0.0
CL35	111.7	0.0
CL36	217.5	0.0
CL37	155.5	0.0
CL38	362.3	0.0
CL39	233.8	0.0
CL40	71.3	0.0
CL41	129.9	0.0
CL42	47.7	0.0
CL43	85.0	0.0
CL44	45.2	0.0
CL45	87.7	0.0

<b>Name</b>	<b>Land Area - Subcatch 1 (acres)</b>	<b>Water Area - Subcatch 2 (acres)</b>
CL46	68.2	0.0
CL47	59.1	0.0
CL48	77.5	0.0
CL49	81.7	0.0
CL50	67.4	0.0
CL51	120.7	0.0
CL52	34.3	0.0
CL53	29.7	0.0
CL54	189.1	219.3
CL55	20.8	0.0
CL56	141.6	0.0
CL57	69.5	0.0
CL58	51.0	0.0
CL59	30.7	0.0
CL61	134.2	0.0
CL62	74.3	0.0
CL64	11.3	0.0
CL65	105.9	0.0
CL82	97.1	0.0
FL01	1350.6	2282.9
FL02	16.4	0.0
FL09-L	30.4	0.0
FL10	97.6	0.0
FL12	59.5	7.4
FL13	62.2	0.0
FL14	19.2	1.4
FL15	14.6	0.0
FL16	68.5	0.0
FL17	24.8	0.0
FL18	7.5	0.0
FL19	57.1	0.0
FL20-L	66.8	39.0
FL21-L	8.8	0.0
FL22	39.5	6.5
FL23	30.9	21.2
FL24	129.0	29.3
FL25	28.8	0.0
FL26-L	41.9	3.8
FL27	81.8	0.0
FL28	45.5	4.9
FL29-L	25.7	1.8
FL30	155.3	29.8
FL31-L	46.9	0.0
FL32-L	17.5	1.9
FL33	19.5	0.0



**TABLE 2 CONTINUED**  
**SUBWATERSHED DRAINAGE AREAS**

<b>XP-SWMM Name</b>	<b>Land Area - Subcatch 1 (acres)</b>	<b>Water Area - Subcatch 2 (acres)</b>
FL33A	26.1	0.0
FL34-L	19.5	0.0
FL35-L	102.6	18.1
FL36-L	114.8	13.4
FL37	15.6	0.0
FL38	136.8	20.7
FL39	24.3	0.0
FL40	12.8	0.0
FL41	216.5	15.8
FL42	25.4	10.2
FL43	81.6	51.2
FL44	497.6	0.0
FL45	77.7	0.0
FL46	105.8	0.0
FL47	116.8	0.0
FL48	6.4	0.0
FL49	56.0	1.6
FL50	35.1	0.0
FL51	64.9	0.0
FL52	55.8	0.0
FL53	108.5	0.0
FL54	115.2	0.0
FL55-L	19.6	0.0
FL56	39.8	1.9
FL57	147.0	7.6
FL58	24.8	11.9
FL59	44.0	0.0
FL61	10.1	0.0
FL61A	75.0	0.0
FL62	148.4	7.6
FL63	128.8	0.0
FL64	62.6	0.0
FL65-1	111.7	0.0
FL65-2	44.4	0.0
FL67-L	20.4	0.0
FL68	28.4	12.6
FL69	83.7	0.0
FL70-L	8.2	0.0
FL71	49.6	0.0
FL72	38.3	0.0
FL73	69.3	0.0
FL74	123.0	0.0
FL75	80.8	0.0
FL76	14.5	0.0
FL77-L	9.9	0.0

<b>Name</b>	<b>Land Area - Subcatch 1 (acres)</b>	<b>Water Area - Subcatch 2 (acres)</b>
FL78-L	9.1	0.0
FL81	74.9	0.0
FL87	99.1	0.0
FLSL01	70.8	17.4
FLSL02	23.3	10.2
FLSL03	96.7	0.0
FLSL04	254.3	87.1
FLSL05	32.5	0.0
FLSL06-L	26.3	0.0
FLSL07	181.9	51.4
FLSL08	122.3	0.0
FLSL09	224.0	0.0
FLSL10-L	108.7	0.0
FLSL11	93.4	0.0
FLSL12	219.5	0.0
FLSL13-L	69.1	0.0
FLSL14	69.7	0.0
FLSL15	35.6	0.0
FLSL16	114.4	0.0
FLSL17	38.3	0.0
FLSL18	135.6	0.0
FLSL19	122.1	0.0
FLSL21	17.0	0.0
FLSL22	51.8	0.0
FLSL23-L	12.5	0.0
FLSL24	15.1	0.0
FLSL25	26.7	0.0
LCL01	89.2	0.0
LCL02	130.6	38.8
LCL03	70.2	0.0
LCL04	127.4	0.0
LCL05	80.4	0.0
LCL06-L	44.9	0.0
LCL07	36.3	0.0
LCL08	52.5	0.0
LCL09-L	79.6	0.0
LCL10	94.6	0.0
LCL11	388.7	0.0
LCL12	112.2	0.0
LCL13	123.0	0.0
LCL14	71.3	0.0
LCL15	265.5	0.0
LCL16	17.7	0.0
LCL17-L	374.9	0.0
LCL18-L	49.0	0.0

**TABLE 2 CONTINUED**  
**SUBWATERSHED DRAINAGE AREAS**

<b>XP-SWMM Name</b>	<b>Land Area - Subcatch 1 (acres)</b>	<b>Water Area - Subcatch 2 (acres)</b>
LCL20	233.3	0.0
LCL21	102.7	0.0
LCL22-L	76.0	0.0
LCL24	96.9	0.0
LCL25	35.0	0.0
LCL26-L	28.0	0.0
LCL27	45.2	0.0
LCL28	47.8	0.0
LCL29-L	46.4	0.0
LCL30	31.2	0.0
LCL31-L	18.2	0.0
LCL32-L	39.1	0.0
LCL33	112.8	0.0
LCL34	154.9	0.0
LCL35	20.3	0.0
LCL36	22.6	0.0
LCL37-L	6.7	0.0
LCL38-L	15.3	0.0
LCL39-L	4.1	0.0
LCL40-L	15.4	0.0
LCL41-L	5.5	0.0
LCL42	40.5	0.0
LCL43	53.5	0.0
LCL44	115.1	0.0
LCL45	42.2	0.0
LCL46	98.2	0.0
LCL47	306.3	0.0
LCL48	140.4	0.0
LCL49	53.8	0.0
LCL50-L	28.9	0.0
LCL51-L	23.6	0.0
LCL52	47.9	0.0
NBL01	53.2	0.0
NBL02	62.3	0.0
NBL04	35.7	0.0
NBL05	76.4	0.0
NBL06	158.8	66.4
NBL07	217.9	60.0
NBL08	37.7	0.0
NBL09	15.7	0.0
NBL10	71.1	0.0
NBL11	101.6	0.0
NBL12	72.1	0.0
NBL13	162.1	32.9
NBL14	153.5	93.6

<b>Name</b>	<b>Land Area - Subcatch 1 (acres)</b>	<b>Water Area - Subcatch 2 (acres)</b>
NBL16	64.3	0.0
NBL17	148.5	44.7
NBL18	23.7	0.0
NBL19	71.5	0.0
NBL20	37.8	0.0
NBL21	167.1	0.0
NBL22	99.2	64.8
NBL23	205.6	27.8
NBL24	60.5	0.0
NBL25	63.3	0.0
SBL01	138.1	222.1
SBL02	37.2	0.0
SBL03	238.9	50.7
SBL04	119.1	0.0
SBL05	119.8	0.0
SBL06	88.6	0.0
SBL07	109.8	0.0
SBL08	11.8	0.0
SBL09	106.9	0.0
SBL10	35.4	0.0
SBL11	68.4	0.0
SBL12-L	26.2	0.0
SBL13	61.1	0.0
SBL14	246.8	0.0
SBL15	98.6	0.0
SBL16	107.5	0.0
SBL17	32.6	0.0
SBL18	70.3	0.0
SBL19	127.4	0.0
SBL20-L	27.7	0.0
SBL21	43.1	0.0
SBL22	207.5	0.0
SBL23	49.7	0.0
SBL24	42.8	0.0
SBL25	104.3	0.0
SBL26	43.6	0.0
SBL27	23.6	0.0
SBL28	135.9	0.0
SBL29	45.2	0.0
SBL30	34.8	0.0
SBL31	52.0	0.0
SBL32	32.7	0.0
SBL33	36.5	0.0
SBL34	47.2	0.0
SBL35-L	37.3	0.0
SBL36-L	3.6	0.0

**TABLE 2 CONTINUED  
SUBWATERSHED DRAINAGE AREAS**

<b>XP-SWMM Name</b>	<b>Land Area - Subcatch 1 (acres)</b>	<b>Water Area - Subcatch 2 (acres)</b>
SBL37	51.2	0.0
SBL38	152.5	0.0
SBL39	97.9	0.0
SL01	275.9	122.8
SL02-L	32.1	0.0
SL03	101.1	0.0
SL04	60.0	0.0
SL05-L	48.3	0.0
SL06	73.2	0.0
SL07	38.9	0.0
SL08	13.1	0.0
SL09	21.4	0.0
SL10-L	36.5	0.0
SL11-L	45.3	0.0

**Drainage Area Summary**

<b>XP-SWMM Name</b>	<b>Drainage Area Covered</b>	<b>Area (acres)</b>	<b>Area (sq mi)</b>
CL	Comfort Lake	5241	8.2
FL	Forest Lake	8730	13.6
FLSL	First Lake/Second Lake	2328	3.6
LCL	Little Comfort Lake	4355	6.8
NBL	North Bone Lake	2550	4.0
SBL	South Bone Lake	3386	5.3
SL	Sylvan Lake	869	1.4
<b>Sum</b>		<b>27458</b>	<b>42.9</b>

**TABLE 1  
STRUCTURE INVENTORY**

Structure ID	Upstream SWMM Node	Existing Structure Type	Location Description	Y Coordinate	X Coordinate	Upstream Invert Elevation	Downstream Invert Elevation	Existing Condition Rating	Existing Length (ft)	County	City Township	Notes
1	CL34	60" RCP	Crossing Forest Blvd. east of Hwy 61	300415.49	460515.76	886.34	867.75	FAIR	62	Washington	Forest Lake	
2	CL34 B	8" X 6" BOX	Crossing Hwy 61 south of 240th St.	300451.37	460609.18	884.27	885.11	VERY POOR	63	Washington	Forest Lake	
3	CL34 B	8" X 6" BOX	Crossing Hwy 61 south of 240th St.	300461.53	460672.33	884.27	885.11	VERY POOR	63	Washington	Forest Lake	
4	FL44	36" CSP	Crossing North Shore Trail west of Iverson Ln.	292331.67	475518.02	901.03	901.15	FAIR	50	Washington	Forest Lake	
5	FL71	48" CSP	Crossing Hwy 97 east of Imperial Ave.	284795.43	476760.56	897.66	897.73	GOOD	84	Washington	Forest Lake	
6	FL65-1	15" CSP	Crossing Ingensoll Ave. south of 210th St.	282528.71	473058.84	915.83	915.42	VERY POOR	49	Washington	Forest Lake	
7	FL63-B	48" RCP	Crossing Hwy 97 west of Imperial Ave.	288513.10	470999.85	899.85	899.88	GOOD	68	Washington	Forest Lake	
8	CL04	48" RCP	Crossing SW ramp at I-35 and Broadway Ave.	294175.85	455870.15	891.79	890.46	GOOD	561	Washington	Forest Lake	
9	CL12A	36" RCP	Crossing I-35 south of Hwy 8	296888.03	456188.60	888.39	888.31	GOOD	230	Washington	Forest Lake	
10	CL35	54" RCP	Crossing driveway north of Hwy 8	299426.42	462422.44	887.08	887.02	GOOD	29	Washington	Forest Lake	
11	N520	60" CSP	Crossing Hwy 8 east of Hwy 61	299074.62	462739.01	887.30	894.92	FAIR	173	Washington	Forest Lake	
12	CL34A	66" CSP	Crossing bike trail west of Hwy 61	300426.53	460546.64	887.18	886.93	FAIR	40	Washington	Forest Lake	
13	N518	54" RCP ARCH	Crossing North Shore Trail (Forest Lake outlet)	298786.65	463282.76	899.17	897.85	FAIR	102	Washington	Forest Lake	(A)
14	CL30	60" RCP	Crossing Hwy 8 west of Hwy 61	298111.39	459488.01	888.74	888.54	GOOD	195	Washington	Forest Lake	
15	FL47	18" CSP	Crossing North Shore Trail south of 235th St.			903.99	903.89	FAIR	51	Washington	Forest Lake	(C)
16	FL45	24" CSP	Crossing North Shore Trail east of North Shore Ct.			900.72	900.45	FAIR	54	Washington	Forest Lake	(C)
17	FL38	36" CSP	Crossing North Shore Trail east of Jeffery Ave.					FAIR		Washington	Forest Lake	(C)
18	FL49	18" RCP	Crossing North Shore Trail west of Keather Tr.			914.51	914.19	FAIR	65	Washington	Forest Lake	(C)
19	FL51	24" CSP	Crossing Keather Tr. south of 217th St.			918.00	917.70	GOOD	60	Washington	Forest Lake	(C)
20	NBL20	18" CSP	Crossing Morgan Ave. north of 256th St.	308797.80	496983.70	936.74	936.66	GOOD	51	Chisago	Wyoming twp	
21	FLSL03	24" CSP	Crossing Morgan Ave. north of 250th St.	307172.40	496986.10	936.19	935.66	GOOD	60	Chisago	Wyoming twp	
22	NBL09	36" CSP	Crossing Lofton Ave. south of 250th St.	305811.80	490328.20	912.81	912.14	GOOD	158	Chisago	Wyoming twp	
23	NBL113	30" CSP	Crossing driveway south of 256th St.	308771.70	493995.80	915.81	915.09	FAIR	23	Chisago	Wyoming twp	
24	NBL113	24" CSP	Crossing driveway south of 256th St.	30794.70	494001.60	915.24	915.19	POOR	23	Chisago	Wyoming twp	
25	NBL19	36" CSP	Crossing 245th St. (Moody Lake inlet)	303354.00	491474.80	909.71	910.20	GOOD	40	Chisago	Wyoming twp	
26	NBL19	36" CSP	Crossing 245th St. (Moody Lake inlet)	303352.42	491315.80	909.98	910.81	GOOD	41	Chisago	Wyoming twp	
27	NBL13A	48" CSP	Crossing 256th St.	310221.82	494172.76	918.27	917.92	GOOD	62	Chisago	Wyoming twp	
28	NBL12	24" CSP	Crossing driveway on north side of 250th St.	306003.60	489934.32	913.54	913.81	GOOD	237	Chisago	Wyoming twp	
29	LCL03	45" RCP ARCH	Crossing Itasca Ave. (Little Comfort Lake inlet)	306586.70	474624.55	885.44	885.20	GOOD	65	Chisago	Wyoming twp	
30	LCL02	42" CSP	Crossing Hwy 8 (Little Comfort Lake Outlet)	307404.40	472931.58	883.68	883.61	FAIR	59	Chisago	Wyoming twp	
31	LCL48A	24" CSP	Crossing Heath Ave. south of Hwy 8	305060.17	471338.20	898.94	898.60	VERY POOR	51	Chisago	Wyoming twp	
32	CL54	84" RCP ARCH	Crossing W. Comfort Dr. (Comfort Lake outlet)	311446.44	481146.00	884.29	884.01	GOOD	40	Chisago	Wyoming twp	
33	CL54	84" RCP ARCH	Crossing W. Comfort Dr. (Comfort Lake outlet)	311461.51	468124.14	884.22	883.98	GOOD	40	Chisago	Wyoming twp	
34	LCL11A	48" HDPE	Crossing July Ave. north of 240th St.	302952.68	481117.15	894.00	893.44	GOOD	60	Chisago	Wyoming twp	
35	LCL24	42" CSP	Crossing July Ave. north of 240th St.	303823.79	481069.41	901.75	900.54	FAIR	66	Chisago	Wyoming twp	
36	LCL24	18" CSP	Crossing July Ave. south of Green Lake Tr.	305533.43	481090.95	910.26	909.29	FAIR	51	Chisago	Wyoming twp	
37	CL31	24" CSP	Crossing Falcon Ave. north of 240th St.	302254.05	457460.98	895.88	895.85	GOOD	45	Chisago	Wyoming twp	
38	CL31	24" RCP	Crossing driveway west of Falcon Ave.	302347.34	457349.39	897.89	896.35	VERY POOR	26	Chisago	Wyoming twp	
39	CL35	60" CSP	Crossing driveway east of Hwy 61	300919.45	461256.95	887.07	887.07	GOOD	29	Chisago	Wyoming twp	
40	CL45A	8" X 6" BOX	Crossing Hwy 61 north of 240th St.	302255.30	460193.80	886.25	884.52	VERY POOR	55	Chisago	Wyoming twp	
41	CL45A	8" X 6" BOX	Crossing Hwy 61 north of 240th St.	302240.35	460197.29	886.25	884.52	VERY POOR	55	Chisago	Wyoming twp	
42	CL45	24" CSP	Crossing bike trail north of 240th St.	302247.12	460108.35	889.96	889.65	FAIR	61	Chisago	Wyoming twp	
43	CL37	96" RCP ARCH	Crossing Greenway Ave. west of Goodview Ave.	305809.11	463529.37	886.52	886.14	GOOD	70	Chisago	Wyoming twp	
44	LCL27	48" CSP	Crossing Manning Tr. north of 240th St.	301414.91	486181.09	899.45	899.45	FAIR	59	Chisago	Wyoming twp	
45	CL38	72" CSP	Crossing 256th St. west of Gramford Ave.	308386.78	464773.19	885.35	885.28	GOOD	90	Chisago	Wyoming twp	
46	CL22A	54" RCP	Crossing I-35 south of Helms Lake	305107.66	458223.31	893.17	892.50	GOOD	312	Chisago	Wyoming twp	
47	CL26	54" RCP	Crossing I-35 north of 240th St.	303261.83	456341.60	893.42	893.94	GOOD	270	Chisago	Wyoming twp	
48	CL38	60" CSP	Crossing driveway south of 256th St.	308078.83	464600.68	885.32	885.54	GOOD	30	Chisago	Wyoming twp	
49	NBL12	24" CSP	Crossing 250th St. west of Lofton Ave.	305849.95	490212.68	913.82	913.19	GOOD	65	Chisago	Wyoming twp	

**TABLE 1 CONTINUED  
STRUCTURE INVENTORY**

Structure ID	Upstream SWMM Node	Existing Structure Type	Location Description	Y Coordinate	X Coordinate	Upstream End (D) Invert Elevation	Downstream (D) Invert Elevation	Existing Condition Rating	Existing Length (ft)	County	City Township	Notes
50	LCL43A	48" CSP	Crossing Hwy.8 south of 250th St.	305840.23	470505.09	897.88	897.78	POOR	139	Chisago	Wyoming twp	
51	LCL39	96" CSP	Crossing W. Comfort Dr. (Comfort Lake inlet)	310042.13	468797.13	884.03	884.07	POOR	50	Chisago	Wyoming twp	
52	LCL52	21" CSP	Crossing 250th Street west of Hwy 8			900.66	900.41	FAIR	62	Chisago	Wyoming twp	(C)
53	CL19	24" RCP	Crossing I-35 north of 240th St.			896.32	897.62	GOOD	140	Chisago	Wyoming twp	(B)
54	LCL13	36" CSP	Crossing Manning Tr. south of 240th St.			912.00	911.70	FAIR	60	Chisago	Wyoming twp	(C)
55	CL43	24" CSP	Crossing 250th St. west of Fondant Ave.			895.00	894.66	FAIR	68	Chisago	Wyoming twp	(C)
56	CL20B	36" CSP	Crossing 250th St. west of 245th St.			893.66	893.36	FAIR	60	Chisago	Wyoming twp	(C)
57	N288	36" CSP	Crossing 238th St. (Bone Lake inlet)	299812.30	491991.80	907.75	907.58	FAIR	43	Washington	New Scandia twp	
58	NBL10	24" CSP	Crossing 238th St. west of Melanie Trail	299927.30	494069.70	913.97	913.39	VERY POOR	61	Washington	New Scandia twp	
59	SBL38	18" CSP	Crossing 228th St. west of Meadowbrook Ave.	294154.20	493280.18	909.16	909.00	FAIR	64	Washington	New Scandia twp	(A)
60	SBL15	36" CSP ARCH	Crossing Oakhill Rd. west of Meadowbrook Ave.	292377.09	496638.57	939.20	939.10	POOR	50	Washington	New Scandia twp	
61	SBL05	84" RCP	Crossing Meadowbrook Ave. south of Melanie Tr.	295161.49	495705.67	910.14	909.62	GOOD	60	Washington	New Scandia twp	
62	SBL03	18" RCP	Crossing Nolan Ave. south of 236th St.	297324.70	496646.59	927.56	927.32	GOOD	38	Washington	New Scandia twp	
63	SBL03	12" HDPE	Crossing driveway northeast of Nolan Ave.	297379.03	496622.91	927.82	928.57	GOOD	38	Washington	New Scandia twp	
64	LCL30	24" RCP	Crossing Manning Tr. south of 240th St.	299609.80	486314.34	926.85	926.39	FAIR	115	Washington	New Scandia twp	
65	SBL25	24" CSP	Crossing Hwy 97 east of Novak Ave.	286253.08	503237.33	985.49	984.83	POOR	74	Washington	New Scandia twp	
66	FLSL16	48" CSP	Crossing 230th St. east of Nolan Ave.	295440.55	501174.40	933.04	932.23	GOOD	58	Washington	New Scandia twp	
67	FLSL16	48" CSP	Crossing 230th St. east of Nolan Ave.	295439.19	501169.22	932.41	932.34	GOOD	58	Washington	New Scandia twp	
68	SBL39	24" CSP	Crossing Oakhill Rd. east of Nolan Ave.	291536.92	501064.02	981.59	980.93	GOOD	53	Washington	New Scandia twp	
69	FLSL09	48" CSP	Crossing 240th St. east of Oldfield Ave.	300703.99	503239.99	915.21	914.65	GOOD	48	Washington	New Scandia twp	
70	FLSL09	48" CSP	Crossing 240th St. east of Oldfield Ave.	300704.54	503245.13	915.26	914.78	GOOD	48	Washington	New Scandia twp	
71	FLSL09	15" CSP	Crossing 240th St. east of Oldfield Ave.	300706.67	503328.59	920.13	919.45	GOOD	41	Washington	New Scandia twp	
72	FLSL21	24" RCP	Crossing 237th St. east of Oldfield Ave.	298896.00	503950.88	923.02	922.83	GOOD	44	Washington	New Scandia twp	
73	SBL11	18" CSP	Crossing 228th St. west of Meadowbrook Ave.	294061.46	494246.29	909.67	911.21	VERY POOR	69	Washington	New Scandia twp	
74	FLSL12	24" RCP	Crossing 236th St. east of Oldfield Ave.	298387.87	503681.84	925.12	924.99	GOOD	44	Washington	New Scandia twp	
75	SBL01	36" CSP ARCH	Crossing Lofton Ave. (Bone Lake outlet)	299340.52	491471.86	913.00	906.95	FAIR	98	Washington	New Scandia twp	(C)
76	SBL10	12" CSP	Crossing Meadowbrook Ave. north of Melanie Tr.			913.00	912.70	POOR	60	Washington	New Scandia twp	(C)
77	SBL08	15" CSP	Crossing Melanie Tr. north of 228th St.			914.00	913.70	VERY POOR	60	Washington	New Scandia twp	(C)
78	SBL02	15" CSP	Crossing Melanie Tr. south of 238th St.			913.00	912.70	VERY POOR	60	Washington	New Scandia twp	(C)
79	FL21	15" CSP	Crossing 230th St. east of Kirk Ave.					POOR		Washington	New Scandia twp	(C)
<b>Weir Data</b>												
32	CL54	43' Long Weir	Comfort Lake Rock Weir Outfall			885.40	883.97	Good		Chisago	Wyoming twp	
13	FL01	23' Long Weir	Forest Lake Concrete Weir Outfall			901.35	899.00	Good		Washington	Forest Lake	

NOTES:  
 (A) UPSTREAM END OF CULVERT WAS SURVEYED. DOWNSTREAM INVERT APPROXIMATED AS FIELD OBSTRUCTIONS PREVENTED SURVEY OF INVERT.  
 (B) DOWNSTREAM END OF CULVERT WAS SURVEYED. UPSTREAM INVERT APPROXIMATED AS FIELD OBSTRUCTIONS PREVENTED SURVEY OF INVERT.  
 (C) CULVERT WAS VISUALLY INSPECTED IN THE FIELD BUT NO SURVEY DATA WAS OBTAINED.  
 MODELED INVERT ELEVATIONS WERE OBTAINED FROM TIN MODEL CREATED FOR THE WATERSHED.

**TABLE 9  
CALIBRATION COMPARISON**

**Peak Discharge**

	Measured Peak Flow (cfs)	Calibrated Peak Flow (cfs)	Calibrated Flow as % of Measured
Bone Lake	28.1	25.8	92%
Comfort Lake	97.3	107.6	111%
Forest Lake	56.0	50.9	91%

**Discharge Volume**

	Measured Volume (ac-ft)	Calibrated Volume (ac-ft)	Calibrated Volume as % of Measured
Bone Lake	748	914	122%
Comfort Lake	4964	5345	108%
Forest Lake	2233	2191	98%

**Peak Stage**

	Measured Stage (ft)	Calibrated Stage (ft)	Variance (ft)
Bone Lake	N/A <sup>(a)</sup>	910.59	N/A
Comfort Lake	887.31	887.74	0.43
Forest Lake	902.08	902.02	-0.06

(a) No Lake Finder data for Bone Lake available for the calibration event

# Appendix C - Inventory of Existing RCWD Models

Area of Study	General Purpose/Description of the Reason	Factors Addressed (code)1	Reference/Infor-mation Source	Year of Effort	Model Used	Modeling Effort Performed By...	Model Found?	GIS Subwater-shed Boundaries?	Modeled Land Use Con-ditions	Level of Detail	Continue to Use?
ACD 31 watershed	ditch repair analysis	WSEL	ACD 31	2005	XP-SWMM	Emmons Olivier Resources (EOR)	yes - unfinished	yes, but do not match model	Correlation	Medium / Incomplete	no
ACD 46 watershed	ditch repair analysis	WSEL	ACD 46	2005	XP-SWMM	EOR	yes - unfinished	yes	Correlation	Medium / Incomplete	No
Washington Co. portion of RWCD	floodplain study	WSEL	Washington Co. Floodplain Study	?	XP-SWMM	EOR	yes	yes	Existing		
direct drainage area to Marshan Lake	ditch repair analysis	WSEL	ACD 10-22-32	2007	XP-SWMM	EOR	See Lino Lakes RMP	See Lino Lakes RMP			
JD 4 watershed	ditch repair analysis	WSEL	JD 4/ACD 15	2007	XP-SWMM	EOR	yes	yes	Existing / Do Nothing / Full Repair / RMP	Medium / High	No - CN's not documented
ACD 25 watershed	ditch repair analysis	WSEL	ACD 25	2007	XP-SWMM	EOR	no	no			
	TP loading	LOAD			PLOAD	EOR	no	no			
	ditch repair analysis	WSEL			XP-SWMM	EOR	no	no			
ACD 53-62 watershed	ditch repair analysis	WSEL			XP-SWMM	EOR	yes	yes	Existing / Repair / As Constructed	Low - large subs's, trap channels	No - Channels not detailed
ACD 53-62 and area contributing to Golden Lake	groundwater elevation	GW	ACD 53-62	2003	MODFLOW	EOR	no	no			
	assimilative capacity of Golden Lake	WQC: LKRM			BATHUB	EOR	no	no			
area around Lino Lakes and Centerville	provide an analysis of the current city infrastructure and identify areas of concern	WSEL	Lino Lakes RMP	2008	XP-SWMM	EOR	yes	yes	Existing, Future (Full Build Out), Future RMP	High	No - CN's not documented
	culvert replacement analysis	WSEL			HEC-RAS	EOR	no	no			
area contributing to Hardwood Creek	ditch repair analysis	WSEL	Hardwood Creek/JD 2	2004	XP-SWMM	EOR	yes	yes	Existing / Future (2020)	Hydrology: Low/ Medium Hydraulics: High	No - CN's not documented
area of City of Shoreview	surface water analysis	PRR; WSEL	City of Shoreview Surface Water Management Plan	2005	HEC-HMS	Short Elliot and Hendrickson (SHE)	yes	No, but delineated in report	Existing	Hydrology: High Hydraulics: Low (no channels modeled)	Yes - for hydrology only purposes
watershed district	watershed management	VRO; Q_VEL; WSEL	RCWD HydroCAD model	1998	HydroCAD	Montgomery-Watson	yes	No, but delineated in report	Existing	Low	Yes - for low detail purposes
Rice Creek watershed	flood management	VRO; Q_VEL; WSEL	RCWD Stormwater Study	1992	HEC-2	James M. Montgomery	no	no			
Baldwin Lake	flood insurance study	WSEL	Baldwin Lake	1980	HEC-2	Totz, Kind, Duvall, Anderson and Associates	no	no			
Clear Lake	runoff volume/flooding	VRO; Q_VEL; WSEL	Clear Lake	1996	HydroCAD	Montgomery-Watson	no	no			
	sediment transport and erosion potential for scenario analysis	WGES			CONCEPTS	EOR	no	no			
	hydraulic analysis for input hydrographs to CONCEPTS	Q_VEL; WSEL	Middle Rice Creek Restoration Study	2008	XP-SWMM	EOR	no	no			
Middle Rice Creek	channel stability	WGES			Rosgen stream classification	EOR	no	no			

# Appendix C - Inventory of Existing RCWD Models

Area of Study	General Purpose/Description of the Reason	Factors Addressed (code)1	Reference/Infor-mation Source	Year of Effort	Model Used	Modeling Effort Performed By...	Model Found?	GIS Subwater-shed Boundaries?	Modeled Land Use Con-ditions	Level of Detail	Continue to Use?
Bald Eagle Lake	channel stability	WGES	Bald Eagle Lake assessment	2005	Channel Evolution Model	EOR	no	no			
	lake water quality	LOAD	Bald Eagle Lake TMDL	?	MNLEAP P8	?	no	no			
	lake water quality loading analysis	LOAD	Chain of Lakes	?	P8	Wenck Wenck	no	no			
Chain of Lakes	lake water quality	LOAD	Golden Lake	?	EPAs Simple Method	EOR	no	no			
	lake water quality	LOAD	Jones Lake	2001	FLUX	Montgomery-Watson	no	no			
Golden Lake	lake water quality	LOAD	Peltier Lake assessment	2006	MNLEAP	?	no	no			
Jones Lake	lake water quality	LOAD	Peltier/Centerville TMDL	?	LOADEST	EOR	no	no			
Peltier and Centerville Lakes	lake water quality	LOAD	Rice Lake assessment	2005	BATHUB	EOR	no	no			
	lake water quality impacts	WQC; LKRM			XP-SWMM	EOR	no	no			
Rice Lake	weir design analysis	Q_VEL; WSEL	Silver Lake drainage alternatives study	1992	PONDNET	Barr Engineering	no	no			
County Road E drainage to Silver Lake	stormwater nutrient loading analysis	LOAD	Silver Lake West Evaluation Report	2000	P8	Ramsey Co. Public Works	no	yes - unknown if it correlates to a model			
Silver Lake	nutrient loading analysis	LOAD	Silver Lake TMDL	?	P8	EOR	no	no			
<b>Factors Addressed Code</b>											
Waterway Geomorphology, Erosion and Stability (WGES)											
Ground Water Quantity and Quality (GW)											
Peak Rate of Runoff (PRR)											
Volume of Runoff (VRO)											
Flow and Velocity in the Conveyance System (Q_VEL)											
Water surface elevation (WSEL)											
Lake and Reservoir Management (LKRM)											
Water Quality Load (LOAD)											
Water Quality Concentration (WQC)											
Total Maximum Daily Load (TMDL)											
Best Management Plan analysis (BMP)											
Temperature of Runoff and Water Bodies (TEMP)											
Design at the Site Level or Trunk System Level (DES)											



## **Appendix F - Excess Runoff Rate Control**

The policies and rules to control excess run-off have evolved from requiring rate control for the 100-year storm only, to requiring rate control for both the 2-year and 100-year events, to requiring both rate control and infiltration where feasible. The District retains permitting jurisdiction for runoff management purposes for all new or redevelopment projects on properties greater than 1 acre in size.

The most recent, comprehensive District-wide study occurred in a three phase flood management study conducted from 1991-1993 and 1998. Phase I was the stormwater run-off study that established the peak discharge rates at or near municipal boundaries using 5 major sub-watersheds: Clearwater Creek (CWC), Hardwood Creek (HWC), and Upper, Middle and Lower Rice Creek (URC, MRC and LRC, respectively). Phase II of the study used a HEC-2 hydrologic model to determine the 100-year profile along Rice Creek from Howard Lake to the Mississippi River and along Clearwater Creek from Bald Eagle Lake to Peltier Lake. Phase III updated the Phase I model and established maximum allowable discharge rates at municipal boundaries and other key locations. Rice Creek facilitates discussion about flows at these locations to try to attain these rates. A summary of the study results can be found in the following table. In 1998, the model was updated and calibrated using the HydroCAD modeling system.

While various discreet storm water run-off studies have been completed, the overall District wide study could be updated to reflect not only the changes in land use, but also the advancements in modeling capabilities. In addition, a modeling methodology could be adopted by the district so that future models can be integrated into existing data.

Since the last plan update, the RCWD has made it a rule to require infiltration on new and redeveloped projects. The rules adopted in 1998 required the infiltration of the run-off of a 0.34 inch storm. The 2008 rule updated increased the required infiltration to the volume of the run-off of a 2.8 inch storm. While the rate control reduces peak surface run-off, infiltration reduces the volume of water. This helps to reduce problems with flash flooding. It also leads to more open channel stability in the ditches and creeks of the District. Infiltration is an effective method for removing pollutants from stormwater.

More recently, the RCWD has adopted Resource Management Plans (RMPs) over the portions of the District that will most likely be rapidly developing over the next ten years. The RMPs are an attempt to balance the need for development with protection of the wetlands and water systems. The RMPs establish a wetland protection zone (WPZ), which leads to the development of larger higher quality wetland complexes. It also helps to maximize the developable area outside the WPZ.

The final report of phase I of the modeling, entitled Addendum to Water Resources Management Plan: Stormwater Run-off Study was submitted in February 1992. The study established the peak discharge rates at or near municipal boundaries using 5 major sub-watershed, Clearwater Creek, Hardwood Creek, and Upper, Middle and Lower Rice Creek. The 5 sub-watersheds were then broken down further into 84 minor sub-watersheds. The results of this study are listed in the following table:

Sub-watershed Number	Denoted as a Management Concern	Outlet Location	Critical Peak Discharge (cfs)
CWC 1	Yes (Grant twp)	White Bear Lake (NW corner)	25
CWC 2		CD 11 under TH 61	37
CWC 3A		Long Lake under CR 10	10
CWC 3B		Sunset Lake under Ingersoll Ave	7
CWC 3C		Mann Lake under Ironwood Ave	22
CWC 4		Pine Tree Lake under Hadley Ave N	80
CWC 5		JD 1 under Goodview Ave	80
CWC 6		JD 1 under CR 10	110
CWC 7		JD 1 under Portland Ave	100
CWC 8		Otter Lake under Bald Eagle Blvd W	---
CWC 9		Bald Eagle Lake under 129 St N	160
CWC 10		Branch 3 of JD 3 under CR 8	190
CWC 11		JD 3 under Elmcrest Ave	580
CWC 12A		JD 3 under 35E	590
CWC 12B		JD 3 under 20th Ave	810
CWC 13A		JD 3 under Main St	670
CWC 13B	Yes (Lino Lake)	JD 3 under Peltier Lake Dr	690
HWC 1		Oneka Lake under Oneka Lake Blvd	5
HWC 2A		Egg Lake under Geneva Ave	6
HWC 2B		Hardwood Creek under 157th St N	140
HWC 3		Hardwood Creek 200' east of 180th St N	110
HWC 4		Hardwood Creek under Harrow Ave N	800
HWC 5		Hardwood Creek under TH 61	840
HWC 6		Hardwood Creek under Elmcrest Ave	990
HWC 7		Hardwood Creek under 20th Ave N	1120
URC 1A	Yes (Forest Lake)	11th Ave SW approx. 200' west of TH 61	25
URC 1B	Yes	TH 61 approx. 400' south of 11th Ave SW	85
URC 1C	Yes	Clear Lake under Eureka Ave N	50
URC 2		Mud Lake under field crossing	27
URC 3		Howard Lake under Lake Dr NE	160
URC 4		County Ditch 46 under Kettle River Blvd	210
URC 5	Yes	JD 4 under 35W	240
URC 6		Crossways Lake under Rondeau Lake Dr	35
URC 7		Rondeau Lake under Rondeau Lake Dr	50
URC 8		Rice Creek under 35W	390
URC 9		Centerville Lake under CR 14	---

Sub-watershed Number	Denoted as a Management Concern	Outlet Location	Critical Peak Discharge (cfs)
URC 10		Peltier Lake approx. 900' SE of CR 14 bridge over Rice Creek	1860
MRC 1	Yes (Columbus)	CD 22 under CR 14	170
MRC 2		CD 10 under Lake Dr	370
MRC 3		Drainage under 35W	150
MRC 4		Marshan Lake under Aqua Ln	1560
MRC 5A	Yes	Poplar Lake under CR J	16
MRC 5B		CD 25 under Birch Street	520
MRC 6		CD 25 under Black Duck Dr	120
MRC 7		Reshanau Lake under West Shadow Lake Dr	---
MRC 8		Rice Lake under CR 49	1340
MRC 9		CD 62 under Lexington Ave	70
MRC 10		CD 62 under Lexington Ave	160
MRC 11	Yes (Blaine)	Golden Lake (south end)	290
MRC 12	Yes	CD 8 under Baldwin Lake Rd	130
MRC 13		Turtle Lake (NW corner)	7
MRC 14	Yes	CD 1 under Hamline Ave	36
MRC 15	Yes (Blaine)	Baldwin Lake under CR J	1300
MRC 16	Yes	Rice Lake under Lexington Ave.	1330
MRC 17	Yes	Branch 2 of JD 1 under north-bound access road from 35W	110
MRC 18	Yes	JD 1 under CR J	110
MRC 19	Yes	JD 1 under 35W	160
MRC 20	Yes	Rice Creek under aqueduct structure north of CR I bridge	1390
MRC 21	Yes	Rice Creek under 35W	1390
MRC 22	Yes	Rice Creek under Minnesota Transfer Railroad bridge	1390
LRC 1	Yes	Walsh Lake	6.7
LRC 2	Yes	CR D near Long Lake Rd	130
LRC 3A	Yes	SW corner of upper portion of Langton Lake	6
LRC 3B	Yes	Cleveland Ave. approx. 1200' north of CR D	26
LRC 3C	Yes	CD 5 under 35W	50
LRC 4	Yes	Jones Lake (NE corner)	310
LRC 5A		Manhole at Silver Lake Rd and Silver Lake	23
LRC 5B	Yes	CD 3 approx. 300' west of 8th Ave NW and railroad crossing	230
LRC 6A	Yes	CD 2 under 7th St NW	510
LRC 6B	Yes	NE corner of Pike Lake and Long Lake Rd	650

Sub-watershed Number	Denoted as a Management Concern	Outlet Location	Critical Peak Discharge (cfs)
LRC 7		Little Johanna under Shorewood Dr	470
LRC 8		NW corner of Lake Josephine near Hamline Ave	60
LRC 9		NW corner of Lake Johanna under Lake Johanna Blvd	410
LRC 10	Yes	Round Lake (SE corner)	40
LRC 11A		Island Lake (NW corner)	0
LRC 11B		SW corner of Valentine Lake under Old Hwy 10	130
LRC 12		E2 wetland below SE corner of CR F and 35W	340
LRC 13		NW corner of Long Lake and Long Lake Blvd	1930
LRC 14	Yes	Rice Creek at Ramsey/Anoka County boundary	1990
LRC 15A		Spring Lake (west edge)	3
LRC 15B	Yes	Rice Creek under Hwy 65	2050
LRC 16	Yes (New Brighton)	Moore Lake West (NE corner)	40
LRC 17		Rice Creek under University Ave	2300
LRC 18		Locke Lake dam	2360

CD – County Ditch  
CR – County Road  
JD – Judicial Ditch

The report of the Phase II of the modeling, entitled Addendum to Water Resources Management Plan: Flood Profile Study, dated October 1991, used the HEC-2 computer model to determine the 100-year flood profiles along Rice Creek from Howard Lake to the Mississippi River, and along Clearwater Creek from Bald Eagle Lake to Peltier Lake. Existing HEC-2 computer data files were used from past hydraulic studies with new HEC-2 data files created from field surveys. Computer model runs were made to provide flood profiles for both future and existing conditions. The results of the 100-year flood study are listed below:

Road	Downstream Elevation (MSL)	Upstream Elevation (MSL)	Difference	Creek
University Avenue	827.7	831.0	3.3	Rice Creek
Highway 65	846.5	851.6	5.1	Rice Creek
Silver Lake Road	853.0	856.0	3.0	Rice Creek
Mississippi Street	856.5	858.4	1.9	Rice Creek
Long Lake Road	869.3	870.0	0.7	Rice Creek
MN Transfer Railroad	870.4	873.5	3.1	Rice Creek
Bike Trail	873.5	875.0	1.5	Rice Creek
I-35	877.5	879.8	2.3	Rice Creek
County Road H	879.8	881.7	1.9	Rice Creek
County Road I	882.0	882.2	0.2	Rice Creek

Road	Downstream Elevation (MSL)	Upstream Elevation (MSL)	Difference	Creek
Lexington Avenue	883.0	883.3	0.3	Rice Creek
County Road J	884.0	885.4	1.4	Rice Creek
I-35	887.0	887.5	0.5	Rice Creek
County Road 23	889.4	890.0	0.6	Rice Creek
Peltier Lake Drive	890.7	897.2	6.5	Clearwater Creek
Main Street	899.0	900.8	1.8	Clearwater Creek
20 Avenue N	902.8	904.3	1.5	Clearwater Creek
I-35E	904.6	910.3	5.7	Clearwater Creek

The report of Phase III of the modeling, entitled Addendum to Water Resources Management Plan: Flood Management Study, dated October 1993 used the results of the first two reports to identify flooding problems along the major creek reaches and analyze possible solutions. The flooding problems due to the rise in Rice Creek were identified at several residences between University Avenue and Silver Lake Boulevard.

The purpose of the final phase, the discharge rate study, was to establish maximum allowable discharge rates at municipal boundaries (and other appropriate locations) and to determine a flood management profile along Rice Creek and Clearwater Creek while considering the needs of the local governmental units. This work was coordinated with the MnDNR Floodplain Management Program so that county and municipal floodplain concerns were considered. Management profiles for the 100-year flood will be determined for Rice Creek and Clearwater Creek.

## Appendix H: Surface Water Management Plan Review Letters



44 Lake Street South Suite A, Forest Lake, MN 55025

Phone 651.395.5850 Fax 651.395.5851 www.clflwd.org

July 27, 2018

Mr. Timothy Olson  
Bolton & Menk, Inc.  
2035 County Road D East  
Maplewood, MN 55109

RE: City of Forest Lake SWMP Comments

Dear Mr. Olson,

The Comfort Lake-Forest Lake Watershed District (CLFLWD) has completed its review of the City of Forest Lake's Surface Water Management Plan (SWMP), dated March 2018, for compliance with the current CLFLWD Watershed Management Plan as well as Minnesota Statutes 103B.235 and Minnesota Rules 8410. Comments received from the Metropolitan Council on June 15, 2018 have been taken into consideration. We find the plan to be largely compliant and provides a good level of detail regarding the City's management of water resources, however CLFLWD requests the revisions on the following pages before staff can recommend approval by the Board of Managers.

The CLFLWD appreciates the opportunity to comment on the City's plan. We look forward to reviewing a revised draft for consideration by the CLFLWD Board of Managers. If you have any questions please contact me at (651)-395-5856 or [emily.heinz@clflwd.org](mailto:emily.heinz@clflwd.org).

Sincerely,

Emily Heinz  
Watershed Technician

Cc: Dan Udem – City of Forest Lake  
Phil Belfiori – Rice Creek Watershed District  
Judy Sventek – Metropolitan Council  
Sam Paske – Metropolitan Council  
Jessica Collin-Pilarski – Washington County

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**Comment Matrix**

<b>Comment #</b>	<b>Page #</b>	<b>Draft Plan Text</b>	<b>Suggested Revision</b> (shown in <u>red and underline</u> )	<b>CLFLWD Comment</b>
1	7	This ditch conveys flows north to Forest Lake. The area serviced by Judicial Ditch 6 is within the Comfort Lake-Forest Lake topographic drainage boundary, though it is currently included within the Rice Creek Watershed District jurisdictional boundary for political purposes.		JD-6 discussion is outdated. JD-6 is now completely located in CLFLWD.
2	11			Consider noting that Shields Lake has a public fishing pier and may thus support recreational use.
3	11	Judicial Ditch #2 and its tributary area comprise the Sunrise River's remaining headwater area.		The plan references JD-2 at the headwaters of the Sunrise. JD-2 was abandoned. This is also confusing because there is a JD-2 in RCWD.
4	14	Both RCWSD and CLFLWSD have utilized their resources to study existing resources within the City and develop regulations to protect these resources.		CLFLWD is referred to as CLFLWSD. Recommend being consistent and using CLFLWD.
5	15			We recommend adding Low-Impact-Development Practices and Reduction of Impervious Areas to the list.
6	18			Recommend making more specific reference to/citation of CLFLWD fertilizer application standards
7	20	Citywide sweeping will continue to take place twice a year, in spring and fall. Additional sweeping will apply when needed. In coordination with NPDES Phase II	<u>Citywide sweeping will <del>continue to take place twice a year</del> seven to twelve times per year, in <del>spring and fall</del> accordance with the recommended frequencies outlined for each sweeping</u>	Policy 5.4: First paragraph is not up to date and consistent with the second paragraph. Should add the new sweep frequencies from the plan.



		requirements, additional sweeping is currently provided during construction. Operational routines will also employ special methods to address seasonal conditions.	<u>zone in the 2018 Street Sweeping Management Plan.</u> Additional sweeping <u>beyond the recommended frequencies outlined in the plan</u> will apply when needed. In coordination with NPDES Phase II requirements, additional sweeping is currently provided during construction. Operational routines will also employ special methods to address seasonal conditions.	
8	21			Goal 6: References parks as valuable resource. Lakes and especially Forest Lake should be called out as a valuable public natural resource. Consider adding an item 6.2 to note the valuable public lakes that exist within the city.
9	25	...The project will impound water from a tributary to Shields Lake for irrigation reuse at the Forest Hills Golf Club, reducing watershed phosphorus loads to Shields Lake by 77 pounds per year.	...The project will impound water from a tributary to Shields Lake for irrigation reuse at the Forest Hills Golf Club, reducing watershed phosphorus loads to Shields Lake by <del>77</del> 94 pounds per year. <u>Additionally, the irrigation reuse system will supply the golf club with up to 26 million gallons of water per year, greatly reducing the demand for pumping from a deep, regionally significant aquifer.</u>	Modeling used in project feasibility report estimates a 94 pound per year reduction under average conditions. Impact on groundwater pumping is also important to convey.
10	25	...The irrigation reuse system coupled with the alum treatment are expected to reduce phosphorus loads to Forest Lake by up to 250 pounds per year.	...The irrigation reuse system coupled with the alum treatment are expected to <u>reduce phosphorus loads such that Shields achieves a clear water state, which will</u> reduce phosphorus loads to Forest Lake by up to 250 pounds per year.	It is important to convey that Shields Lake will see a major benefit from this project as well.
11	25			Table 7: Might be a quick/helpful reference for

				some readers if you inserted a footnote listing out the six lakes that are included in the “Six Lake TMDL”
12	26			See suggested figures for Table 8 below. Note that Met Council grades are shown as the 5-year averages as well, so the double-asterisk was added to that header. Also, I will note here that the chlorophyll-a values shown in the table below are pheophytin-corrected. Consider adding this as an additional footnote to the table.
13	27	(Under 5.2.8 Intercommunity Flows) CLFWLD	(Under 5.2.8 Intercommunity Flows) CLF <del>W</del> LWD	Suggest performing a word search in the document for “CLFWLD” or other such letter transpositions
14	27	Forest Lake discharges into Columbus, Hugo and Wyoming through open ditch conveyances.	<u>The City of</u> Forest Lake discharges into Columbus, Hugo and Wyoming through open ditch conveyances.	Suggest clarifying that this is the City of Forest Lake and not the lake itself.
15	29	The following section outlines the standards for design, performance and management of its stormwater systems developed in conjunction with recent (2017) changes to RCWD rules and prior to expected changes to CLFLWD rules.		CLFLWD adopted its rule revisions in February 2018.
16	40	(Section I, item 3) The Pond Treatment Effectiveness Assessment Plan in the City’s SWPPP should be followed.		Should clarify that the Pond Treatment Effectiveness Assessment Plan and subsequent Implementation Plan are standalone documents that are not actually included in Appendix E to this LWMP document.
17	40	As part of the NPDES MS4 program the City of Forest Lake now prepares and annual budget outlining the costs		SWPPP is in Appendix E in 4/2/18 draft. Additionally, SWPPP that is included in Appendix E does not appear to contain a budget,

		associated with implementing the SWPPP. A copy of this budget can be found in Appendix D along with the City's SWPPP.		as referenced.
18	42	Implementation Plan		Capital Improvement Plan should have a clear and detailed schedule with estimated costs and potential funding sources.

**Extended Text**

**Comment #12**

Lake*	Mean [TP]** (ppb)	Mean [Chlorophyll-a]** (ppb)	Mean Secchi Disk Reading** (m)	Met. Council Grade** (A-F)
Forest	35	<u>15.0</u>	<u>1.8</u>	C+
Shields	<u>239</u>	<u>50.7</u>	<u>0.9</u>	<u>D-</u>
Keewahtin	<u>15</u>	<u>3.0</u>	<u>4.5</u>	<u>A</u>

\* Lakes included in the Minnesota Pollution Control Agency's (MPCA) Lake Water Quality Assessment Program

\*\* 5-Year Mean (2011-2017) Summertime Average

June 15, 2018

Mr. Phil Belfiori, Administrator  
Rice Creek Watershed District  
4325 Pheasant Ridge Dr. NE #611  
Blaine, MN 55449-4539

RE: City of Forest Lake Comprehensive Surface Water Management Plan 45-Day Review  
Metropolitan Council Review File 21950-1

Dear Mr. Belfiori:

The Metropolitan Council (Council) has completed its 45-day review of the draft City of Forest Lake's (City) Comprehensive Surface Water Management Plan (Plan), as required under Minnesota Statute 103B.235. The Council reviewed the Plan for consistency with Minnesota Rules Part 8410.0160 and our *2040 Water Resources Policy Plan* (Policy Plan). Specifically, the Council outlines suggested plan elements in the Policy Plan Appendix C-2: Local Surface Water Management Plan Elements.

Overall, the plan provides a good framework for the City to continue to successfully manage its water resources alongside its watershed partners. The *Background* and *Land and Water Resources* chapters set a strong context for the plan, with sufficient information to understand the City's existing and future land use, physical setting and key water resources.

The City does a good job of summarizing water resources related issues and potential solutions. In *Chapter 5: System Assessment*, water quality and quantity issues are discussed by watershed district, and show that the City has worked with Rice Creek Watershed District (RCWD) and Comfort Lake-Forest Lake Water District (CLFLWD) to identify and correct issues within the City. *Section 5.2: Assessment of Problems* includes the Metropolitan Council lake grades for lakes within the City, identifying lakes that need further protection to improve or maintain water quality. Impaired waters and the status of TMDLs are also included in this discussion of problems. For each problem discussed in this chapter, the Plan references measures that have been taken or are planned to correct the issue, often in collaboration with the watersheds.

The City also has clearly defined roles in managing water within its jurisdiction and official controls to implement water management. The City does not intend to pursue local regulatory authority at this time and this role is carried out by the watersheds. The Plan does lay out stormwater design standards intended to help the City meet the goals of this Plan as well its NPDES MS4 permit. These standards include rate control requirements that require discharge rates from sites not exceed current rates for the 2, 10, and 100-year 24-hour storm events, using precipitation estimates from NOAA Atlas 14. The standards also include water quality requirements including pretreatment and infiltration guidelines. The City has a separate Stormwater Management ordinance, as well as Land Alteration and Grading, Shoreland Overlay District, and Flood Plain Management ordinances.

Finally, the City lays out a clear process for amendments to be made to the plan.

There are a few areas of the plan, however, that need to be strengthened. To be in full conformance with Minnesota Rules Part 8410.0160 and the Policy Plan, Council staff recommends the plan be updated to:

1. Include a summary of the appropriate water resources management-related agreements that have been entered into by the City. The Plan includes *Appendix D* for this purpose, but the agreements are not included.
2. Include drainage areas, volumes, rates, and paths of stormwater runoff.
  - a. The Plan indicates that Figure SW-02 shows contributing drainage areas to each major water body and ditch within the City, but the included SW-02 only shows watershed jurisdictional boundaries. Drainage area boundaries and flow paths should be shown on a map, or referenced in an appropriate watershed district plan.
  - b. The Plan references regional hydraulic modeling completed by RCWD and CLFLWD, and includes a summary of intercommunity flows in Table 9. These models may be incorporated by reference, but a summary of all volumes and rates within Forest Lake, not just intercommunity flows, should be included in this Plan.
3. Prioritize solutions to address problems identified in the Plan. Water quality and quantity issues are identified in both watershed districts within the City, and solutions to these problems are discussed. However, while the Plan states in *Section 5.1: Overview of the System Assessment Chapter*, that allocation of resources will be based on prioritization of activities, no prioritization of projects is included in the Plan. It is not clear whether the order of projects in Table 17: Summary of Future Stormwater Projects, is a prioritization, and if it is, how that prioritization was determined.
4. Improve Table 17: Summary of Future Stormwater Projects, with schedule, estimated cost, and potential funding source identified with as much detail as possible. Specifically:
  - a. The table should include years all the way through the year the local water plan extends, with specific actions scheduled for all years.
  - b. The table should include annual budget totals.
  - c. The Plan indicates that generally projects will be funded by the stormwater utility, with additional funding potentially coming from cost sharing with the watershed districts and grants. Each item in the table should have an identified goal funding source, which will help the City prioritize and target these funding opportunities.

In addition to the above requirements that must be met, the Council recommends the following:

- Clarify the status of the stormwater systems design standards included in *Section 6.3: Design Standards*. This section is described as being included in the City's design standards, which are referenced in *Appendix C*, but none of the stormwater standards are included in *Appendix C*. Clarify if the stormwater design standards are intended to be added to the Public Works/Engineering Standards, or if the stormwater design standards will be formally adopted separately.
- Consider adopting stormwater standards more closely aligned with the MPCA's Minimal Impact Design Standards (MIDS) or other green infrastructure practices. MIDS is concerned with

keeping the raindrop where it falls and mimicking natural hydrology in order to reduce flooding, minimize pollutants entering our waterbodies, and recharge groundwater. Both CLFLWD and RCWD's rules align well with MIDS.

- Correct all references to *Section 5.3: Design Standards* to Section 6.3.
- Rearrange the sections in the *Chapter 5: System Assessment* so that *Section 5.2.5: Impaired Water Bodies*, does not appear to pertain only to the CLFLWD. Also consider revising the *Impaired Water Bodies* section as follows:
  - a. Two impaired streams are within City boundaries: Hardwood Creek and Judicial Ditch #2. The text references only one stream.
  - b. Add White Rock Lake in Scandia to *Table 7: Forest Lake Impaired Waters*, as the text indicates part of the City discharges to White Rock Lake.
- Reference the Metropolitan Council lake data year on pages 23 and 26.

We appreciate your considering our comments as you move forward with approval of the Plan. If you have any questions about these comments, please contact Emily Resseger, at 651-602-1033, or at [emily.resseger@metc.state.mn.us](mailto:emily.resseger@metc.state.mn.us).

Sincerely,



Sam Paske  
Assistant General Manager, Environmental Services Division

cc: Dan Udem, City of Forest Lake  
Tim Olson, Bolton & Menk, Inc.  
Mike Kinney, Comfort Lake-Forest Lake Watershed District  
Harry Melander, Metropolitan Council District 12  
Corrin Wendell, Metropolitan Council Sector Representative  
Raya Esmaeili, Metropolitan Council Referrals Coordinator  
Emily Resseger, Water Resources Section



February 28, 2019

Tim Olson  
Bolton & Menk, Inc.  
2035 County Rd D East  
Maplewood, MN 55109

**RE: City of Forest Lake Local Water Management Plan Comments**

Dear Tim,

The Rice Creek Watershed District (RCWD) has completed a formal review of the City of Forest Lake's Local Water Management Plan (LWMP), dated January 2019, for compliance with the current RCWD Watershed Management Plan (WMP) as well as Minnesota Statutes 103B.235 and Minnesota Rules 8410. The RCWD requests the following additions and corrections before RCWD staff can recommend approval by the Board of Managers.

1. General comment: The Metropolitan Council indicated the need to provide a summary of all volumes and rates of stormwater runoff, however the City's references to RCWD's hydraulic and hydrologic model and Watershed Management plan are satisfactory to address this.
2. Section 3.6.3 Wetlands, second-to-last paragraph: Please revise this paragraph to include language on the Comprehensive Wetland Protection and Management Plan (CWPMP) in the City, such as: "In addition to the City's efforts of identifying and assessing wetlands, the RCWD completed a wetland inventory along JD 4 as part of a Resource Management Plan (RMP) which included a State WCA Comprehensive Wetland Protection and Management Plan (CWPMP) (December 2007). The results of the effort are available on the District's website [www.ricecreek.org](http://www.ricecreek.org). These inventories must be referenced in combination with a site-specific assessment when a project is located within the study and subsequent regulatory boundaries."
3. Section 5.2.2.A, last paragraph: Judicial Ditch (JD) 4 is located within the RCWD boundary. This paragraph should be moved to Section 5.2.1.A.
4. Section 5.3 Impaired Water Bodies:
  - a. The City needs to identify actions, policies, or projects that will help address the Peltier & Centerville Lake TMDL goals. This could include the City's enhanced street sweeping, bmps when the JD 4 area develops, etc. The City should also explicitly state that the City Code provisions will help address the Upper Mississippi River Bacteria TMDL goals.
  - b. Table 8: The Hardwood Creek TMDL was approved in 2009; please update the "TMDL Approved column."
5. Section 5.4 Intercommunity Flows and Hydraulic Modeling, first paragraph, last sentence: Recommend removing this sentence, or revising to "The City of Forest Lake and RCWD have entered into agreements for digital file sharing, including updated geospatial and hydraulic modeling as needed."
6. Section 6.6 Capital Improvement Program, Table 17:
  - a. The table is required to have estimated years and costs for each project and annual budget totals. Please add as much detail as possible to the table.

4325 Pheasant Ridge Drive NE #611 | Blaine, MN 55449 | T: 763-398-3070 | F: 763-398-3088 | [www.ricecreek.org](http://www.ricecreek.org)

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Anoka County

**John J. Waller**  
Washington County

- b. Implement the TH61 WQ and Aesthetics Plan project: The City should add both watershed districts as possible funding sources.
  - c. Forest Road Water Quality Structure project: The City should add RCWD as a possible funding source.
  - d. Drainage Ditch Maintenance project: Please add clarification on if this is for private ditches.
7. Figures:
- a. The City should label and include the public drainage systems within the City on a figure.
  - b. A map of the JD 4 CWPMP and Wetland Management Corridor area within RCWD is still missing from the plan and should be added. RCWD can provide GIS files.

The provided comments below offer grammatical and formatting suggestions for the LWMP:

1. Section 3.3, third-to-last paragraph: Either “is within the” or “is in the” can be removed.
2. Section 3.6.3 Wetlands, second paragraph: Figure 3-6 is referenced, but this figure is not present in the plan. Please remove this reference or add the figure to the plan.
3. Section 4.2: “SWMP” should be updated for consistency with the plan.
4. Section 4.6.10 Policy 3.11: Recommend removing the comma in the first sentence.
5. Section 4.9.3 Policy 6.3, second sentence: “In partner” should be corrected to “in partnership.”
6. Section 5.2.1.B: Recommend adding detail to the Forest Lake High School Reuse project, similar to the level of detail present in the CLFLWD Shield Lake Reuse project description for consistency.
7. Section 6.3.2.A.1 Water Quality: The reference to Figure 3-4 should be removed or the figure added to the plan.
8. Appendix F: The City’s Wetland Inventory and Assessment is shown to have been completed in 2012, however Section 6.3.2 discusses a 2002 Wetland Inventory and Assessment. Recommend updating references as necessary.

The RCWD appreciates the opportunity to comment on the City’s plan. We look forward to reviewing a revised draft for consideration by the RCWD Board of Managers. If you have any questions regarding the comments, please contact me at (763) 398-3078 or [lsampedro@ricecreek.org](mailto:lsampedro@ricecreek.org).

Sincerely,



Lauren Sampedro  
District Technician

Cc: Judy Sventek-Metropolitan Council  
Sam Paske-Metropolitan Council  
Mike Kinney-Comfort Lake-Forest Lake Watershed District  
Jessica Collin-Pilarski-Washington County



# Appendix I: City of Forest Lake Street Sweeping Management Plan (2018)

# City of Forest Lake Street Sweeping Management Plan 2018



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# TABLE OF CONTENTS

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<b>TABLE OF CONTENTS</b> .....	<b>II</b>
<b>TABLE OF TABLES</b> .....	<b>IV</b>
<b>TABLE OF FIGURES</b> .....	<b>VI</b>
<b>EXECUTIVE SUMMARY</b> .....	<b>1</b>
<b>1. INTRODUCTION</b> .....	<b>2</b>
<b>2. BENEFITS</b> .....	<b>2</b>
2.1. Compliance with Non-degradation Policies .....	3
2.2. Protection of Water Resources .....	3
2.3. Good Housekeeping and Maintenance .....	3
2.4. Safety and Aesthetics .....	4
<b>3. CURRENT PRACTICES AND POLICIES</b> .....	<b>4</b>
<b>4. SWEEPING ZONES</b> .....	<b>4</b>
4.1. Tree Canopy .....	4
4.2. Curb-Miles .....	5
4.3. Sweeping Zones.....	5
<b>5. LOAD RECOVERY AND LOAD REDUCTION ESTIMATES</b> .....	<b>13</b>
5.1. Load Recovery .....	13
5.2. Load Reductions .....	17
<b>6. COST-BENEFIT ANALYSIS</b> .....	<b>20</b>
<b>7. RECOMMENDATIONS</b> .....	<b>23</b>
<b>8. REFERENCES</b> .....	<b>27</b>
<b>9. APPENDIX A: STREET SWEEPING ZONE MAPS</b> .....	<b>28</b>
<b>10. APPENDIX B: MECHANICAL BROOM LOAD RECOVERY ASSUMPTIONS</b> .....	<b>42</b>
<b>11. APPENDIX C: ESTIMATED SOLIDS AND PHOSPHORUS RECOVERY, REDUCTION, AND COSTS BY SWEEPING SCENARIO</b> .....	<b>44</b>
11.1. Baseline Scenario (2 times per year) .....	44
11.2. Enhanced Baseline Scenario (4 times per year) .....	45
11.3. Monthly Scenario (7 times per year).....	46
11.4. Twice Monthly Scenario (14 times per year).....	47
11.5. Weekly Scenario (28 times per year) .....	48
11.6. Base Priority Scenario.....	49

11.7.	Recommended Scenario .....	50
11.8.	Maximum Scenario.....	51

## TABLE OF TABLES

---

Table 4-1. Summary of curb-mile and tree canopy characteristics by defined sweeping zone .....	5
Table 4-2. Summary of defining characteristics for street sweeping zones in the City of Forest Lake. ....	10
Table 5-1. Street sweeping scenarios used in load recovery and load reduction estimates.....	14
Table 5-2. Summary of estimated annual total solids and phosphorus recovery for the street sweeping scenarios described in Table 5-1 by receiving waterbody. ....	15
Table 5-3. Typical BMP removal efficiencies (Minnesota Stormwater Manual) used to estimate the collective pollutant removal efficiency of BMPs within each sweeping zone. ....	18
Table 5-4. Estimated collective pollutant removal by existing stormwater BMPs within each sweeping zone based on the number and type of BMPs and estimated length of street treated by BMPs.....	18
Table 5-5. Estimated annual total solids and phosphorus reductions to downstream waterbodies for street sweeping scenarios described in Table 5-1.....	19
Table 6-1. 2017 street sweeping annual cost assumptions for the City of Forest Lake .....	20
Table 6-2. Baseline scenario (spring/fall only sweeping) total annual cost (\$) and annual cost-benefit (\$/lb-P reduced) of street sweeping by sweeping zone.....	22
Table 7-1. Cost-benefit of recommended street sweeping scenarios based on sweeping zone characteristics .....	25
Table 7-2. Total sediment reductions to receiving waterbody by sweeping scenario .....	26
Table 7-3. Total phosphorus reductions to receiving waterbody by sweeping scenario .....	26
Table 10-1. Comparison of removal efficiencies, mechanical broom and vacuum sweeper technologies, fine and coarse particle size ranges as reported in MNDOT, 2008.....	43
Table 11-1. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for BASELINE sweeping (once each spring and fall) using mechanical broom and regenerative air technologies. Costs for a City-owned sweeper are based on regenerative air or comparable high-efficiency technology. ....	44
Table 11-2. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for enhance spring and fall sweeping (2-spring, and 2-fall sweepings) using mechanical broom and regenerative air technologies. Costs for a City-owned sweeper are based on regenerative air or comparable high-efficiency technology.....	45
Table 11-3. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for monthly sweeping using mechanical broom and regenerative air technologies. Costs for a City-owned sweeper are based on regenerative air or comparable high-efficiency technology. ....	46

Table 11-4. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for twice monthly sweeping using mechanical broom and regenerative air technologies. Costs for a City-owned sweeper are based on regenerative air or comparable high-efficiency technology..... 47

Table 11-5. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for weekly sweeping using mechanical broom and regenerative air technologies..... 48

Table 11-6. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for Base Priority enhanced sweeping scenario using mechanical broom and regenerative air technologies (Table 7-1)..... 49

Table 11-7. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for Recommended enhanced sweeping scenario using mechanical broom and regenerative air technologies (Table 7-1)..... 50

Table 11-8. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for Maximum enhanced sweeping scenario using mechanical broom and regenerative air technologies (Table 7-1)..... 51

## TABLE OF FIGURES

---

Figure 4-1. Over-street tree canopy cover by sweeping zone .....	6
Figure 4-2. Paved road curb-miles by sweeping zone .....	6
Figure 4-3. Arial photograph and tree canopy cover map for Sunrise River/Comfort Lake-3 (SR/C3), a low canopy sweeping zone with approximately 1% average over-street tree canopy cover. ....	7
Figure 4-4. Arial photograph and tree canopy cover map for Keewahtin Lake, a moderate canopy sweeping zone with approximately 7% average over-street tree canopy cover. ....	8
Figure 4-5. Arial photograph and tree canopy cover map for Forest Lake-1, a high canopy sweeping zone with approximately 17% average over-street tree canopy cover.....	9
Figure 4-6. City of Forest Lake sweeping zones. Maps of individual zones are included in Appendix A. ....	11
Figure 4-7. City of Forest Lake sweeping priorities by sweeping zone. ....	12
Figure 5-1. Predicted phosphorus recovery per sweep and per year vs. number of sweepings for Clear Lake and Forest Lake Sweeping zones.....	16
Figure 5-2. Predicted percent increase in load recovery of phosphorus and solids vs. number of sweepings. ....	16
Figure 6-1. Total cost of sweeping and cost-benefit of sweeping (in-house sweeping only) vs. sweeping frequency for contract service and in-house street sweeping.....	22
Figure 9-1. Sweeping Zone Forest Lake 1 (FL1).....	28
Figure 9-2. Sweeping Zone Forest Lake 2 (FL2).....	29
Figure 9-3. Sweeping Zone Forest Lake 3 (FL3).....	30
Figure 9-4. Sweeping Zone Forest Lake 4 (FL4).....	31
Figure 9-5. Sweeping Zone Forest Lake 5 (FL5).....	32
Figure 9-6. Sweeping Zone Forest Lake 6 (FL6).....	33
Figure 9-7. Sweeping Zone Clear Lake 1 (CL1). ....	34
Figure 9-8. Sweeping Zone Clear Lake 2 (CL2). ....	35
Figure 9-9. Sweeping Zone Clear Lake 3 (CL3). ....	36
Figure 9-10. Sweeping Zone Shields Lake (Shields). ....	37
Figure 9-11. Sweeping Zone Keewahtin Lake (Keewahtin).....	38
Figure 9-12. Sweeping Zone Sunrise River/Comfort Lake 1 (SRC1). ....	39
Figure 9-13. Sweeping Zone Sunrise River/Comfort Lake 2 (SRC2). ....	40
Figure 9-14. Sweeping Zone Sunrise River/Comfort Lake 3 (SRC3). ....	41



Figure 10-1. Pick-up efficiencies vs. loading intensity for different sweeper types (Sutherland and Jelen, 1997). Efficiencies are based on pick up of street dirt simulant, NURP particle size distribution 13% fine ( $d < 63 \mu\text{m}$ ), 40% medium ( $250 \mu\text{m} \leq d \leq 2000 \mu\text{m}$ ), and 47% coarse ( $d \geq 2000 \mu\text{m}$ ). 43

## EXECUTIVE SUMMARY

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Street sweeping is the practice of removing particulates (salt, sand, and soil) and organic matter (leaves, seeds, flowers) from streets using mechanical broom or vacuum street sweeping vehicles to reduce the amount of pollutants and sediment discharged to stormwater conveyance systems. Traditional municipal street sweeping programs typically involve mechanically sweeping all City streets once in the spring and once in the fall. Enhanced municipal street sweeping programs typically involve sweeping street with high efficiency sweepers (vacuum type or similar) sweeping streets at higher frequency, based on the variable generation of particulates and organic matter to streets. This Plan identifies road-specific street sweeping timing and frequency, quantified expected phosphorus load reductions, itemized costs of enhanced street sweeping (including purchase and subcontract options), and recommended funding options for an enhanced street sweeping program in the City of Forest Lake, MN.

The City currently sweeps approximately 240 curb miles twice annually (according to the City's 2016 sweeping contract). Current sweeping practices improve road safety and appearance, recovers approximately 127 lb of phosphorus (TP) and 148,188 lb of solids (TS) from road surfaces each year, and removes approximately 51 lb of TP and 61,402 lb of TS loads each year to Clear, Comfort, Shields, Keewahtin (formerly Sylvan/Halfbreed), and Forest Lakes. Key findings from this Street Sweeping Management Plan indicate that twice monthly sweeping in the City of Forest Lake with regenerative air (or similar) technology has the potential to reduce loading to Clear, Comfort, Shields, Keewahtin, and Forest Lakes by an additional 137 lb of TP and 169,793 lb of TS compared to the reductions achieved through current contract sweeping practices.

For the purpose of this study, streets were aggregated into sweeping zones (Figure 4-6) based on connectivity to downstream water resources, storm water management type, and tree canopy cover characteristics (Table 4-2). In zones where streets drain directly to a downstream resource, the primary benefit of street sweeping is pollutant reduction to downstream resources and improved water quality. In zones where street runoff is intercepted by structural best management practices (BMPs), the primary benefit of street sweeping is increased longevity of BMP treatment efficiency.

Guidelines for sweeping based on the sweeping priorities for each zone are outlined in Section 7 of this report. It is recommended that streets located within zones identified as high priority for water quality be swept monthly to bi-weekly throughout the sweeping season. Enhanced sweeping at a frequency of 4-7 times per season is recommended for streets located in areas designated as high priority for BMP longevity. It is also recommended that the City maintain an observation log during sweeping operations and adjust sweeping frequency as needed to address conditions that may arise due to construction activity, storms, traffic patterns, or other unique considerations.

Based on the findings from the Plan, the City of Forest Lake is pursuing purchase of a regenerative air street sweeper so that an Enhanced Street Sweeping program can be adopted as part of the City's regular street maintenance program. Using an in-house sweeping program, sweeping zones that are a high priority for water quality could be swept up to 12 times per year and sweeping zones that are a high priority for BMP longevity could be swept up to 7 times per year, for about the same cost as spring and fall only sweeping contract services.

## 1. INTRODUCTION

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Street sweeping is the practice of removing particulates (salt, sand, and soil) and organic matter (leaves, seeds, flowers) from streets using mechanical broom or vacuum street sweeping vehicles to reduce the amount of pollutants and sediment discharged to stormwater conveyance systems. Traditional municipal street sweeping programs typically involve mechanically sweeping all City streets once in the spring and once in the fall. Enhanced municipal street sweeping programs typically involve vacuum sweeping streets at higher frequency, based on the variable generation of particulates and organic matter to streets.

Enhanced street sweeping has been identified as the most cost-effective best management practice (BMP) for treating stormwater runoff from the direct drainage area of several large recreational lakes in the City of Forest Lake: Forest Lake in the Comfort Lake-Forest Lake Watershed District (CLFLWD) and Clear Lake in the Rice Creek Watershed District (RCWD). The CLFLWD and the City have discussed the benefits of modifying their existing street sweeping program from one spring regenerative air and one fall mechanical sweep to more than two sweeps per year with a regenerative air vacuum sweeper. But implementation of an enhanced street sweeping program has been hindered by the lack of a prescriptive plan for the optimal timing and frequency of additional sweeps or the amount of additional staff needed by the City.

The objectives of this plan are to identify road-specific street sweeping timing and frequency, quantify expected phosphorus load reductions to area lakes, and itemize costs of enhanced street sweeping (including purchase and subcontract options) to support the adoption of an enhanced street sweeping program by the City of Forest Lake as part of their regular street maintenance program. The ultimate goal of this project is develop a formal agreement between the RCWD, the CLFLWD, and the City of Forest Lake to implement enhanced street sweeping for at least 10 years.

## 2. BENEFITS

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Stormwater management in older neighborhoods tends to be comprised mainly of catch basin and pipe networks that convey stormwater runoff directly from streets to surface waters with little or no structural BMPs in place to intercept and treat stormwater. Therefore, source control measures, such as street sweeping, are the primary tool available to protect downstream water quality. Stormwater systems in newer neighborhoods tend to include structural BMPs such as detention ponds and infiltration basins. While these BMPs provide water quality treatment for stormwater runoff from streets, accumulated sediments must be removed periodically to maintain BMP pollutant removal efficiency. Street sweeping is a good housekeeping measure that can extend the maintenance life cycle of stormwater BMPs in these areas by reducing pollutant loads.

Most cities do some amount of street sweeping each year to improve road safety and appearance, but street sweeping also offers a cost-effective and efficient means to reduce pollutant loads to storm sewer infrastructure and to downstream water resources (Beretta et. al (2011), SPU (2009), Kalinosky et. al (2013), others). Additional benefits of street sweeping include reduced clogging and

flooding of storm drains, reduced maintenance to downstream stormwater infrastructure, improved safety for pedestrians, and reduced presence of pests.

### **2.1. Compliance with Non-degradation Policies**

The City of Forest Lake lies within the jurisdiction of two watershed districts: the Comfort Lake Forest Lake Watershed District (CLFLWD) and the Rice Creek Watershed District (RCWD). Stormwater management rules for both of these watersheds include non-degradation policies that apply to both water quality and volume control. Enhanced street sweeping may provide assurance for non-degradation of water quality by reducing pollutant loads, and may address non-degradation of stormwater volume by reducing loss of storage volume through decreased sediment loading to stormwater ponds.

### **2.2. Protection of Water Resources**

Shields Lake, Forest Lake, Comfort Lake, Keewahtin Lake, Sunrise River in the CLFLWD, and Clear Lake in the RCWD, all receive surface water from City of Forest Lake streets. Some streets discharge their untreated runoff directly into receiving waters, while others enter the City's stormwater management systems prior to discharge. All the lakes except Keewahtin Lake have comprehensive diagnostics studies that identify total phosphorus (TP) and total solids (TS) as pollutants of concerns and define reductions needed to ensure that beneficial uses are maintained.

The 2010 Comfort Lake-Forest Lake Watershed District Six Lakes Total Maximum Daily Load (TMDL) Study identified a TP reduction goal of 952 lb/yr, or 83%, to Shields Lake and a TP reduction goal of 123 lb/yr, or 5%, to Comfort Lake. The Clear Lake Diagnostic Study identified a TP reduction goal of 140 lb/yr, or 13%, to Clear Lake. The DRAFT Forest Lake Diagnostic Study identified a TP reduction goal of 96 lb/yr, or 26%, in the direct drainage area to Forest Lake. Street sweeping was identified as a cost-effective BMP in all of these lake studies.

### **2.3. Good Housekeeping and Maintenance**

Street sweeping is a good housekeeping practice that can extend the maintenance life cycle of structural BMPs and road surfaces and consequently reduce the cost of maintenance over time. The pollutant removal efficiency of structural BMPs that are designed to remove sediment such as settling ponds, filter strips, and catch basin sumps, decreases as sediment storage capacity is depleted. Eventually, sediment must be removed from the practice to restore pollutant removal capacity. By reducing pollutant loading to structural BMPs, street sweeping can preserve the sediment storage capacity and pollutant removal efficiency of structural BMPs.

Sweeping can also be part of a preventative maintenance plan to extend the life of pavement surfaces. Sweeping removes sand and fines which wear down pavement when vehicles pass over paved surfaces. Fine particles that collect in cracks can also become areas where vegetation establishes, making pavement more susceptible to cracking and freeze/thaw damage.

## **2.4. Safety and Aesthetics**

Historically, safety and aesthetics are the primary reasons that municipalities sweep streets. Accumulated sand and trash detract from curb appeal, may contribute to clogging and flooding at storm inlets, and may pose a safety risks to bicycles and pedestrians.

## **3. CURRENT PRACTICES AND POLICIES**

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The City of Forest Lake currently sweeps all paved roads twice per year: once in the spring using a mechanical broom sweeper and again in the fall using a vacuum sweeper. Sweeping is done using a contract sweeping service. The City also owns an older (>10 years) mechanical broom sweeper. This sweeper is used as needed in conjunction with City maintenance and construction work.

The City of Forest Lake is a Municipal Separate Storm Sewer System (MS4) community subject to stormwater regulation under the Clean Water Act and Minnesota Rule 7090. As such, the City is required to develop a Storm Water Pollution Prevention Plan (SWPPP) to reduce the discharge of pollutants from their storm sewer. In the City's current SWPPP (August 1, 2013), street sweeping is included as a BMP that will be used to address approved TMDL studies with approved Waste Load Allocations (WLA); and as a pollution prevention/good housekeeping BMP. The SWPPP states that the City will modify and implement a Street Sweeping Plan (Part II.D.6.f); will measure/track the total length of street swept both per sweep and annually; and will implement revised programs when necessary (Part II.D.5).

## **4. SWEEPING ZONES**

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Street surfaces are connected to surface waters via storm water conveyance systems and can be a significant source of pollution to downstream water resources. Key factors that influence pollutant accumulation on streets include pavement type and condition, traffic volume, maintenance practices, adjacent land use, and over-street tree canopy.

### **4.1. Tree Canopy**

Tree canopy is particularly important when considering nutrient pollution. Organic litter from trees can be the primary source of total solids and nutrient loading on street surfaces during certain times of the year in areas of modest to dense tree canopy cover (Kalinovsky, 2015). Older neighborhoods laid out in grid fashion tend to have more mature trees in front yard areas and denser over-street canopy than newer neighborhoods or those with typical suburban street layout patterns. Areas with denser tree canopy can act as pollutant 'hot spots' due to the large amount of accumulation of organic litter on street surfaces.

Over street tree canopy cover was quantified for all paved roads included in the 2016 contract for sweeping services using high-resolution land cover data (1-meter) developed by the University of Minnesota. Average over-street tree canopy covers for each sweeping zone were estimated by intersecting deciduous canopy cover data with road surface polygons created from curb line data (Figure 4-1 and Table 4-1). Over street tree canopy cover tends to be less dense in

commercial/industrial and recently developed areas (e.g. SR/C3 in Table 4-1 and Figure 4-3); and densest in older residential neighborhoods (e.g. FL1 in Table 4-1 and Figure 4-5). Examples of average tree canopy cover are shown in Figure 4-3 through Figure 4-5.

#### 4.2. Curb-Miles

The length of street to be swept within each sweeping zone was estimated from road centerline data (Figure 4-2 and Table 4-1). The total ‘curb-miles’ to be swept in each zone is equal to the total length of paved road (centerline) in the zone multiplied by two (representing the curb on both sides of the street). Curb-miles include rural cross section roads but not gravel roads. Additional road lanes that might be swept were not included in load recovery estimates, but should be swept as possible along with curb/outer lanes.

#### 4.3. Sweeping Zones

Streets were aggregated into sweeping zones based on connectivity to downstream water resources, storm water management type, and tree canopy cover characteristics. Sweeping zone characteristics are summarized in (Table 4-2) and zones are illustrated in Figure 4-6 and Figure 4-7. Maps of individual sweeping zones are included in Appendix A.

**Table 4-1. Summary of curb-mile and tree canopy characteristics by defined sweeping zone**

Subwatershed	Zone ID	Curb-miles			Average Over-street Canopy Cover
		Curb & Gutter	Rural Paved	Zone Total	
Clear Lake	CL1	1.4	12.1	13.5	8%
	CL2	9.1	0.1	9.2	6%
	CL3	45.1	2.3	47.4	1%
Forest Lake	FL1	13.0	4.3	17.3	17%
	FL2	9.5	3.5	12.9	6%
	FL3	8.0	10.7	18.7	8%
	FL4	4.5	22.7	27.2	11%
	FL5	0.0	11.0	11.0	7%
	FL6	2.0	26.8	28.8	6%
Keewahtin Lake	Keewahtin	0.0	5.4	5.4	7%
Shields Lake	Shields	0.2	5.3	5.4	7%
Sunrise/ Comfort	SR/C1	19.2	1.1	20.3	7%
	SR/C2	7.5	1.1	8.6	2%
	SR/C3	9.5	3.4	12.9	1%
<b>TOTAL</b>		<b>128.9</b>	<b>109.9</b>	<b>238.8</b>	<b>7%</b>

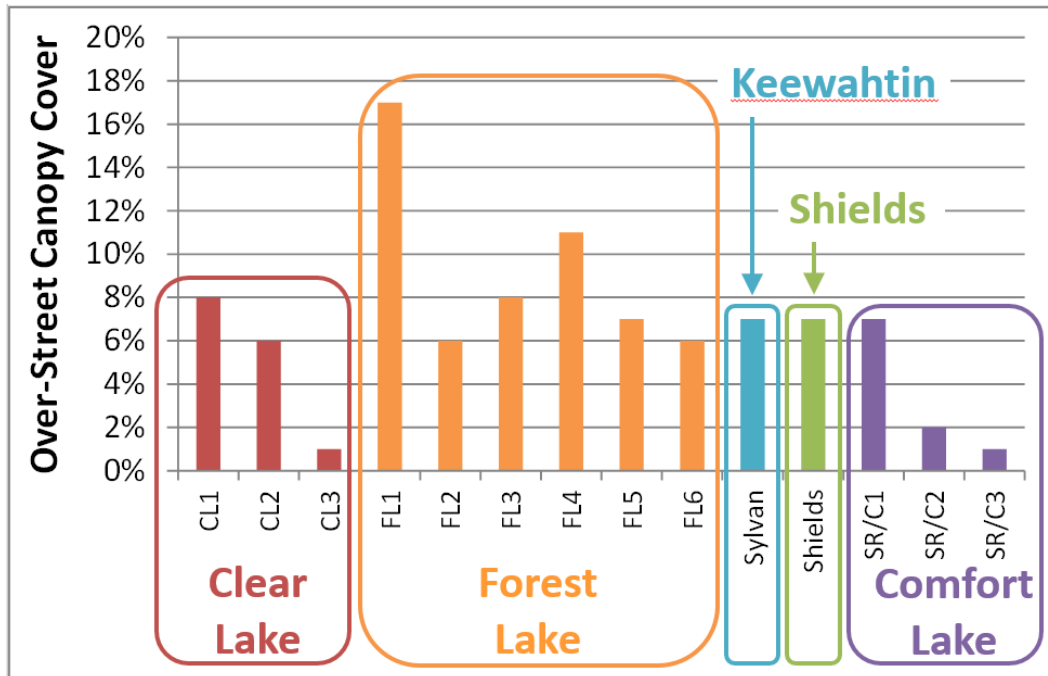


Figure 4-1. Over-street tree canopy cover by sweeping zone

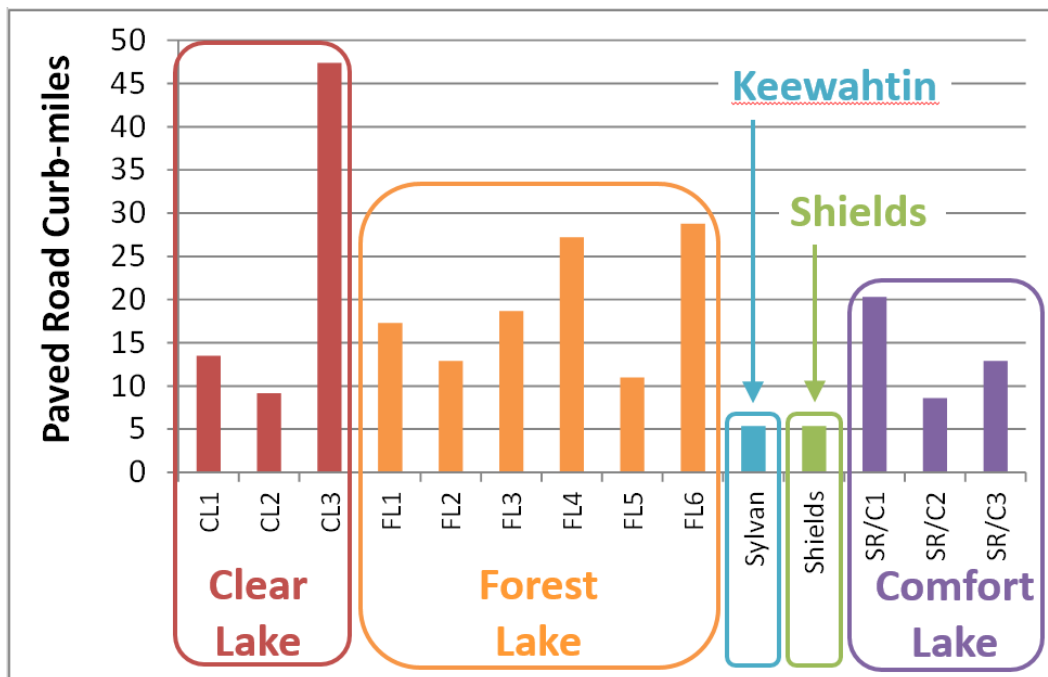
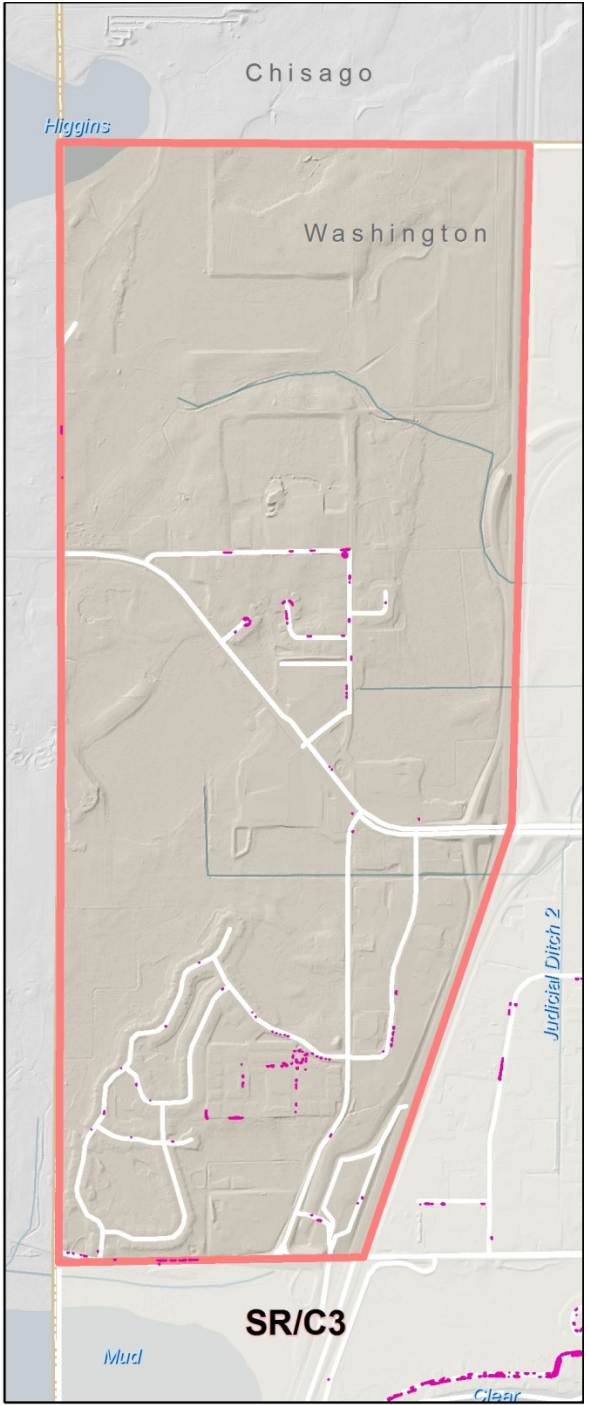


Figure 4-2. Paved road curb-miles by sweeping zone

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**Proposed Street Sweeping**

- Canopy Coverage
- Street Sweeping Zone
- Proposed Sweeping



**Forest Lake Street Sweeping**

- Canopy Coverage
- Street Sweeping Zone
- Proposed Sweeping

North Arrow

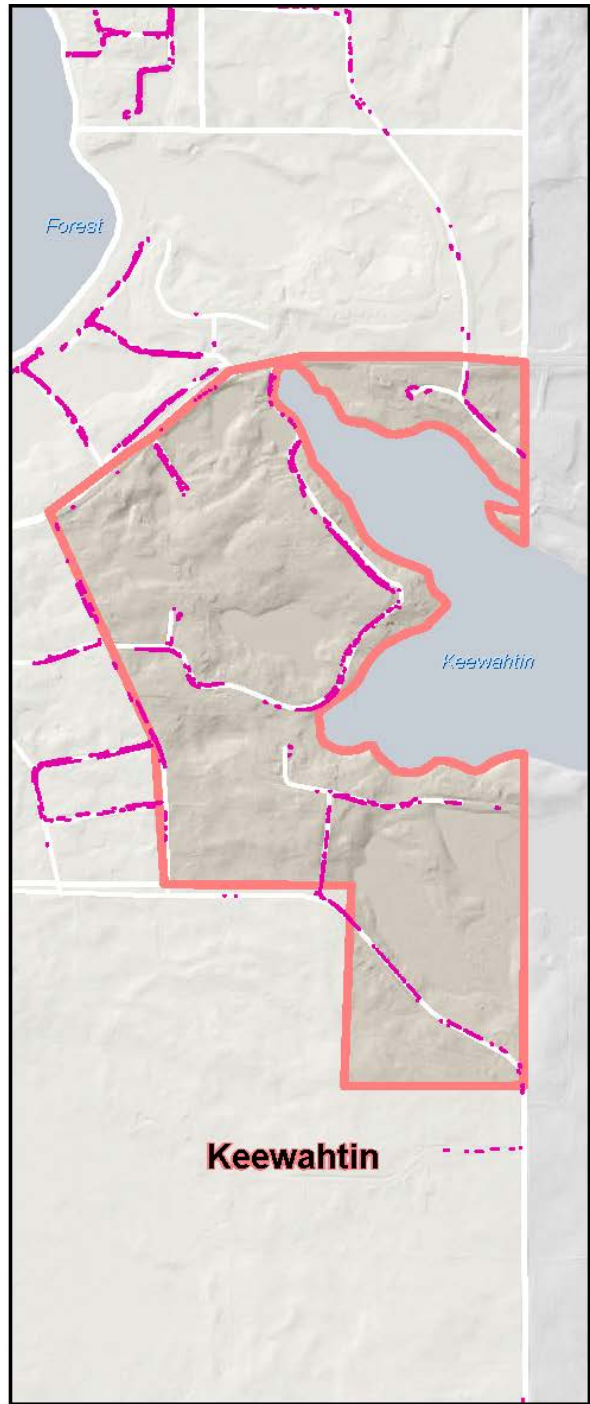
Miles

0 0.25

Figure 4-3. Aerial photograph and tree canopy cover map for Sunrise River/Comfort Lake-3 (SR/C3), a low canopy sweeping zone with approximately 1% average over-street tree canopy cover.

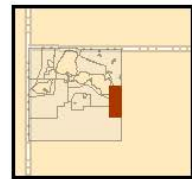


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**Proposed Street Sweeping**

- Canopy Coverage
- Street Sweeping Zone
- Proposed Sweeping

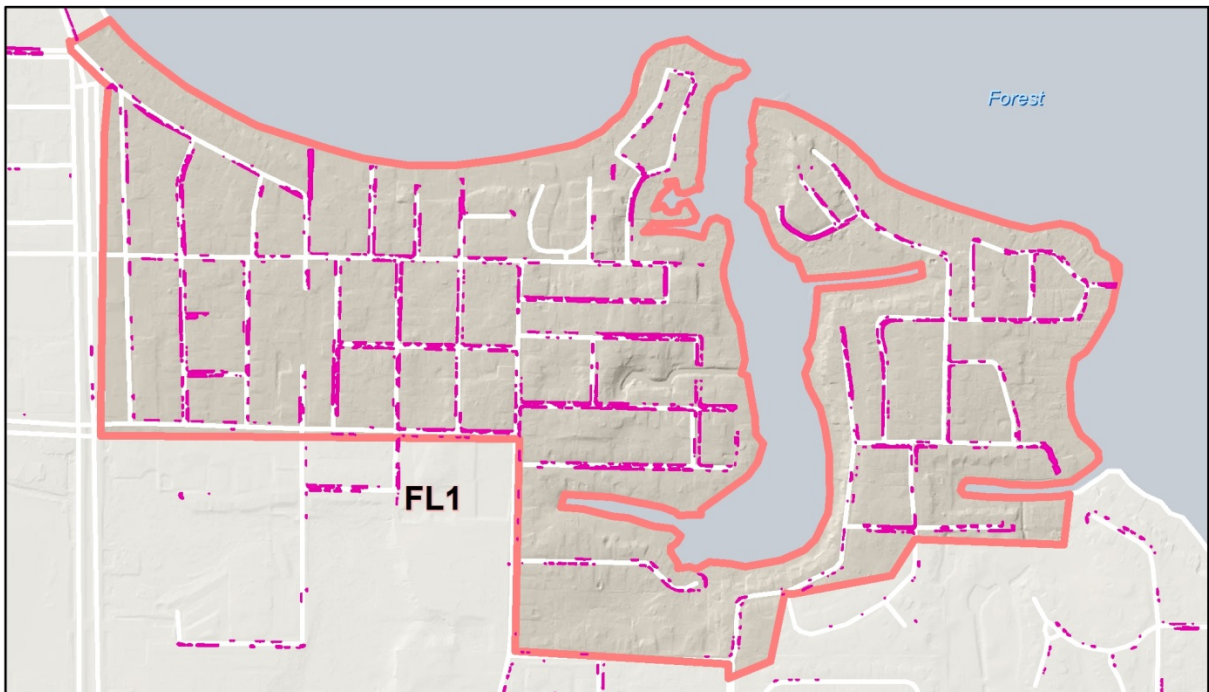


**Forest Lake Street Sweeping**  
 Canopy Coverage  
 Aerial Photography

Miles  
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**Figure 4-4. Aerial photograph and tree canopy cover map for Keewahtin Lake, a moderate canopy sweeping zone with approximately 7% average over-street tree canopy cover.**

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**Proposed Street Sweeping**

- Canopy Coverage
- Street Sweeping Zone
- Proposed Sweeping



**Forest Lake Street Sweeping**

- Canopy Coverage
- Aerial Photography

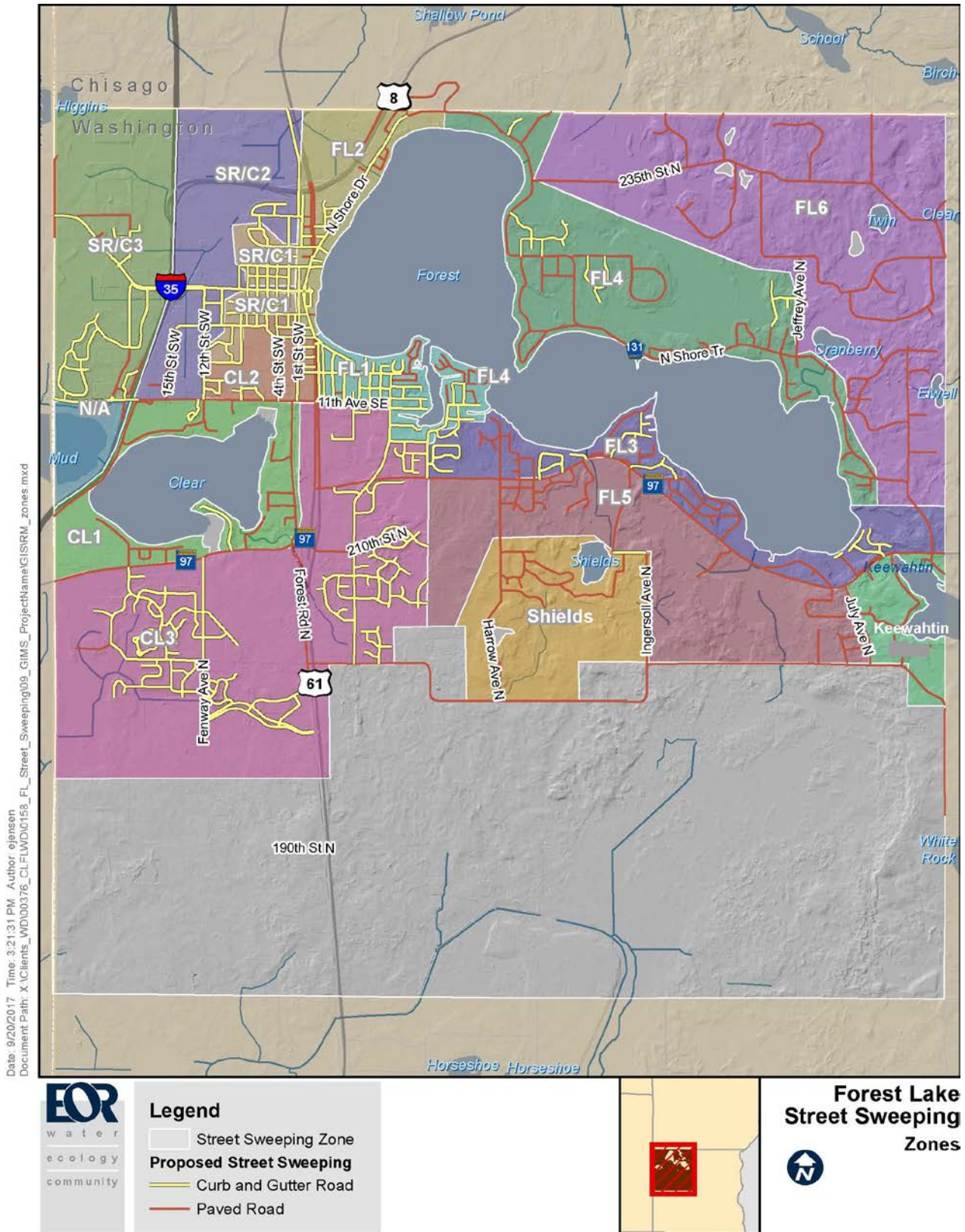


Figure 4-5. Aerial photograph and tree canopy cover map for Forest Lake-1, a high canopy sweeping zone with approximately 17% average over-street tree canopy cover.

**Table 4-2. Summary of defining characteristics for street sweeping zones in the City of Forest Lake.**

Downstream Resource	Zone ID	Description				
		Connectivity <sup>1</sup>	Stormwater Managment <sup>2</sup>	Primary Street Type	Over-street Tree Canopy <sup>3</sup>	Primary Land Use <sup>4</sup>
Clear Lake	CL1	Direct Drainage Area	Rural, Rate & Volume BMPs	Rural	Mature, moderate	Residential
	CL2	Upstream Drainage Area	Pipes, Rate & Volume BMPs	Curb & gutter	Mature, little - moderate	Mixed, Residential
	CL3		Rate & Volume BMPs		Immature, minimal-moderate	Mixed, Residential, Industrial
Forest Lake	FL1	Direct Drainage Area	Pipes		Rural, Curb & gutter	Mature, dense
	FL2			Mature, little-dense		Commercial and Residential
	FL3		Rural, Rate & Volume BMPs	Rural		Mixed, moderate
	FL4	Mature, dense				
	FL5	Upstream Drainage Area		Rural	Mature, moderate	
	FL6					
Keewahtin Lake	Keewahtin	Direct Drainage Area				
Shields Lake	Shields					
Sunrise River/ Comfort Lake	SR/C1	Upstream Drainage Area	Pipes	Curb & gutter	Immature, no-little	Business, Industrial
	SR/C2		Rate & Volume BMPs			
	SR/C3					

<sup>1</sup>Zones designated as 'Direct' drainage areas are located within the direct drainage area of the receiving water body based on surface drainage characteristics. 'Upstream' drainage areas generally drain to surface waterbodies/conveyances located upstream of the designated receiving water. <sup>2</sup> Rural = conveyance via overland flow and ditch systems, 'Rate & Volume BMPs' = includes structural BMPs identified through City of Forest Lake Water Resources Inventory Map. <sup>3</sup>Tree canopy cover over and within 2 feet of the curb or shoulder line. <sup>4</sup> City of Forest Lake Zoning Maps



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Figure 4-6. City of Forest Lake sweeping zones. Maps of individual zones are included in Appendix A.

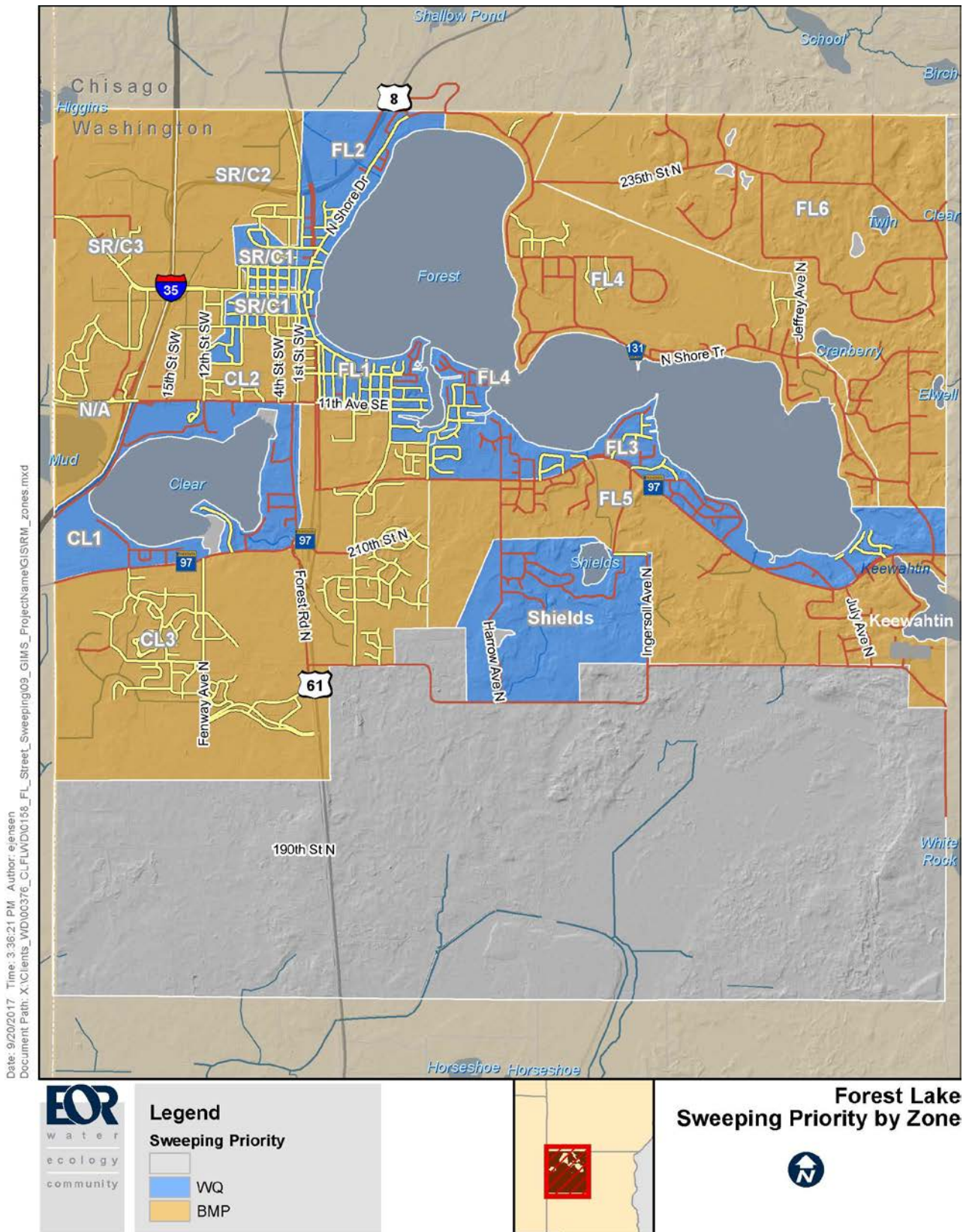


Figure 4-7. City of Forest Lake sweeping priorities by sweeping zone.

## 5. LOAD RECOVERY AND LOAD REDUCTION ESTIMATES

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The amount of pollutant reduction can be characterized in two ways for street sweeping: the total amount of pollutant collected from the street surface (load recovery), and the total reduction in load to a downstream surface water (load reduction). Load recovery is greater than load reduction due to treatment effects from downstream BMPs that also reduce pollutant loads. For the purposes of this plan, load recovery and load reduction estimates were calculated for solids and phosphorus, the pollutants of concern for street maintenance and lake water quality, respectively.

### 5.1. Load Recovery

Average pollutant recovery was estimated using a street sweeping planning calculator tool developed by the University of Minnesota, 'Estimating Nutrient and Solids Load Recovery through Street Sweeping' (Kalinovsky, et. al, 2014). The tool predicts the average annual amount of solids and nutrients that can be recovered from streets based on the length of street to be swept, the timing (month) and frequency of sweeping; and density of tree canopy cover over the street. The tool was calibrated using street sweeping data collected over a 2-year period in Prior Lake, MN and is intended for use in comparable settings (climate and geography). Actual pollutant recovery is expected to vary somewhat compared to estimates. Factors such as precipitation, climate, and land disturbing activities, which may affect solids loading to streets, typically vary somewhat from year to year.

Pollutant load recovery was estimated for two sweeping technologies: mechanical broom, and regenerative air sweepers. The calculator tool used to estimate pollutant load recovery was developed using load recovery observations for regenerative air sweeping technology. To estimate load recovery for sweeping with a mechanical broom sweeper, load recovery estimates from the street sweeping calculator were reduced by 20% for baseline sweepings (first spring and fall sweepings), and by 30% for subsequent sweepings to reflect the lower pick-up efficiency of mechanical broom sweepers compared to regenerative air and vacuum type sweepers. The rationale for this discount is described in Appendix B.

Load recovery estimates are based on street sweeping during the snow-free season (assumed to be April 1 – October 31). Recovery of solids and nutrients was estimated for five sweeping scenarios (Table 5-1). Estimated solids and phosphorus recovery for each sweeping scenario are summarized for receiving waterbodies in Table 5-2 and for individual sweeping zones in Table 11-1 through Table 11-5. For the purpose of summarizing potential load recovery, sweeping scenarios are simplistic, with all streets being swept at the same frequency. Zone-specific sweeping frequency recommendations are included in Section 7.

Current sweeping practices are expected to remove approximately 26 to 32 lb-TP/yr in the Clear Lake sweeping zone, 56 to 70 lb-TP/yr in the Forest Lake sweeping zone, 2 to 3 lb-TP/yr each in the Shields Lake and Keewahtin Lake sweeping zones, and 16 to 20 lb-TP/yr in the Sunrise River/Comfort Lake sweeping zones (Table 5-2). In general, although the amount of material recovered *per sweep* is expected to decrease as sweeping frequency increases, the increase in the total amount of material recovered through additional sweepings may be significant (Figure 5-1). Compared to baseline, recovery of phosphorus could be increased by approximately 62% if an

additional sweeping is added in the spring and fall, 125% if street are swept monthly, 250% if street are swept twice per month, and 350% if streets are swept weekly (Figure 5-2).

**Table 5-1. Street sweeping scenarios used in load recovery and load reduction estimates.**

Sweeping Scenario <sup>1</sup>	Number of Sweeps per Year	Description
Baseline	2	Once sweeping each in the spring and fall
Enhanced Baseline	4	Two sweepings each in the spring and fall
Monthly	7	Once per month sweeping during the snow-free season
Bi-weekly	14	Twice per month sweeping during the snow free season
Weekly	28	Four sweepings per month during the snow free season

<sup>1</sup>All scenarios are based on sweeping during the snow free season – assumed to be April 1 –October 31

**Table 5-2. Summary of estimated annual total solids and phosphorus recovery for the street sweeping scenarios described in Table 5-1 by receiving waterbody.**

Sweeping Scenario	Clear Lake		Forest Lake		Shields Lake		Keewahtin Lake		Sunrise River/ Comfort Lake	
	TS	TP	TS	TP	TS	TP	TS	TP	TS	TP
Baseline <sup>1</sup>	34,300	29	71,685	63	3,045	3	3,045	3	21,300	18
Enhanced Baseline	61,600	50	129,230	109	5,570	5	5,570	5	38,250	31
Monthly	95,460	72	199,500	157	8,470	7	8,470	7	59,280	45
Bi-weekly	151,960	113	312,400	240	13,500	10	13,500	10	94,360	71
Weekly	192,530	141	402,350	309	17,090	13	17,090	13	119,550	89

<sup>1</sup>Based on 2016 contract service practices (mechanical broom sweeper used for spring sweeping, regenerative air sweeper used for in the fall sweeping). Estimates for all other scenarios are based on sweeping with a vacuum type sweeper.



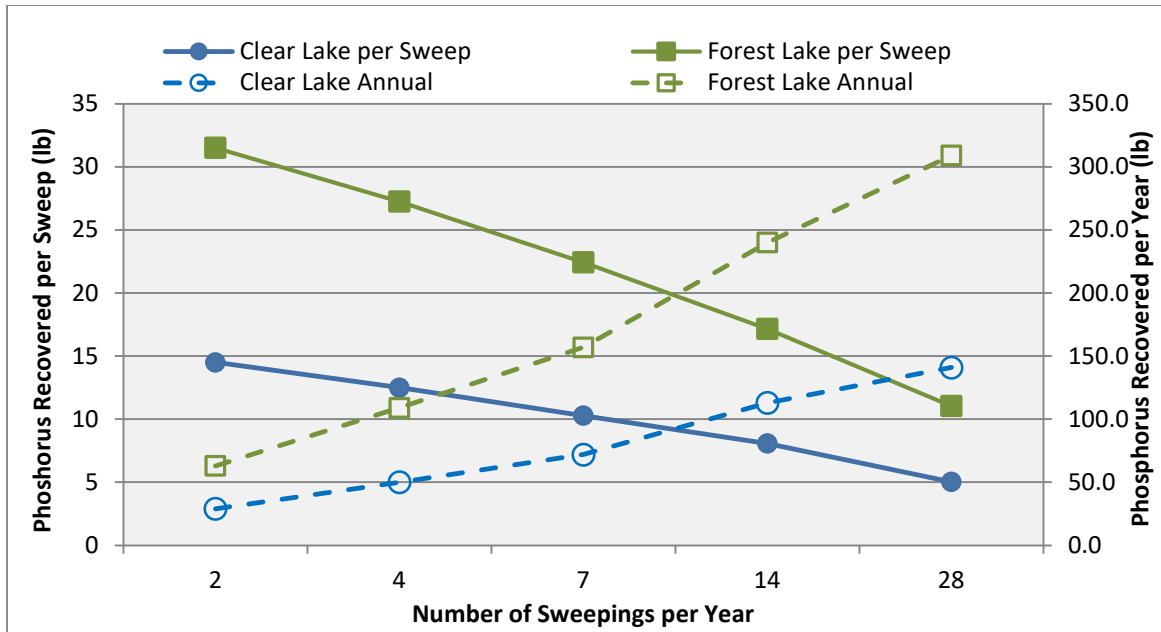


Figure 5-1. Predicted phosphorus recovery per sweep and per year vs. number of sweepings for Clear Lake and Forest Lake Sweeping zones.

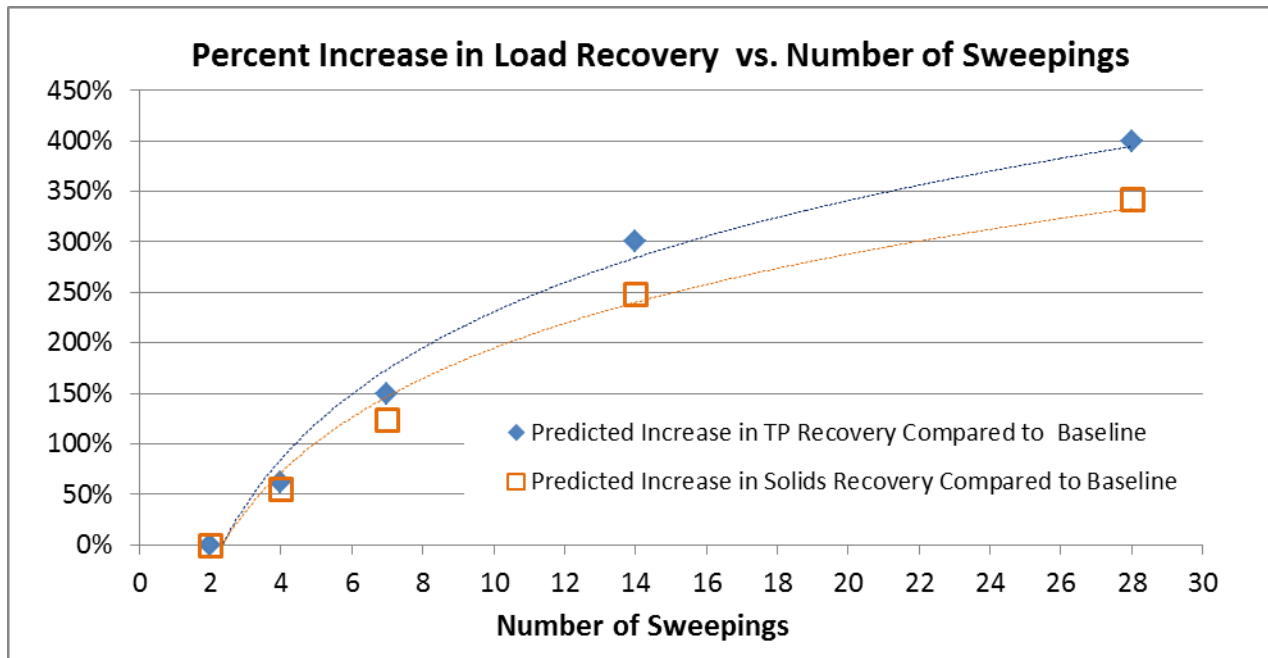


Figure 5-2. Predicted percent increase in load recovery of phosphorus and solids vs. number of sweepings.

## 5.2. Load Reductions

Load reductions to downstream water resources are not equal to recovered loads because downstream structural BMPs can also remove pollutants before street runoff discharges to surface waters. To estimate pollutant reductions to downstream water resources, it was necessary to take into account the pollutant removal of BMPs located along the flow path between streets and downstream receiving waterbodies.

For the purpose of this study, detailed water quality modeling at the city scale was not practical. A simple spreadsheet model was developed to estimate the overall pollutant removal capacity of existing BMPs based on the number and type of existing BMPs within each sweeping zone. Water quality BMP types identified within street sweeping zones and their typical pollutant removal efficiencies are listed in Table 5-3. The overall removal efficiency of BMPs within each zone was computed as a weighted average based on the approximate curb-miles of street intercepted by each BMP. The length of curb-miles intercepted, and the number and location of BMPs, were estimated from the City of Forest Lake surface drainage and storm sewer data (GIS) and Water Resource Inventory Map (May 2015).

Estimated pollutant load reductions to downstream waterbodies are based on the following assumptions:

- Over time, all solids on the street surface will be transferred to the storm sewer system and ultimately to downstream waterbodies.
- The design efficiency of modeled BMPs can be applied to solids which typically collect on street surfaces (including organic material).
- The design efficiency of modeled BMPs is preserved through regular maintenance.

Estimated total solids and total phosphorus reductions to downstream waterbodies are summarized in Table 5-2 and by individual sweeping zone in Table 11-1 through Table 11-5.

Current sweeping practices are expected to reduce total phosphorus loading by approximately 6 to 7 lb/yr to Clear Lake, 33 to 41 lb/yr to Forest Lake, 1 lb/yr to Shields Lake and Keewahtin Lake, and 6 to 7 lb/yr to the Sunrise River/Comfort Lake (Table 5-5). Compared to baseline, phosphorus reductions could be increased by approximately 62% if an additional sweep is added in the spring and fall, 125% if streets are swept monthly, 250% if streets are swept twice per month, and 350% if streets are swept weekly (Table 5-2).

Since the number and kind of structural BMPs vary among sweeping zones, sweeping appears to be more effective as a water quality BMP in areas with few structural BMPs (load reduction  $\approx$  load recovery). However, sweeping in zones with many structural BMPs is still important to help preserve the removal efficiency of those BMPs and consequently protect downstream water quality.

**Table 5-3. Typical BMP removal efficiencies (Minnesota Stormwater Manual) used to estimate the collective pollutant removal efficiency of BMPs within each sweeping zone.**

	No BMPs	Detention Pond	Multiple Ponds	Dry Swale	Wetlands	Infiltration Practices (volume infiltrated)
<b>TP</b>	0%	50%	75%	50%	40%	100%
<b>TSS</b>	0%	85%	95%	85%	73%	100%

TP = total phosphorus; TSS = total suspended solids

**Table 5-4. Estimated collective pollutant removal by existing stormwater BMPs within each sweeping zone based on the number and type of BMPs and estimated length of street treated by BMPs.**

Receiving Waterbody	Sweeping Zone	Estimated Pollutant Removal Efficiency	
		TS	TP
Clear Lake	CL1	86%	54%
	CL2	93%	75%
	CL3	98%	88%
Forest Lake	FL1	0%	0%
	FL2	27%	18%
	FL3	22%	18%
	FL4	89%	64%
	FL5	95%	72%
	FL6	96%	71%
Shields Lake	Shields	93%	75%
Keewahtin Lake	Keewahtin	93%	64%
Sunrise River/ Comfort Lake	SR/C1	85%	50%
	SR/C2	92%	75%
	SR/C3	98%	88%

**Table 5-5. Estimated annual total solids and phosphorus reductions to downstream waterbodies for street sweeping scenarios described in Table 5-1.**

Sweeping Scenario	Clear Lake		Forest Lake		Shields Lake		Keewahntin Lake		Sunrise River/ Comfort Lake	
	TS	TP	TS	TP	TS	TP	TS	TP	TS	TP
Baseline <sup>1</sup>	1,989	6.4	53,830	37.0	465	0.7	601	0.9	4,517	6.4
Enhanced Baseline	3,570	11	74,804	64	1,370	1.1	1,943	1.6	13,390	11
Monthly	5,540	16	115,290	91	2,120	1.6	3,010	2.3	20,760	16
Bi-weekly	8,810	25	178,350	137	3,370	3.0	4,790	4.0	33,040	25
Weekly	11,160	31	232,520	180	4,270	3.0	6,070	5.0	41,860	31

<sup>1</sup>Low end based on sweeping with mechanical broom, high end based on sweeping with vacuum type sweeper. Estimates for all other scenarios are based on sweeping with a vacuum type sweeper.

## 6. COST-BENEFIT ANALYSIS

Total annual program costs and cost-benefit (\$/lb-P removed) were estimated for baseline, enhanced baseline, monthly, and bi-weekly sweeping scenarios. For contract sweeping, the cost-basis (\$/curb-mile) is assumed to be constant for all sweeping scenarios. The cost per curb-mile was calculated using the total cost of spring sweeping services divided by the total curb-miles swept. The total cost of sweeping services was taken from the City of Forest Lake 2016 street sweeping service contract. For a City-owned vehicle, the cost-basis (\$/curb-mile) is not constant, but rather depends on the sweeper type and financing, and the cost of vehicle maintenance, labor, and fuel. Total costs for each sweeping scenario were calculated using the 2017 component costs and assumptions listed in Table 6-1.

**Table 6-1. 2017 street sweeping annual cost assumptions for the City of Forest Lake**

Category	Annual Cost Assumption
Vehicle Depreciation <sup>1</sup>	\$27,032/yr
Vehicle refurbishment	\$5,000 every 3 years
Vehicle Maintenance	\$2,000-\$3,000/yr
Labor (wages + benefits)	\$45/hr
Diesel Fuel	\$3/gal
Disposal Cost	\$1/yd <sup>3</sup> of material

<sup>1</sup>Based on data collected from City of Edina Public Works Department for purchase of a 2014 Elgin Crosswind regenerative air sweeper. An annual inflation rate of 2% was assumed in estimating the sweeper purchase price. Assumes a vehicle purchase price of \$250,000, and an anticipated salvage value = \$35,000.

Additional cost assumptions used in the City owned-vehicle cost-benefit calculations include:

- Sweepers are owned by the City of Forest Lake
- Typical sweeper operational speed = 4.5 mph
- An additional 1 hour of labor is required for every 2 hours of sweeping time
- Total transit miles (brush off) are about 3 times the total swept miles
- On average, sweeper fuel consumption is 5 mpg  
= [(brush off time, empty) + (brush on time) + (brush off time, full capacity)] / [distance traveled]
- The average dry bulk density of sweeper waste is approximately 2,025 lb/yd<sup>3</sup> and has a moisture content of approximately 25% when collected (Kalinovsky et al., 2014)
- The City has sufficient staffing to operate the sweepers as needed
- One city-wide sweep includes approximately 239 curb-miles of sweeping (approximately twice the length of the roadway).
- Approximately 10 work days are needed to complete a single city-wide sweep (includes both sweeper operation time and required additional labor)
- For city-wide weekly sweeping, a second sweeper is needed to complete all sweeping in the scenario. The costs for this scenario are based on the purchase, maintenance, and operation

of two street sweepers. Although a second sweeper was included in this hypothetical scenario, zone-specific sweeping recommendation for sweeping (Section 7) were developed based on the purchase and operation of only one sweeper.

Based on these assumptions, the cost-benefit for baseline sweeping is \$139 per curb-mile for a contract sweeper, and \$78 per curb-mile for a City-owned sweeper (Table 6-2). For baseline sweeping (spring/fall only) with a City-owned sweeper, the total cost of sweeping is driven by capital outlay for the vehicle (vehicle depreciation). Because this component of the cost is essentially flat, the cost-benefit (\$/curb-mile) of in-house sweeping decreases (improves) as the vehicle is utilized for additional sweepings (Figure 6-1). In contrast, the cost-benefit of contract sweeping is constant (\$139/curb-mile), making additional sweepings no more cost effective than baseline sweeping.

Sweeping is most cost-effective when solids loading to streets is greatest. Since solids loading varies over the course of the year, adding sweepings at certain times of the year (summer) is less cost-effective than adding sweepings at peak loading times (spring and fall). Although sweeping operations can be further optimized to take advantage of these differences, the cost estimates presented in Section 5 are based on regular sweeping at the frequency specified for each scenario.

Reducing pollutant discharge to the City's stormwater management infrastructure will also extend the treatment capacity of those BMPs, and reduce maintenance costs. While difficult to quantify, these additional pollutant reductions and decreased costs add to the cost-effectiveness of street sweeping as a water quality BMP. Items not included in the cost calculation, but which may add cost for the City to implement an enhanced street sweeping program, include:

- Administrative staff time
- Public outreach and notification
- Signage and installation

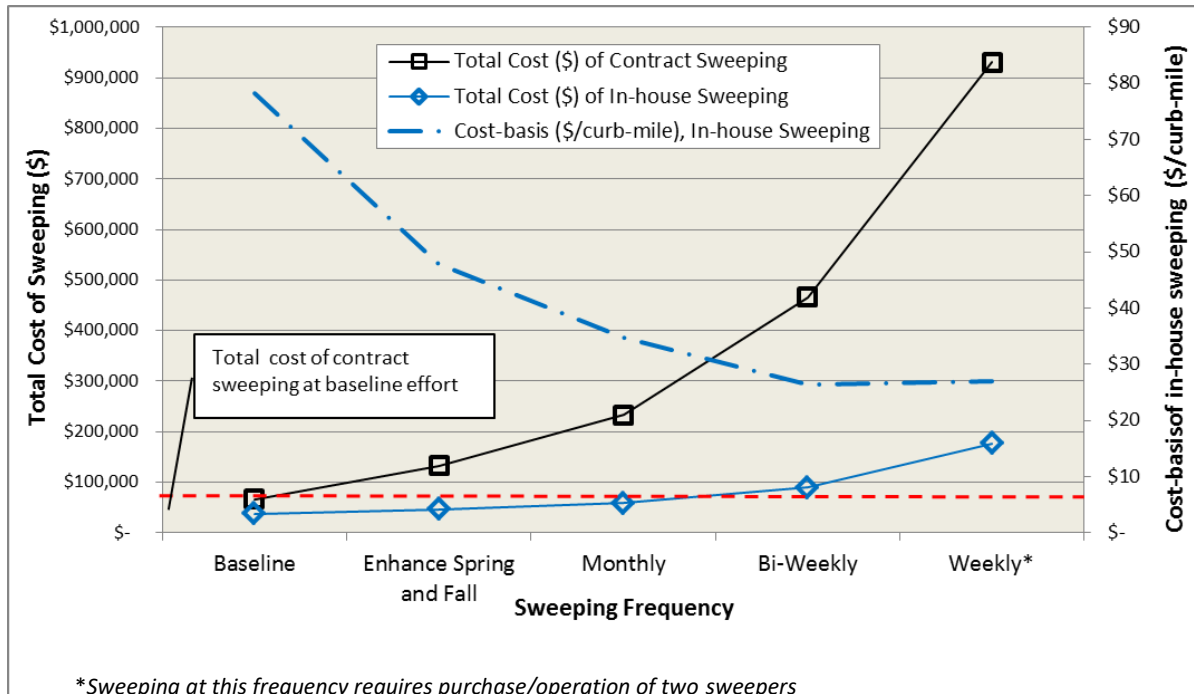


Figure 6-1. Total cost of sweeping and cost-benefit of sweeping (in-house sweeping only) vs. sweeping frequency for contract service and in-house street sweeping.

Table 6-2. Baseline scenario (spring/fall only sweeping) total annual cost (\$) and annual cost-benefit (\$/lb-P reduced) of street sweeping by sweeping zone.

Sweeper Type	HUC 12 Watershed	Total Annual Average Cost (\$)	10-year Cost-Benefit	
			Phosphorus Recovery from Streets (\$/lb-P)	Phosphorus Reduction to Receiving Waterbody (\$/lb-P)
Contract Sweeper	Clear Lake	\$19,544	\$613	\$2,758
	Forest Lake	\$32,293	\$461	\$791
	Shields Lake	\$1,504	\$518	\$2,074
	Keewahtin Lake	\$1,512	\$522	\$1,467
	Sunrise River/Comfort Lake	\$11,648	\$582	\$1,643
	<b>TOTAL</b>	<b>\$66,500</b>	<b>\$521</b>	<b>\$1,172</b>
City-Owned Sweeper	Clear Lake	\$11,049	\$346	\$1,559
	Forest Lake	\$18,290	\$261	\$448
	Shields Lake	\$851	\$293	\$1,174
	Keewahtin Lake	\$856	\$295	\$830
	Sunrise River/Comfort Lake	\$6,587	\$329	\$929
	<b>TOTAL</b>	<b>\$37,633</b>	<b>\$295</b>	<b>\$663</b>

## 7. RECOMMENDATIONS

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The City of Forest Lake can reduce the cost of, and increase the pollutant recovery achieved during spring and fall, street sweeping through purchase of a high efficiency street sweeper. Based on an amortization period of 10-years (vehicle purchase), the cost of spring and fall sweeping can be reduced by approximately 45% using an in-house program compared to a contract sweeping service (Section 6). Use of a high efficiency sweeper is also expected to increase pollutant recovery by approximately 20% for fall sweeping compared to contract service sweeping which uses a mechanical broom sweeper for fall sweepings (2016 contract service).

Guidelines for sweeping by zone are shown in Table 7-1 for three levels of effort:

- 1) Base Priority number of sweepings based on the sweeping priorities for each zone
  - a. Water quality benefit zones: 7 times per year
  - b. Maintenance benefit zones: 4 times per year
- 2) Recommended number of sweepings based on the sweeping priorities for each zone
  - a. Water quality benefit zones: 12 times per year
  - b. Maintenance benefit zones: 7 times per year
- 3) Maximum number of sweepings based on sweeping full time (including expected maintenance activities) using one sweeper every 4 of 5 week days during the sweeping season.

Each sweeping zone was assigned a street sweeping priority based on the zone characteristics (Table 4-2 and Figure 4-7). Zones comprised primarily of streets that drain directly to a downstream resource, the primary benefit of street sweeping is improving lake water quality. In areas where street runoff is intercepted by structural BMPs, the primary benefit of street sweeping is preservation of BMP efficiency.

Total costs for each of the scenarios are outlined in Table 7-1. Detailed load recovery, load reduction, and cost estimates are summarized by sweeping zone in Table 11-6 through Table 11-8 (see Appendix C). Using an in-house sweeping program without grant funding for purchase of a regenerative air sweeper: sweeping zones swept primarily for water quality benefit could be swept up to 12 times per year and sweeping zones swept primarily for maintenance benefit could be swept up to 7 times per year, for about the same total annual cost as the City's existing spring/fall only contract sweeping total annual cost (Recommended number of sweepings scenario in Table 7-1 and Table 11-1).

In August of 2017, the City of Forest Lake submitted a BWSR FY18 Clean Water Fund Projects & Practices grant application to purchase a regenerative air sweeper. In December 2017, the full proposal amount was approved, contributing \$220,000 in grant funding towards the purchase of a regenerative air sweeper. With this grant funding and using an in-house sweeping program: the Maximum Number of Sweepings scenario in Table 7-1 can be achieved for a total annual cost similar to the City's existing spring/fall only contract sweeping total annual cost.



Specific recommendations for an enhanced street sweeping program in the City of Forest Lake:

1. Purchase a regenerative air, or similar high efficiency sweeper, and develop an in-house sweeping program for regular street sweeping.
  - To maximize the water quality and maintenance reduction benefits, use a high efficiency sweeper for all regular sweepings.
  - Consider using the mechanical broom style sweeper owned by the City for targeted, tandem sweeping in areas susceptible to sediment and debris, or during times of high sediment and debris loading. Tandem sweeping consists of sweeping first with a mechanical broom sweeper followed shortly thereafter by a high efficiency sweeper to maximize the pick-up of both large and small debris and sediment.
  - Consider grant or cost-sharing opportunities (Watershed Districts or other partners) to assist with the purchase of a new street sweeper or sweeping program.
2. Increase sweeping frequency in sweeping zones that are high priority for water quality (CL1, FL1, FL2, FL3, Shields, and SR/C1) to 12 times per snow-free season.
  - Sweeping zones that are high priority for water quality are comprised mainly of streets that drain directly to a downstream resource. In these areas, street sweeping is one of the few BMPs that can be readily implemented.
  - For waterbodies with approved TMDLs (Shields Lake, Comfort Lake), total phosphorus reduction achieved through street sweeping can be estimated and tracked by interpolation using the load reduction estimates outline Table 5-5 - Table 11-5.
3. Increase sweeping frequency in sweeping zones that are high priority for BMP preservation and maintenance reduction (CL2, CL3, FL4, FL5, FL6, Keewahtin, SR/C2, and SR/C3) to 7 times per snow-free season
  - Regional street sweeping studies indicate that sediment loading on street surfaces remains relatively intense throughout the spring season (Kalinovsky, 2015). Additional sweepings in the spring may help to maximize recovery of winter residuals and sediment deposited during spring runoff events.
  - Additional sweepings in late spring and in the fall may also help to maximize recovery of organic litter/nutrients in areas with mature canopy cover (Kalinovsky, 2015).
4. Consider using an observation log to track areas of high loading. Modify street sweeping frequency to address observations.
5. Sweep as needed to address other concerns such as:
  - Keeping storm inlets free of debris
  - Sweeping regularly in areas of active construction
  - Sweeping regularly for debris removal/aesthetics in high profile areas of the City

**Table 7-1. Cost-benefit of recommended street sweeping scenarios based on sweeping zone characteristics**

Waterbody	Sweeping Zone	Sweeping Priority <sup>1</sup>	Curb-miles	Number of Sweepings		
				Base Priority	Enhanced (Recommended)	Maximum
Clear Lake	CL1	WQ	13.5	7	12	28
	CL2	P/M	9.2	4	7	7
	CL3	P/M	47.4	4	7	7
Forest Lake	FL1	WQ	17.3	7	12	28
	FL2	WQ	12.9	7	12	28
	FL3	WQ	18.7	7	12	14
	FL4	P/M	27.2	4	7	7
	FL5	P/M	11.0	4	7	7
	FL6	P/M	28.8	4	7	7
Shields Lake	Shields	WQ <sup>2</sup>	5.4	7	12	14
Keewahtin Lake	Keewahtin	P/M	5.4	4	7	7
Sunrise River/Comfort Lake	SR/C1	WQ <sup>2</sup>	20.3	7	12	14
	SR/C2	P/M	8.6	4	7	7
	SR/C3	P/M	12.9	4	7	7
<b>Total Curb-miles</b>				1,220	<b>2,085</b>	2,900
<b>Solids Reduction Compared to Baseline (20 tons/yr)</b>				+26	<b>+48</b>	+66
<b>Phosphorus Reduction Compared to Baseline (57 lb/yr)</b>				+54	<b>+110</b>	+140
<b>Estimated Annual Cost</b>				\$53,810	<b>\$68,301</b>	\$82,296
<b>Estimated Annual Cost – Reduced Sweeper Purchase Price<sup>3</sup></b>				\$32,232	<b>\$46,294</b>	\$60,394

<sup>1</sup> WQ = Water quality benefit (direct drainage areas of lakes), P/M = BMP preservation and maintenance benefit (indirect water quality benefit to lakes)

<sup>2</sup> TMDL watershed

<sup>3</sup> With grant funding of \$220,000 towards the cost of a regenerative air sweeper

**Table 7-2. Total sediment reductions to receiving waterbody by sweeping scenario**

Waterbody	Total Sediment Reduction (ton/yr)							
	Existing Baseline (2 times per year)	Enhanced Baseline (4 times per year)	Monthly (7 times per year)	Twice Monthly (14 times per year)	Weekly (28 times per year)	Base Priority (4-7 times per year)	Enhanced/ Recommended (7-12 times per year)	Maximum (7-28 times per year)
Clear Lake	2,210	3,572	5,536	8,812	11,164	4,637	6,909	8,589
Forest Lake	34,015	55,341	85,201	130,449	232,517	82,395	120,554	153,658
Shields Lake	254	410	635	1,012	4,272	635	635	1,012
Keewahtin Lake	240	387	600	955	6,073	387	600	600
Comfort Lake	2,405	3,887	6,024	9,589	41,858	3,887	8,209	8,851
<b>ALL</b>	<b>39,123</b>	<b>63,597</b>	<b>97,996</b>	<b>150,816</b>	<b>295,882</b>	<b>91,942</b>	<b>136,908</b>	<b>172,710</b>

**Table 7-3. Total phosphorus reductions to receiving waterbody by sweeping scenario**

Waterbody	Total Phosphorus Reduction (lb/yr)							
	Existing Baseline (2 times per year)	Enhanced Baseline (4 times per year)	Monthly (7 times per year)	Twice Monthly (14 times per year)	Weekly (28 times per year)	Base Priority (4-7 times per year)	Enhanced/ Recommended (7-12 times per year)	Maximum (7-28 times per year)
Clear Lake	7	11	16	25	31	13	20	23
Forest Lake	41	64	91	137	180	83	122	146
Shields Lake	0.7	1.1	1.6	2.6	3.2	1.6	1.6	2.6
Keewahtin Lake	1.0	1.6	2.3	3.7	4.6	1.6	2.3	2.3
Comfort Lake	7	11	16	25	31	11	22	23
<b>ALL</b>	<b>57</b>	<b>89</b>	<b>127</b>	<b>194</b>	<b>251</b>	<b>111</b>	<b>167</b>	<b>197</b>

## 8. REFERENCES

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- Berretta C., S. Raje, and J.J. Sansalone. Quantifying Nutrient Loads Associated with Urban Particulate Matter (PM), and Biogenic/Litter Recovery Through Current MS4 Source Control and Maintenance Practices. University of Florida, College of Engineering, Gainesville, Florida: Florida Stormwater Association Education Foundation (FSAEF); 2011 Final Report: 31 May 2011.
- Kalinosky, P., 2015. Quantifying Solids and Nutrient Recovered Through Street Sweeping in a Suburban Watershed. Master's Thesis, University of Minnesota
- Kalinosky, P., Baker, L., Hobbie, S., Bintner, R., Buyarski, C. 2013. User Support Manual: Estimating Nutrient Removal by Enhanced Street Sweeping, University of Minnesota for Minnesota Pollution Control Agency (MPCA).
- Minnesota Department of Transportations (MNDOT). 2008. Resource for Implementing a Street Sweeping Best Practice, MN/RC – 2008RIC06.
- Seattle Public Utilities (SPU). 2009. Seattle Street Sweeping Pilot Study, Monitoring Report. Seattle, WA: Seattle Public Utilities in association with Herrera Environmental Consultants.
- Sutherland R. C. 2008. Real World Street Cleaner Pickup Performance Testing. World Sweeper.com, Street and Municipal Sweeping: Studies.
- Sutherland R. C., S. L. Jelen. 1997. Chapter 9 - Contrary to Conventional Wisdom, Street Sweeping can be an Effective BMP. Pages 1-14. In W. James, editor. Advances in Modeling the Management of Stormwater Impacts, Vol 5, CHI, Guelph, Canada.

## 9. APPENDIX A: STREET SWEEPING ZONE MAPS

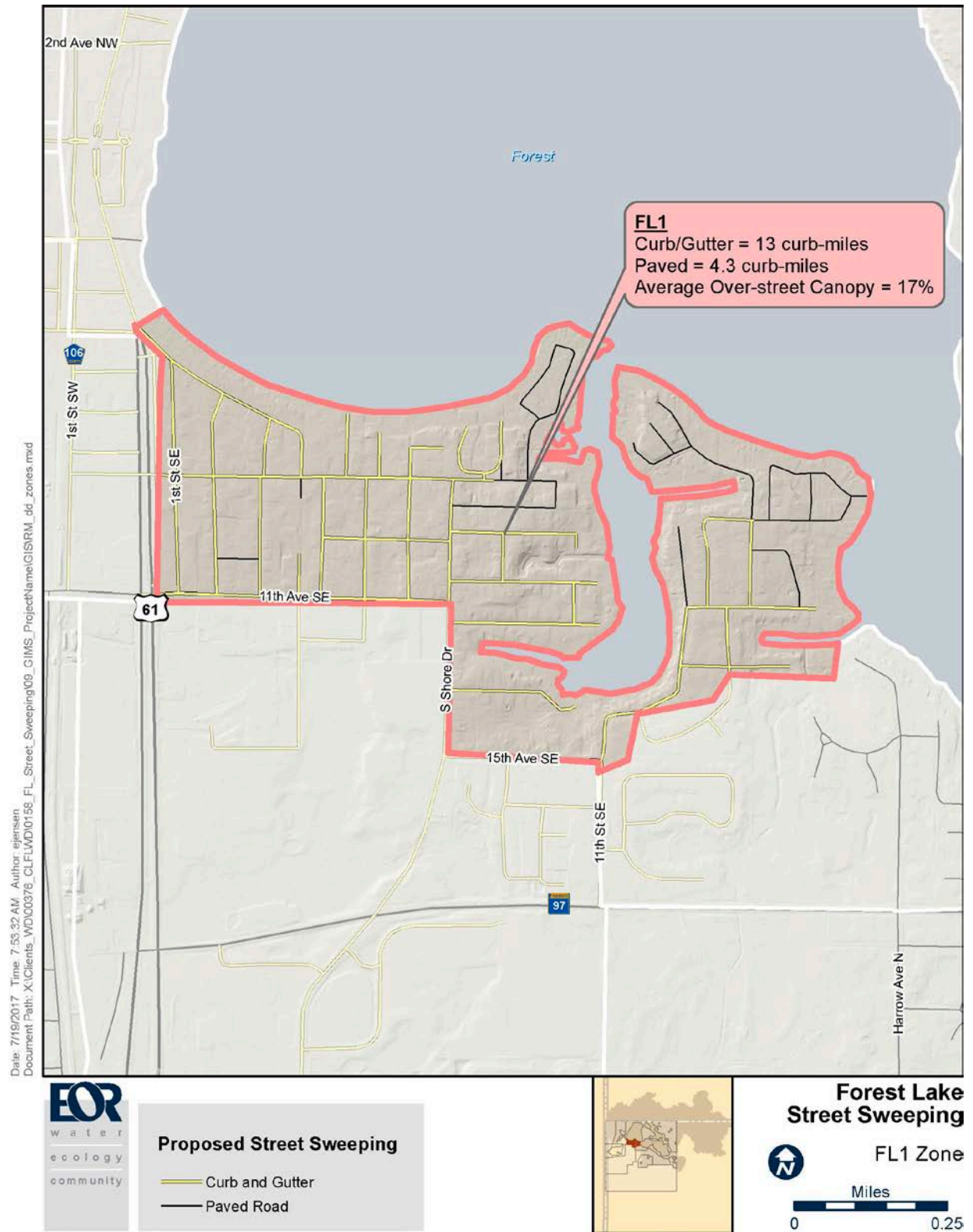
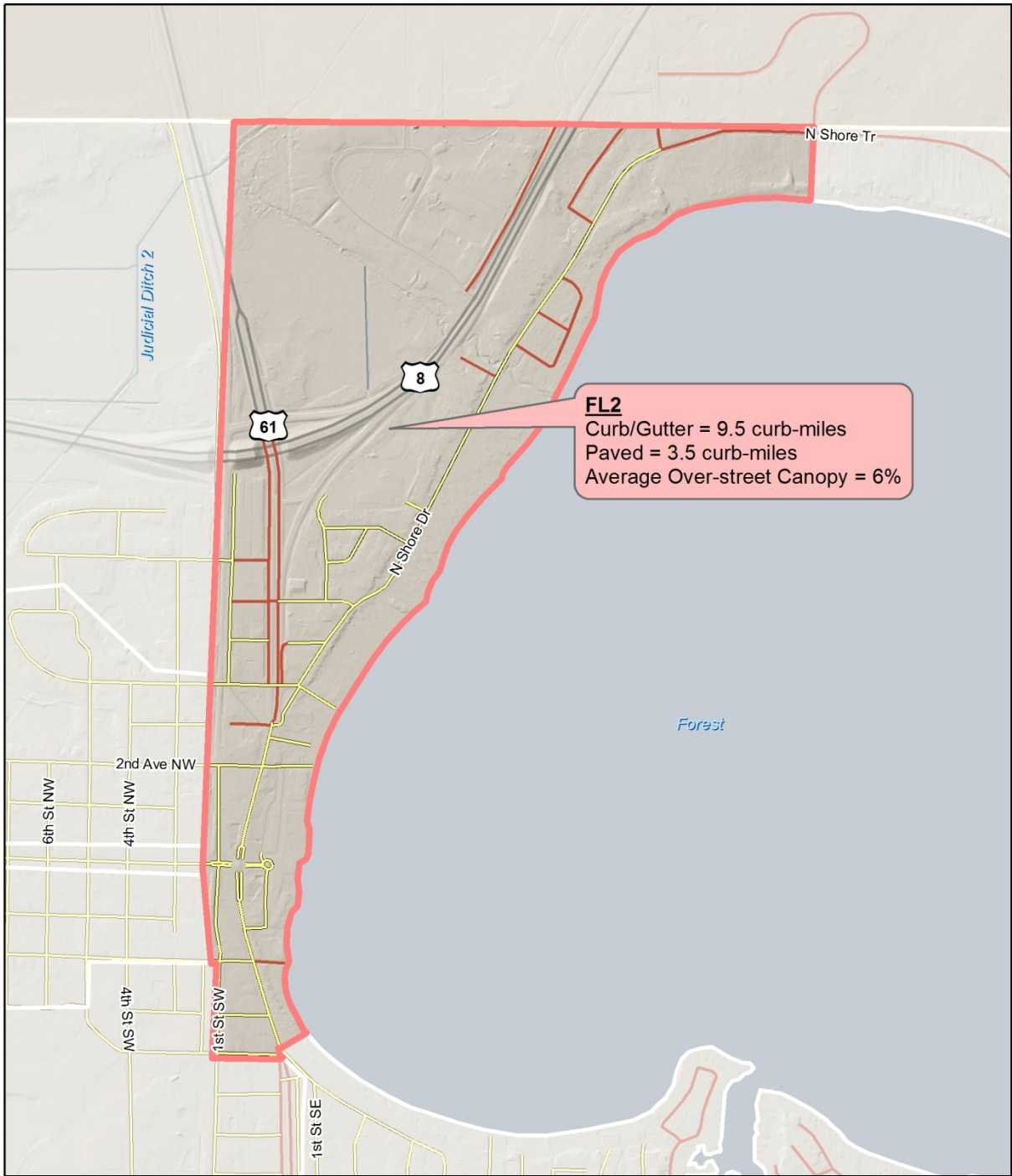


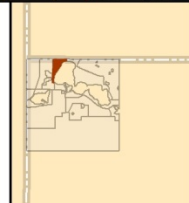
Figure 9-1. Sweeping Zone Forest Lake 1 (FL1).

Date: 9/21/2017 Time: 1:58:55 PM Author: ejensen  
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**Proposed Street Sweeping**

- Curb and Gutter Road
- Paved Road



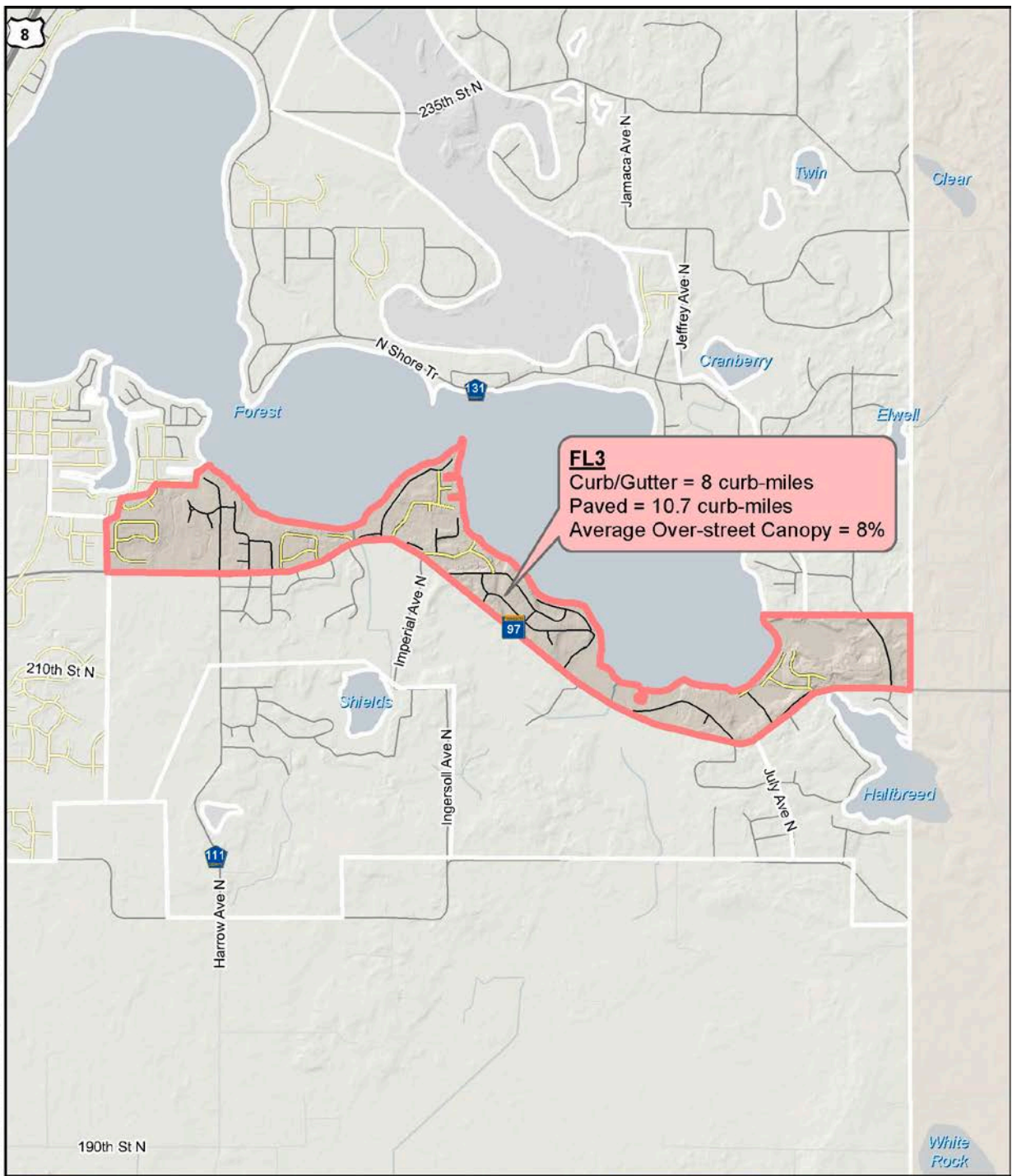
**Forest Lake Street Sweeping**

FL2 Zone

Miles  
0 0.25

Figure 9-2. Sweeping Zone Forest Lake 2 (FL2).

Date: 7/19/2017 Time: 7:55:09 AM Author: ejensen  
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**Proposed Street Sweeping**

- Curb and Gutter
- Paved Road



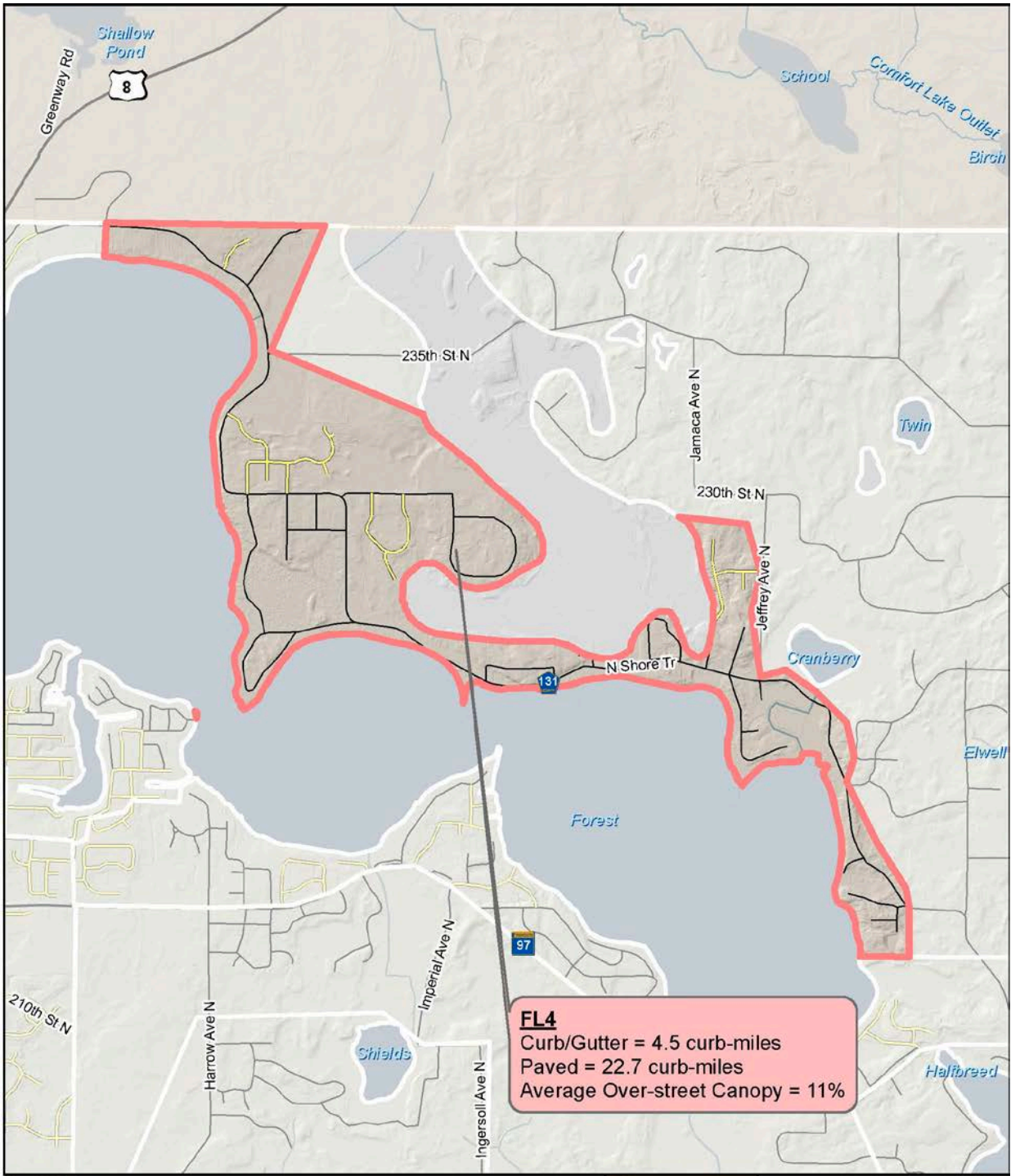
**Forest Lake Street Sweeping**

FL3 Zone

0 0.25 0.5 0.75 1 Miles

Figure 9-3. Sweeping Zone Forest Lake 3 (FL3).

Date: 7/19/2017 Time: 7:55:56 AM Author: ejensen  
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**Proposed Street Sweeping**

- Curb and Gutter
- Paved Road



**Forest Lake Street Sweeping**



FL4 Zone

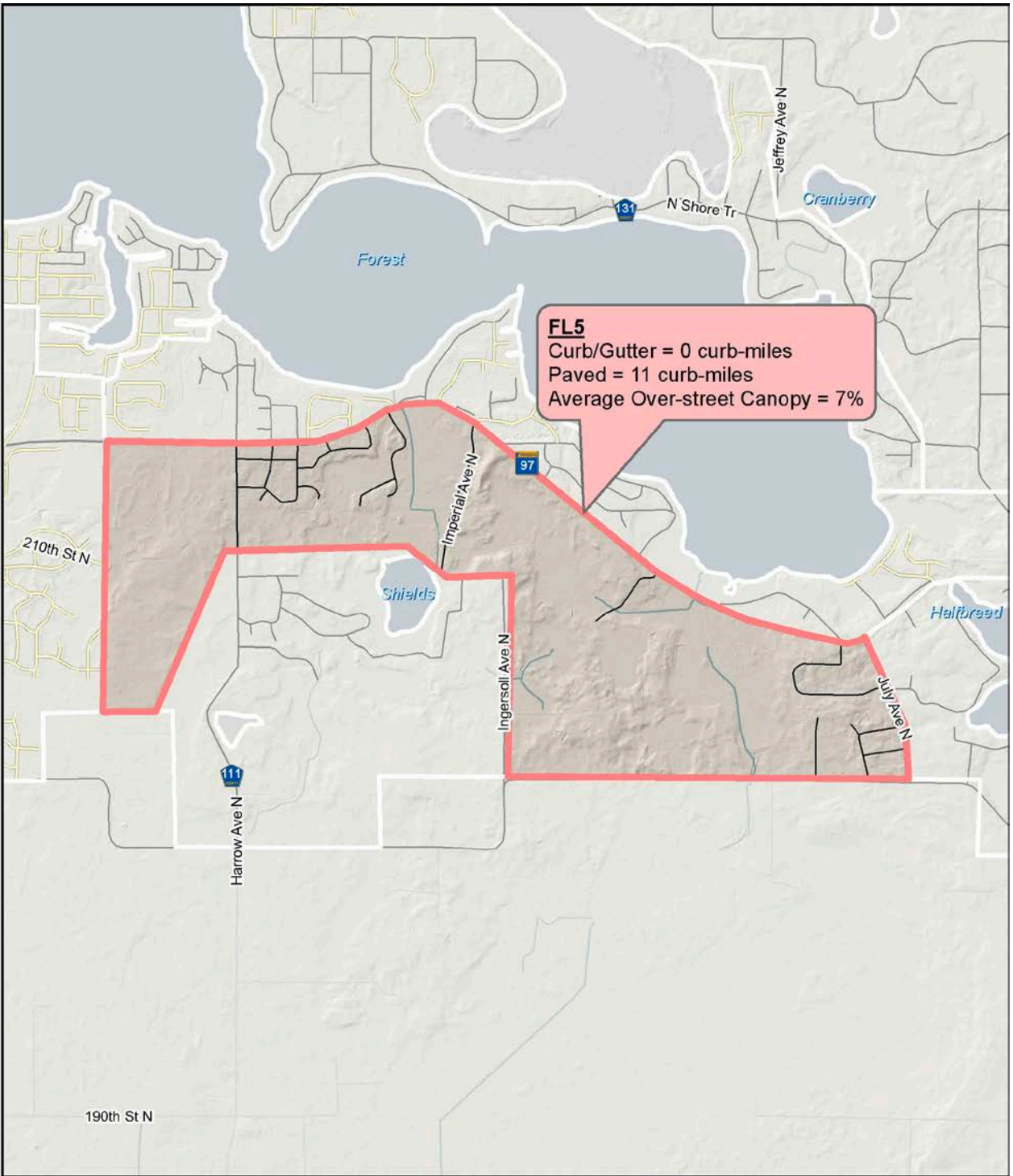
Miles



Figure 9-4. Sweeping Zone Forest Lake 4 (FL4).



Date: 7/19/2017 Time: 7:56:48 AM Author: ejensen  
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**Proposed Street Sweeping**

- Curb and Gutter
- Paved Road



**Forest Lake Street Sweeping**

FL5 Zone

Miles  
0 0.25 0.5 0.75

Figure 9-5. Sweeping Zone Forest Lake 5 (FL5).

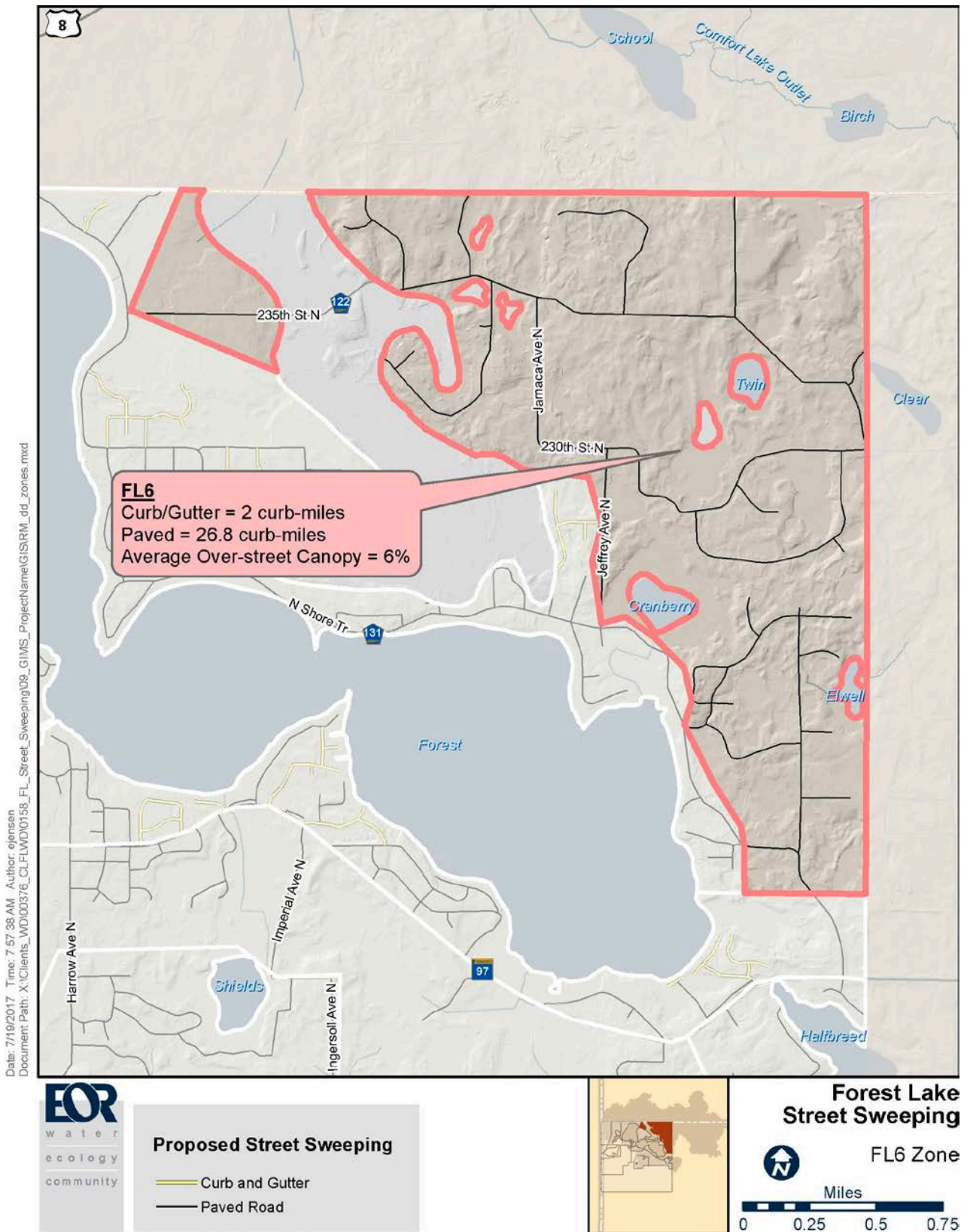
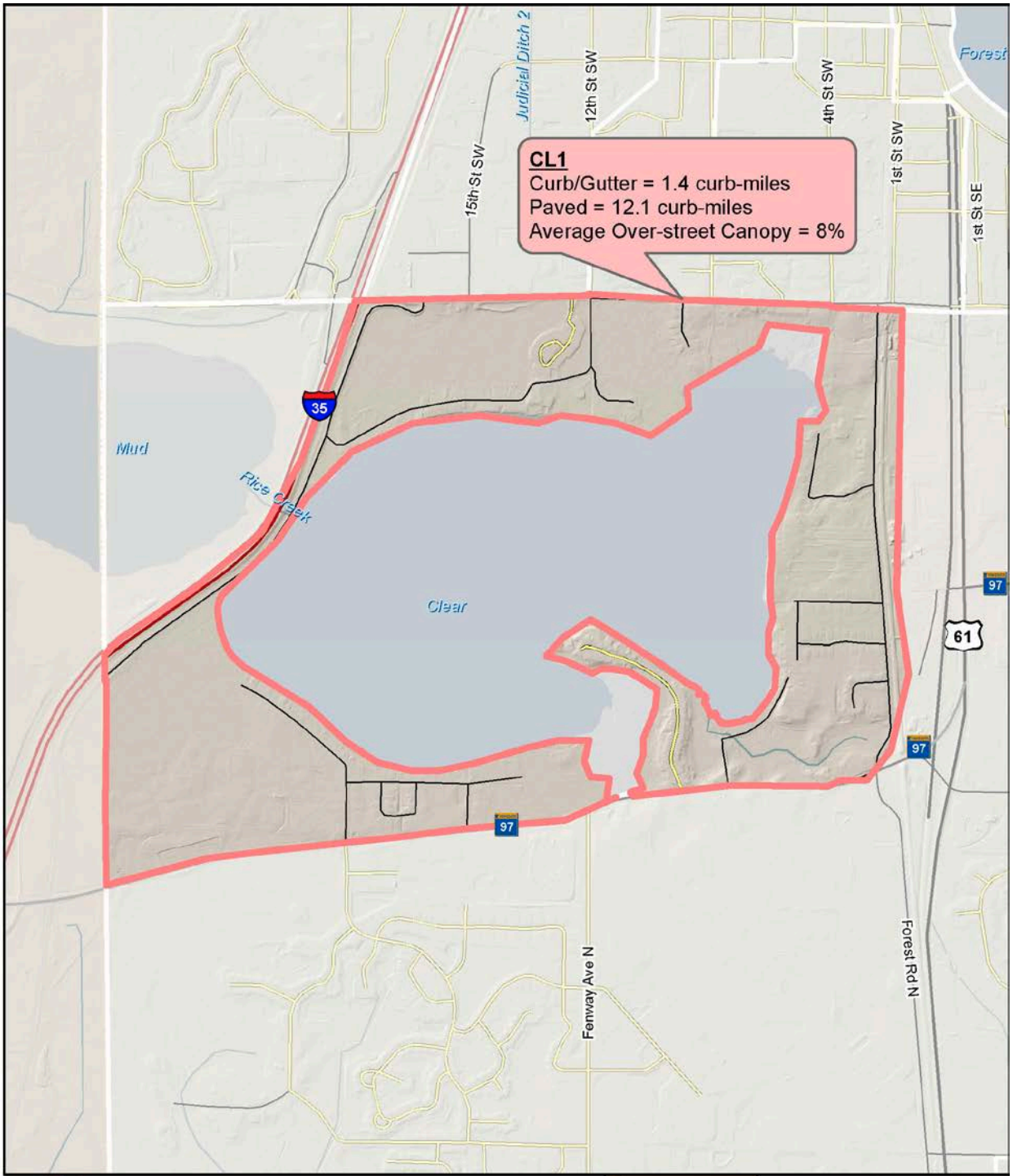


Figure 9-6. Sweeping Zone Forest Lake 6 (FL6).

Date: 7/19/2017 Time: 7:51:02 AM Author: ejensen  
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### Proposed Street Sweeping

- Curb and Gutter
- Paved Road



### Forest Lake Street Sweeping

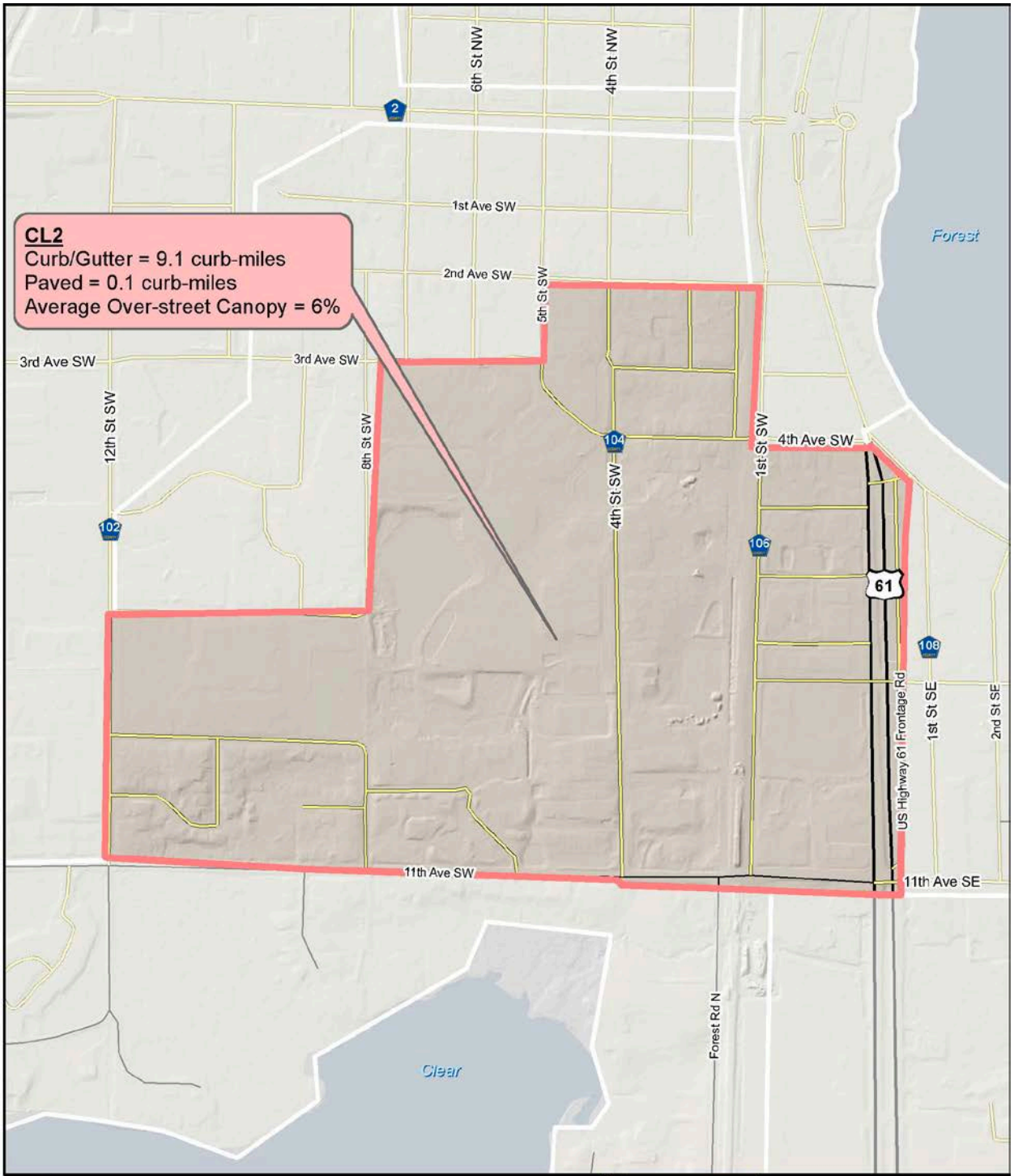


CL1 Zone



Figure 9-7. Sweeping Zone Clear Lake 1 (CL1).

Date: 7/19/2017 Time: 7:51:56 AM Author: ejensen  
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**Proposed Street Sweeping**

- Curb and Gutter
- Paved Road



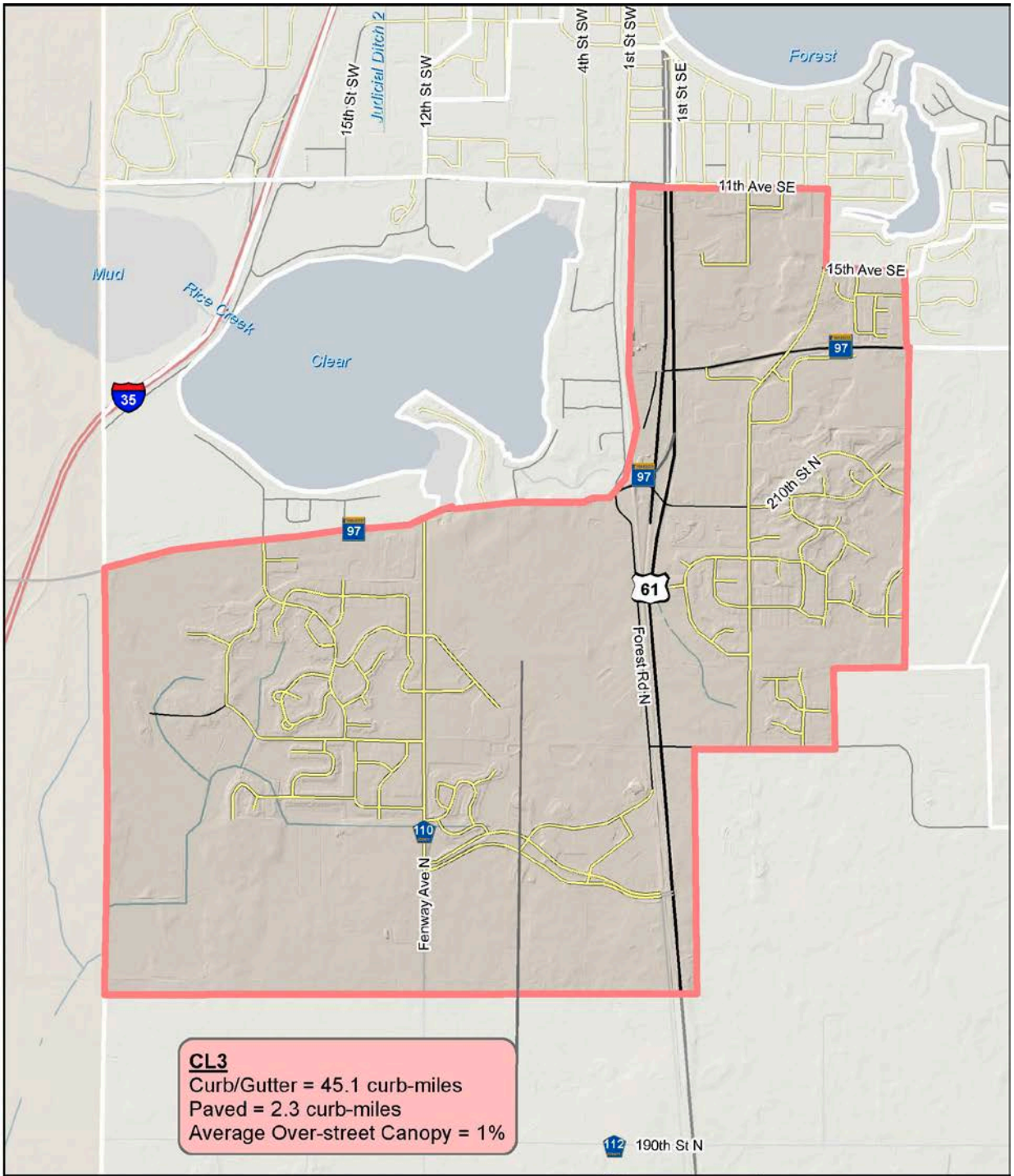
**Forest Lake Street Sweeping**



CL2 Zone

Figure 9-8. Sweeping Zone Clear Lake 2 (CL2).

Date: 7/19/2017 Time: 7:52:45 AM Author: ejensen  
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**CL3**  
 Curb/Gutter = 45.1 curb-miles  
 Paved = 2.3 curb-miles  
 Average Over-street Canopy = 1%



**Proposed Street Sweeping**

- Curb and Gutter
- Paved Road



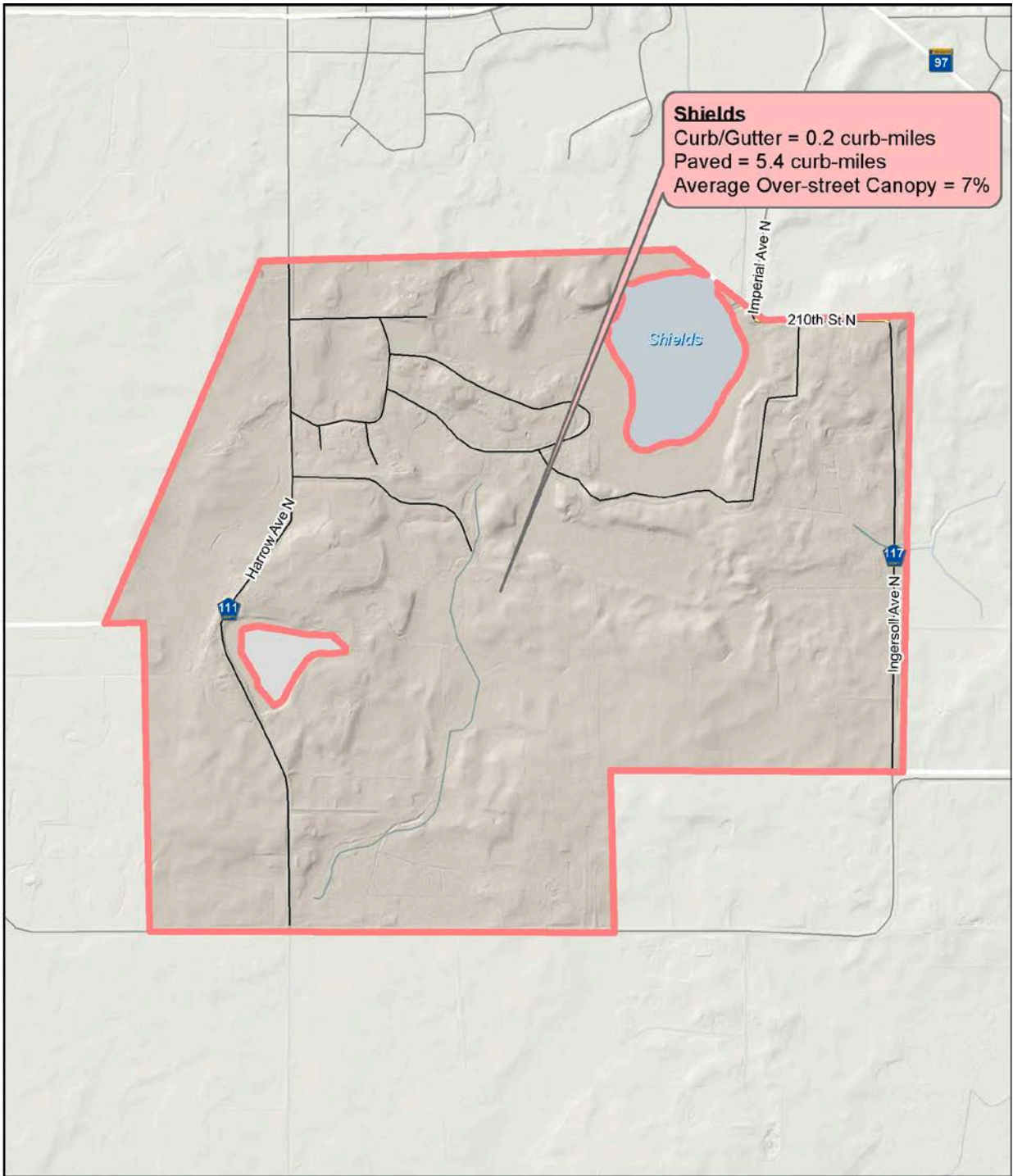
**Forest Lake Street Sweeping**

CL3 Zone

Miles  
 0 0.25 0.5

Figure 9-9. Sweeping Zone Clear Lake 3 (CL3).

Date: 7/19/2017 Time: 8:00:38 AM Author: ejenssen  
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**Proposed Street Sweeping**

- Curb and Gutter
- Paved Road



**Forest Lake Street Sweeping**



Shields Zone

Miles

0 0.25

Figure 9-10. Sweeping Zone Shields Lake (Shields).

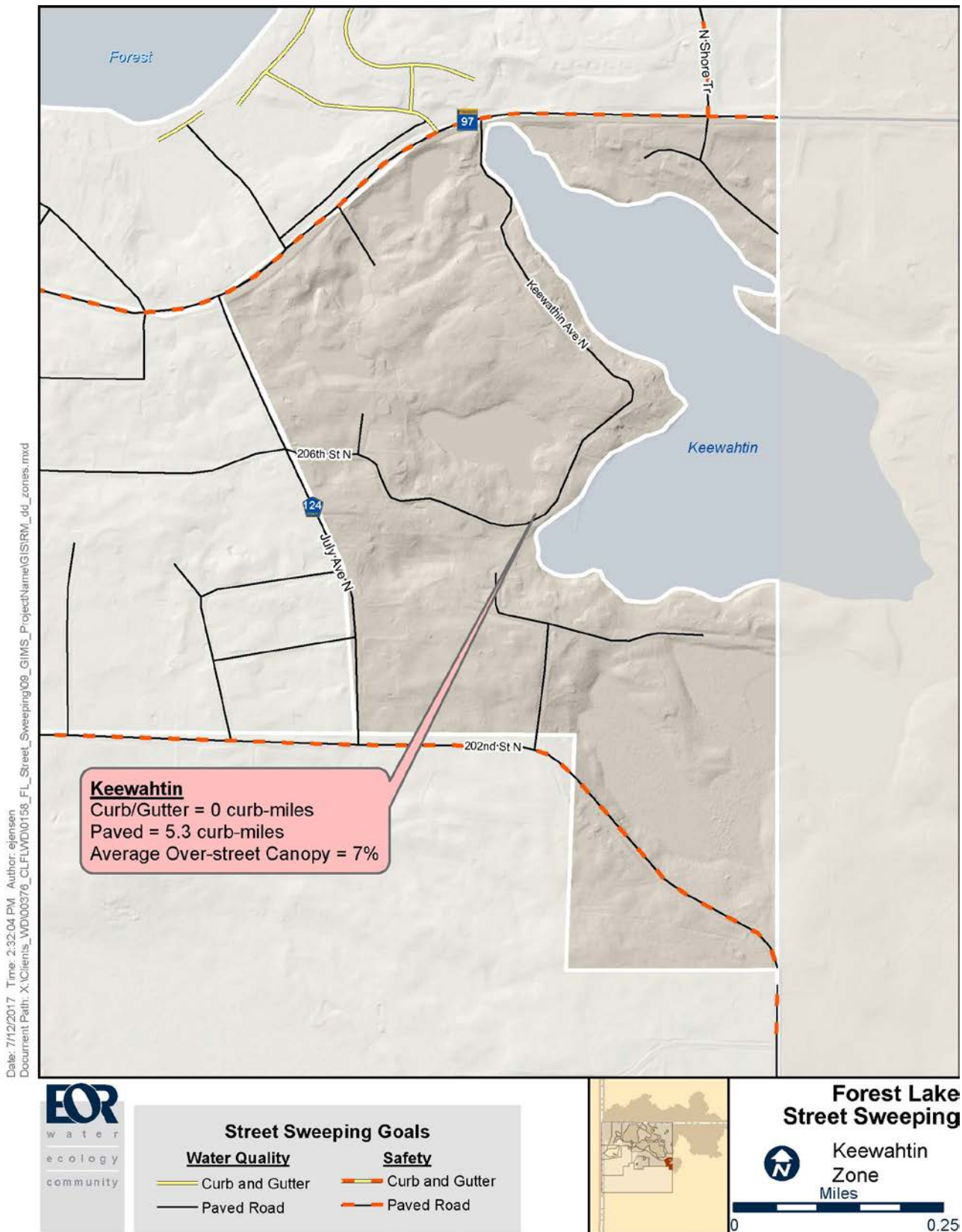
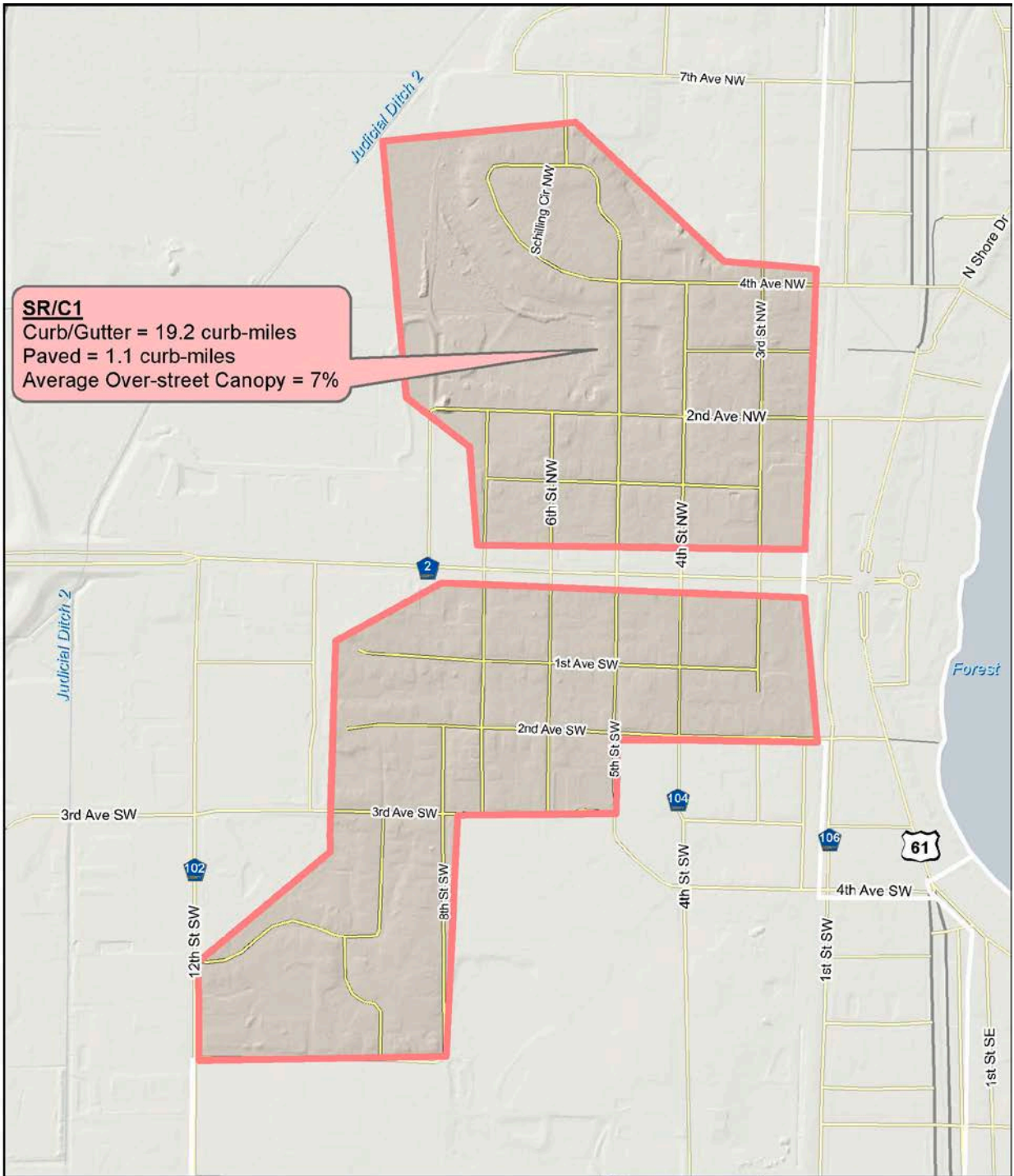


Figure 9-11. Sweeping Zone Keewahtin Lake (Keewahtin).

Date: 7/19/2017 Time: 8:02:26 AM Author: ejensen  
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**Proposed Street Sweeping**

- Curb and Gutter
- Paved Road



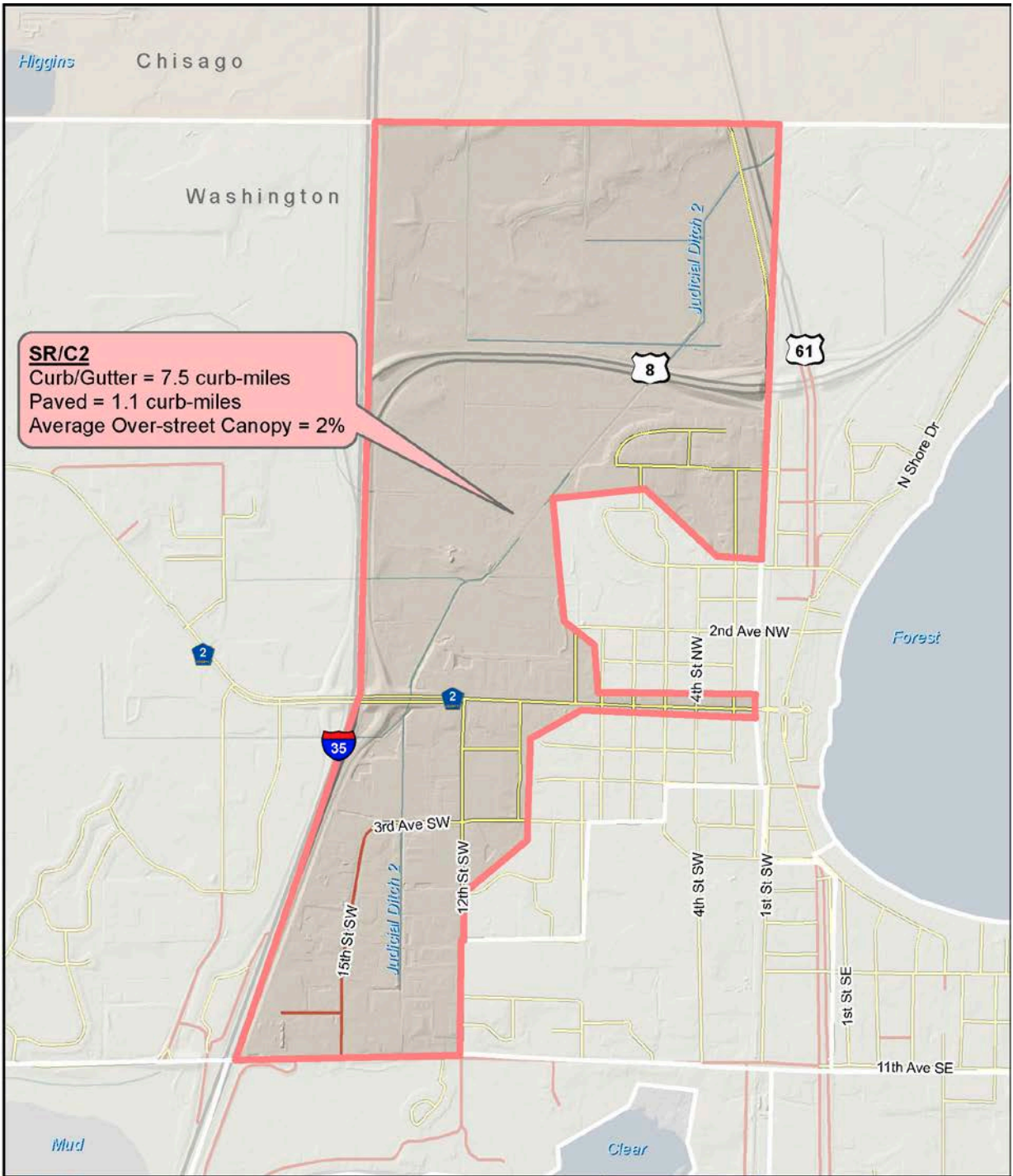
**Forest Lake Street Sweeping**

SR/C1 Zone

Figure 9-12. Sweeping Zone Sunrise River/Comfort Lake 1 (SRC1).



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### Proposed Street Sweeping

- Curb and Gutter Road
- Paved Road



### Forest Lake Street Sweeping

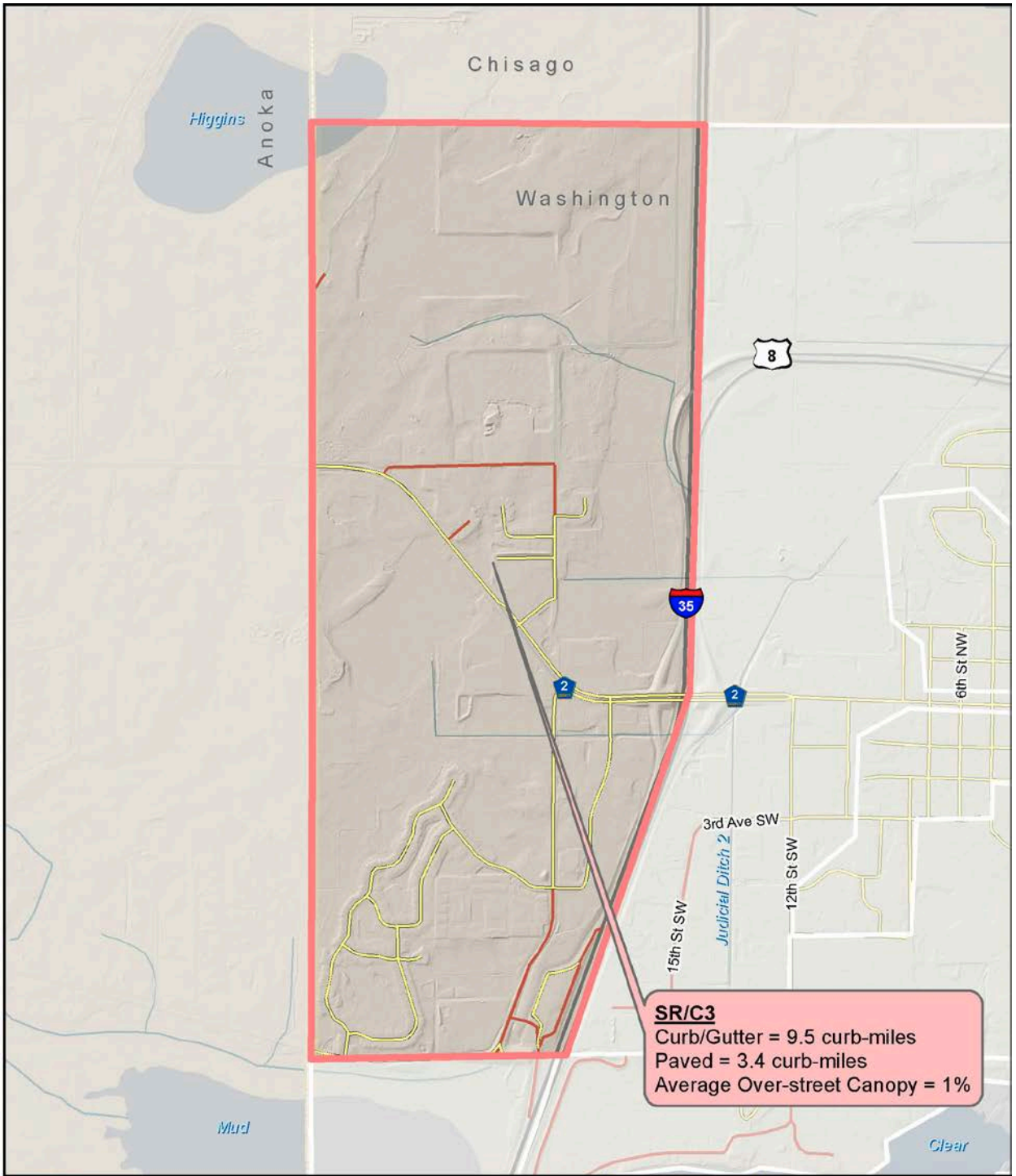


SR/C2 Zone



Figure 9-13. Sweeping Zone Sunrise River/Comfort Lake 2 (SRC2).

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**Proposed Street Sweeping**

- Curb and Gutter Road
- Paved Road



**Forest Lake Street Sweeping**

SR/C3 Zone

Miles

0 0.25

Figure 9-14. Sweeping Zone Sunrise River/Comfort Lake 3 (SRC3).

## 10. APPENDIX B: MECHANICAL BROOM LOAD RECOVERY ASSUMPTIONS

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Based on a review of street sweeper performance testing literature, mechanical broom type sweepers are estimated to have overall pick-up efficiency that is 20% to 40% less than that of higher efficiency sweepers, on average. The range of reported street sweeper pick-up efficiencies is fairly broad, but some trends are consistent across different sources. The pick-up performance of most street sweepers decreases with particle size, but higher efficiency sweepers (regenerative air or vacuum) generally outperform mechanical sweepers across all particle size classes (Table 10-1). For the largest material (rocks, trash), differences in pick-up efficiency may be minimal. For recovery of smaller particles and adhered pollutants, it may be beneficial to use a higher efficiency sweeper.

In addition to variation with particle size, the overall pick-up efficiency of sweepers tends to increase with loading intensity (Figure 10-1). When streets are relatively clean (lower intensity street dirt loading), pick-up efficiency may be reduced. The trend is most noticeable for mechanical broom type sweepers. The difference in overall pick-up efficiency for mechanical broom type sweepers compared to higher efficiency sweepers ranges from about 40% less at lower intensity loading rates to about 20% less at higher intensity loading rates. Street loading tends to be most intense in early spring, when roads (winter residuals) and during peak fall leave drop (Kalinovsky et. al, 2013). During these limited time periods, the pick-up efficiency of mechanical broom sweepers may be within 0% to 25% of the total pick-up efficiency for higher efficiency sweepers. At other times of the year, solids loading on street surfaces tends to be less intense and may include more fine material such as pollen and silt (Kalinovsky, 2015). During these times, the pick-up efficiency of mechanical broom sweepers is expected to be somewhat lower (25% to 40% less) than higher efficiency sweepers.

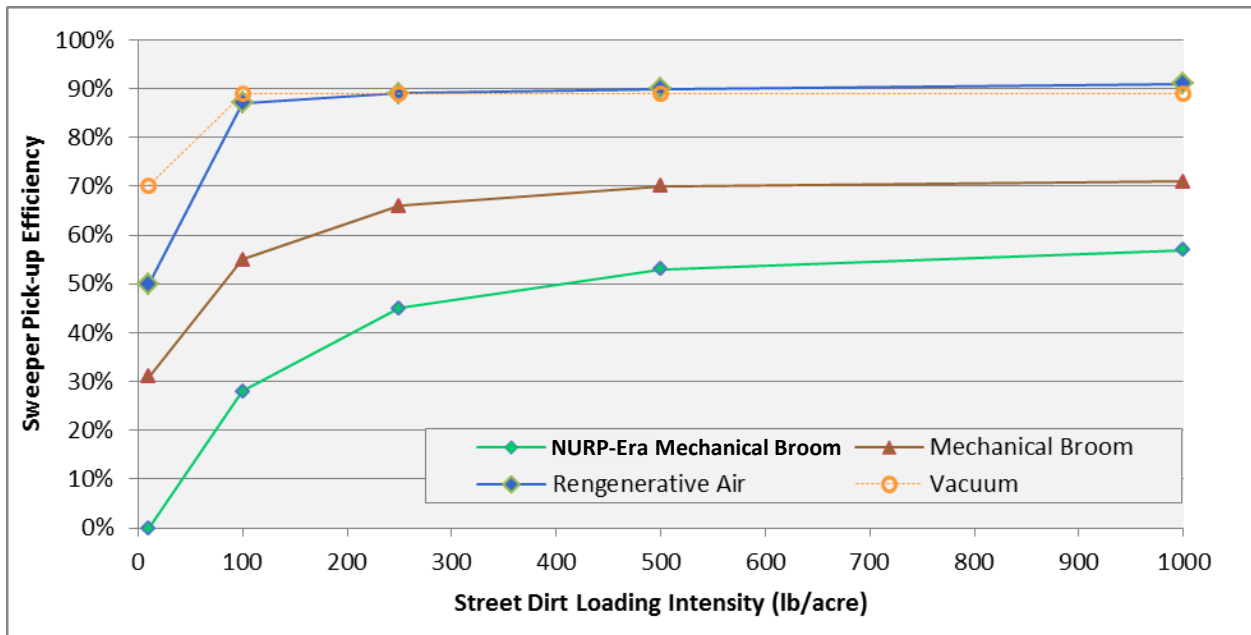
**Table 10-1. Comparison of removal efficiencies, mechanical broom and vacuum sweeper technologies, fine and coarse particle size ranges as reported in MNDOT, 2008.**

Class Name	Material Particle Size (mm)	Removal Efficiency (%) [mechanical broom sweeper]		Removal Efficiency (%) [vacuum sweeper]	
		Range	Average	Range	Average
Gravel	2.0	60 - 79% <sup>1</sup> 9 - 40% <sup>2</sup>	69% <sup>1</sup> 21% <sup>2</sup>	n/a <sup>1</sup> 31 - 94% <sup>2</sup>	n/a <sup>1</sup> 71% <sup>2</sup>
Medium to very coarse sand	0.25 - 2.0				
Very fine to fine sand	0.050 - 0.250				
Silt	0.002 - 0.050 <sup>3</sup>	16 - 48 % <sup>1</sup>	21% <sup>1</sup>	n/a <sup>1</sup>	n/a <sup>1</sup>
Clay	<0.002	13 - 13 % <sup>2</sup>	13% <sup>2</sup>	39 - 81 % <sup>2</sup>	60% <sup>2</sup>

<sup>1</sup> Pitt, Robert, Bannerman, R. and Sutherland, R. 2004. The Role of Street Cleaning in Stormwater Management. Paper presented at Water World and Environmental Resources Conference 2004, Environmental and Water Resources Institute of the American Society of Civil Engineers, Salt Lake City, Utah. May 27 - June 1, 2004, Table 1.

<sup>2</sup> Breault, R.F., Smith, K.P., and Sorenson, J.R., 2005. Residential street-dirt accumulation rates and chemical composition, and removal efficiencies by mechanical- and vacuum-type sweepers, New Bedford, Massachusetts, 2003-04: U.S. Geological Survey Scientific Investigations Report 2005-5184, 27 p., Table 6.

<sup>3</sup> Particle size is representative of PM10



**Figure 10-1. Pick-up efficiencies vs. loading intensity for different sweeper types (Sutherland and Jelen, 1997). Efficiencies are based on pick up of street dirt simulant, NURP particle size distribution 13% fine ( $d < 63 \mu\text{m}$ ), 40% medium ( $250 \mu\text{m} \leq d \leq 2000 \mu\text{m}$ ), and 47% coarse ( $d \geq 2000 \mu\text{m}$ ).**

**11. APPENDIX C: ESTIMATED SOLIDS AND PHOSPHORUS RECOVERY, REDUCTION, AND COSTS BY SWEEPING SCENARIO**

**11.1. Baseline Scenario (2 times per year)**

Table 11-1. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for BASELINE sweeping (once each spring and fall) using mechanical broom and regenerative air technologies. Costs for a City-owned sweeper are based on regenerative air or comparable high-efficiency technology.

Total number of Sweepings = 2

Waterbody	Sweeping Zone	Curb-miles	LOAD RECOVERY				LOAD REDUCTION				COSTS					
			Estimated Watershed Load Recovery (lb/yr)				Reduction to Waterbody through Sweeping (lb/yr)				Contract Sweeping			City-Owned Sweeper		
			Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)	\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)
TS	TP	TS	TP	TS	TP	TS	TP	TS	TP							
Clear Lake	CL1	13.5	7019	6.1	8774	7.6	959	2.8	1199	3.5	\$ 3,763	\$ 495	\$ 1,087	\$ 2,131	\$ 280	\$ 616
	CL2	9.2	4442	3.8	5553	4.7	333	0.9	416	1.2	\$ 2,565	\$ 546	\$ 2,183	\$ 1,451	\$ 309	\$ 1,235
	CL3	47.4	19027	15.7	23784	19.6	476	2.0	595	2.5	\$ 13,215	\$ 674	\$ 5,394	\$ 7,467	\$ 381	\$ 3,048
	<b>Subtotal</b>		<b>30,489</b>	<b>25.5</b>	<b>38,111</b>	<b>31.9</b>	<b>1,768</b>	<b>5.7</b>	<b>2,210</b>	<b>7.1</b>	<b>\$ 19,544</b>	<b>\$ 613</b>	<b>\$ 2,758</b>	<b>\$ 11,049</b>	<b>\$ 346</b>	<b>\$ 1,559</b>
Forest Lake	FL1	17.3	12,545	11.6	15,681	14.5	12545	11.6	15681.0	14.5	\$ 4,823	\$ 333	\$ 333	\$ 2,739	\$ 189	\$ 189
	FL2	12.9	6,230	5.4	7,787	6.7	5108	4.4	5659.5	5.5	\$ 3,606	\$ 538	\$ 656	\$ 2,040	\$ 304	\$ 371
	FL3	18.7	9,723	8.4	12,154	10.5	8012	6.9	9516.4	8.7	\$ 5,213	\$ 496	\$ 603	\$ 2,951	\$ 281	\$ 341
	FL4	27.2	15,801	14.0	19,751	17.5	5621	5.0	2108.0	6.2	\$ 7,563	\$ 432	\$ 1,215	\$ 4,286	\$ 245	\$ 688
	FL5	11.0	5,512	4.7	6,890	5.9	1552	1.3	366.6	1.7	\$ 3,062	\$ 519	\$ 1,843	\$ 1,733	\$ 294	\$ 1,043
	FL6	28.8	13,907	11.9	17,384	14.9	3984	3.4	683.2	4.3	\$ 8,026	\$ 539	\$ 1,881	\$ 4,541	\$ 305	\$ 1,064
	<b>Subtotal</b>		<b>63,718</b>	<b>56.0</b>	<b>79,647</b>	<b>70.0</b>	<b>36,822</b>	<b>32.6</b>	<b>34,015</b>	<b>40.8</b>	<b>\$ 32,293</b>	<b>\$ 461</b>	<b>\$ 791</b>	<b>\$ 18,290</b>	<b>\$ 261</b>	<b>\$ 448</b>
Shields Lake	Shields	5.4	2,706	2	3,382	2.9	676.4	0.6	253.7	0.7	\$ 1,504	\$ 518	\$ 2,074	\$ 851	\$ 293	\$ 1,174
Keewahtin Lake	Keewahtin	5.4	2,706	2	3,382	2.9	961.6	0.8	239.6	1.0	\$ 1,512	\$ 522	\$ 1,467	\$ 856	\$ 295	\$ 830
Sunrise River/Comfort Lake	SR/C1	20.3	10,172	8.8	12,715	11.0	5086.0	4.4	1907.3	5.5	\$ 5,664	\$ 515	\$ 1,030	\$ 3,206	\$ 291	\$ 583
	SR/C2	8.6	3,582	3.0	4,478	3.7	895.6	0.7	335.9	0.9	\$ 2,392	\$ 647	\$ 2,586	\$ 1,352	\$ 365	\$ 1,462
	SR/C3	12.9	5,178	4.2	6,473	5.3	647.3	0.5	161.8	0.7	\$ 3,592	\$ 678	\$ 5,421	\$ 2,029	\$ 383	\$ 3,063
	<b>Subtotal</b>		<b>18,933</b>	<b>16.0</b>	<b>23,666</b>	<b>20.0</b>	<b>6,629</b>	<b>5.7</b>	<b>2,405</b>	<b>7.1</b>	<b>\$ 11,648</b>	<b>\$ 582</b>	<b>\$ 1,643</b>	<b>\$ 6,587</b>	<b>\$ 329</b>	<b>\$ 929</b>
<b>TOTAL</b>			<b>118,550</b>	<b>102.2</b>	<b>148,188</b>	<b>127.7</b>	<b>46,857</b>	<b>45.4</b>	<b>39,123</b>	<b>56.7</b>	<b>\$ 66,500</b>	<b>\$ 521</b>	<b>\$ 1,172</b>	<b>\$ 37,633</b>	<b>\$ 295</b>	<b>\$ 663</b>

**11.2. Enhanced Baseline Scenario (4 times per year)**

Table 11-2. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for enhance spring and fall sweeping (2-spring, and 2-fall sweepings) using mechanical broom and regenerative air technologies. Costs for a City-owned sweeper are based on regenerative air or comparable high-efficiency technology.

Waterbody			LOAD RECOVERY				LOAD REDUCTION				COST					
			Estimated Watershed Load Recovery (lb/yr)				Reduction to Waterbody through Sweeping (lb/yr)				Contract Sweeping			City-Owned Sweeper		
			Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper							
Sweeping Zor	Curb-miles	TS	TP	TS	TP	TS	TP	TS	TP	\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)	\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)	
Clear Lake	CL1	13.5	10805	9.0	14,182	11.8	1476	4.1	1938	5.4	\$ 7,527	\$ 638	\$ 1,401	\$ 2,611	\$ 221	\$ 486
	CL2	9.2	6839	5.7	8,976	7.4	513	1.4	673	1.9	\$ 5,130	\$ 693	\$ 2,773	\$ 1,779	\$ 240	\$ 961
	CL3	47.4	29288	23.3	38,442	30.5	732	2.9	961	3.8	\$ 26,430	\$ 867	\$ 6,932	\$ 9,147	\$ 300	\$ 2,399
	<b>Subtotal</b>		<b>46,931</b>	<b>38.0</b>	<b>61,600</b>	<b>49.7</b>	<b>2,721</b>	<b>8.4</b>	<b>3,572</b>	<b>11.0</b>	<b>\$ 39,087</b>	<b>\$ 786</b>	<b>\$ 3,542</b>	<b>\$ 13,537</b>	<b>\$ 272</b>	<b>\$ 1,227</b>
Forest Lake	FL1	17.3	19,310	17.2	25,345	22.5	19310	17.2	25345	22.5	\$ 9,646	\$ 429	\$ 429	\$ 3,361	\$ 149	\$ 149
	FL2	12.9	9,939	8.4	13,086	11.1	8150	6.9	9511	9.1	\$ 7,211	\$ 650	\$ 792	\$ 2,501	\$ 225	\$ 275
	FL3	18.7	14,966	12.5	19,644	16.4	12333	10.3	15381	13.5	\$ 10,426	\$ 636	\$ 772	\$ 3,617	\$ 221	\$ 268
	FL4	27.2	24,322	20.7	31,924	27.1	8653	7.4	3407	9.6	\$ 15,125	\$ 558	\$ 1,569	\$ 5,254	\$ 194	\$ 545
	FL5	11.0	8,484	7.0	11,136	9.2	2389	2.0	593	2.6	\$ 6,124	\$ 666	\$ 2,364	\$ 2,124	\$ 231	\$ 820
	FL6	28.8	21,407	17.7	28,098	23.1	6132	5.1	1104	6.6	\$ 16,053	\$ 695	\$ 2,426	\$ 5,565	\$ 241	\$ 841
<b>Subtotal</b>		<b>98,428</b>	<b>83.6</b>	<b>129,233</b>	<b>109.4</b>	<b>56,966</b>	<b>48.9</b>	<b>55,341</b>	<b>64.0</b>	<b>\$ 64,585</b>	<b>\$ 590</b>	<b>\$ 1,010</b>	<b>\$ 22,422</b>	<b>\$ 205</b>	<b>\$ 351</b>	
Shields Lake	Shields	5.4	4,165	3.4	5,467	4.5	1041	0.9	410	1.1	\$ 3,007	\$ 668	\$ 2,673	\$ 1,043	\$ 232	\$ 927
Keewahtin Lake	Keewahtin	5.4	4,165	3.4	5,467	4.5	1480	1.2	387	1.6	\$ 3,025	\$ 672	\$ 1,891	\$ 1,049	\$ 233	\$ 656
Sunrise River/Comfort Lake	SR/C1	20.3	15,657	13.0	20,551	17.0	7828.6	6.5	3083	8.5	\$ 11,328	\$ 666	\$ 1,333	\$ 3,929	\$ 231	\$ 462
	SR/C2	8.6	5,514	4.4	7,237	5.8	1378.4	1.1	542.8	1.5	\$ 4,784	\$ 825	\$ 3,300	\$ 1,656	\$ 286	\$ 1,142
	SR/C3	12.9	7,971	6.3	10,462	8.3	996.3	0.8	261.6	1.0	\$ 7,183	\$ 865	\$ 6,923	\$ 2,486	\$ 300	\$ 2,396
	<b>Subtotal</b>		<b>29,142</b>	<b>23.8</b>	<b>38,250</b>	<b>31.1</b>	<b>10,203</b>	<b>8.4</b>	<b>3,887</b>	<b>11.0</b>	<b>\$ 23,295</b>	<b>\$ 749</b>	<b>\$ 2,120</b>	<b>\$ 8,071</b>	<b>\$ 260</b>	<b>\$ 735</b>
<b>TOTAL</b>		<b>182,831</b>	<b>152.2</b>	<b>240,017</b>	<b>199.2</b>	<b>72,412</b>	<b>67.8</b>	<b>63,597</b>	<b>88.7</b>	<b>\$ 133,000</b>	<b>\$ 668</b>	<b>\$ 1,499</b>	<b>\$ 46,122</b>	<b>\$ 232</b>	<b>\$ 520</b>	

**11.3. Monthly Scenario (7 times per year)**

Table 11-3. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for monthly sweeping using mechanical broom and regenerative air technologies. Costs for a City-owned sweeper are based on regenerative air or comparable high-efficiency technology.

Total number of Sweepings = 7

Waterbody	Sweeping Zor	Curb-miles	LOAD RECOVERY				LOAD REDUCTION				COSTS					
			Estimated Watershed Load Recovery (lb/yr)				Reduction to Waterbody through Sweeping (lb/yr)				Contract Sweeping			City-Owned Sweeper		
			Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)	\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)
TS	TP	TS	TP	TS	TP	TS	TP	TS	TP							
Clear Lake	CL1	13.5	16262	12.7	21,978	17.0	2222	5.8	3003	7.7	\$ 13,172	\$ 775	\$ 1,701	\$ 3,332	\$ 196	\$ 430
	CL2	9.2	10292	7.9	13,910	10.6	772	2.0	1043	2.7	\$ 8,978	\$ 847	\$ 3,388	\$ 2,269	\$ 214	\$ 856
	CL3	47.4	44082	32.7	59,576	43.9	1102	4.1	1489	5.5	\$ 46,252	\$ 1,054	\$ 8,429	\$ 11,666	\$ 266	\$ 2,126
	<b>Subtotal</b>		<b>70,636</b>	<b>53.2</b>	<b>95,464</b>	<b>71.5</b>	<b>4,096</b>	<b>11.8</b>	<b>5,536</b>	<b>15.9</b>	<b>\$ 68,403</b>	<b>\$ 957</b>	<b>\$ 4,307</b>	<b>\$ 17,267</b>	<b>\$ 241</b>	<b>\$ 1,087</b>
Forest Lake	FL1	17.3	29,063	24.1	39,279	32.4	29063	24.1	39279	32.4	\$ 16,880	\$ 521	\$ 521	\$ 4,292	\$ 132	\$ 132
	FL2	12.9	14,432	11.1	19,505	14.9	11834	9.1	14176	12.2	\$ 12,620	\$ 847	\$ 1,033	\$ 3,189	\$ 214	\$ 261
	FL3	18.7	22,526	17.6	30,443	23.6	18562	14.5	23836	19.4	\$ 18,246	\$ 773	\$ 938	\$ 4,616	\$ 196	\$ 237
	FL4	27.2	36,607	29.1	49,474	39.1	13023	10.4	5280	13.9	\$ 26,470	\$ 677	\$ 1,903	\$ 6,706	\$ 172	\$ 482
	FL5	11.0	12,770	9.9	17,258	13.3	3596	2.8	918	3.7	\$ 10,716	\$ 806	\$ 2,862	\$ 2,710	\$ 204	\$ 724
	FL6	28.8	32,220	24.7	43,545	33.2	9230	7.1	1711	9.5	\$ 28,092	\$ 846	\$ 2,954	\$ 7,100	\$ 214	\$ 747
	<b>Subtotal</b>		<b>147,618</b>	<b>116.6</b>	<b>199,504</b>	<b>156.5</b>	<b>85,308</b>	<b>67.9</b>	<b>85,201</b>	<b>91.2</b>	<b>\$ 113,024</b>	<b>\$ 722</b>	<b>\$ 1,239</b>	<b>\$ 28,613</b>	<b>\$ 183</b>	<b>\$ 314</b>
Shields Lake	Shields	5.4	6,269	4.8	8,472	6.5	1567.2	1.2	635.4	1.6	\$ 5,262	\$ 810	\$ 3,238	\$ 1,331	\$ 205	\$ 819
Keewahtin Lake	Keewahtin	5.4	6,269	4.8	8,472	6.5	2228.0	1.7	600.2	2.3	\$ 5,294	\$ 814	\$ 2,291	\$ 1,338	\$ 206	\$ 579
Sunrise River/Comfort Lake	SR/C1	20.3	23,566	18.3	31,849	24.5	11782.9	9.1	4777.4	12.3	\$ 19,824	\$ 809	\$ 1,618	\$ 5,012	\$ 205	\$ 409
	SR/C2	8.6	8,299	6.2	11,216	8.3	2074.8	1.5	841.2	2.1	\$ 8,372	\$ 1,009	\$ 4,035	\$ 2,113	\$ 255	\$ 1,018
	SR/C3	12.9	11,997	8.9	16,214	11.9	1499.6	1.1	405.4	1.5	\$ 12,570	\$ 1,056	\$ 8,451	\$ 3,170	\$ 266	\$ 2,131
	<b>Subtotal</b>		<b>43,862</b>	<b>33.3</b>	<b>59,279</b>	<b>44.7</b>	<b>15,357</b>	<b>11.8</b>	<b>6,024</b>	<b>15.8</b>	<b>\$ 40,767</b>	<b>\$ 912</b>	<b>\$ 2,578</b>	<b>\$ 10,295</b>	<b>\$ 230</b>	<b>\$ 651</b>
<b>TOTAL</b>		<b>274,653</b>	<b>212.8</b>	<b>371,191</b>	<b>285.7</b>	<b>108,556</b>	<b>94.5</b>	<b>97,996</b>	<b>126.9</b>	<b>\$ 232,750</b>	<b>\$ 815</b>	<b>\$ 1,835</b>	<b>\$ 58,844</b>	<b>\$ 206</b>	<b>\$ 464</b>	

**11.4. Twice Monthly Scenario (14 times per year)**

Table 11-4. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for twice monthly sweeping using mechanical broom and regenerative air technologies. Costs for a City-owned sweeper are based on regenerative air or comparable high-efficiency technology.

Total number of Sweepings = 14

			LOAD RECOVERY				LOAD REDUCTION				COSTS					
			Estimated Watershed Load Recovery (lb/yr)				Reduction to Waterbody through Sweeping (lb/yr)				Contract Sweeping			City-Owned Sweeper		
			Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper							
Waterbody	Sweeping Zor	Curb-miles	TS	TP	TS	TP	TS	TP	TS	TP	\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)	\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)
Clear Lake	CL1	13.5	16055	12.2	34,985	26.9	3466	8.9	4780	12.3	\$ 26,344	\$ 979	\$ 2,150	\$ 5,034	\$ 187	\$ 411
	CL2	9.2	68762	50.5	22,143	16.8	1204	3.1	1661	4.2	\$ 17,956	\$ 1,069	\$ 4,275	\$ 3,429	\$ 204	\$ 816
	CL3	47.4	110185	82.4	94,834	69.4	1719	6.3	2371	8.7	\$ 92,505	\$ 1,333	\$ 10,663	\$ 17,643	\$ 254	\$ 2,034
	<b>Subtotal</b>			<b>195,002</b>	<b>145.1</b>	<b>151,962</b>	<b>113.1</b>	<b>6,389</b>	<b>18.3</b>	<b>8,812</b>	<b>25.1</b>	<b>\$ 136,805</b>	<b>\$ 1,210</b>	<b>\$ 5,445</b>	<b>\$ 26,107</b>	<b>\$ 231</b>
Forest Lake	FL1	17.3	22,512	17.1	57,349	44.3	41712	32.5	57349.0	44.3	\$ 33,760	\$ 762	\$ 762	\$ 6,474	\$ 146	\$ 146
	FL2	12.9	35,137	27.1	31,048	23.5	18460	14.0	22565.5	19.3	\$ 25,239	\$ 1,074	\$ 1,310	\$ 4,820	\$ 205	\$ 250
	FL3	18.7	57,102	45.0	48,460	37.2	28955	22.3	37943.4	30.7	\$ 36,492	\$ 981	\$ 1,190	\$ 6,974	\$ 187	\$ 227
	FL4	27.2	19,919	15.3	78,753	61.8	20314	16.0	8405.0	22.0	\$ 52,939	\$ 857	\$ 2,408	\$ 10,127	\$ 164	\$ 461
	FL5	11.0	50,260	38.2	27,472	21.0	5609	4.3	1461.8	5.9	\$ 21,433	\$ 1,021	\$ 3,625	\$ 4,095	\$ 195	\$ 692
	FL6	28.8	226,643	175.2	69,316	52.5	14397	11.0	2724.1	15.0	\$ 56,185	\$ 1,070	\$ 3,736	\$ 10,730	\$ 204	\$ 714
	<b>Subtotal</b>			<b>411,574</b>	<b>318.0</b>	<b>312,398</b>	<b>240.3</b>	<b>129,447</b>	<b>100.1</b>	<b>130,449</b>	<b>137.2</b>	<b>\$ 226,048</b>	<b>\$ 941</b>	<b>\$ 1,648</b>	<b>\$ 43,219</b>	<b>\$ 180</b>
Shields Lake	Shields	5.4	<b>9,778</b>	<b>7.5</b>	<b>13,486</b>	<b>10.3</b>	<b>2444.6</b>	<b>1.9</b>	<b>1011.5</b>	<b>2.6</b>	\$ 10,525	\$ 1,022	\$ 4,087	\$ 2,011	\$ 195	\$ 781
Keewahtin Lake	Keewahtin	5.4	<b>36,760</b>	<b>28.2</b>	<b>13,486</b>	<b>10.3</b>	<b>3475.4</b>	<b>2.7</b>	<b>955.3</b>	<b>3.7</b>	\$ 10,587	\$ 1,028	\$ 2,892	\$ 2,023	\$ 196	\$ 552
Sunrise River/Comfort Lake	SR/C1	20.3	12,946	9.6	50,698	38.7	18380.1	14.1	7604.7	19.4	\$ 39,649	\$ 1,025	\$ 2,049	\$ 7,574	\$ 196	\$ 391
	SR/C2	8.6	18,714	13.8	17,854	13.2	3236.4	2.4	1339.1	3.3	\$ 16,745	\$ 1,269	\$ 5,074	\$ 3,195	\$ 242	\$ 968
	SR/C3	12.9	68,419	51.6	25,809	18.9	2339.2	1.7	645.2	2.4	\$ 25,141	\$ 1,330	\$ 10,642	\$ 4,795	\$ 254	\$ 2,030
	<b>Subtotal</b>			<b>100,079</b>	<b>74.9</b>	<b>94,361</b>	<b>70.8</b>	<b>23,956</b>	<b>18.2</b>	<b>9,589</b>	<b>25.0</b>	<b>\$ 81,534</b>	<b>\$ 1,152</b>	<b>\$ 3,260</b>	<b>\$ 15,564</b>	<b>\$ 220</b>
<b>TOTAL</b>			<b>753,193</b>	<b>573.7</b>	<b>585,693</b>	<b>444.8</b>	<b>165,712</b>	<b>141.1</b>	<b>150,816</b>	<b>193.5</b>	<b>\$ 465,500</b>	<b>\$ 1,047</b>	<b>\$ 2,405</b>	<b>\$ 88,923</b>	<b>\$ 200</b>	<b>\$ 459</b>



**11.5. Weekly Scenario (28 times per year)**

Table 11-5. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for weekly sweeping using mechanical broom and regenerative air technologies.

Total number of Sweepings = 28

			LOAD RECOVERY				LOAD REDUCTION				COSTS					
			Estimated Watershed Load Recovery (lb/yr)				Reduction to Waterbody through Sweeping (lb/yr)				Contract Sweeping			City-Owned Sweeper		
			Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper							
Waterbody	Sweeping Zor	Curb-miles	TS	TP	TS	TP	TS	TP	TS	TP	\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)	\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)
Clear Lake	CL1	13.5	31904	24.3	44,324	33.6	4359	11.1	6056	15.3	\$ 52,689	\$ 1,568	\$ 3,443	\$ 10,025	\$ 298	\$ 655
	CL2	9.2	20192	15.2	28,053	21.0	1514	3.8	2104	5.3	\$ 35,912	\$ 1,710	\$ 6,840	\$ 6,831	\$ 325	\$ 1,301
	CL3	47.4	86483	62.7	120,149	86.8	2162	7.8	3004	10.9	\$ 185,010	\$ 2,131	\$ 17,052	\$ 35,168	\$ 405	\$ 3,241
	<b>Subtotal</b>			<b>138,579</b>	<b>102.2</b>	<b>192,526</b>	<b>141.4</b>	<b>8,036</b>	<b>22.7</b>	<b>11,164</b>	<b>31.4</b>	<b>\$ 273,610</b>	<b>\$ 1,935</b>	<b>\$ 8,713</b>	<b>\$ 52,024</b>	<b>\$ 368</b>
Forest Lake	FL1	17.3	57,019	46.3	79,216	64.0	57019	46.3	79216.0	64.0	\$ 67,521	\$ 1,055	\$ 1,055	\$ 12,870	\$ 201	\$ 201
	FL2	12.9	28,314	21.3	39,336	29.4	23217	17.4	32255.1	24.1	\$ 50,478	\$ 1,717	\$ 2,094	\$ 9,602	\$ 327	\$ 398
	FL3	18.7	44,193	33.7	61,396	46.6	36417	27.7	50592.9	38.4	\$ 72,985	\$ 1,566	\$ 1,901	\$ 13,887	\$ 298	\$ 362
	FL4	27.2	71,818	55.9	99,776	77.3	25550	19.9	35495.8	27.5	\$ 105,878	\$ 1,370	\$ 3,850	\$ 20,157	\$ 261	\$ 733
	FL5	11.0	25,053	18.9	34,805	26.2	7054	5.3	9800.3	7.4	\$ 42,865	\$ 1,636	\$ 5,810	\$ 8,155	\$ 311	\$ 1,105
	FL6	28.8	63,212	47.5	87,820	65.7	18107	13.6	25156.4	18.8	\$ 112,370	\$ 1,710	\$ 5,971	\$ 21,375	\$ 325	\$ 1,136
	<b>Subtotal</b>			<b>289,609</b>	<b>223.4</b>	<b>402,349</b>	<b>309.2</b>	<b>167,364</b>	<b>130.2</b>	<b>232,517</b>	<b>180.2</b>	<b>\$ 452,097</b>	<b>\$ 1,462</b>	<b>\$ 2,509</b>	<b>\$ 86,045</b>	<b>\$ 278</b>
Shields Lake	Shields	5.4	<b>12,298</b>	<b>9.3</b>	<b>17,086</b>	<b>12.9</b>	<b>3074.6</b>	<b>2.3</b>	<b>4271.5</b>	<b>3.2</b>	\$ 21,050	\$ 1,632	\$ 6,527	\$ 4,005	\$ 310	\$ 1,242
Keewahntin Lake	Keewahntin	5.4	<b>12,298</b>	<b>9.3</b>	<b>17,086</b>	<b>12.9</b>	<b>4371.0</b>	<b>3.3</b>	<b>6072.6</b>	<b>4.6</b>	\$ 21,175	\$ 1,641	\$ 4,618	\$ 4,028	\$ 312	\$ 879
Sunrise River/Comfort Lake	SR/C1	20.3	46,233	35.0	64,231	48.4	23116.6	17.5	32115.5	24.2	\$ 79,297	\$ 1,638	\$ 3,277	\$ 15,086	\$ 312	\$ 623
	SR/C2	8.6	16,282	11.9	22,620	16.5	4070.5	3.0	5655.0	4.1	\$ 33,490	\$ 2,030	\$ 8,119	\$ 6,367	\$ 386	\$ 1,543
	SR/C3	12.9	23,537	17.1	32,699	23.6	2942.1	2.1	4087.4	3.0	\$ 50,281	\$ 2,131	\$ 17,045	\$ 9,558	\$ 405	\$ 3,240
	<b>Subtotal</b>			<b>86,052</b>	<b>64.0</b>	<b>119,550</b>	<b>88.5</b>	<b>30,129</b>	<b>22.6</b>	<b>41,858</b>	<b>31.3</b>	<b>\$ 163,068</b>	<b>\$ 1,843</b>	<b>\$ 5,214</b>	<b>\$ 31,011</b>	<b>\$ 350</b>
<b>TOTAL</b>			<b>538,837</b>	<b>408.2</b>	<b>748,597</b>	<b>564.9</b>	<b>212,975</b>	<b>181.2</b>	<b>295,882</b>	<b>250.7</b>	<b>\$ 931,000</b>	<b>\$ 1,648</b>	<b>\$ 3,714</b>	<b>\$ 177,113</b>	<b>\$ 314</b>	<b>\$ 706</b>

**NOTE:** A second sweeper is needed to complete city-wide weekly sweeping. Although the cost calculations for this scenario include the purchase, operation, and maintenance of a second sweeper (Section 6), recommendations for sweeping are based on use of a single sweeper (Section 7).

### 11.6. Base Priority Scenario

Table 11-6. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for Base Priority enhanced sweeping scenario using mechanical broom and regenerative air technologies (Table 7-1).

Waterbody	Sweeping Zone	Sweeping Priority <sup>1</sup>	Curb-miles	# Sweepings	LOAD RECOVERY				LOAD REDUCTION				COSTS					
					Estimated Watershed Load Recovery (lb/yr)				Reduction to Waterbody through Sweeping (lb/yr)				Contract Sweeping			City-Owned Sweeper		
					Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)	\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)
TS	TP	TS	TP	TS	TP	TS	TP	TS	TP									
Clear Lake	CL1	WQ	13.5	7	16262	12.7	21,978	17.0	2222	5.8	3003	7.7	\$ 52,700	\$ 1,568	\$ 3,444		\$ 298	\$ 655
	CL2	P/M	9.2	4	6839	5.7	8,976	7.4	513	1.4	673	1.9	\$ 8,980	\$ 847	\$ 3,389	\$ 6,831	\$ 325	\$ 1,301
	CL3	P/M	47.4	4	29288	23.3	38,442	30.5	732	2.9	961	3.8	\$ 46,262	\$ 1,054	\$ 8,430	\$ 35,168	\$ 405	\$ 3,241
	<b>Subtotal</b>				<b>52,388</b>	<b>41.6</b>	<b>69,396</b>	<b>54.9</b>	<b>3,467</b>	<b>10.1</b>	<b>4,637</b>	<b>13.4</b>	<b>\$ 107,942</b>	<b>\$ 1,225</b>	<b>\$ 4,605</b>	<b>\$ 52,024</b>	<b>\$ 368</b>	<b>\$ 1,657</b>
Forest Lake	FL1	WQ	17.3	7	29,063	24.1	39,279	32.4	29063	24.1	39279.0	32.4	\$ 67,535	\$ 1,055	\$ 1,055	\$ 12,870	\$ 201	\$ 201
	FL2	WQ	12.9	7	14,432	11.1	19,505	14.9	11834	9.1	14176.1	12.2	\$ 50,489	\$ 1,717	\$ 2,094	\$ 9,602	\$ 327	\$ 398
	FL3	WQ	18.7	7	22,526	17.6	30,443	23.6	18562	14.5	23836.4	19.4	\$ 36,500	\$ 981	\$ 1,191	\$ 13,887	\$ 298	\$ 362
	FL4	P/M	27.2	4	24,322	20.7	31,924	27.1	8653	7.4	3407.1	9.6	\$ 26,475	\$ 677	\$ 1,903	\$ 20,157	\$ 261	\$ 733
	FL5	P/M	11.0	4	8,484	7.0	11,136	9.2	2389	2.0	592.6	2.6	\$ 10,719	\$ 806	\$ 2,862	\$ 8,155	\$ 311	\$ 1,105
	FL6	P/M	28.8	4	21,407	17.7	28,098	23.1	6132	5.1	1104.3	6.6	\$ 28,098	\$ 846	\$ 2,955	\$ 21,375	\$ 325	\$ 1,136
<b>Subtotal</b>				<b>120,234</b>	<b>98.2</b>	<b>160,385</b>	<b>130.3</b>	<b>76,633</b>	<b>62.1</b>	<b>82,395</b>	<b>82.9</b>	<b>\$ 219,817</b>	<b>\$ 1,017</b>	<b>\$ 1,506</b>	<b>\$ 86,045</b>	<b>\$ 278</b>	<b>\$ 477</b>	
Shields Lake <sup>2</sup>	Shields	WQ	5.4	7	6,269	4.8	8,472	6.5	1567.2	1.2	635.4	1.6	\$ 10,527	\$ 1,022	\$ 4,088	\$ 4,005	\$ 310	\$ 1,242
Keewahtin Lake	Keewahtin	P/M	5.4	4	4,165	3.4	5,467	4.5	1480.3	1.2	387.3	1.6	\$ 5,295	\$ 815	\$ 2,292	\$ 4,028	\$ 312	\$ 879
Sunrise River/Comfort Lake <sup>2</sup>	SR/C1	WQ	20.3	7	15,657	13.0	20,551	17.0	7828.6	6.5	3082.7	8.5	\$ 39,657	\$ 1,025	\$ 2,049	\$ 15,086	\$ 312	\$ 623
	SR/C2	P/M	8.6	4	5,514	4.4	7,237	5.8	1378.4	1.1	542.8	1.5	\$ 8,374	\$ 1,009	\$ 4,036	\$ 6,367	\$ 386	\$ 1,543
	SR/C3	P/M	12.9	4	7,971	6.3	10,462	8.3	996.3	0.8	261.6	1.0	\$ 12,573	\$ 1,057	\$ 8,452	\$ 9,558	\$ 405	\$ 3,240
	<b>Subtotal</b>				<b>29,142</b>	<b>23.8</b>	<b>38,250</b>	<b>31.1</b>	<b>10,203</b>	<b>8.4</b>	<b>3,887</b>	<b>11.0</b>	<b>\$ 60,604</b>	<b>\$ 1,029</b>	<b>\$ 2,645</b>	<b>\$ 31,011</b>	<b>\$ 350</b>	<b>\$ 992</b>
<b>TOTAL</b>				<b>212,198</b>	<b>171.9</b>	<b>281,970</b>	<b>227.3</b>	<b>93,351</b>	<b>83.0</b>	<b>91,942</b>	<b>110.5</b>	<b>\$ 404,185</b>	<b>\$ 1,064</b>	<b>\$ 2,050</b>	<b>\$ 177,113</b>	<b>\$ 314</b>	<b>\$ 706</b>	

<sup>1</sup> WQ = direct water quality benefit (direct drainage areas), P/M = BMP preservation and maintenance reduction (indirect water quality benefit).

<sup>2</sup> TMDL watershed.

**11.7. Recommended Scenario**

**Table 11-7. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for Recommended enhanced sweeping scenario using mechanical broom and regenerative air technologies (Table 7-1).**

**Sweeping Scenario:**

1. Zones designated as 'WQ' swept twice monthly during the sweeping season. Sweeping can be reduced to once monthly during July and August.
2. Zone designated as 'P/M' swept monthly.

Waterbody	Sweeping Zone	Sweeping Priority <sup>1</sup>	Curb-miles	# Sweepings	LOAD RECOVERY				LOAD REDUCTION				COSTS					
					Estimated Watershed Load Recovery (lb/yr)				Reduction to Waterbody through Sweeping (lb/yr)				Contract Sweeping			City-Owned Sweeper		
					Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)	\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)
TS	TP	TS	TP	TS	TP	TS	TP											
Clear Lake	CL1	WQ	13.5	12	23299	18.4	32,031	25.2	3183	8.4	4376	11.5	\$ 22,586	\$ 896	\$ 1,968	\$ 5,297	\$ 210	\$ 462
	CL2	P/M	9.2	7	10292	7.9	13,910	10.6	772	2.0	1043	2.7	\$ 8,980	\$ 847	\$ 3,389	\$ 2,108	\$ 199	\$ 796
	CL3	P/M	47.4	7	44082	32.7	59,576	43.9	1102	4.1	1489	5.5	\$ 46,262	\$ 1,054	\$ 8,430	\$ 10,838	\$ 247	\$ 1,975
	<b>Subtotal</b>				<b>77,673</b>	<b>59.0</b>	<b>105,517</b>	<b>79.7</b>	<b>5,057</b>	<b>14.4</b>	<b>6,909</b>	<b>19.6</b>	<b>\$ 77,828</b>	<b>\$ 977</b>	<b>\$ 3,968</b>	<b>\$ 18,244</b>	<b>\$ 229</b>	<b>\$ 930</b>
Forest Lake	FL1	WQ	17.3	12	41,640	35.0	57,245	47.9	41640	35.0	57245.0	47.9	\$ 28,944	\$ 604	\$ 604	\$ 6,916	\$ 144	\$ 144
	FL2	WQ	12.9	12	20,677	16.1	28,426	22.0	16955	13.2	20659.8	18.0	\$ 21,638	\$ 984	\$ 1,199	\$ 5,127	\$ 233	\$ 284
	FL3	WQ	18.7	12	32,273	25.4	44,368	34.8	26594	20.9	34739.5	28.7	\$ 31,286	\$ 899	\$ 1,091	\$ 7,306	\$ 210	\$ 255
	FL4	P/M	27.2	7	36,607	29.1	49,474	39.1	13023	10.4	5280.2	13.9	\$ 26,475	\$ 677	\$ 1,903	\$ 6,223	\$ 159	\$ 447
	FL5	P/M	11.0	7	12,770	9.9	17,258	13.3	3596	2.8	918.3	3.7	\$ 10,719	\$ 806	\$ 2,862	\$ 2,582	\$ 194	\$ 689
	FL6	P/M	28.8	7	32,220	24.7	43,545	33.2	9230	7.1	1711.3	9.5	\$ 28,098	\$ 846	\$ 2,955	\$ 6,546	\$ 197	\$ 688
	<b>Subtotal</b>				<b>176,186</b>	<b>140.2</b>	<b>240,316</b>	<b>190.3</b>	<b>111,037</b>	<b>89.3</b>	<b>120,554</b>	<b>121.8</b>	<b>\$ 147,160</b>	<b>\$ 773</b>	<b>\$ 1,208</b>	<b>\$ 34,700</b>	<b>\$ 182</b>	<b>\$ 285</b>
Shields Lake <sup>2</sup>	Shields	WQ	5.4	12	6,269	4.8	8,472	6.5	1567.2	1.2	635.4	1.6	\$ 5,264	\$ 810	\$ 3,239	\$ 1,237	\$ 190	\$ 761
Keewahtin Lake	Keewahtin	P/M	5.4	7	6,269	4.8	8,472	6.5	2228.0	1.7	600.2	2.3	\$ 5,295	\$ 815	\$ 2,292	\$ 1,244	\$ 191	\$ 538
Sunrise River/Comfort Lake <sup>2</sup>	SR/C1	WQ	20.3	12	33,763	26.4	46,417	36.2	16881.7	13.2	6962.6	18.1	\$ 33,992	\$ 939	\$ 1,878	\$ 7,969	\$ 220	\$ 440
	SR/C2	P/M	8.6	7	8,299	6.2	11,216	8.3	2074.8	1.5	841.2	2.1	\$ 8,374	\$ 1,009	\$ 4,036	\$ 1,963	\$ 236	\$ 946
	SR/C3	P/M	12.9	7	11,997	8.9	16,214	11.9	1499.6	1.1	405.4	1.5	\$ 12,573	\$ 1,057	\$ 8,452	\$ 2,946	\$ 248	\$ 1,980
	<b>Subtotal</b>				<b>54,060</b>	<b>41.5</b>	<b>73,847</b>	<b>56.4</b>	<b>20,456</b>	<b>15.9</b>	<b>8,209</b>	<b>21.7</b>	<b>\$ 54,939</b>	<b>\$ 974</b>	<b>\$ 2,536</b>	<b>\$ 12,877</b>	<b>\$ 228</b>	<b>\$ 594</b>
<b>TOTAL</b>					<b>320,456</b>	<b>250.4</b>	<b>436,624</b>	<b>339.4</b>	<b>140,346</b>	<b>122.6</b>	<b>136,908</b>	<b>167.0</b>	<b>\$ 290,485</b>	<b>\$ 856</b>	<b>\$ 1,739</b>	<b>\$ 68,301</b>	<b>\$ 201</b>	<b>\$ 409</b>

<sup>1</sup> WQ = direct water quality benefit (direct drainage areas), P/M = BMP preservation and maintenance reduction (indirect water quality benefit).

<sup>2</sup> TMDL watershed.

**11.8. Maximum Scenario**

**Table 11-8. Estimated total solids and phosphorus recovery, load reduction, and sweeping cost estimates for Maximum enhanced sweeping scenario using mechanical broom and regenerative air technologies (Table 7-1).**

**Sweeping Scenario:**

- 1. Zones designated as 'WQ' swept either weekly or twice monthly during the sweeping season.
- 2. Zone designated as 'P/M' swept monthly.

Waterbody	Sweeping Zone	Sweeping Priority <sup>1</sup>	Curb-miles	# Sweepings	LOAD RECOVERY				LOAD REDUCTION				COSTS					
					Estimated Watershed Load Recovery (lb/yr)				Reduction to Waterbody through Sweeping (lb/yr)				Contract Sweeping			City-Owned Sweeper		
					Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		Mechanical Broom Sweeper		Vacuum/Regen Air Sweeper		\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)	\$	\$/lb-P (RECOVERY)	\$/lb-P (REDUCTION)
TS	TP	TS	TP	TS	TP	TS	TP											
Clear Lake	CL1	WQ	13.5	28	31904	24.3	44,324	33.6	4359	11.1	6056	15.3	\$ 52,700	\$ 1,568	\$ 3,444	\$ 10,671	\$ 318	\$ 697
	CL2	P/M	9.2	7	10292	7.9	13,910	10.6	772	2.0	1043	2.7	\$ 8,980	\$ 847	\$ 3,389	\$ 1,831	\$ 173	\$ 691
	CL3	P/M	47.4	7	44082	32.7	59,576	43.9	1102	4.1	1489	5.5	\$ 46,262	\$ 1,054	\$ 8,430	\$ 9,408	\$ 214	\$ 1,714
	<b>Subtotal</b>				<b>86,278</b>	<b>64.9</b>	<b>117,810</b>	<b>88.1</b>	<b>6,233</b>	<b>17.1</b>	<b>8,589</b>	<b>23.4</b>	<b>\$ 107,942</b>	<b>\$ 1,225</b>	<b>\$ 4,605</b>	<b>\$ 21,909</b>	<b>\$ 249</b>	<b>\$ 935</b>
Forest Lake	FL1	WQ	17.3	28	57,019	46.3	79,216	64.0	57019	46.3	79216.0	64.0	\$ 67,535	\$ 1,055	\$ 1,055	\$ 13,650	\$ 213	\$ 213
	FL2	WQ	12.9	28	28,314	21.3	39,336	29.4	23217	17.4	28589.2	24.1	\$ 50,489	\$ 1,717	\$ 2,094	\$ 10,166	\$ 346	\$ 422
	FL3	WQ	18.7	14	35,137	27.1	48,460	37.2	28955	22.3	37943.4	30.7	\$ 36,500	\$ 981	\$ 1,191	\$ 7,447	\$ 200	\$ 243
	FL4	P/M	27.2	7	36,607	29.1	49,474	39.1	13023	10.4	5280.2	13.9	\$ 26,475	\$ 677	\$ 1,903	\$ 5,549	\$ 142	\$ 399
	FL5	P/M	11.0	7	12,770	9.9	17,258	13.3	3596	2.8	918.3	3.7	\$ 10,719	\$ 806	\$ 2,862	\$ 2,309	\$ 174	\$ 617
	FL6	P/M	28.8	7	32,220	24.7	43,545	33.2	9230	7.1	1711.3	9.5	\$ 28,098	\$ 846	\$ 2,955	\$ 5,720	\$ 172	\$ 601
	<b>Subtotal</b>				<b>202,067</b>	<b>158.3</b>	<b>277,289</b>	<b>216.2</b>	<b>135,039</b>	<b>106.2</b>	<b>153,658</b>	<b>145.9</b>	<b>\$ 219,817</b>	<b>\$ 1,017</b>	<b>\$ 1,506</b>	<b>\$ 44,842</b>	<b>\$ 207</b>	<b>\$ 307</b>
Shields Lake <sup>2</sup>	Shields	WQ	5.4	14	9,778	7.5	13,486	10.3	2444.6	1.9	1011.5	2.6	\$ 10,527	\$ 1,022	\$ 4,088	\$ 2,141	\$ 208	\$ 831
Keewahtin Lake	Keewahtin	P/M	5.4	7	6,269	4.8	8,472	6.5	2228.0	1.7	600.2	2.3	\$ 5,295	\$ 815	\$ 2,292	\$ 1,080	\$ 166	\$ 468
Sunrise River/Comfort Lake <sup>2</sup>	SR/C1	WQ	20.3	14	36,760	28.2	50,698	38.7	18380.1	14.1	7604.7	19.4	\$ 39,657	\$ 1,025	\$ 2,049	\$ 8,064	\$ 208	\$ 417
	SR/C2	P/M	8.6	7	8,299	6.2	11,216	8.3	2074.8	1.5	841.2	2.1	\$ 8,374	\$ 1,009	\$ 4,036	\$ 1,704	\$ 205	\$ 821
	SR/C3	P/M	12.9	7	11,997	8.9	16,214	11.9	1499.6	1.1	405.4	1.5	\$ 12,573	\$ 1,057	\$ 8,452	\$ 2,557	\$ 215	\$ 1,719
	<b>Subtotal</b>				<b>57,056</b>	<b>43.2</b>	<b>78,128</b>	<b>58.9</b>	<b>21,954</b>	<b>16.7</b>	<b>8,851</b>	<b>22.9</b>	<b>\$ 60,604</b>	<b>\$ 1,029</b>	<b>\$ 2,645</b>	<b>\$ 12,325</b>	<b>\$ 209</b>	<b>\$ 538</b>
<b>TOTAL</b>					<b>361,448</b>	<b>278.8</b>	<b>495,185</b>	<b>380.0</b>	<b>167,899</b>	<b>143.7</b>	<b>172,710</b>	<b>197.2</b>	<b>\$ 404,185</b>	<b>\$ 1,064</b>	<b>\$ 2,050</b>	<b>\$ 82,296</b>	<b>\$ 217</b>	<b>\$ 417</b>

<sup>1</sup> WQ = direct water quality benefit (direct drainage areas), P/M = BMP preservation and maintenance reduction (indirect water quality benefit).

<sup>2</sup> TMDL watershed.