



2030 COMPREHENSIVE LOCAL SURFACE WATER MANAGEMENT PLAN



City of Lake Elmo, Minnesota

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LIST OF ACRONYMS

The following acronyms are used in this Report:

Acronym	Description
AUAR	Alternative Urban Area-wide Review
BMP	Best Management Practice
BWSR	Board of Water and Soil Resources
BCWD	Brown’s Creek Watershed District
CIP	Capital Improvement Program
CWA	Clean Water Act
EQB	Environmental Quality Board
FEMA	Federal Emergency Management Agency
FHBM	Flood Hazard Boundary Map
FIRM	Flood Insurance Rate Map

Acronym	Description
FIS	Flood Insurance Study
JPA	Joint Powers Agreement
LGU	Local Government Unit
LSWMP	Local Surface Water Management Plan
LID	Low Impact Development
MCBS	Minnesota County Biological Survey
MDH	Minnesota Department of Health
MNDNR	Minnesota Department of Natural Resources
MNDOT	Minnesota Department of Transportation
MLCCS	Minnesota Land Cover Classification System
MPCA	Minnesota Pollution Control Agency
MS4	Municipal Separate Storm Sewer System (NPDES)
NFIP	National Flood Insurance Program
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetlands Inventory
NRCS	Natural Resources Conservation Service
OHWL	Ordinary High Water Level
ORVW	Outstanding Resource Value Water
PWI	Public Waters Inventory
RSEA	Regionally Significant Ecological Areas
SDWA	Safe Drinking Water Act
SWCD	Soil and Water Conservation District
SCS	Soil Conservation Service, USDA (replaced by NRCS)
SWWD	South Washington Watershed District
SFHA	Special Flood Hazard Area
SWCA	Special Well Construction Areas
STIP	State Transportation Improvement Plan
SWPPP	Storm Water Pollution Prevention Plan
SWMP	Surface Water Management Plan
TMDL	Total Daily Maximum Load
TP	Total Phosphorus
TSS	Total Suspended Solids
TCE	Trichloroethylene
USACE	United States Army Corp of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VBWD	Valley Branch Watershed District
VOCs	Volatile Organic Compounds
WCD	Washington Conservation District
WD	Watershed District
WMO	Watershed Management Organization
WMP	Watershed Management Plan
WCA	Wetland Conservation Act
WMA	Wildlife Management Area

EXECUTIVE SUMMARY

This Surface Water Management Plan will help to guide the protection and management of surface waters, ground water, and related natural resources in the City of Lake Elmo. The plan has been developed as a part of the City's 2030 Comprehensive Plan, to meet the requirements of the State Statutes, the Metropolitan Council, and local Watershed Districts.

The City is included within three Watershed Districts - the Valley Branch Watershed District, South Washington Watershed District, and Brown's Creek Watershed District. The City concurs with the watershed management plans and standards that have been adopted by these districts, and adopts them by reference in this plan. The current plans of these organizations were used to develop several sections of this plan. The City discussed the water management issues identified by the Districts in Lake Elmo in the Watershed Plan, and this plan includes goals, policies, and implementation actions to address those issues and others identified by the City.

The plan includes an inventory of surface waters and natural resources within the City. Approximately 10 percent of the City is covered by lakes and wetlands. The City also includes several creeks. Local Watershed Districts, the Minnesota Department of Natural Resources (MnDNR), and the City have identified significant natural areas and a greenway corridor that connects these resources in Lake Elmo.

The goals and policies indicate that the Watershed Districts will continue to take the primary regulatory role in surface water management within Lake Elmo. The three organizations will take the primary role in permitting for development projects. The City will provide comments to the watersheds during the review process. The City will implement its adopted MS4 Permit and SWPPP to manage and maintain the surface waters and infrastructure in the City, and educate its residents about the importance of protecting surface and ground water resources.

The goals, policies, and Implementation Plan note that the City will enforce its zoning and subdivision ordinances to assist in maintaining or improving the quality of surface and ground waters within Lake Elmo. The City will update its code as noted to ensure that it meets the requirements of the Metropolitan Council and to be consistent with the Watershed Management Plans and standards, as well as the Washington County Ground water Plan. The City will continue to cooperate with local Watershed Districts, the Washington Conservation District, Washington County, its residents, and others to protect and enhance surface water, ground water and natural resources for current and future generations.

A. Purpose and Scope

1. Purpose

The purpose of this Surface Water Management Plan (Plan) is to serve as a comprehensive planning document to guide the City of Lake Elmo in conserving, protecting, and maintaining the quality of its natural resources, surface waters, and ground water resources. This Plan recognizes the numerous entities involved in water resources management and environmental protection and has been created to meet the provisions of Minnesota Statutes §473.157 and §103B.235. It also conforms to Minnesota Rules 8410, and to the rules and standards of the Valley Branch, South Washington, and Brown’s Creek Watershed Districts.

The Plan avoids duplicating efforts of others by adopting or referencing the standards and policies of the Brown’s Creek Watershed District (BCWD), Valley Branch Watershed District (VBWD), South Washington Watershed District (SWWD), Washington County, the Metropolitan Council, State of Minnesota Agencies such as the Minnesota Pollution Control Agency (MPCA), the Minnesota Department of Natural Resources (MnDNR), the Minnesota Department of Health (MDH) and the Board of Soil and Water Resources (BWSR), plus Federal Agencies, most notably the Environmental Protection Agency (EPA). This plan may be periodically amended to remain current with local practices and policies.

2. Scope

To achieve its general goal of protecting and improving the quality of City surface waters, the Plan includes specific goals for surface and ground water management.

Each of the goals has one or more corresponding policies. A policy is a specific means for achieving established goals.

The Implementation Plan is prioritized to focus on the policies that the City can most effectively implement. There are several policy areas where the City will work in cooperation with others to achieve the goals for surface waters and related resources.

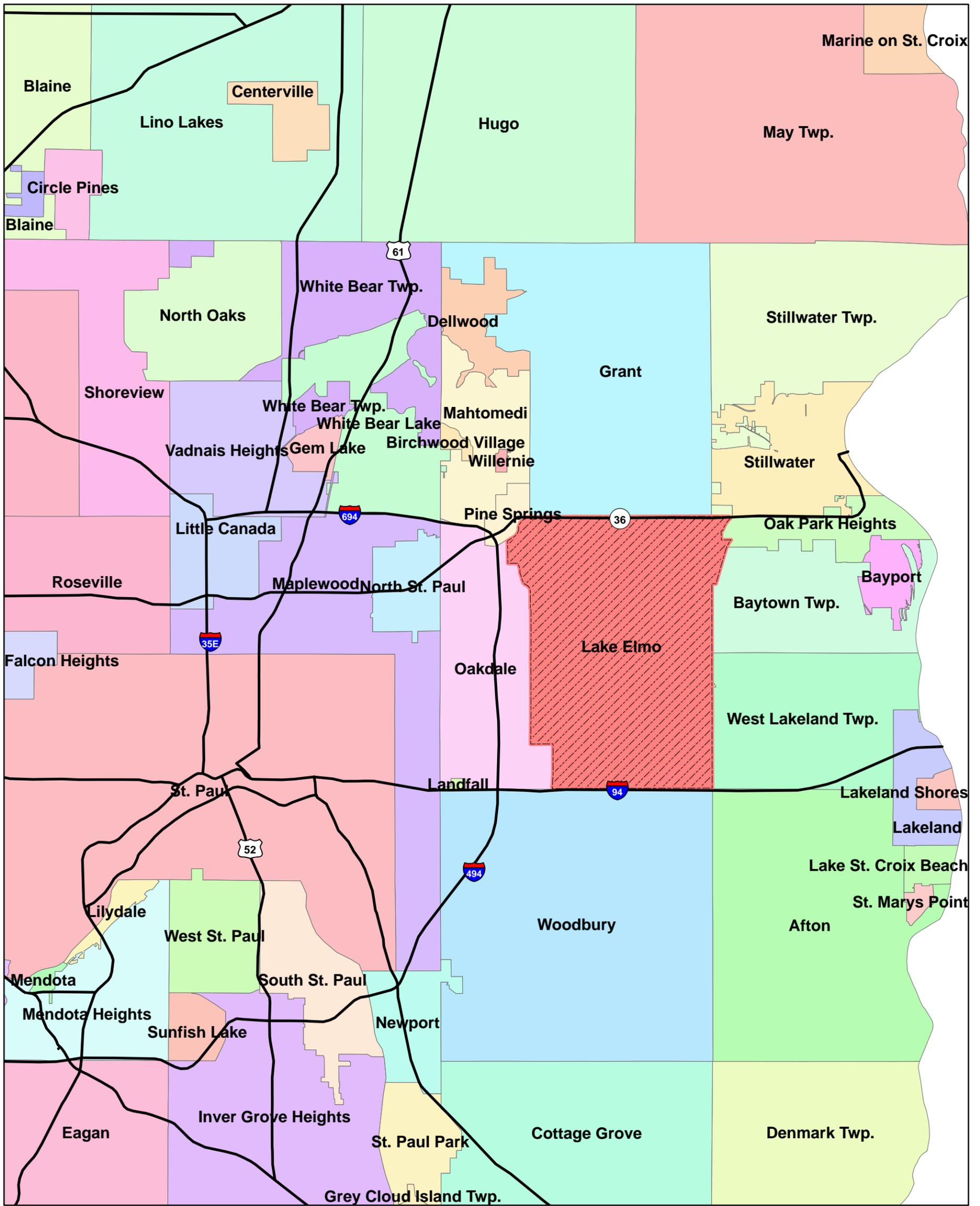
3. Surface Water Related Agreements

The City of Lake Elmo is adopting the Water Management Plans, rules and standards of the three Districts within the City in this LSWMP by reference in this plan. The watershed organizations manage permitting within the City, and the City provides comments on development proposals and other permit applications.

The Valley Branch Watershed District (VBWD) serves as the local governmental unit (LGU) for the Wetland Conservation Act (WCA) in the area of Lake Elmo within VBWD. The City is the LGU for the WCA within the BCWD and SWWD areas. The City utilizes the services of the Washington Conservation District (WCD) in carrying out its responsibilities under WCA. The WCD provides services to administer WCA, including wetland determinations, reviewing wetland delineations and impact applications, providing recommendations to the City, preparing notices of application or decisions, and other administrative tasks.

The City has an approved MS4 Permit and SWPPP, and is implementing the SWPPP requirements. Copies of these documents are included in the Appendix.

The City of Oakdale, the City of Lake Elmo, and the VBWD entered into a joint powers agreement for storm water management for the 3M property on the east and west sides of Ideal Avenue (in Lake Elmo and Oakdale, respectively). Discharge rates must be compliant with this agreement for any future development of this area. A copy of the agreement is included in the Appendix.



K:\gis\LAKEELMO\PROJECTS\2009 SWMP\Maps\Figure 1-Location Map.mxd

FIGURE 1: LOCATION MAP

Surface Water Management Plan

2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: February 2009
Prepared by:



LIMITATION OF LIABILITY
This document is not a legally recorded map or survey and is not intended to be used as one. This map is a compilation of records and information from various state, county, and city offices, and other sources.

Legend

- City of Lake Elmo
- Highways

Sources: Metropolitan Council, TKDA

B. Physical Setting

1. Location, Population and History

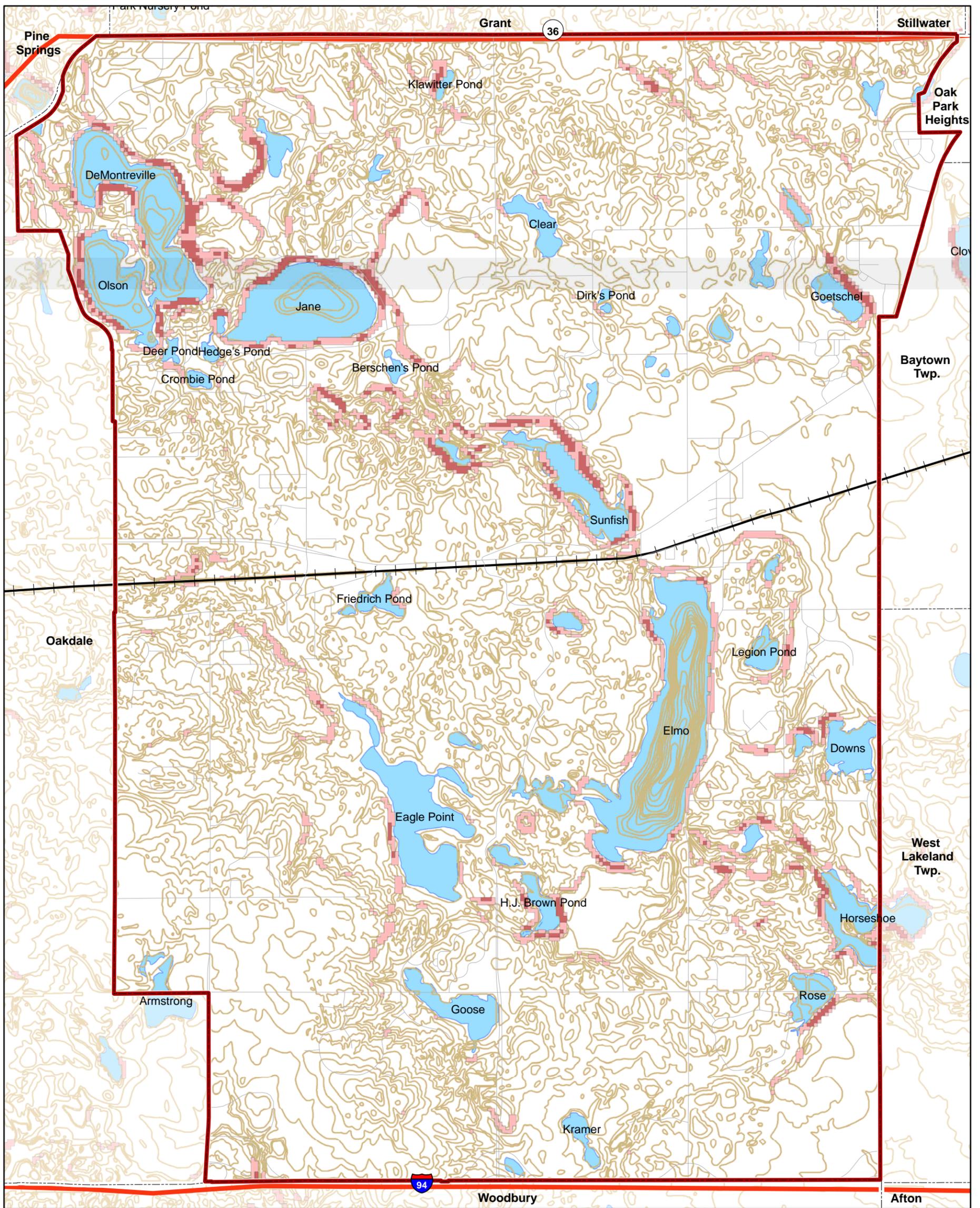
The City of Lake Elmo is located in central Washington County in the eastern portion of the Minneapolis-St. Paul Metropolitan Area as shown in Figure 1. The City of Lake Elmo was established in 1969. The City is home to four priority lakes, varying in size from 87 to 257 acres. The City also includes some high quality natural areas and rare species. Many of these areas are within the Lake Elmo Regional Park Reserve.

Between 1970 and 1980, Lake Elmo experienced a significant increase in the number of households (84%). Development slowed during the 1980s and 1990s (17 - 19% increases in households), and is forecasted to grow significantly through 2030. Between 2010 and 2030, the City is projected to add over 5,000 households and increase its population by approximately 14,000. Much of the growth is expected to occur within the Old Village Area and south of 10th Street.

2. Topography

The topography of Washington County is dominated by hills of the St. Croix moraine, which was created during the late Wisconsinan glaciation. The moraine was formed as the edge of the glacier, which was obstructed by the rise in bedrock elevation toward the edge of the Twin Cities basin, stabilized its position. As the glacier retreated, ice blocks left behind were buried in topographic lows on the bedrock surface. The gradual melting of these blocks of ice created many depressions and lakes. Some of these wetlands and lakes are visible throughout Lake Elmo today.

There are areas of steep slopes surrounding the lake system in Lake Elmo located generally from the northwest corner of the City towards the southeast corner. Steep slopes are also found in the area around Goetchel Pond in the northeastern part of the City. The topographical and slope characteristics in the City are shown on Figure 2.

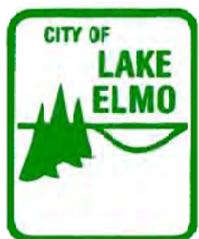


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FIGURE 2: TOPOGRAPHY

Surface Water Management Plan

2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: February 2009
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TKDA
ENGINEERS • ARCHITECTS • PLANNERS



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Legend

- City Boundary
- Areas where slopes of 12% to 18% are more likely to be found
- Areas where slopes greater than 18% are more likely to be found
- 10 foot Contours

Sources: MnDNR, Metropolitan Council, TKDA

3. Soils

The Soil Conservation Service (SCS), now the Natural Resources Conservation Service (NRCS), published the *Soil Survey of Washington and Ramsey Counties* in 1980. The publication provides soil location maps and information on the physical properties of soils found in both Washington and Ramsey County.

NRCS has identified three soil associations (soil patterns) within the City of Lake Elmo. A general description of these associations is given below.

Antigo-Chetek-Mahtomedi Association – These soils are formed dominantly in outwash. They are described as nearly level to steep, well drained to excessively drained, medium textured to coarse textured soils; mostly on outwash plains. These soil types are located in the north central and south eastern areas of the City as well as a small portion in the southwestern area of the City.

Santiago Kingsley Association – These soils formed dominantly in glacial till. They are described as undulating to steep, well drained, medium textured and moderately coarse textured soils, and are found on uplands. These soils are found generally in the south western portion of the City reaching north easterly through the central area of the City.

Antigo-Comstock Association – These soils are formed dominantly in silty mantle and the underlying sandy outwash and in silty lacustrine sediments. They are described as level to moderately sloping, well drained and somewhat poorly drained, medium textured soils on outwash plains and glacial lake plains. These soils are found in the south eastern corner of the City as well as the east central border of the City. A small area in the north central area also has these soil characteristics.

The nature of soils comprising the top layer of unconsolidated material in a watershed is important because soil properties are a primary factor in determining the volume of runoff associated with a given rainfall event. The NRCS *Soil Survey* assigns soil types to a hydrologic group depending on the soils ability to infiltrate water during long-duration storms. The four hydrologic soil group classifications are described below.

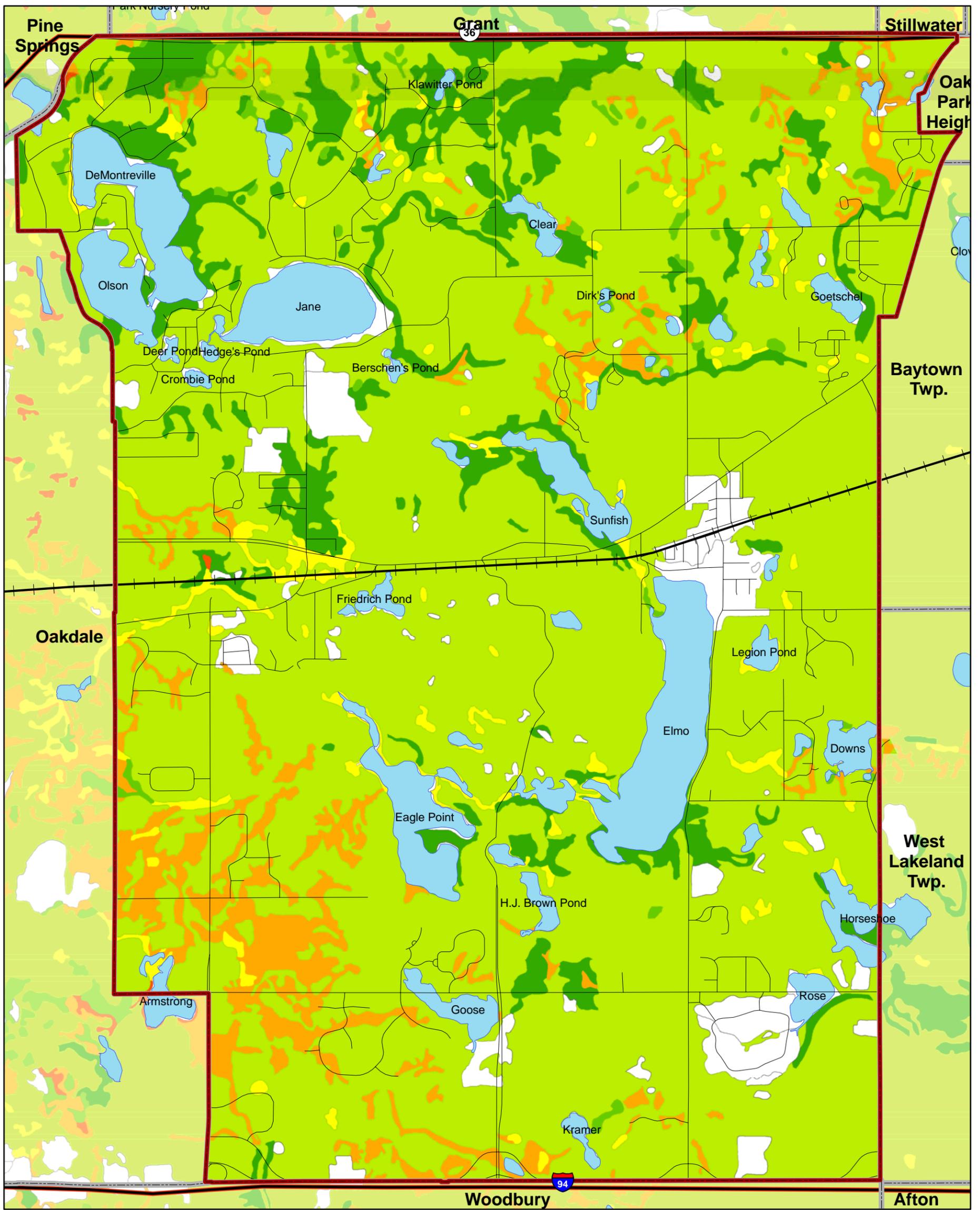
Group A soils have low runoff potential and high infiltration rates even when thoroughly wetted. These consist of deep, well-drained sands or gravels.

Group B soils have moderate infiltration rates and the potential for runoff. They consist of moderately-deep to deep, and moderate to well-drained soils.

Group C soils have low infiltration rates and generally impede the downward movement of water. These soils have more moderately-fine to fine textures and provide greater amounts of runoff volumes when thoroughly wetted.

Group D soils have very low infiltration rates and very high runoff potential. These soils are associated with clays with high swelling potential and soils with a high permanent water table.

The hydrologic soil groups located within the City are shown on Figure 3. Land disturbing activities can change a soil's physical properties; therefore, actual conditions of a particular site may vary somewhat from the general conditions identified on the hydrologic soils map.

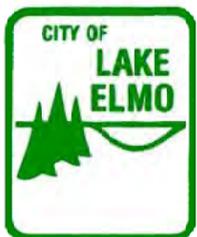


K:\gis\LAKEELMO\PROJECTS\2009 SWMP\Maps\Figure 3-HydrologicSoilsGroupMap.mxd

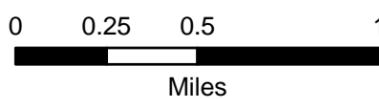
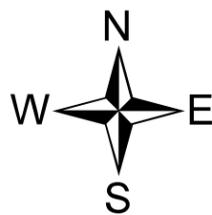
FIGURE 3: HYDROLOGIC SOILS

Surface Water Management Plan

2030 Comprehensive Plan
City of Lake Elmo, Minnesota



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Legend

- | | |
|-------------------------------|---------------|
| Hydrologic Soils Group | City Boundary |
| A | Lakes |
| A/D | |
| B | |
| B/D | |
| C | |
| C/D | |
| D | |
| Not Rated | |

Sources: NRCS, TKDA

4. Ground water

The ground water resources of Washington County are contained in geologic formations called aquifers. The depth to which wells must be drilled and the amount of water they will yield depend on the ability of subsurface materials to store and to transmit water. The Prairie du Chien-Jordan, Franconia-Ironton-Galesville, Mt. Simon and Quaternary (water-table) aquifers are the most used in the County.

The Prairie du Chien and Jordan Sandstone together form the most heavily used aquifer in the County. In some parts of the County, it is up to 200 feet thick. Since no regional confining bed separates these two aquifers, they act as a single aquifer. In general, the ground water flows from the highest water level elevation in northern Washington County toward the Mississippi and St. Croix Rivers.

The Minnesota Geological Survey has established aquifer sensitivity ratings, related to the ability of a contaminant to reach the aquifer. Figure 4 shows the Geologic Sensitivity of the Uppermost Aquifer to Pollution and identifies these areas within the City. The City has areas of High and High-Moderate areas of sensitivity throughout the eastern and central portions of the City. Moderate, Low-Moderate, and Low areas of sensitivity make up the remaining area within the City in the southern, western, and northern portions of the City.

The City of Lake Elmo recognizes the importance of ground water sensitivity and will work with Washington County, local Watershed Districts, and other agencies to protect local ground water resources. The City will implement its land use plan, ordinances, and the policies included in this surface water management plan to protect ground water resources.

Lake Elmo also has two areas identified as Special Well Construction Areas (SWCA); the Baytown/West Lakeland SWCA and the Washington County Landfill SWCA.

a. Baytown/West Lakeland SWCA

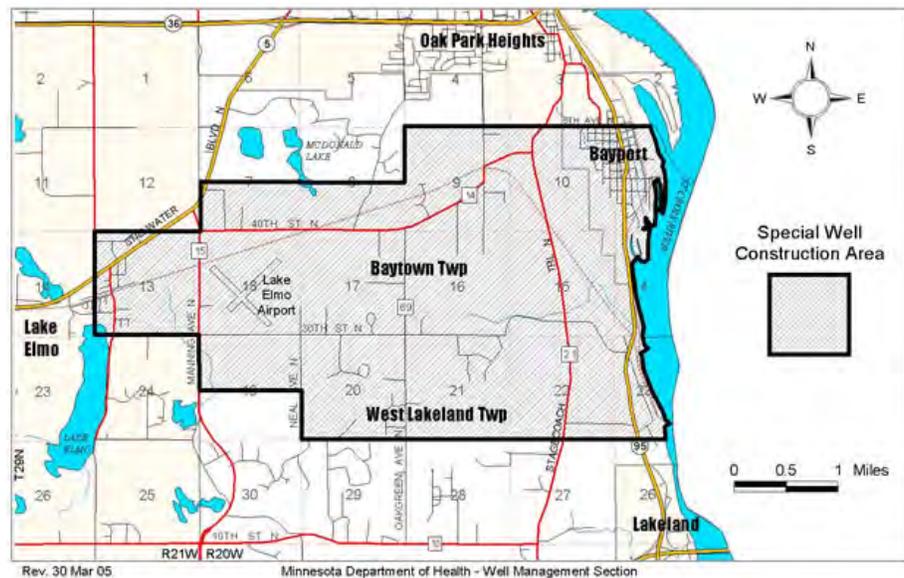
The Baytown SWCA begins just west of the Lake Elmo Airport and extends eastward to the City of Bayport and the St. Croix River. It includes portions of Lake Elmo, Baytown Township, Bayport, and West Lakeland Township. The entire area of contamination in the Baytown SWCA is approximately six square miles.

Ground water movement in the area is generally west to east. Most of the existing private residential wells are within the Prairie du Chien and Jordan aquifers. Bayport's municipal water supply and a

few newer residential developments in eastern Baytown Township have wells drilled into the Franconia aquifer.

Volatile organic compounds (VOCs) were first found in the ground water in 1987. Additional well sampling showed VOC contamination across a wide area. In 1988, the MDH issued a well-drilling advisory for portions of West Lakeland Township, Baytown Township, and Bayport. This advisory puts limits on the construction of new wells, and requires additional water testing of new wells. The well drilling advisory remains in effect today. It has recently been expanded to reflect the spreading of the contaminants. The main contaminant found is trichloroethylene (TCE). TCE is commonly used for metal cleaning and degreasing, and as a dry cleaning solvent. In 2004, the MPCA found a major source of the TCE contamination one mile northwest of the Lake Elmo Airport, on the site of a former metal fabricating shop in Lake Elmo.

The location and extent of the SWCA is shown below. For additional information, the MDH provides updates on this SWCA at <http://www.health.state.mn.us/divs/eh/wells/swca/baytown.html>.



Cleanup of the site is under the direction of the MPCA. The major components of the selected cleanup action at the site include:

- ◆ Continued monitoring of private wells, sampling of private water supply wells, and installation, change out, and maintenance of granular activated carbon (GAC) filter systems.
- ◆ An air stripping treatment system at Bayport Municipal Well #2.

- ◆ Containment and treatment of TCE in ground water at the primary source zone, a former metal fabricating shop located in Lake Elmo. Two approaches are being implemented for this method as follows:
 - ▶ **Containment (Hydraulic barrier)** - The MPCA constructed a hydraulic barrier to capture or contain the TCE plume and prevent off-property migration of contaminated ground water. The barrier consists of “extraction” wells which collectively capture the contamination before it can migrate off the property. The extracted water is then treated by air stripping to remove the TCE from the water. The pumps for the barrier system were started up on March 17, 2008. This barrier is anticipated to operate continuously to control the ground water gradient so that high concentrations of contamination are unable to continue to migrate to the east. The barrier will likely operate for at least 5-10 years.
 - ▶ **Source treatment** - Ground water beneath the source zone will be treated using a treatment train approach. Treating the source area directly will help to minimize the necessary duration for the hydraulic barrier and ultimately the time downgradient wells must remain on whole-house GAC filters. In-situ chemical oxidation is currently being evaluated as an additional element of this approach.

For additional information on the cleanup of this site, the MPCA provides the most up-to-date information at <http://www.pca.state.mn.us/cleanup/sites/baytown.html>.

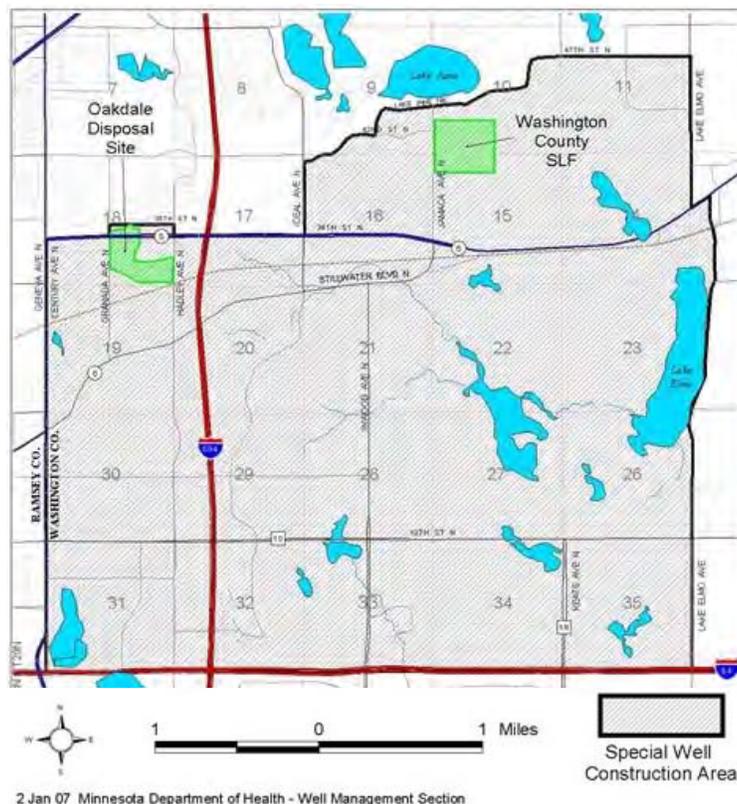
b. Lake Elmo-Oakdale Special Well Construction Area (formerly the Washington County Landfill Special Well Construction Area)

This Special Well Construction Area consists of two disposal areas; the Washington County Landfill and the Oakdale disposal site.

The Washington County landfill is located one-quarter mile south of Lake Jane, in the City of Lake Elmo. Washington County owns the landfill and operated the landfill under a solid waste permit authorized in 1969. In early 1981, the MPCA received a hotline tip that hazardous wastes were placed in the landfill. Subsequent sampling in 1981 detected volatile organic chemicals (VOCs) and sampling done by MDH in 1982 detected VOCs including trichloroethylene and tetrachloroethylene in private drinking water wells. In 1982, the MDH issued a well advisory of approximately one square mile. The advisory alerted well contractors and local officials to the problems of ground water contamination in the area

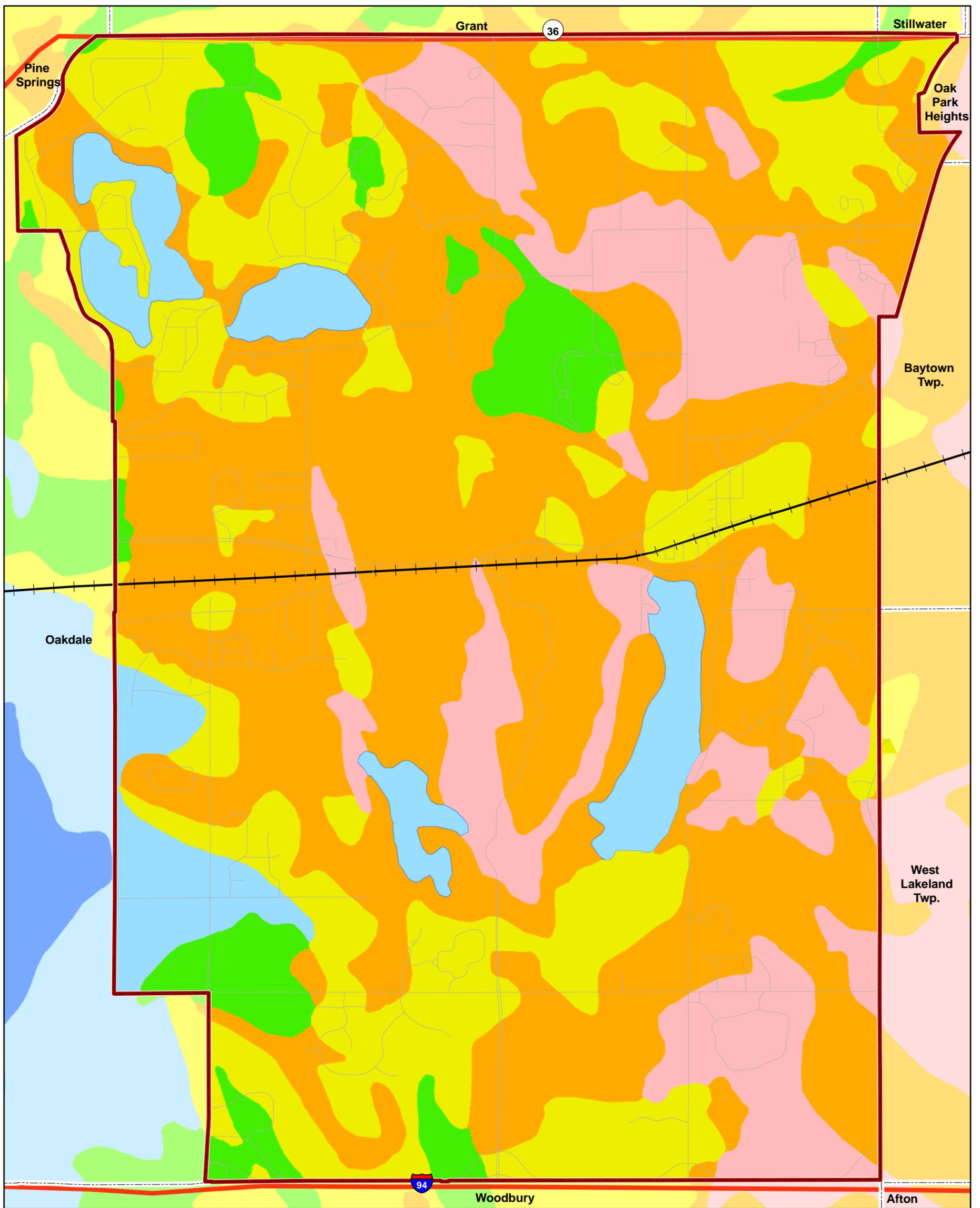
of the landfill and instructed that the MDH be contacted before any well construction is undertaken within one mile of the area. The boundaries were revised in 1983, and in 1993 the advisory became a Special Well Construction Area. The landfill is located in an abandoned gravel pit and is hydraulically connected to the Prairie du Chien-Jordan aquifer. The natural ground water flow direction is generally to the southwest.

The Oakdale disposal site was used in the 1940s through the 1960s for disposal of commercial, industrial, and residential wastes. Site investigations in 1980 discovered contaminants, including VOCs. In 2003, perflourochemicals (PFCs) began to be investigated by the MPCA. PFCs are chemicals used in products resistant to heat, oil, grease, and water, and which appear to be persistent in the environment. PFCs were produced by the 3M Company (3M) at its Cottage Grove facility and wastes were disposed at the Washington County Landfill and at the Oakdale disposal site. The SWCA designation was renamed and the boundaries revised in March 2007 to include both the Washington County Landfill and the Oakdale disposal site. The site boundaries now include approximately 20 square miles. This area makes up the Lake Elmo-Oakdale SWCA. The location and extent of the SWCA is shown below. For additional information, the MDH provides updates on this SWCA at <http://www.health.state.mn.us/divs/eh/wells/swca/lakeelmo.html>.



The MPCA issued a Remedy Decision Document in 2007 for this SWCA which identified the selected course of action for this site. After considering the evaluation of remedy alternatives, comments from the public, and the information gathered through the MPCA's environmental investigations, the MPCA determined that a "Dig & Line" option is the most effective remedy. The Dig & Line remedy will consist of excavating the Landfill's waste and placing it in a new facility with a triple liner and leachate collection system in the approximate location of the current landfill. This process will take approximately three years to complete. Leachate that accumulates will be recirculated back through the waste. This option will effectively contain the source of PFC and VOC waste and remove it from the ground water pathway. As a result, human exposure to contaminants via drinking water sources and the continued degradation of the ground water resource will be mitigated.

For additional information on the cleanup of this site, the Minnesota Pollution Control Agency provides the most up-to-date information under the Washington County Landfill Site at <http://www.pca.state.mn.us/cleanup/pfc/pfcsites.html>.

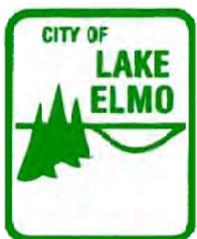


K:\gis\LAKEELMO\PROJECTS\2009 SWMP\Maps\Figure 4-AquiferSensitivityMap.mxd

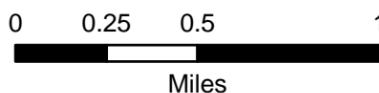
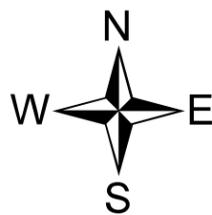
FIGURE 4: AQUIFER SENSITIVITY

Surface Water Management Plan

2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: February 2009
Prepared by:



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Legend

- City Boundary
- VERY HIGH
- HIGH
- HIGH-MODERATE
- MODERATE
- LOW-MODERATE
- LOW
- VERY LOW
- WATER

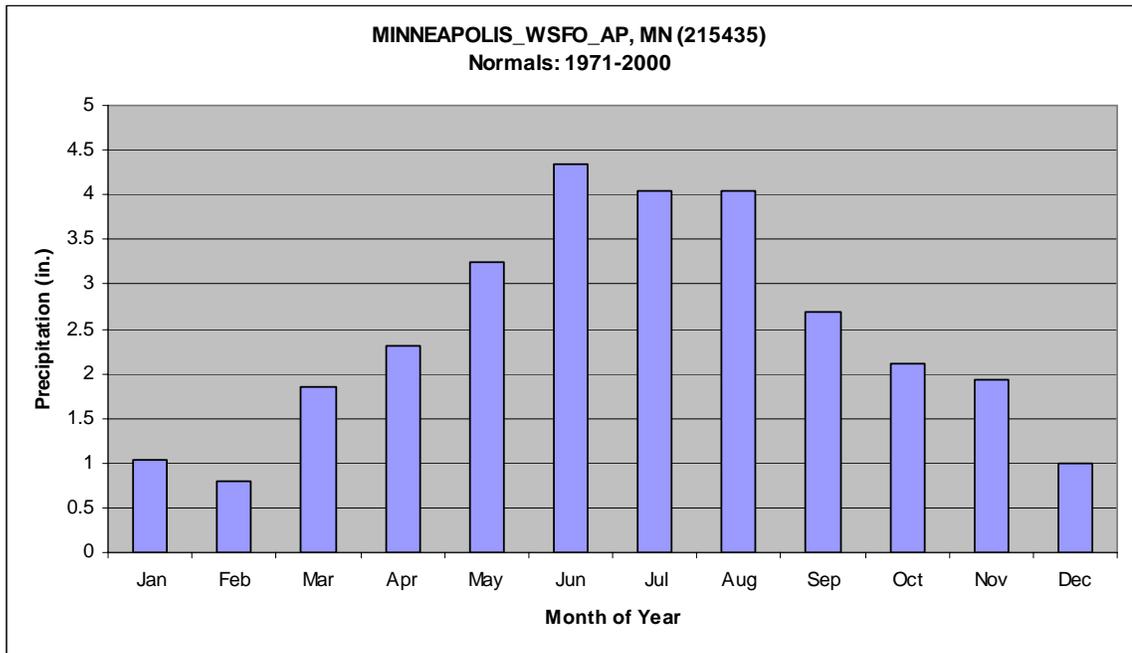
Sources: Washington County Digital Geological Atlas, TKDA

5. Climate

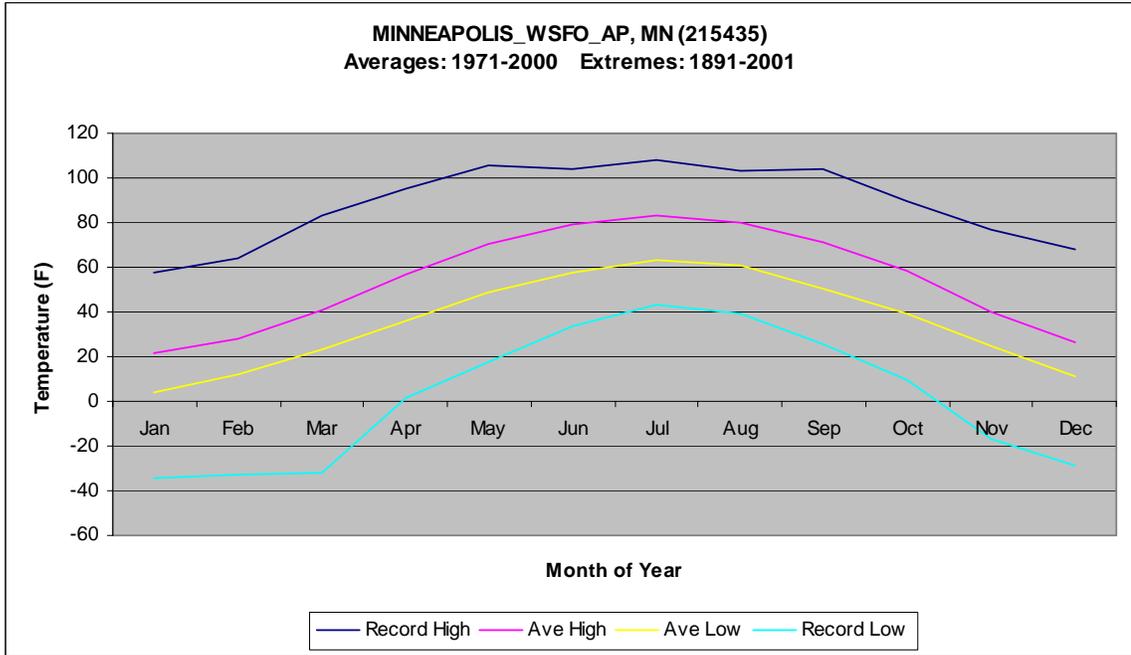
This City is located near the center of the North American continent, which greatly influences climate. The climate is continental, meaning cold winters and mild summers characterize the area, the result of being near the center of a large land mass. Polar air masses dominate during the winter season resulting in cold, dry weather. Warm and moist air masses, originating from the Gulf of Mexico, share predominance during the summer with tropical air masses from the desert southwest resulting in warm days and nights. The spring and fall seasons are transition periods, characterized by alternating intrusions of air from various sources. The diverse nature of the air masses impacting Minnesota’s climate leads to seasonal temperature extremes within the City.

The National Weather Service station at Chanhassen has published climatic summaries of precipitation, temperatures, snowfall, heating degree days and cooling degree days; all of which are summarized in Figures 5 through 9.

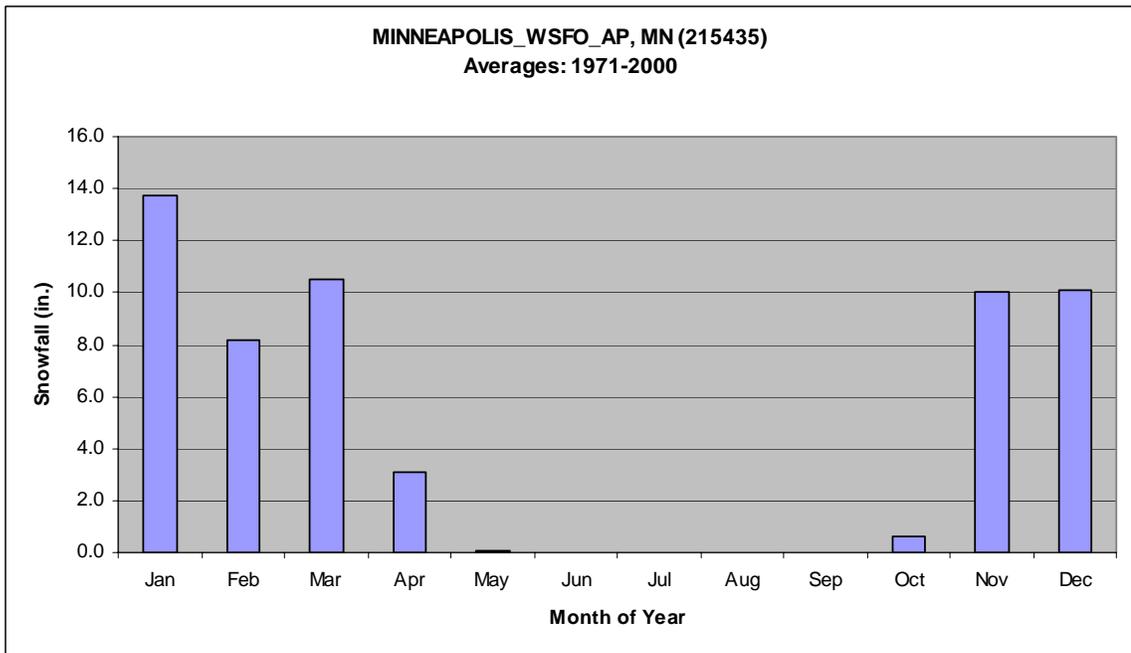
**Figure No. 5:
Normal Monthly Precipitation**



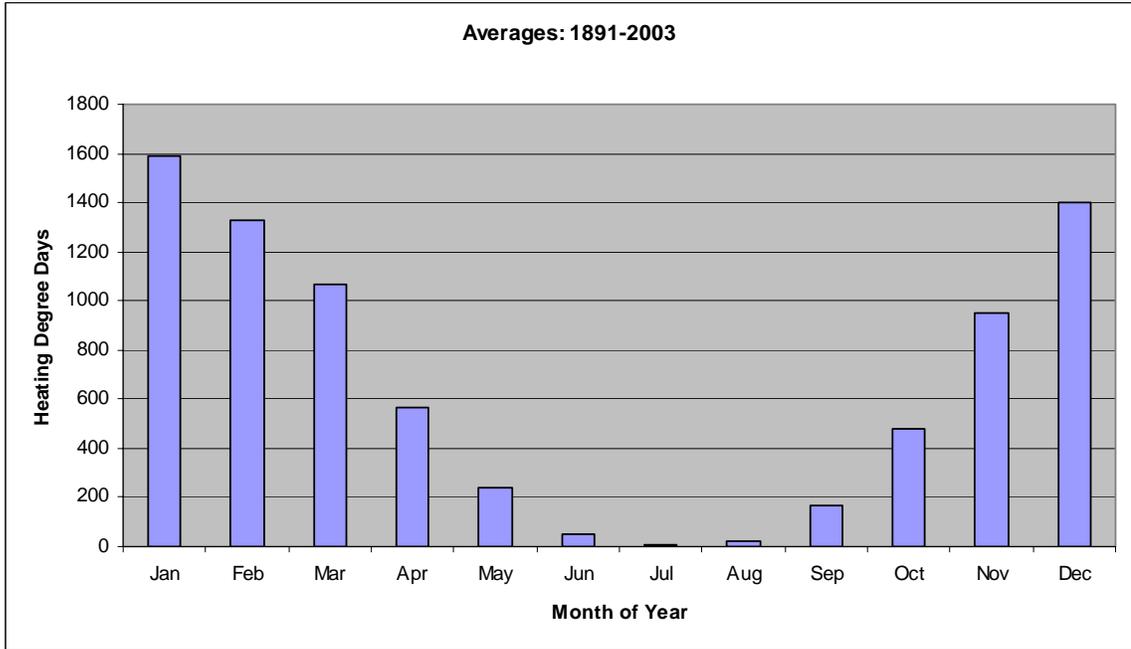
**Figure No. 6:
Average High and Low and Extreme Temperatures**



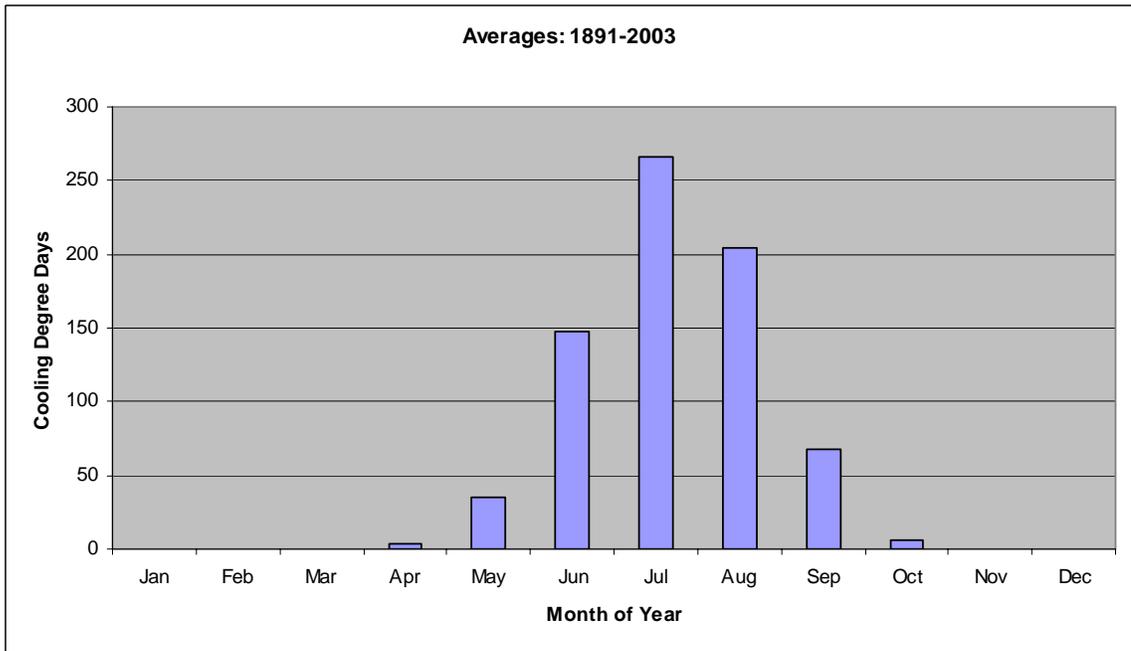
**Figure No. 7:
Average Monthly Snowfall**



**Figure No. 8:
Average Monthly Heating Degree Days**



**Figure No. 9:
Average Monthly Cooling Degree Days**



6. Surface Water Resources

Wetlands and open water are prevalent in the landscape and constitute nearly 10% of the City. The MnDNR has regulatory authority over all lakes, wetlands, and watercourses defined as public waters within the state and utilizes county-scale maps to show the general location of the public waters and public waters wetlands (lakes, wetlands, and watercourses) under its regulatory jurisdiction. These maps are commonly known as Public Waters Inventory (PWI) maps. The regulatory “boundary” of these waters and wetlands is called the ordinary high water level (OHWL). Figure 10 and the table below identify the major public waters located in the City of Lake Elmo.

**Table No. 1:
Public Waters, Lakes, and Wetlands**

<i>Name</i>	<i>DNR Public Waters No.</i>	<i>Surface Area (Acres)</i>	<i>Maximum Depth (ft)</i>
DeMontreville (Lake)	82-101 P	158	24
Eagle Point (Lake)	82-109 P	154	6
Elmo (Lake)	82-106 P	297	140
Horseshoe (Lake)	82-74 P	76	11
Jane (Lake)	82-104 P	154	39
Olson (Lake)	82-103 P	87	15
Sunfish (Lake)	82-107 P	73	Not determined
Armstrong	82-116 W	6	-
Berschen’s Pond	82-105 W	6	-
Beutel’s Pond	82-399 W	3	Not determined
Clear	82-99 W	25	10
Crombie Pond	82-386 W	7	-
Deer Pond	82-385 W	6	-
Dirk’s Pond	82-389 W	3	-
Downs	82-110 W	38	7
Friedrich Pond	82-108 W	17	Not determined
Goetschel	82-313 W	22	14
Goose	82-113 W	42	5-7
H.J. Brown Pond	82-111 W	21	-
Hedge’s Pond	82-387 W	5	-
Klawitter Pond	82-368 W	5	Not determined
Kramer	82-117 W	28	Not determined
Legion Pond	82-462 W	18	Not determined
Rose	82-112 W	26	Not determined
Unnamed Wetlands	82-100; 82-314; 82-315; 82-316; 82-366; 82-367; 82-369; 82-370; 82-371; 82-384; 82-388; 82-390;	198	-

<i>Name</i>	<i>DNR Public Waters No.</i>	<i>Surface Area (Acres)</i>	<i>Maximum Depth (ft)</i>
	82-391; 82-392; 82-398; 82-400; 82-412; 82-413; 82-414; 82-415; 82-416; 82-417; 82-418; 82-419; 82-420; 82-460; 82-463; 82-484		

Sources: MnDNR, VBWD, TKDA

a. Lakes

There are 52 lakes and wetlands within Lake Elmo that are listed as public waters by the MnDNR. Seven of these are classified as lakes and the remaining include 17 named wetlands and 28 unnamed wetlands. The public waters lakes are listed in the table above. Size and depth of these water bodies is included where available from the MnDNR. The total land area approximates 1,475 acres of public water within the City.

Lake Information Reports for the seven named lakes in this area are included in the Appendix. These reports are a summary of MnDNR data and describe available public access information, lake characteristics, water level histories, and water quality information. Additional information on these lakes is available from the VBWD Watershed Management Plan.

The Metropolitan Council has identified four priority lakes in Lake Elmo; DeMontreville, Olson, Jane, and Lake Elmo. The “priority lake” designation is used to focus the Council’s limited resources, and to identify lakes that will require completion of a nutrient budget analysis during environmental review processes.

b. Wetlands

The relatively flat topography and wet soil conditions in Lake Elmo result in extensive wetland areas. Wetland community types within the City include a full range of wetlands, from emergent wetland habitats, to scrub and shrub wetland habitats, as well as forested wetland habitats. However, the primary wetland features in the City include deep water and shallow water habitats due to the extensive lake network within the City. The wetland areas within the City are illustrated in Figure 11.

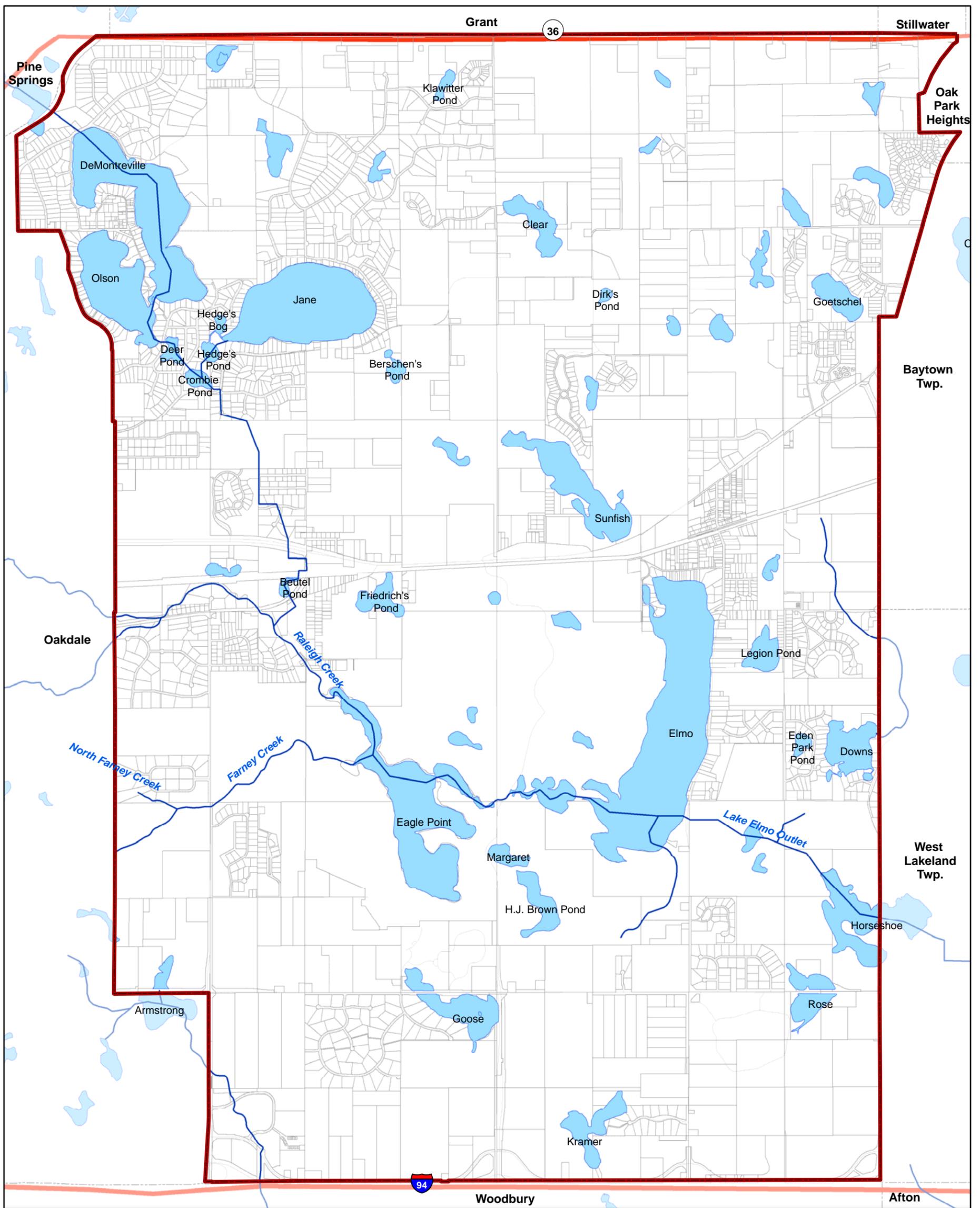
Wetland areas are valuable resources that provide many benefits to the City and surrounding areas. Some of these benefits include ground water recharge, filtration of sediments and nutrients, flood control, wildlife habitat, and scenic value.

The VBWD is currently conducting a functional assessment of wetlands within the District as a part of its adopted Watershed Management Plan. The District has adopted standards for wetland management in its Watershed Management Plan. The BCWD and SWWD have completed functional assessments of wetlands within their Districts, and set standards for wetland management in their Watershed Management Plans.

c. Rivers and Streams

Raleigh Creek. Raleigh Creek is the dominant stream that flows through Lake Elmo. Raleigh Creek is a major subwatershed within the VBWD. It is an intermittent stream that begins in the City of Oakdale, west of I-694 and south of TH 5. From there, water flows easterly, enters the City of Lake Elmo and crosses Stillwater Boulevard near its intersection with 31st Street North, directly east of Tablyn Park. A tributary enters Raleigh Creek from south of Stillwater Boulevard and just east of the Ideal Avenue intersection. In addition, the discharge from Beutel Pond enters Raleigh Creek near the Stillwater Boulevard intersection. From near Tablyn Park and Stillwater Boulevard, Raleigh Creek flows southerly to Lake Elmo Park Reserve and the northernmost bay of Eagle Point Lake. VBWD has completed a Watershed Management Plan for Raleigh Creek and extensive information about this subwatershed can be found in the VBWD's Watershed Management Plan.

Farney Creek and North Farney Creek. Farney Creek and North Farney Creek are located within the Eagle Point Lake subwatershed within the VBWD. These creeks are located south of Raleigh Creek in the City of Lake Elmo and drain into Eagle Point Lake. Farney Creek is an intermittent stream that enters the lake's west side. Additional details can be found in the VBWD's Watershed Management Plan for Eagle Point Lake.

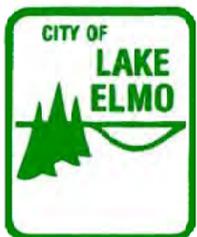


K:\gis\LAKEELMO\PROJECTS\2009 SWMP\Maps\Figure 10-PublicWatersInventory Map.mxd

FIGURE 10: PUBLIC WATER INVENTORY

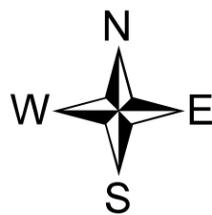
Surface Water Management Plan

2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: February 2009
Prepared by:

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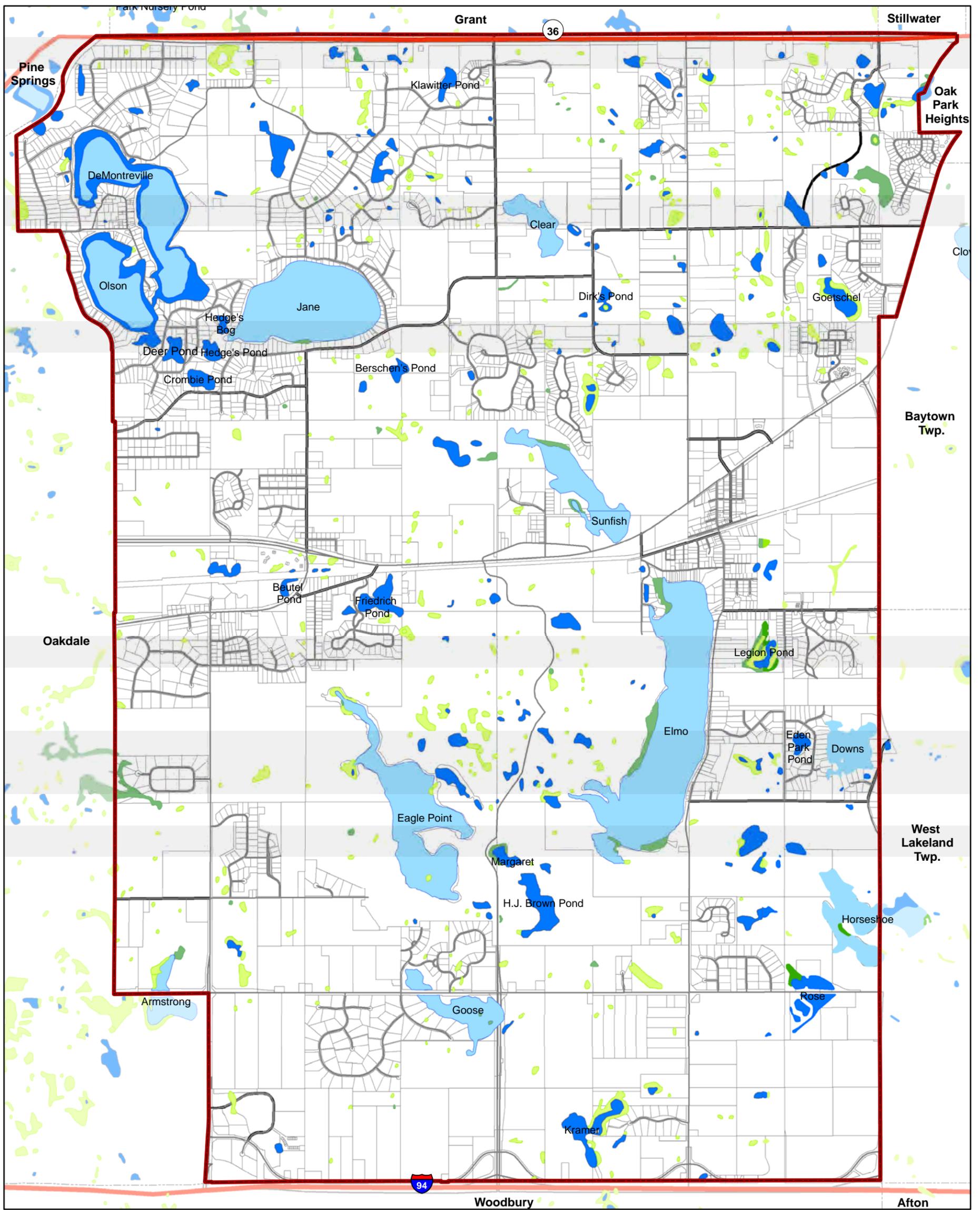


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Legend

- City Boundary
- Streams Network
- Public Waters
- Local Roads
- Major Highways

Sources: MnDNR, TKDA

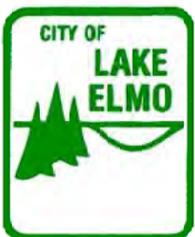


K:\gis\LAKEELMO\PROJECTS\2009 SWMP\Maps\Figure 11-WetlandsMap.mxd

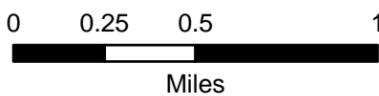
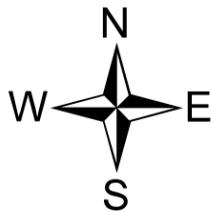
FIGURE 11: WETLAND INVENTORY

Surface Water Management Plan

2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: February 2009
Prepared by:



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Legend

- City Boundary
- Emergent Habitat
- Scrub/Shrub Habitat
- Forested Habitat
- Deep Water Habitat
- Shallow Water Habitat
- Major Highways
- Parcels

Sources: MnDNR, Metropolitan Council, TKDA

7. **Floodplains**

Land use regulations define the floodplain as the area covered by the flood that has a one percent chance of occurring each year, also known as the 100-year flood. The floodplain is divided into two zoning districts: the floodway and flood fringe. The floodway includes the river channel and nearby land areas which must remain open to discharge the 100-year flood. The flood fringe, while in the flood plain, lies outside the floodway. Regulations usually allow development in the flood fringe but require flood-proofing or raising to the legal flood protection elevation.

In 1968, Congress created the National Flood Insurance Program (NFIP) to make flood insurance available to property owners at federally subsidized rates. The NFIP required communities to adopt local laws to protect lives and future development from flooding. The Federal Emergency Management Agency (FEMA) first must formally notify a community that it has special flood hazard areas (SFHA) before it can join the NFIP. FEMA notifies communities by issuing a Flood Hazard Boundary Map (FHBM). This map shows the approximate boundaries of the community's 100-year flood plain. Each participating community has a special conversion study or a Flood Insurance Study (FIS). The FIS includes a floodplain map depicting the community's flood hazard areas.

In 2008, floodplain data was updated by Washington County. This update revised the floodplain zones within Lake Elmo, resulting in reductions to the floodplain zone surrounding Eagle Point Lake and other areas, and increasing the floodplain zone in areas like H.J. Brown Pond, Rose Lake, and other various wetland and ponds in the City. Figure 12 shows the comparisons of the 1979 FEMA floodplain zones and the 2008 update. The City will use the revised FEMA floodplain areas to identify flood zones upon approval of the revised data by FEMA. The revised floodplain maps will be effective February 3, 2010.

Local Issues. The VBWD Watershed Management Plan notes that local and regional flooding has been identified as priority issues within the watershed. Flood management has been expanded to include other issues of water quantity such as flooding, low water levels, high flows, and low flows. The WD indicates that water level and floodplain management issues are dependent on the hydrology and the physical conditions of the resource. Hydrology is dependent on the weather, the topography of the landscape, the soils, the land cover, and other factors. Changes to any of these factors will influence the water levels and floodplains of a water resource/basin. While some of the factors are difficult to control, changes to land cover can be regulated and/or managed. The VBWD collects data on lake levels, precipitation records, snowpack monitoring, and ground water levels to assist in managing the water levels and floodplains of the VBWD's water resources. In addition, flooding problems will be

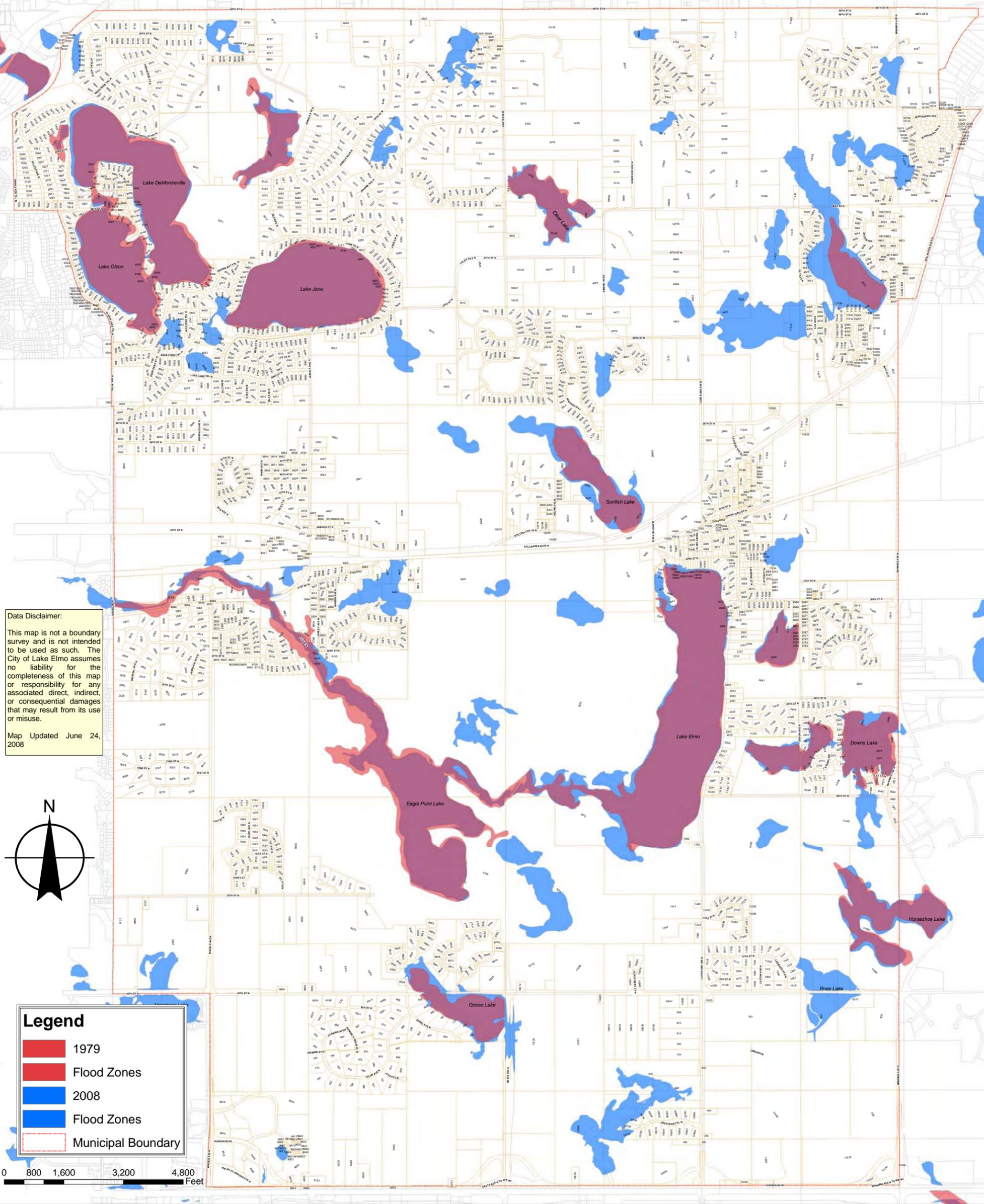
prevented through watershed standards for structure elevations, permit review, community plan review, and education efforts implemented through VBWD's Watershed Management Plan.

The SWWD Watershed Management Plan indicates that flooding problems result within the watershed as a result of substantial changes in the natural drainage system by the construction of interconnected storm water conveyance systems. In addition, existing developments around lakes (and other depressional storage areas) are potentially vulnerable to flood damage. This connectivity allows previously landlocked areas to drain while also providing storm sewer systems which efficiently collect and convey runoff, thereby increasing the volume and rate of runoff. New developments create impervious surfaces and further increase the connectedness of the conveyance system, burdening existing flood storage areas. The timing of peak flows from existing and new developments exacerbate flood storage challenges. The SWWD identifies the need to further identify and protect key flood storage areas; implement an Emergency Response Plan for flood events; identify critical inter-community flow crossings and assess actual flow rates as a means to address flooding problems within the watershed.

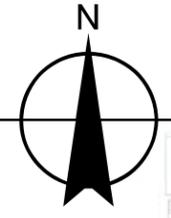
The BCWD Watershed Management Plan indicates that the District has recognized that changes in flooding characteristics can impact properties and natural resources. These changes to flood storage areas result from alterations to the floodplain or outlets of water bodies or storm water management facilities. There is an elevated risk of flooding if changes in adjacent land uses cause increased volumes of runoff to enter the basins. The District identified protection of flood storage areas and management of floodprone areas as issues for the District. In order to address these issues, the District has set goals to ensure no net loss of flood storage capability within the District; assess the potential for flooding properties when evaluating land management activities; minimize the risk of flooding to structures within landlocked basins; and to minimize the risk of flooding on downstream properties when outlets are provided for landlocked basins.

Flood zone areas in Lake Elmo are identified on Figure 12. The City has adopted a Floodplain Ordinance to protect and manage these areas.

CITY OF LAKE ELMO FLOODPLAIN COMPARISON MAP

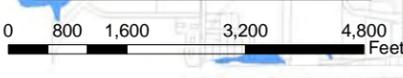


Data Disclaimer:
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 Map Updated June 24, 2008



Legend

- 1979
- Flood Zones
- 2008
- Flood Zones
- Municipal Boundary



8. Natural Resources

a. Land Cover, Natural Resources and Fish and Wildlife Habitat

The vegetation of Lake Elmo includes woodlands and hardwood forests, and wetland communities such as wetland prairies and wetland forests. The Minnesota County Biological Survey (MCBS) has identified some high quality hardwood forest areas that still remain in the City. These are located within the Lake Elmo Park Reserve and north of this area.

The MnDNR has identified regionally significant ecological areas (RSEA) and several of these areas of outstanding resource quality are located within Lake Elmo. These communities are located throughout the Park Reserve and in other areas of the community. Both the RSEA and MCBS areas are identified on Figure 13.

The County Biological Survey maps also include the approximate locations of several rare species of animals and plants found within the City of Lake Elmo. In general, the rare species locations coincide with the remaining natural communities in the City.

The Lake Elmo Park Reserve is 2,165 acres in size (3-1/2 square miles) with 80 percent of its acreage set aside for preservation and protection. This 80 percent will eventually resemble the land as it was prior to the arrival of the settlers in the mid-1800s. This park reserve offers gently rolling hills with a variety of landscape types, including forest and prairie. Washington County manages the Park Reserve.

The current land cover in Lake Elmo is identified on Figure 14, using data from the Minnesota Land Cover Classification System (MLCCS). MLCCS data is a natural resources inventory classification system that categorizes areas in terms of physical land cover. Agricultural and residential land uses predominate, along with the numerous wetlands, lakes and natural communities remaining in the City.

b. Greenway Corridors

The Metropolitan Council, the SWWD, and the City have mapped and identified Greenway and Wildlife Corridors throughout Lake Elmo. The wildlife corridors developed by the Metropolitan Council, the SWWD and City Greenways are shown on Figure 15. These corridors connect the significant natural areas identified by the County Biological Survey and the major water and natural resource areas. SWWD's Greenway proposes to connect the

regional park systems at Lake Elmo Park Reserve and the Cottage Grove Regional Park.

The Lake Elmo Park Plan recommends a Greenway loop that fully utilizes trails proposed by the Comprehensive Trail Plan focusing on connectivity within the park system. The Greenway along with the trail system provides for a highly connected park system and builds connections among the rural and future urban parts of the City. The Greenway loop makes use of the existing and proposed trails to create a route through the City with a unified identity as it runs through the different areas of the community. Where the Greenway utilizes existing trails or streets with limited width, signage and landscaping may be used as cues to let the user know to follow the Greenway. Where the trails have not yet been developed and where there is space for additional parkland acquisition, the Greenway may expand in width to allow for more significant landscaping, trees and resting places. Conservation subdivisions with open space abutting the Greenway would provide users access to views of natural and rural landscapes.

The BCWD and the WCD are currently compiling a list of priority areas for the development of a County-wide conservation corridor. This work is anticipated to progress over the next year for the Brown's Creek Watershed District and then move forward in other areas of the Conservation District.

SWWD has established a Greenway Corridor. In Lake Elmo, the Greenway extends north from Woodbury past the Eagle Point Business Park and then stretches eastward to connect to the Lake Elmo Park Reserve. The SWWD's ultimate goal is to connect the Cottage Grove Regional Park to the Lake Elmo Park Reserve via the greenway.

The VBWD recommended that the City identify a natural corridor which includes the area from the south end of Lake Elmo to Horseshoe Lake, including areas of public and semi-public land. This natural corridor extends south towards Lake Edith and Valley Creek and illustrates connection with the St. Croix River.

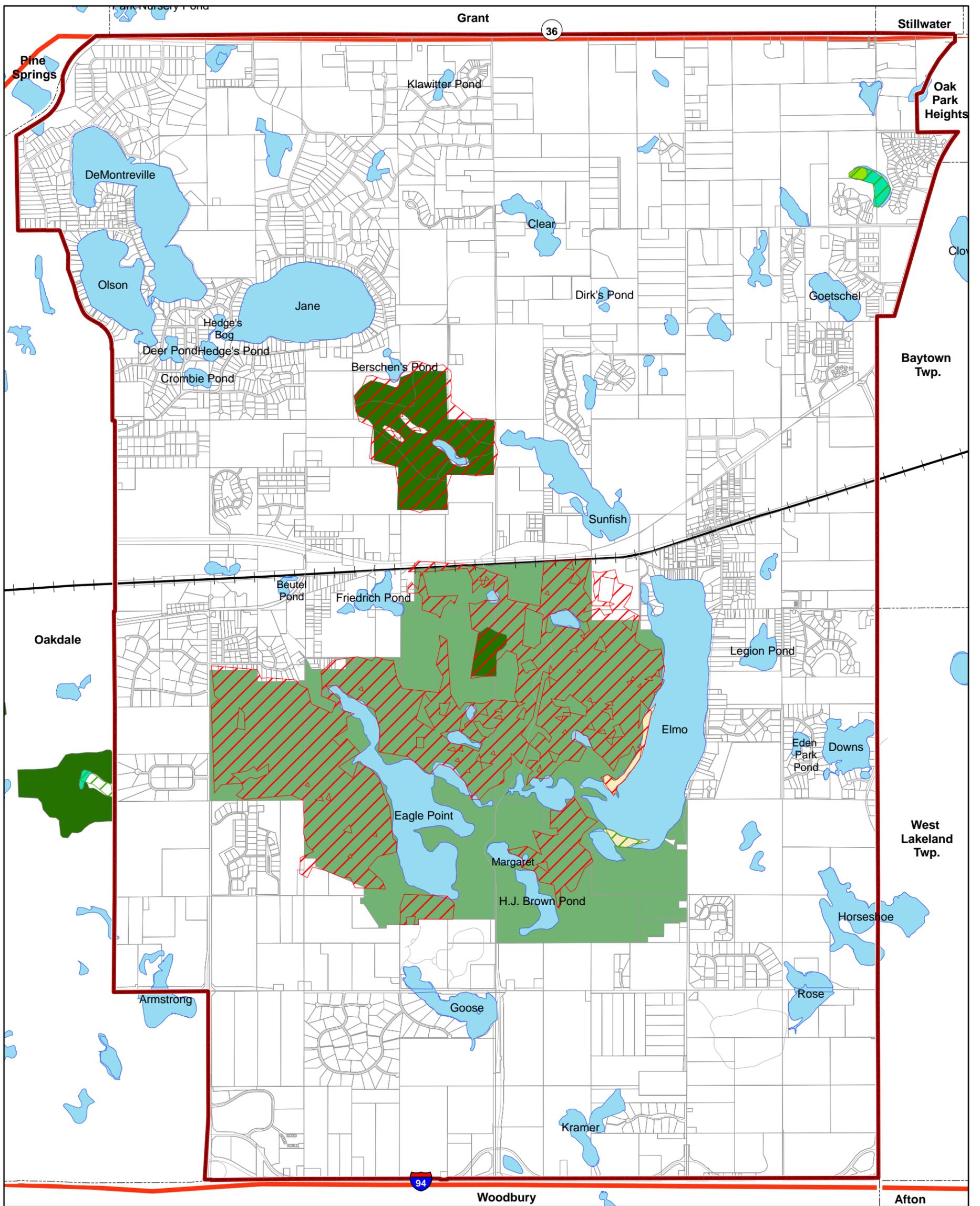
c. Surface Water Based Recreation and Access

Water bodies within Lake Elmo provide a variety of opportunities for recreation. Public access can be found on the following lakes within the City:

- ◆ Lake DeMontreville provides public access on the NW shore.

- ◆ Lake Elmo offers access along the west shore of the lake within the Lake Elmo Park Reserve.
- ◆ Lake Jane provides public access on the SSE shore of the lake.
- ◆ Olson Lake provides access via a channel from DeMontreville Lake with public access available on the NW shore.

The Lake Elmo Park Reserve provides opportunities for recreation, boating, camping, canoeing, fishing, trails, swimming, and nature observation. Facilities in developed areas of the reserve include an archery range, boat launch, campground, picnic shelters, swimming facilities, and trails.

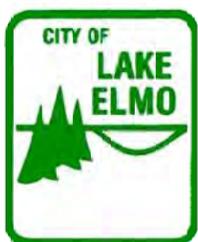


K:\gis\LAKEELMO\PROJECTS\2009 SWMP\Maps\Figure 13-NaturalPriorityAreasMap.mxd

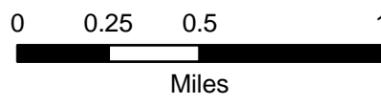
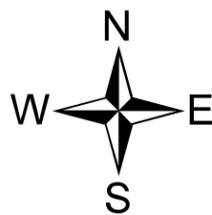
FIGURE 13: NATURAL PRIORITY AREAS

Surface Water Management Plan

2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: March 2009
Prepared by:

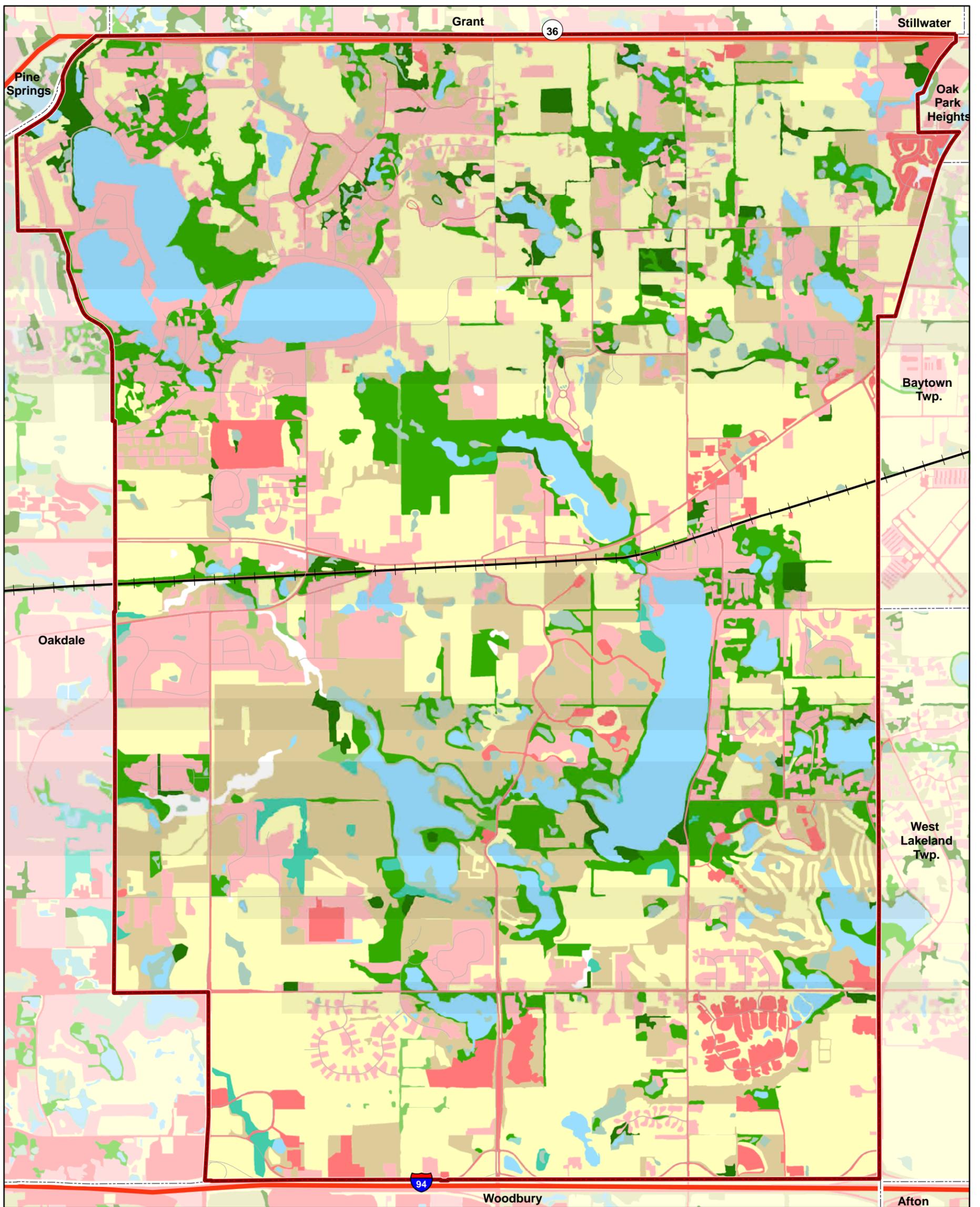


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Legend

- City Boundary
- Regional Parks and Open Space
- DNR Regionally Significant Natural Areas**
 - Moderate
 - High
 - Outstanding
- Minnesota County Biological Survey**
 - Hardwood Forest
 - Forested Wetland
 - Wetland Prairie
 - Inland Beach

Sources: County Biological Survey, MnDNR, TKDA

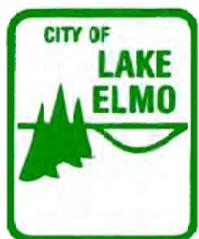


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FIGURE 14: LAND COVER

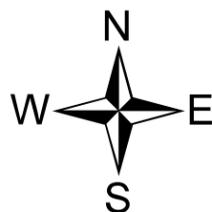
Surface Water Management Plan

2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: February 2009
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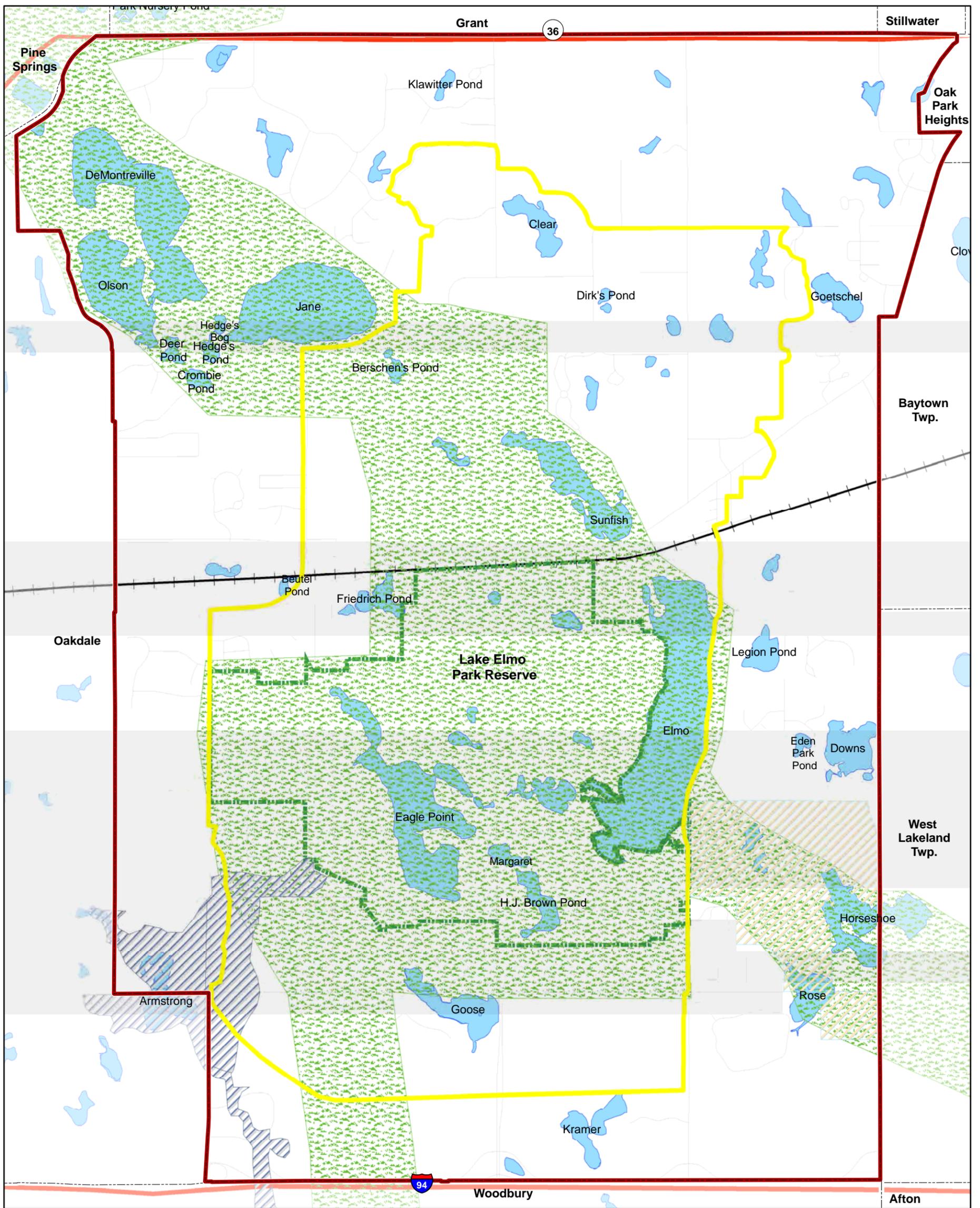


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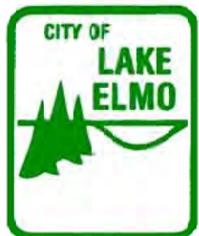
- Urban with Vegetative Cover
- Urban with Little Vegetative Cover
- Planted or Cultivated Vegetation
- Upland Forest
- Wetland Forest
- Woodland
- Upland Shrubland
- Wetland Shrubland
- Dry Grassland
- Wetland Prairie
- Water

Sources: MnDNR, TKDA



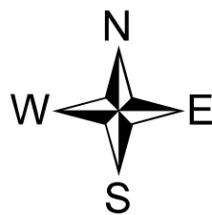
K:\gis\LAKEELMO\PROJECTS\2009 SWMP\Maps\Figure 15-GreenwayCorridorsMap.mxd

**FIGURE 15:
GREENWAY CORRIDORS**
Surface Water Management Plan
2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: July 2009
Prepared by:

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Legend

- City Boundary
- City Greenway/Beltway
- SWWD Greenway Corridor
- VBWD Natural Corridor
- Metropolitan Conservation Corridors
- Lake Elmo Park Reserve Boundary
- Lakes

Sources: MnDNR, Metropolitan Council, Lake Elmo, TKDA

9. Storm Water System

The existing mapped storm water conveyance system and storm water treatment system in Lake Elmo is identified on Figures 16A through 16D.

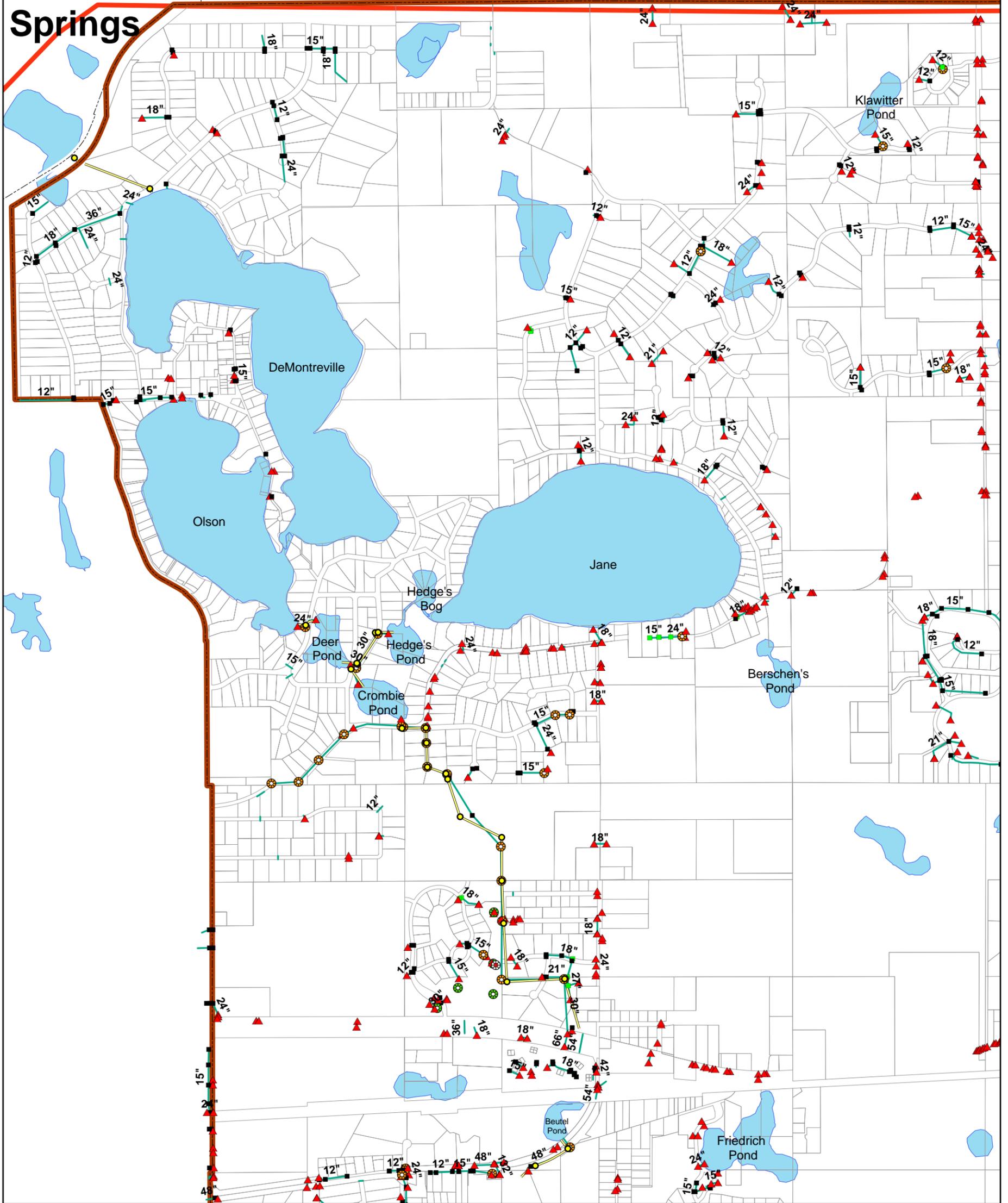
The backbone of the City's drainage system is the major flood-relief project that links drainage from the Tri-Lakes Area through the City and ultimately discharges at the City's eastern boundary at Horseshoe Lake. This project was completed by the VBWD (Project 1007). The VBWD is the owner and operator of the Project 1007 outlet system.

Lake Elmo is also comprised of a series of lakes, ponds, infiltration basins, and wetlands that collect storm water runoff within subwatersheds throughout the City. Developments are a combination of urban streets (curb and gutter with catch basins and storm sewer pipe) and rural streets (ditches). Various sizes and material of storm water pipe, manholes, catch basins, flared end sections, culverts, outlet control structures, skimmers, and ditches manage the conveyance of storm water.

These storm water facilities were required to be mapped for all sizes 24" and larger per the City's MS4 Permit requirement. The City began mapping efforts in 2006, utilizing GPS survey and existing record drawings to map the storm water system. Mapping data is updated annually as the system expands and new information is integrated.

Pine Springs

Grant

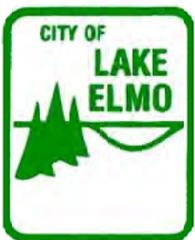


K:\gis\LAKEELMO\PROJECTS\2009 SWMP\Maps\Figure 16A-NW-StormwaterSystemMap.mxd

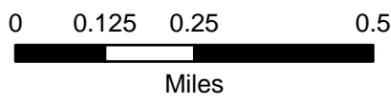
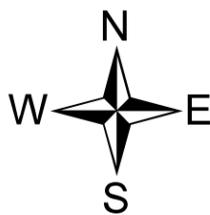
FIGURE 16A: STORM WATER SYSTEM (NW AREA)

Surface Water Management Plan

2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: February 2009
Prepared by:

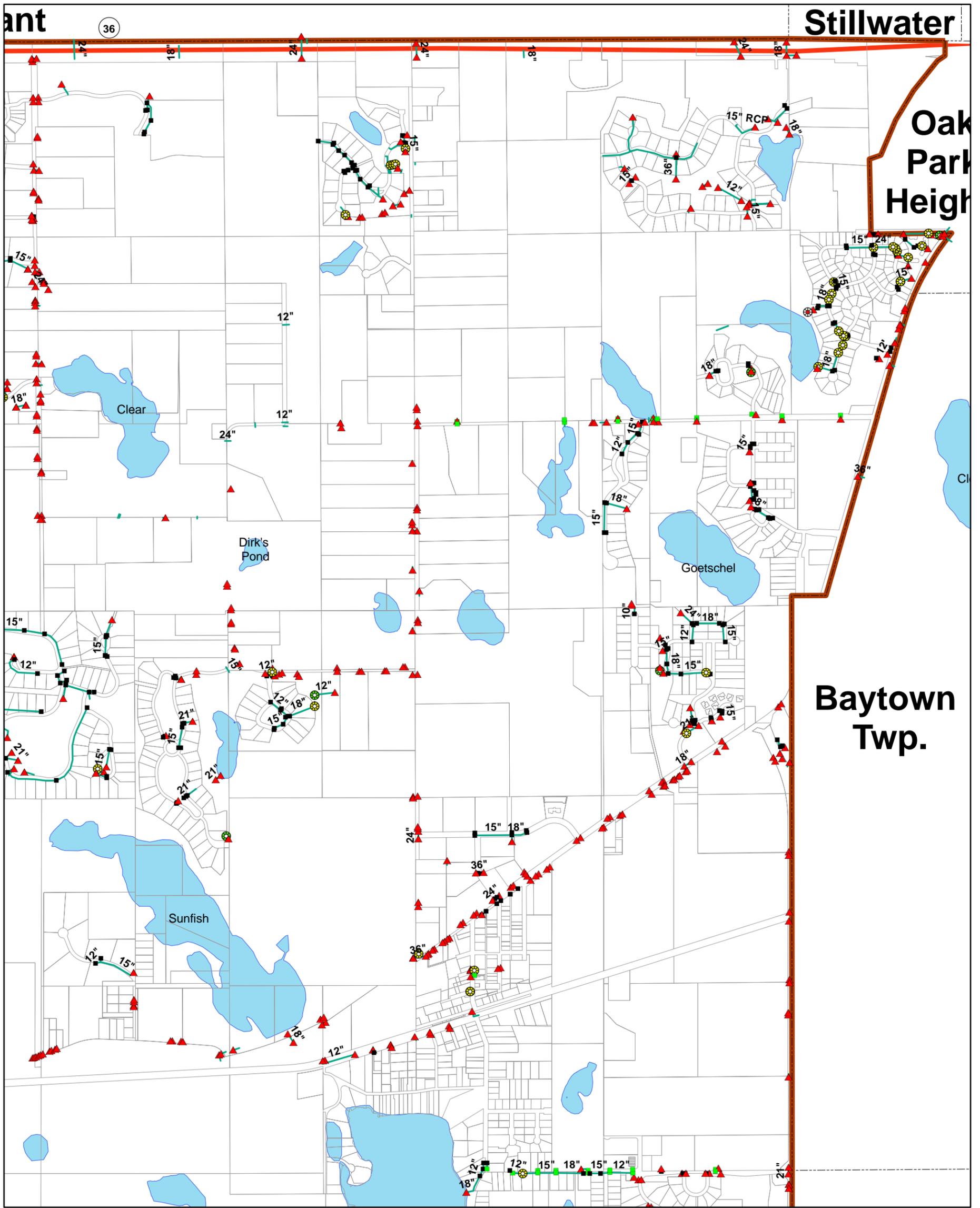


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Legend

- City Boundary
- Public Waters
- CB
- CB MH
- FES
- MH
- Outlet Control Structure
- Skimmer
- Storm Pipes
- Box Culvert
- VBWD Project 1007 Points
- VBWD Project 1007 Lines

Sources: City of Lake Elmo, TKDA

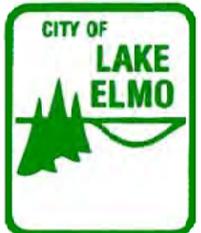


K:\gis\LAKEELMO\PROJECTS\2009 SWMP\Maps\Figure 16B-NE-StormwaterSystemMap.mxd

FIGURE 16B: STORM WATER SYSTEM (NE AREA)
Surface Water Management Plan
 2030 Comprehensive Plan
 City of Lake Elmo, Minnesota

Map date: February 2009
 Prepared by:

TKDA
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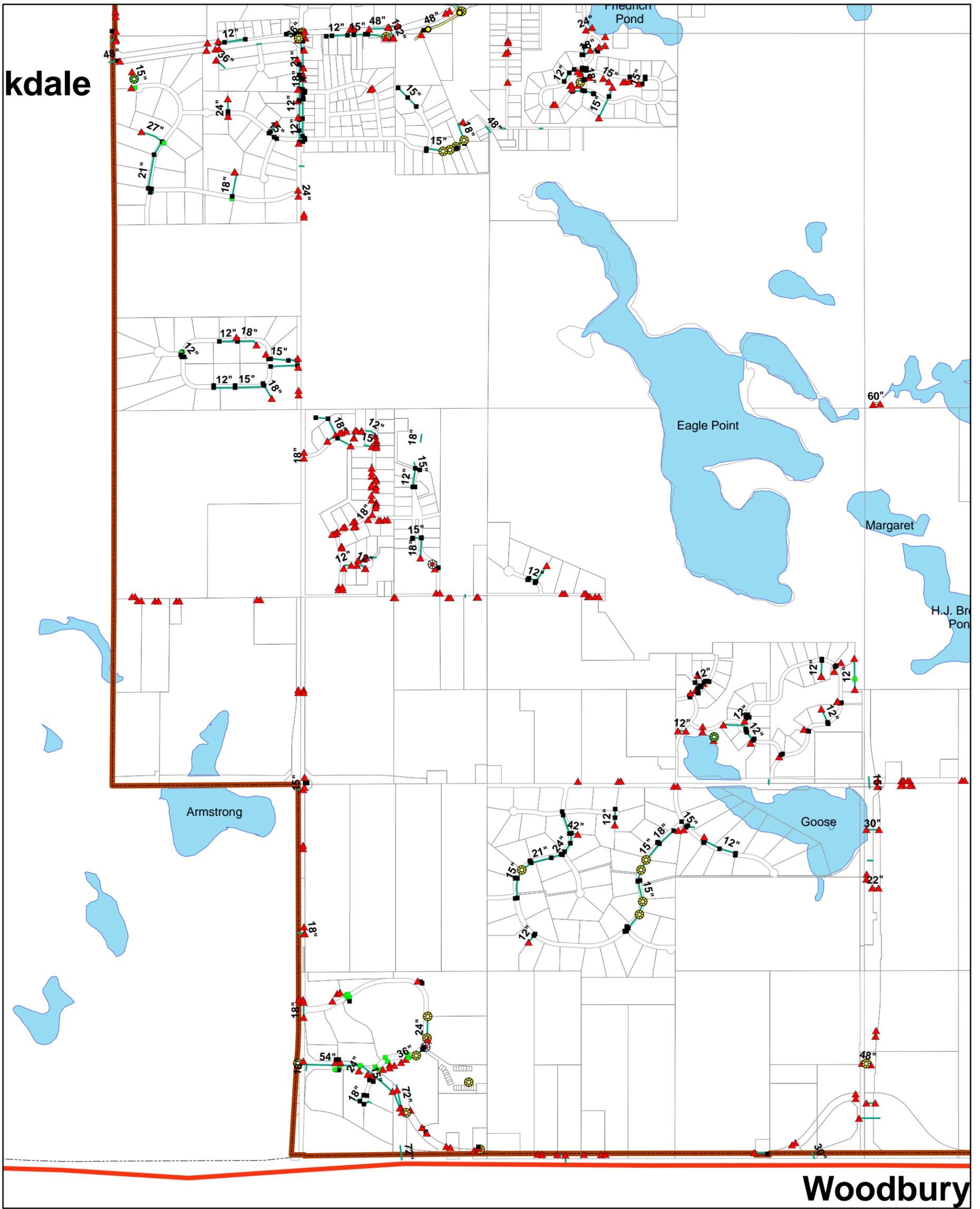


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Legend

-  City Boundary
-  Public Waters
-  CB
-  CB MH
-  FES
-  MH
-  Outlet Control Structure
-  Skimmer
-  Storm Pipes
-  Box Culvert
-  VBWD Project 1007 Points
- VBWD Project 1007 Lines

Sources: City of Lake Elmo, TKDA

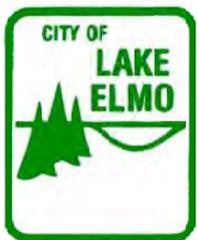


K:\gis\LAKEELMO\PROJECTS\2009 SWMP\Maps\Figure 16C-SW-StormwaterSystemMap.mxd

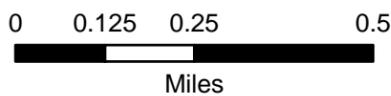
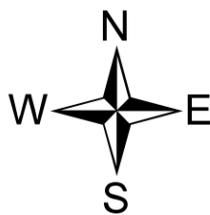
FIGURE 16C: STORM WATER SYSTEM (SW AREA)

Surface Water Management Plan

2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: February 2009
Prepared by:

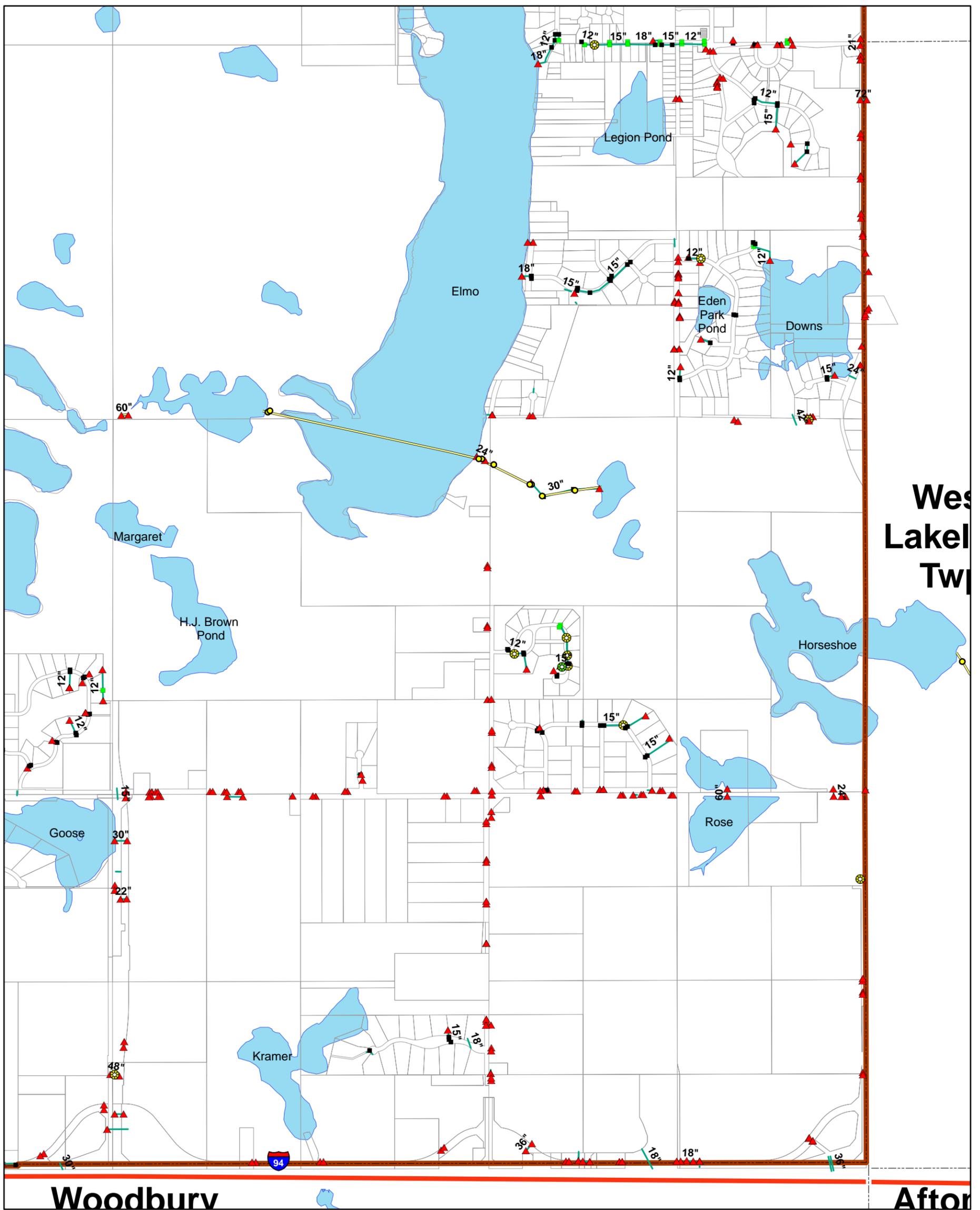


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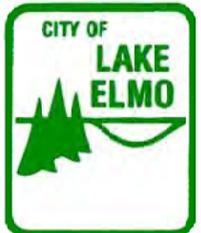
- City Boundary
- Public Waters
- CB
- CB MH
- FES
- MH
- Outlet Control Structure
- Skimmer
- Storm Pipes
- Box Culvert
- VBWD Project 1007 Points
- VBWD Project 1007 Lines

Sources: City of Lake Elmo, TKDA



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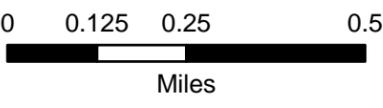
FIGURE 16D: STORM WATER SYSTEM (SE AREA)
Surface Water Management Plan
 2030 Comprehensive Plan
 City of Lake Elmo, Minnesota



Map date: February 2009
 Prepared by:



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Legend

-  City Boundary
-  Public Waters
-  CB
-  CB MH
-  FES
-  MH
-  Outlet Control Structure
-  Skimmer
-  Storm Pipes
-  Box Culvert
-  VBWD Project 1007 Points
-  VBWD Project 1007 Lines

Sources: City of Lake Elmo, TKDA

10. Planning and Development

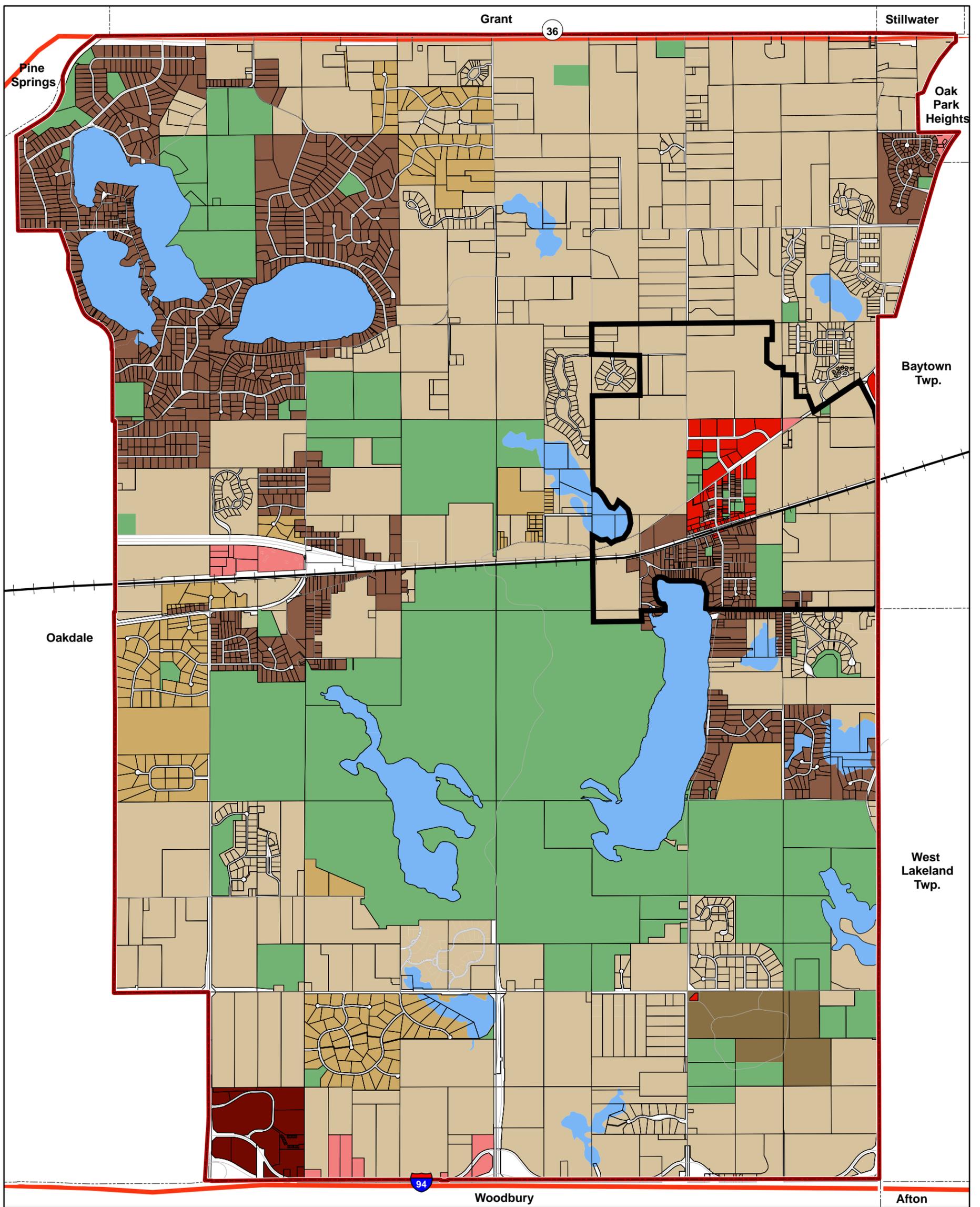
a. Comprehensive Plan and Land Use

The City of Lake Elmo is currently updating its Comprehensive Plan. This Surface Water Management Plan will be adopted as an element of the Comprehensive Plan. The new Comprehensive Plan will be adopted in 2009.

The City expects that the land use plan through 2030 will be similar to the current land use plan. New growth is expected to be focused in the Old Village Area and south of 10th Street. The largest land use within the City is Rural Agricultural Density with over 40% of the land area in this designation. The City's Land Use Plan proposes higher density development within the Old Village area of the community and the City is completing an Alternative Urban Area-wide Review (AUAR) in order to plan for development within the Old Village. The AUAR will include an analysis of potential impacts to surface waters that may result from development in the Old Village area, and a mitigation plan and strategies the City will use to address the potential impacts of new development and impervious surface in the area. The Final AUAR and Mitigation Plan will become part of this LSWMP.

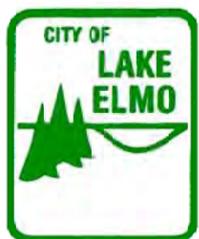
Significant open space areas are included within the Lake Elmo Park Reserve and parks, open space, and trail system within the City.

Figures 17 and 18 show the City's existing and proposed land use maps.

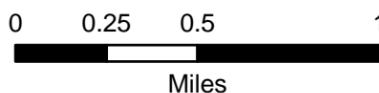
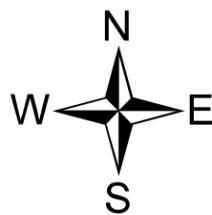


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**FIGURE 17:
EXISTING LAND USE**
Surface Water Management Plan
2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: February 2009
Prepared by:



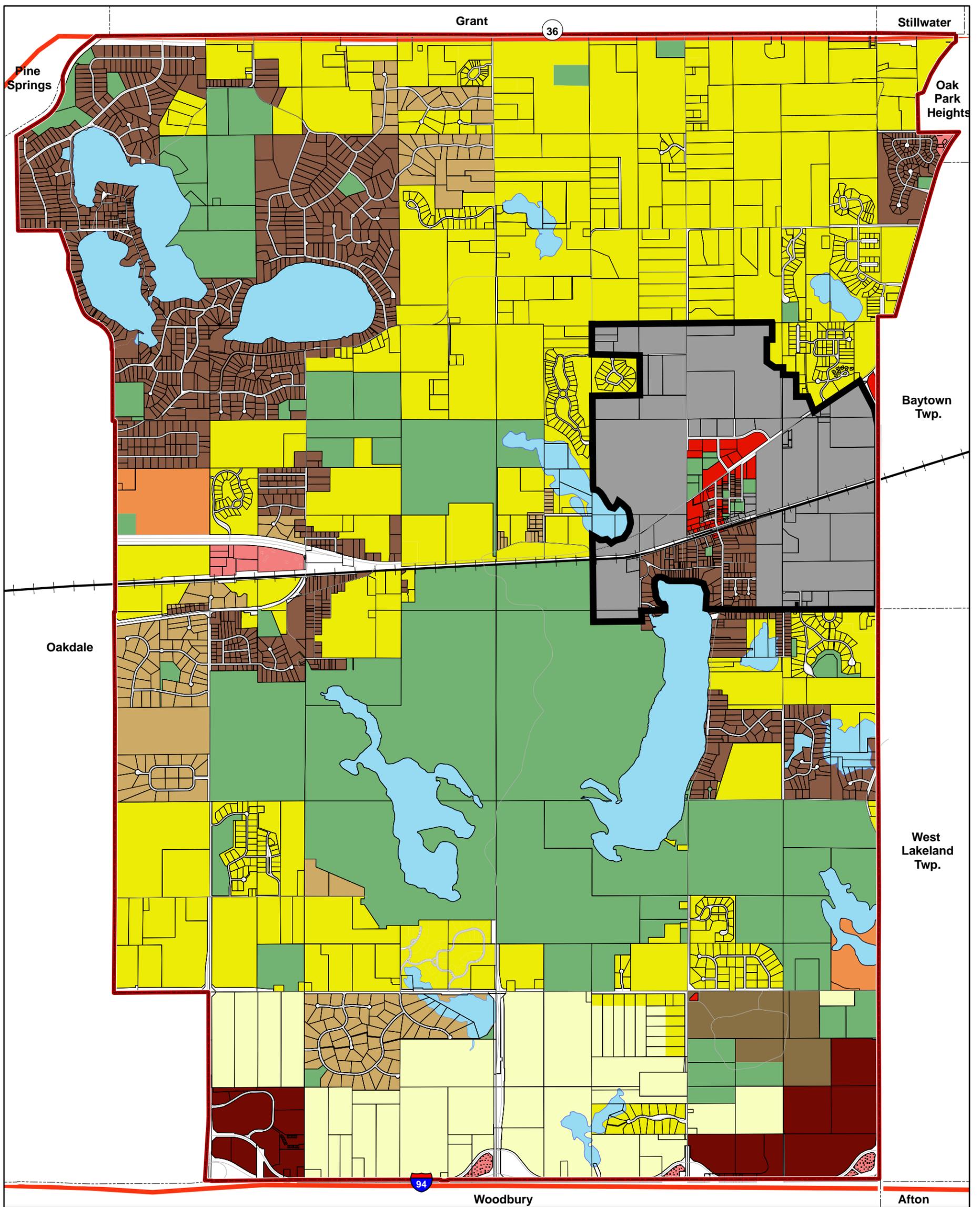
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Legend

- C - Commercial
- BP - Business Park
- LB - Limited Business
- PF - Public/Semi-Public Facilities
- RAD - Rural Agricultural Density
- RED - Residential Estates Density
- URD - Urban Residential Density
- NC - Neighborhood Conservation
- ROW - Right-of-Way
- WAT - Water
- Old Village

Sources: City of Lake Elmo, TKDA

From Future Land Use Map Dated July 12, 2005

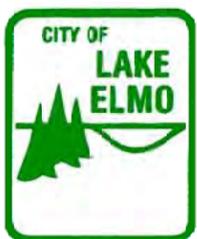


K:\gis\LAKEELMO\PROJECTS\2009 SWMP\Maps\Figure 18-FutureLandUseMap.mxd

FIGURE 18: FUTURE LAND USE

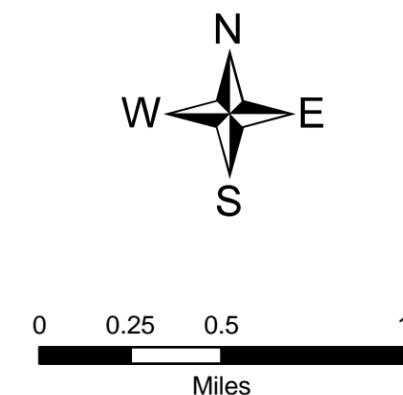
Surface Water Management Plan

2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: February 2009
Prepared by:

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Legend

- C - Commercial
- BP - Business Park - 40 Employees/Acre
- PF - Public/Semi-Public Facilities
- RAD - Res Ag Density 0.45 DU/Acre
- RAD - Res Ag Density - 2 DU/Acre
- URD - Urban Res Density - Cimarron
- SRD - Sewered Res Density - 3.5 DU/Acre
- RED - Res Estates Density
- NC - Neighborhood Conservation
- LB - Limited Business - Future sewer - 40 Empl/Acre
- LB - Limited Business - Non-sewer
- ROW - Right-of-Way
- WAT - Water
- VR - Village Res

Sources: City of Lake Elmo, TKDA

C. Regulatory Setting

1. City of Lake Elmo

The Zoning Administrator manages comprehensive planning, zoning controls and City ordinances, in conjunction with the Planning Commission and City Council. The zoning code contains the following regulations related to surface water management and protection:

Chapter 53 Storm water Management Utility

Chapter 91 Forests and Trees

Chapter 152 Flood Plain Management

Chapter 153 Subdivision Regulations

Chapter 154 Zoning Code

The regulations will be revised as needed to incorporate the goals and policies identified in this Local Surface Water Management Plan.

2. Washington County

Washington County is the primary local planning entity for ground water planning. As directed by Minnesota Statute 103B.255, Washington County prepared the *2003 – 2013 Washington County Ground water Plan*, which provides a county-wide framework for the protection and conservation of ground water resources. The County also prepares an annual ground water work plan. State Statute §103B.255 - Ground water plans, Subdivision 1, requires that Watershed and Local Water Management Plans comply with the provisions of the County's Ground water Plan.

The County also has specific programs and policies relating to drainage issues on its highway systems and county ditch systems. The County has adopted a shoreland zoning ordinance and floodplain ordinance for areas outside incorporated cities.

Key documents related to planning and managing ground water resources in the Lake Elmo area include the following: the Washington County Ground water Plan, the City of Lake Elmo's Wellhead Protection Plan (WHPP)—included in the Appendix, and the Integrating Ground water and Surface Water Management in Southern Washington County study.

3. Washington County Department of Parks and Recreation

The Washington County Parks consists of six regional parks (including Lake Elmo Regional Park Reserve), one county park, one regional trail, one historic site, and an additional regional park in the 'acquisition phase'. These locations total 4,312 acres and contain facilities for a variety of outdoor-oriented activities including camping, swimming, picnicking, fishing, and others. There are also 15 miles of paved trails and 35 miles of turf trails (30 of which are also groomed for cross-country skiing) to accommodate a variety of trail users. An additional 32 miles of County-operated paved trails can be found outside the parks.

In addition to County and Regional Parks, Washington County also has two state parks, William O'Brien and Afton State Park and a portion of the Gateway State Trail. The County is also bordered on the east by the St. Croix National Scenic Riverway and on the south by the Mississippi National River and Recreation Area.

The 'Parks Ordinance' was reviewed, updated, and approved by the Washington County Board of Commissioners on May 23, 2006. It became effective on June 7, 2006.

4. Washington Conservation District

The Washington Conservation District is a Soil and Water Conservation District (SWCD), established under Chapter 103C of Minnesota Statutes. The purpose of these Districts is to promote programs and policies which can conserve the soil and water resources within their territorial limits. Historically, SWCDs focused on identification, implementation, and financial support of practices that effectively reduce or prevent erosion, sedimentation, siltation, and agriculturally-related pollution. As formerly rural counties in the Metropolitan Area have become more urban, SWCDs have expanded their roles to address the impacts of urban development on water and natural resources.

The Washington Conservation District and other SWCD's frequently act as local sponsors or provide cost-share resources for water management projects that include a variety of BMP's. The Districts also are actively involved in educational programs which promote water, natural resource, and soil conservation practices. The SWCDs receive a great deal of technical assistance from the United States Natural Resource Conservation Service (NRCS).

In 1998, Minnesota Legislature established the Metro Greenways Program. The goal of this program is to establish a regional network of connected open space and natural areas for the purpose of protecting diverse plant and animal habitat while providing aesthetic and economic

benefits to communities. The Washington Conservation District is in the process of preparing a Resource Inventory for the City and other communities in Washington County as part of the Metro Greenways Project. This inventory may be used as a tool for greenways planning within the City.

5. Watershed Management Organizations

The State of Minnesota adopted the Minnesota Watershed District Act in 1955. This Act, now codified in Minnesota Statutes §103D (formerly Chapter 112), provides for establishment of watershed districts to regulate water resource planning, flood control, and other conservation issues.

In 1982, the State approved the Metropolitan Surface Water Act, Minnesota Statutes §103B. This act requires all metropolitan area local governments to address surface water management through participation in a Water Management Organization. A WMO can be organized as a Watershed District, a joint powers agreement (JPA) among municipalities, or as a function of county government.

The City of Lake Elmo is divided into multiple drainage basins that flow to three separately managed watersheds. The Brown's Creek Watershed, Valley Branch Watershed, and South Washington Watershed are managed by Watershed Districts. Figure 19 shows the three watershed management organizations with jurisdiction in the City.

a. Brown's Creek Watershed District (BCWD)

Brown's Creek Watershed District was formed in 1997 by Washington County petition, under the authority of Minnesota Statutes §103D. BCWD covers approximately 29.4 square miles and is composed of seven communities: Grant, Hugo, Lake Elmo, May Township, Oak Park Heights, Stillwater, and Stillwater Township.

Lake Elmo is the local governmental unit (LGU) for the Wetland Conservation Act (WCA) within the areas of the City located in the BCWD. The City works with the Washington Conservation District to provide technical assistance with these issues if the City requires assistance.

b. Valley Branch Watershed District (VBWD)

VBWD was formed in 1968 by citizen's petition, under authority of MN Statutes §103D. The VBWD covers approximately 65 square miles and is composed of 14 communities: Afton, Baytown Township, Grant, Lake Elmo, Mahtomedi, Maplewood, North St. Paul, Oak Park Heights, Oakdale, Pine Springs, St. Mary's Point, West Lakeland Township, White Bear Lake, and Woodbury.

The filling, excavation, and draining of wetlands are regulated by the Wetland Conservation Act of 1991, which is administered by a local government unit (LGU). In addition to the Wetland Conservation Act, the VBWD has additional storm water and wetland regulations over activities occurring within its boundaries. The VBWD is the LGU responsible for administering the Wetland Conservation Act in the areas of all cities and townships within the legal boundaries of the VBWD including areas in Lake Elmo.

c. South Washington Watershed District (SWWD)

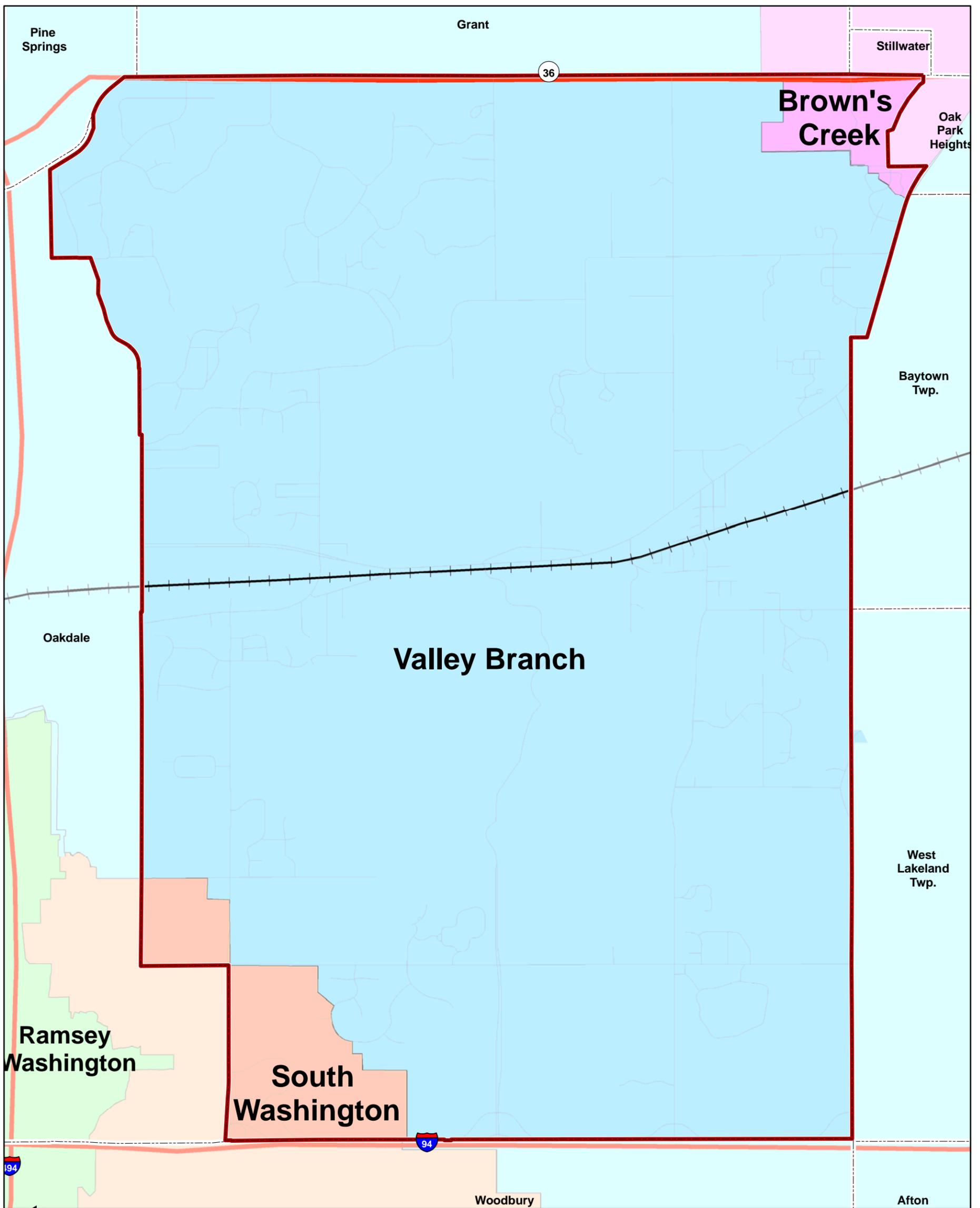
SWWD started as the Cottage Grove Ravine WMO in 1984, was established as a Watershed District in 1993, and changed its name to South Washington Watershed District in 1995. It expanded in 2003 by including the East Mississippi WMO within its boundaries and was formed under the authority of Minnesota Statutes 103D. SWWD covers approximately 71.3 square miles, is located entirely in Washington County, and contains portions of eight cities and townships: Afton, Cottage Grove, Grey Cloud Island Township, Lake Elmo, Newport, Oakdale, St. Paul Park, and Woodbury.

Lake Elmo is the LGU for the Wetland Conservation Act (WCA) within the areas of the City located in the SWWD. The City works with the Washington Conservation District to provide technical assistance with these issues if the City requires assistance.

SWWD's plan includes goals and associated policies that form the framework for water resource management decisions. The following are the SWWDs Guiding Principles:

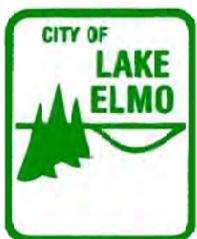
- ◆ **Permitting:** The SWWD believes that the permitting process is best performed by cities. The District, through the promulgation of rules, will provide guidance to cities in managing growth.
- ◆ **Regional Water Planning:** The SWWD believes in proactively coordinating with its constituents for long-term surface water planning and implementation of regional water capital improvement projects. Studies and associated surface water modeling activities are best initiated at the watershed level.
- ◆ **Land Management:** The SWWD recognizes that the primary control and determination of appropriate land uses is the responsibility of the municipalities, except on parcels acquired and owned by the District to benefit water and related resources.

- ◆ **Balanced Approach:** The SWWD believes in taking a balanced approach to managing resources, resolving issues, and implementing solutions. The District seeks the best outcome in the context of the entire watershed resources and constituents.

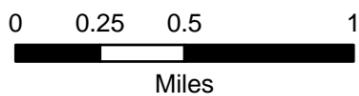
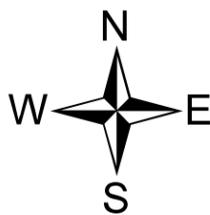


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FIGURE 19:
WATERSHED AUTHORITY
 Surface Water Management Plan
 2030 Comprehensive Plan
 City of Lake Elmo, Minnesota



Map date: January 2009
 Prepared by:



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Legend

- City Boundary
- Brown's Creek
- Ramsey Washington
- South Washington
- Valley Branch

Sources: VBWD, Metropolitan Council, TKDA

6. **Metropolitan Council**

The Metropolitan Council, created in 1963, is the regional governmental body responsible for planning within the seven-county Minneapolis-St. Paul metropolitan area. The Metropolitan Area includes Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties. The Council plans for major regional systems, including the following:

- Transportation and Mass Transit
- Wastewater and Public Water Supply Systems
- Housing, Re-development, and Urban Growth
- Regional Parks and Open Space
- Water Resource Management

The Council has review authority for City and County Comprehensive Plans within the 7-County Area, to assure that they are consistent with the regional system plans. The Council provides extensive data analysis and information to local communities, and completes forecasts of regional and local population growth that are used in the development of local plans.

The Council's activities specific to water resources management include:

- Region-wide Surface and Ground water Planning and Non-point Source Pollution Abatement
- Industrial Wastewater Management
- Sewage Collection and Treatment

The Council provides guidance for developing local water resource plans in its "Water Resource Management Policy Plan" adopted December 19, 1996. The Plan identifies broad region-wide objectives for water management, and its Appendices detail the requirements for Local Surface Water Management Plans.

7. **State Board of Water and Soil Resources (BWSR)**

The BWSR was created by State Legislature in 1986. Three functioning state boards were eliminated by this legislation and their duties were transferred to BWSR on October 1, 1987. BWSR's duties include oversight programs and funding of State Soil and Water Conservation Districts, formation and guidance of watershed districts, and the direction and assistance to counties in developing their Comprehensive Water

Plans. The BWSR is the State agency responsible for implementation of the Wetland Conservation Act (WCA). The BWSR reviews and approves water management plans and project activity of watershed districts and soil and water conservation districts.

8. Minnesota Pollution Control Agency (MPCA)

The MPCA has created by State Legislature in 1967. The MPCA has both regulatory and enforcement authority relative to potential actions which could affect the quality of the ground waters and surface waters of the State. Since future City projects will likely involve water quality considerations, the MPCA may become an active participant in these projects. The MPCA is also involved with other governmental units, such as municipalities, in the construction and operation of wastewater treatment plants and the control of non-point source pollution. The MPCA is the key state agency that regulates the management of wastewater, storm water, and solid waste in the City of Lake Elmo.

The MPCA is required to publish a list of impaired waters in the state not meeting federal water quality standards. For each waterbody on the list, the MPCA is required to conduct a study to determine the allowable Total Maximum Daily Load (TMDL) for each pollutant that exceeds the standard. Local governments will be required to incorporate completed TMDL studies into their surface water management plans. Impaired waters in Lake Elmo are summarized in Table No. 2 and shown on Figure 20.

Another important function of the MPCA is implementing the National Pollutant Discharge Elimination System (NPDES) program. This program regulates not only traditional wastewater discharges but also construction activities and storm water.

The MPCA NPDES Phase II general permit establishes conditions for discharging storm water, and specific other related discharges, to waters of the State. This permit is required for discharges that are from Small Municipal Separate Storm Sewer Systems. The Rule identifies a number of implementation options for regulated small municipal separate storm sewer system (MS4) operators. Lake Elmo completed their MS4 permit in June 2006. A copy of this permit is in the Appendix.

The MPCA has also published the *Minnesota Storm water Manual*. The manual serves as a unified storm water guidance document for the entire state.

The MPCA monitors ground water quality and protects it from contamination. MPCA also identifies and regulates the Special Well Construction Areas (SWCA) within Lake Elmo.

9. Minnesota Department of Natural Resources (MnDNR)

The MnDNR was originally created in 1931 as the Department of Conservation. The MnDNR has both regulatory and enforcement authority over the natural resources of the State. The principal divisions of MnDNR include the Division of Waters, the Division of Forestry, and the Division of Fish and Wildlife (which includes the sections of Wildlife, Fisheries, and Ecological Services). The Division of Fish and Wildlife is responsible for the management of Minnesota's 1.2 million acres of wildlife management areas (WMA).

The MnDNR has permit authority for any change in cross-section or work below the Ordinary High Water (OHW) level of regulated water bodies. This often includes protected waters and wetlands. The MnDNR is also actively involved in helping local units of government administer floodplain management ordinances and standards.

10. Minnesota Department of Health (MDH)

The MDH manages programs to protect the public health, including implementation of the Safe Drinking Water Act (SDWA). It has permit authority and regulatory authority for monitoring water supply facilities. These facilities include water wells, surface water intakes, water treatment, and water distribution for public use. The MDH also is responsible for the development and implementation of the Wellhead Protection Program.

11. Minnesota Environmental Quality Board (EQB)

The EQB is comprised of five citizen members and the heads of ten state agencies that play an important role in Minnesota's environment and development. The EQB develops policy, creates long-range plans and reviews proposed projects that may significantly influence Minnesota's environment.

12. Minnesota Department of Transportation (MnDOT)

Within the City, MnDOT administers several state highway systems. Since highway systems cross drainage patterns of natural and artificial waterways, there is opportunity for frequent interaction between Cities and MnDOT. City projects requiring structures through MnDOT regulated highways require coordination and approval by MnDOT. Anticipated activities of MnDOT are periodically published in their State Transportation Improvement Plan (STIP).

13. U.S. Environmental Protection Agency (USEPA)

The EPA develops and enforces regulations that implement environmental laws enacted by congress. Responsibilities of the EPA within Minnesota have largely been delegated to the MPCA. The NPDES Program and Impaired Waters List are both the result of the Clean Water Act (CWA), administered by the EPA.

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

The USACE can have permit and regulatory authority over projects in the City under Section 404 of the Clean Water Act. Wetlands are considered waters of the United States and are regulated by the U.S. Army Corps of Engineers (USACE) under the Clean Water Act (CWA). Section 404 authorizes the USACE to issue permits for the placement of fill into all wetlands of the U.S.

15. Federal Emergency Management Agency (FEMA)

FEMA manages federal disaster mitigation and relief programs, including the National Flood Insurance Program (NFIP). This program includes floodplain management and flood hazard mapping. FEMA published the Flood Insurance Rate Map (FIRM) in Lake Elmo in 1980.

16. Natural Resource Conservation Service (NRCS)

The Natural Resources Conservation Service (formally called the Soil Conservation Service (SCS), is a division of the U.S. Department of Agriculture. The NRCS provides technical advice and engineering design services to local conservation districts across the nation. The *Soil Survey of Washington and Ramsey Counties* was published by the NRCS in 1980. The NRCS also developed hydrologic calculation methods that are widely used in water resources design.

17. U.S. Geological Survey (USGS)

The USGS provides mapping and scientific study of the nation's landscape and natural resources. USGS maps provide the basis for many local resource management plan efforts.

18. U.S. Fish and Wildlife Service (USFWS)

The mission of the USFWS is to conserve, protect, and enhance the nation's fish, wildlife, plants and habitat. The USFWS developed the National Wetlands Inventory (NWI) in 1974 to support federal, state, and local wetland management work.

D. Related Studies, Plans, and Reports

1. Comprehensive Plan

The City's 2020 Comprehensive Plan is currently being updated for 2030. The plan includes goals and policies for land use, infrastructure and community systems, and for protection of water and natural resources. The Comprehensive Plan will serve as the basis for updating the City's land use map, zoning map, and City Code.

This Local Surface Water Management Plan will be adopted as an element of the City's 2030 Comprehensive Plan.

2. Brown's Creek Watershed District Watershed Management Plan

The Brown's Creek Water Management Organization was established in the early 1980s under the State of Minnesota statutes as a joint powers agency. In 1990, it prepared and had approved the First Generation Watershed Management Plan for the Brown's Creek Watershed Management Organization. Brown's Creek Watershed District was established in October of 1997 and the second generation plan was developed at that time. The third generation plan was developed in 2006 and will guide BCWD activities through 2016. The Watershed District supports fundamental water resource protection and research, capital projects, rules and permitting program, and Watershed Plan development and management as expected under State Statutes 103B and 103D.

This Watershed Management Plan is intended to be a ten-year planning document to guide District activities until superseded by adoption and approval of a subsequent plan. The plan identifies ten general issue areas and a number of policies, goals, and implementation items to address the specific concerns within each issue.

3. Valley Branch Watershed District Watershed Management Plan

The VBWD Watershed Management Plan (VBWD Plan) is the fourth VBWD Plan approved by the Minnesota Board of Water and Soil Resources (BWSR) or its predecessor. The first plan was developed in 1970, with revisions in 1987, and again in 1995. This plan is developed in compliance with the Metropolitan Surface Water Management Act (Minnesota Statutes 103B).

The Plan will govern management of resources in the District through 2015, or until superseded by adoption and approval of a subsequent Plan. The VBWD Watershed Management Plan sets the vision, guidelines, and proposed tasks for managing surface water within the boundaries of the VBWD. It also provides an assessment of water and natural resources, identifies key factors and major issues facing the watershed, and includes

goals and policies for the protection and enhancement of the water and related land resources within the district.

4. South Washington Watershed District Watershed Management Plan

The South Washington Watershed District's Watershed Management Plan (WMP) provides guidance for the SWWD to manage the water and natural resources of the watershed. The SWWD plan inventories resources, assesses resource quality, and establishes regulatory controls or physical improvements to maintain environmental quality of the watershed.

The South Washington Watershed District updated its WMP in 2007. The District's original watershed plan was approved in 1997 and amended in 2002 to incorporate major outcomes of a hydrologic study. According to state law, WMPs must be updated every 10 years. The WMP update was formally adopted in November 2007.

The SWWD's updated plan includes policies and related information critical to managing urban development and growth. The plan identifies priority issues for the District to address. A 10-year work plan has been developed that identifies projects and programs which address these priority issues and other important areas. The updated plan also focuses on characterizing the quality and management of key lake resources in the watershed.

5. Washington County 2003 – 2013 Ground water Plan

The 2003 - 2013 Washington County Ground water Plan provides a County-wide framework for the protection and conservation of ground water resources. The ground water plan compliments existing water plans and establishes goals and policies to protect the ground water. Goals, policies, and implementation actions act as a model for ground water planning and protection throughout the County.

The Washington County Ground water Plan was developed around the desire to develop direction and implementation strategies around two primary issues, ground water quality and ground water quantity. The Plan focuses on efforts to reduce or eliminate the future degradation of ground water quality through initiatives involving community and regional planning, zoning, policies, regulations, research, education, and consultation. Ground water quantity efforts focus on the need to balance ground water recharge and discharge of the region's aquifers by the communities' which share these resources. The overall goals of the plan emphasize a coordinated effort to develop sustainable ground water management.

In addition to the 2003 – 2013 Ground water Plan, the County develops a work plan to implement the strategies identified in the Plan on an annual basis. The annual work plan includes a summary of the previous year’s activities and accomplishments, the implementation tasks to be completed within that year, a detailed schedule of activities, and a detailed budget. The work plan is intended to be a working document that is updated annually.

6. Integrating Ground water and Surface Water Management in South Washington County, August 2005

This study identifies tools to assist in making decisions that balance land use needs with the protection of ground water and surface water resources. The primary focus of this study is the protection of the ground water contribution to surface waters. Decision makers, equipped with scientifically-based tools, should be able to better manage land use and water resources by protecting ground water’s role in the health of surface waters. This study makes some recommendations on management strategies.

7. City of Lake Elmo Wellhead Protection Plan, Parts I and II

Communities with public water systems are required to delineate, inventory, and manage an inner wellhead management zone. This is accomplished in two parts. Part I involves delineation of the wellhead protection area and drinking water supply management area, as well as an assessment of the well(s) vulnerability. This was completed for Lake Elmo by the MDH in December 2006. Part II involves the creation of the wellhead protection plan itself, including goals, objectives, plan of action, evaluation program, and contingency plan. Part II was completed by the City in July 2008. The Lake Elmo Wellhead Protection Plan, Parts I and II are included in the Appendix of this Plan.

E. Goals and Policies

The following are the adopted Surface Water Management *goals and policies* for the City of Lake Elmo:

1. **The City of Lake Elmo is committed to a goal of no adverse impacts to ground and surface water resources in the area.**

Policies:

- The City will work cooperatively with local water management organizations, state agencies, and landowners to protect local wetlands, lakes, streams, and ground water to preserve the values of these resources for future generations.
- The City concurs with and adopts the Valley Branch, South Washington and Brown's Creek Watershed Districts' Watershed Management Plans, rules and standards by reference through this LSWMP. The Watershed Districts will continue to enforce surface water regulations and permitting within the City within the boundaries of their districts. The City will coordinate its review of development proposals with the Watershed Organizations, by providing review comments to the districts.
- The City will manage land use to support protection of surface and ground waters through the following elements of its Zoning and Subdivision Ordinance:

Chapter 53 Storm water Management Utility

Chapter 91 Forests and Trees

Chapter 152 Flood Plain Management

Chapter 153 Subdivision Regulations

Chapter 154 Zoning Code

- The City will review its existing storm water management and erosion and sediment control regulations, and will update its ordinances to be consistent with the Watershed District plans and standards, and NPDES Construction Storm water Permit requirements for storm water management and for erosion and sediment control. This review will include a review of the City's current surface water management rule (Chapter 153.07, Subpart 11 of the City's Code) by June 30, 2009. The review will provide a clear standard for storm water rate and volume control. The City's

subdivision ordinance and language in Chapter 153.07, Subpart 11 will be updated as needed to reflect the outcome of the review.

- The City will cooperate with the County, MPCA and the Watershed Organizations in managing land use to protect ground water resources. Additional goals and policies for ground water protection are included in the Water Supply element of the City's Comprehensive Plan.
- The City encourages the use of best management practices for agricultural land uses to minimize erosion and to protect the quality of surface and ground water resources.
- The City supports and will encourage developers and landowners to use storm water practices that promote infiltration/filtration and decrease impervious areas through site design and use of Low Impact Development (LID) techniques and Green Design.
- The City supports inspection of on-site individual sewage treatment systems by an MPCA certified inspector at the time of property sale or transfer and requirements that these systems meet state standards.

2. The City will work with local Watershed Districts to address the specific water management issues identified in the District's plans.

Policies

- The City will implement the mitigation plan included in the Lake Elmo Village AUAR to manage water quantity and quality concerns in the Down's Lake Watershed. The Mitigation Plan requirements are detailed in Sections F and G of this Plan and in the AUAR document.
- The City will work with Valley Branch Watershed District to address flooding issues near Friedrich's Pond, Legion Pond, and the Kelvin Avenue area north of Highway 5. If potential flooding risks are identified, the City will take the lead with the VBWD assisting in analyzing the problem and determine the appropriate solution.
- The City will adopt and enforce the VBWD's standard that minimum floor elevations of buildings be 2' or more above the 100-year flood plain. The District requires the minimum floor elevations of structures to be at least two feet higher than the adjacent water body's critical 100-year flood level. The rule applies to all water bodies, whether they are mapped as floodplains, whether mapped on FEMA flood insurance rate maps or not.

- The City will work with the SWWD, land owners and developers to implement its concept plans to provide flood storage in Northern Subwatershed, to protect Wilmes Lake.

3. Protect the quality of local lakes by supporting the Watershed Districts' goals and plans for managing lakes in the City.

Policies:

- The City will update and implement its land use plan, zoning and subdivision ordinances to protect shoreland areas and lake water quality, and work with the Watershed Districts to achieve the lake management goals identified in the Watershed's Water Management Plans.
- The City will participate in the Watershed Districts' Total Maximum Daily Load (TMDL) studies and implementation plans to address impaired water bodies within the City and areas downstream.

4. Protect and enhance the quality of wetland resources.

Policies:

- The City will cooperate with the Valley Branch Watershed District as they serve as the LGU for the WCA within its watershed area.
- The City will serve as the LGU for the WCA within the BCWD and SWWD areas of the City. The City will utilize the technical assistance provided by the Washington Conservation District in this role.
- The City will support and help to implement Watershed District requirements for wetland management, including District water quality standards, buffer requirements, and pretreatment of storm water prior to discharge into all wetlands.
- Wetlands that have not been inventoried by the Watershed Districts will be required to complete a functions and values assessment as a part of the development application. Watershed rules regarding wetland management will be applied based on the results of the assessment and the wetland classification.

5. Protect and enhance the quality of natural resources.

Policies:

- The City will work with state agencies, Washington County, local watershed districts and residents and landowners to protect and enhance natural communities and natural resources in Lake Elmo.

- The City will encourage developers and landowners to retain native vegetation and undisturbed areas to protect habitat and manage storm water.
- The City will require subdivision design that preserves natural drainage systems and protects and restores wetlands and wetland buffers.
- The City will work with other organizations and landowners to protect the greenway corridors and habitat connections identified in Lake Elmo.
- The City will work with other organizations and support efforts to control the spread of invasive exotic species.

6. Protect ground water quality and quantity.

Policies:

- The City will cooperate with the Minnesota Pollution Control Agency, Minnesota Department of Health, Washington County, and local watershed districts to address ground water quality and quantity issues. The City will enforce its Zoning and Subdivision ordinances to protect ground water quality, ground water quantity, and to manage ground water recharge areas.
- The City will coordinate with other LGUs for ground water sensitive areas, wellhead protection areas, water use contingency, and allocation plans, and other ground water issues where the plans may affect other jurisdictions.
- The City has completed a Wellhead Protection Plan (included in the Appendix) and will continue to evaluate and monitor implementation of the objectives and plans of actions identified in this Plan.
- The City will consider requiring a ground water monitoring plan or ground water protection plan as part of a permit application for businesses that store, use, or transport hazardous materials and for properties formerly used as a waste disposal site or waste transfer facility.

F. Assessment of Problems and Corrective Actions

1. Valley Branch Watershed District Area

The VBWD Watershed Management Plan has identified the following problems in the area of Lake Elmo that is within the District. The City and District have discussed these problems, and the City is proposing the actions described here to address the problems:

- Potential flooding in the Lake Elmo Village Area and the potential water quality and quantity impacts of storm water runoff from proposed future development, particularly on Down's Lake.
 - ♦ *Assessment of Problem:* Downs Lake is relatively small, with a large tributary area. The lake has a history of wide fluctuations in water levels, from potential for flooding in some years, very low water levels during drought years. Two homes are within the 100-year floodplain of Down's Lake and connecting waterbodies.
 - ♦ The Watershed District and the City have studied conditions on the lake and in its watershed several times. A proposal by VBWD for a more detailed study and flood-relief project were opposed by Washington County, the DNR, Washington SWCD, MPCA, the City and some residents.
 - ♦ Most recently, the Lake Elmo Old Village Area AUAR analyzed the proposed development scenarios for this area, which drains to Down's Lake. The AUAR analyzed the potential impacts to the lake and other water bodies, and recommended strategies to avoid, minimize or mitigate for impacts.
 - ♦ *Proposed Corrective Actions:* The AUAR Mitigation Plan commits the City to the following actions to manage the quantity and quality of runoff from future development in the AUAR area:
 - ▶ Construct ponds 519 and 520 as proposed in the AUAR analysis to alleviate existing downtown flooding issues and address rate control, volume management and water quality treatment goals for the AUAR area.
 - ▶ Complete the "Discharge to Waters with Restricted Discharges Assessment" required by the City's MS4 permit and modify the SWPPP to incorporate changes as needed to protect the St. Croix River.

- ▶ Require developers to provide runoff volume facilities to City storm water ordinances, VBWD permit requirements, State permit requirements, and the Mitigation measures identified in the AUAR.
 - ▶ Encourage the utilization of Low-Impact Design and volume management techniques to minimize the storm water impacts by emphasizing water infiltration and promoting the use of natural drainage systems.
 - ▶ Complete the MPCA requirements for ORVW by the end of 2009.
 - ▶ Complete the ongoing maintenance of proposed and existing storm water facilities
- Flooding near Friedrich's Pond
 - ◆ *Assessment of the Problem:* The VBWD noted from the late 1970s to the mid 1980s Friedrich's Pond experienced high water levels resulting from above average precipitation and decreased ground water seepage from Friedrich's Pond, which resulted in basement flooding to the adjacent homes. Since that time, the VBWD and the City are not aware of instances of high water levels occurring. Recently, area residents have expressed concerns regarding low water levels in the pond. Land uses are proposed to remain the same in the area in the City's 2030 Comprehensive Plan.
 - ◆ *Proposed Corrective Actions:* The VBWD has proposed the following mitigation options to address the high water level in Friedrich's Pond: Installation of a controlled gravity outlet and drainage routes, utilizing a pumped outlet structure, flood proofing the affected homes, flood insurance, and a do nothing approach. The City recognizes all the proposals as feasible solutions to the high water level. However, due to the current trend of low water levels and the Project 1007 flood-relief improvements, the City does not find any immediate need to address flooding issues in this area. The City will work directly with the VBWD to continue to monitor the situation. If potential flooding risks are identified, the City will take the lead with the VBWD assisting in analyzing the problem and determine the appropriate solution. Any permit applications for this area will be reviewed per the City of Lake Elmo Flood Plain Ordinance.

- Flooding near Legion Pond
 - ◆ *Assessment of Problem:* In the 1980's the VBWD reported high water levels in the Legion Pond/Eden Park area which threatened the nearby homes. Several proposals were developed to mitigate the flooding, including overflow pumping to Lake Elmo. The residents located in the floodplain rejected the pumping proposals, objecting to the high cost and lack of a permanent solution to the problem as reasons. The high water levels were later relieved by a onetime overflow pumping of the pond to Lake Elmo, and later by the drought of 1987-1988. Residents have bermed around their homes to help protect against future high water levels.
 - ◆ *Proposed Corrective Action:* The VBWD proposed three feasible mitigation plans to the Legion Pond's high water problem: the first option involves constructing a pumped outlet to Lake Elmo. This option would incur annual operation and maintenance costs. The second option is to construct a gravity outlet from Legion Pond to Lake Elmo. The third option is to provide only emergency pumping relief.
 - ◆ Beginning in 1984, the City constructed a community wastewater facility as part of the 201 System and hooked up 2764, 2778, 2790, and 2814 Legion Avenue North. This addressed the location of the individual septic systems on these lots. If future flood mitigation is pursued, it will focus on the remaining septic systems not connected to the 201 System and the walk out elevations of all homes in the affected area.
 - ◆ The second option (constructing a gravity outlet to Lake Elmo) now becomes a more feasible option with the availability of the 201 System. The City would consider all options provided in the VBWD Plan - the preferred corrective action will depend on the timing, urgency, public comment, agency comment, and available funding. However, due to the current trend of low water levels and the Project 1007 flood-relief improvements, the City does not find any immediate need to address flooding issues in this area.
 - ◆ The City will work directly with the VBWD to continue to monitor the situation. If potential flooding risks are identified, the City will take the lead with the VBWD assisting in analyzing the problem and determine the appropriate solution. Any permit applications for this area will be reviewed per the City of Lake Elmo Flood Plain Ordinance. This ordinance is included in the Appendix of this Report.

- Flooding at Kelvin Avenue, north of Highway 5
 - ♦ *Assessment of Problem:* During the Park Meadows development, residents on the east side of Kelvin Avenue raised concerns about flooding. The VBWD led the efforts to expand the infiltration basin on the west side of Kelvin Avenue within the Park Meadows development. In 2008, silt was removed from the basin and it was re-vegetated.
 - ♦ *Proposed Corrective Action:* The City of Lake Elmo and the VBWD will review the basin in the summer of 2009 to evaluate if vegetation has been established. The City is retaining \$5,930 of the contractor's escrow until the infiltration area is accepted. If flooding becomes a concern, the City will continue to work with VBWD to review improvements to the infiltration basin and potential to route overflow to Sunfish Lake if this is determined to be feasible. The City will take the lead on further investigations of flooding problems and efforts to relieve flooding problems in the Park Meadows/Kelvin Avenue area.

- Low Water Levels on Sunfish Lake
 - ♦ *Assessment of Problem:* Residents have expressed concerns related to low water levels on Sunfish Lake.
 - ♦ *Proposed Corrective Actions:* The City and VBWD have discussed the problem, and agreed that there is little that the City can do to address this issue.

- The City needs to adopt and enforce the VBWD standard that minimum floor elevations of buildings be 2' or more above the 100-year flood plain and enforce the standard on development that is not reviewed by the Watershed District. The District requires the minimum floor elevations of structures to be at least two feet higher than the adjacent water body's critical 100-year flood level. The VBWD rule applies to all water bodies, whether they are mapped as floodplains on FEMA flood insurance rate maps or not.
 - ♦ *Assessment of Problem:* The City agrees that the VBWD standard should be adopted and enforced for all new development.
 - ♦ *Proposed Corrective Action:* The City is adopting the Watershed District standard in its Engineering Standards, and requiring that the low floor elevation data be on record plans and recorded for each property prior to issuance of building permits. The City will adopt this standard in its Floodplain

Ordinance, as a part of ordinance revisions that will occur after the adoption of the 2030 Comprehensive Plan and LSWMP.

- Surface Water Issues related to Highway 36 Corridor Reconstruction
 - ◆ *Assessment of Problem:* Reconstruction of the Highway 36 Corridor will change drainage patterns, and may create impacts to surface water resources.
 - ◆ *Proposed Corrective Action:* Washington County will model the impacts of the proposed project on surface waters, and develop plans for surface water management. The VBWD will take the lead in addressing cross-community storm water issues. The City will work with Washington County to address local issues.

2. **South Washington Watershed District Area**

The SWWD Water Management Plan has identified the following problems in the area of Lake Elmo that is within the District. The City and District have discussed these problems, and the City is proposing the actions described here to address the problems:

- Wilmes Lake Flooding Issues
 - ◆ *Assessment of Problem:* The SWWD has completed studies of Wilmes Lake and potential flooding issues. Areas in the Wilmes Lake subwatershed within Lake Elmo contribute to the lake's drainage area, but are not the cause of the flooding concern. No structures are currently below the 100-year flood elevation. The Watershed District and City of Woodbury have established and funded a program to provide protection to homes on the east side of the lake.
 - ◆ The District is seeking additional areas for flood storage and attenuation within the subwatershed, including the area within Lake Elmo. The District has completed an analysis that identifies conceptual locations for additional storage and enhanced storage within Lake Elmo. (This study and maps of storage areas are included in the Appendix).
 - ◆ *Proposed Corrective Action:* The City has reviewed the Watershed District's analysis, and concurs with the goals to provide additional and enhanced flood storage and attenuation within the Wilmes Lake subwatershed area in Lake Elmo. The City will work with the District as it develops land use plans for the area and reviews proposed development to assist the

District in addressing this issue and providing additional flood storage. The City concurs with and adopts the SWWD volume control standard in this LSWMP and will continue to implement its ordinances requiring volume control.

- Wilmes Lake Water Quality Issue
 - ♦ *Assessment of Problem:* Wilmes Lake has been classified as an impaired water for nutrients. The SWWD has not completed a TMDL study for the lake, but is likely to complete a study and develop recommendations to address the nutrient problems in the future.
 - ♦ *Proposed Corrective Action:* The City will participate in the District's TMDL study for Wilmes Lake, and work with the District to implement its recommendations. The City understands that implementing volume controls will also benefit water quality in Wilmes Lake. The City adopts the District's standards for volume control and allowable phosphorus loading to Wilmes Lake, and will address these requirements as it manages land use and development within the Wilmes Lake Subwatershed area.

3. **Brown's Creek Watershed District**

- Impaired Waters Issues
 - ♦ *Assessment of Problem:* The BCWD area within Lake Elmo includes wetland areas and some areas that may still be developed. The area drains to Long Lake, Brown's Creek, and the St. Croix River. All of these water bodies are impaired waters. The BCWD is currently completing TMDL studies for Long Lake and Brown Creek. The St. Croix Basin Team has set a goal to reduce nutrient loading to the St. Croix basin by 20 percent.
 - ♦ *Proposed Corrective Action:* The City will participate in the District's TMDL studies of Long Lake and Brown's Creek, and will work with the District to implement the recommendations of these studies. The City will implement its land use plan and ordinances to assist with the protection of surface waters in this area.

4. **Impaired Waters**

The impaired waters within Lake Elmo's drainage area include the following:

**Table No. 2:
Impaired Waters in the City of Lake Elmo
and Its Drainage Areas**

Impaired Water	Affected Use	Pollutant/ Stressor	TMDL Target Start Date	TMDL Target Complete Date
St. Croix River	Aquatic consumption/ Aquatic recreation	Mercury in fish tissue/ Nutrient/Eutrophication Biological Indicators	2009	2011
Wilmes Lake	Aquatic recreation	Nutrient/Eutrophication Biological Indicators	2012	2016
Brown’s Creek	Aquatic life	Fish-IBI and Invertebrate IBI/ Lack of a coldwater assemblage/ Aquatic macroinvertebrate bioassessments	2006	2009
Long Lake (in BCWD within the City of Stillwater)	Aquatic recreation	Excess nutrients / Nutrient/Eutrophication Biological Indicators	2008	2012
Lake Jane	Aquatic consumption	Mercury in fish tissue	2006	2021
Sunfish Lake	Aquatic recreation	Nutrient/Eutrophication Biological Indicators	2013	2017
Lake Elmo	Aquatic consumption	Perfluorooctane Sulfonate (PFOS) in Fish Tissue/ Mercury in fish tissue	-	2008 (Approved)

Source: 2008 MPCA List of Impaired Waters, 2008 Final TMDL list, and Watershed District Plans

a. Total Maximum Daily Load (TMDL) Studies

The SWWD Watershed District will be completing TMDL studies and developing plans to address the “impaired waters” issues in Wilmes Lake. The City will participate with the District in the TMDL studies and implementation plan for Wilmes Lake.

The St. Croix Basin Team has set a goal to reduce nutrient loading to the St. Croix basin by 20%, to protect this Outstanding Resource Value Water (ORVW). The City has adopted a BMP in its MS4 permit to cooperate with the Watershed Districts to create a process to identify all discharges from the City’s MS4 system to the St. Croix, and determine if discharges to the ORVW can be eliminated, or to identify and adopt BMP’s that allow the existing high quality of the St. Croix River to be maintained. If modifications are needed, the City will modify its SWPPP and submit the modifications to the MPCA.

The City will work with the Districts and other organizations as they complete TMDL studies, and implement its land use plan and enforce its ordinances to assist in protection and improvement of these resources.

5. Ground water Issues

The following ground water-related issues were identified in the Watershed District Plans:

- Lake Elmo water quality
 - ♦ *Assessment of Problem:* Lake Elmo is a ground water discharge waterbody. Impacts to ground water resources may impact lake quality.
 - ♦ *Proposed Action:* City will implement its land use plan and ordinances to protect ground water recharge areas.
- The VBWD Watershed Management Plan identifies the following issues to address:
 - ♦ *Assessment of Problem:* The City of Lake Elmo has a municipal well at the northeast corner of Lake Elmo. The well is screened in the Jordan aquifer, which is the same aquifer that feeds Lake Elmo. The City, the DNR, Washington County, and the VBWD have not performed any calculations to determine the long-term sustainability of the Jordan aquifer in this area and if the pumping is or will impact the water levels of the lake. Nor has any agency determined if there will be conflict between the drinking water well and the lake.
 - ♦ *Proposed Action:* The City will work cooperatively with the VBWD, the DNR, Washington County, and other entities as this issue is further studied.
- Special Well Construction Areas (SWCA)
 - ♦ *Assessment of Problem:* Special Well Construction Areas. Portions of the City in both VBWD and SWWD were designated by the Minnesota Department of Health as a Special Well Construction Area (SWCA) in 1988 and 2007. This designation applies to the construction repair, modification, and sealing of wells and borings. The primary purpose of SWCAs is to protect public health and ground water quality by ensuring wells and borings are constructed to obtain ground water from a protected aquifer(s) and to help prevent spread of contamination. Storm water related activities in these areas, such as geotechnical evaluations for a pond or infiltration feature, should reflect appropriate compliance with requirements set forth by the Department of Health given the criteria for environmental bore holes. Nonstructural methods

for controlling storm water runoff volumes should generally be given priority over structural methods.

- ◆ *Proposed Action:* The City will cooperate with the MPCA, MDH, and the Watershed Districts to address ground water quality issues, and enforce its Zoning and Subdivision ordinances to protect ground water quality.

- The SWWD Watershed Management Plan identifies the following issues to address:
 - ◆ *Assessment of Problem:* The SWWD’s ground water management initiative consists of monitoring and data analysis. The objective is to compile baseline data to characterize dynamics between storm water and ground water. Outcomes of the ground water management include setting or adjusting thresholds or standards to best address storm water management and ground water protection, and identifying potential ground water resources trends in the context of storm water management efforts.

 - ◆ *Proposed Action:* The City will support these efforts as they relate to the area within the SWWD in Lake Elmo.

- The Washington County Ground water Plan identifies the following issues to address:
 - ◆ *Assessment of Problems:*
 - Reduced ground water recharge resulting from urbanization.

 - Degraded quality of ground water as a result of increased non-point source pollution.

 - Reduced ground water flows to surface waters, lowered lake levels, and well interference resulting from overuse of ground water.

 - Need for citizens and public officials to understand ground water-related issues.

 - ◆ *Proposed Actions:* The County Ground water Plan identifies the following actions to implement:
 - Provide education to citizens and public officials on the interaction of surface and ground water quality and quantity; the value of and need to protect ground water recharge areas

and wetlands; and implementing best management practices and low-impact development strategies to protect ground water resources.

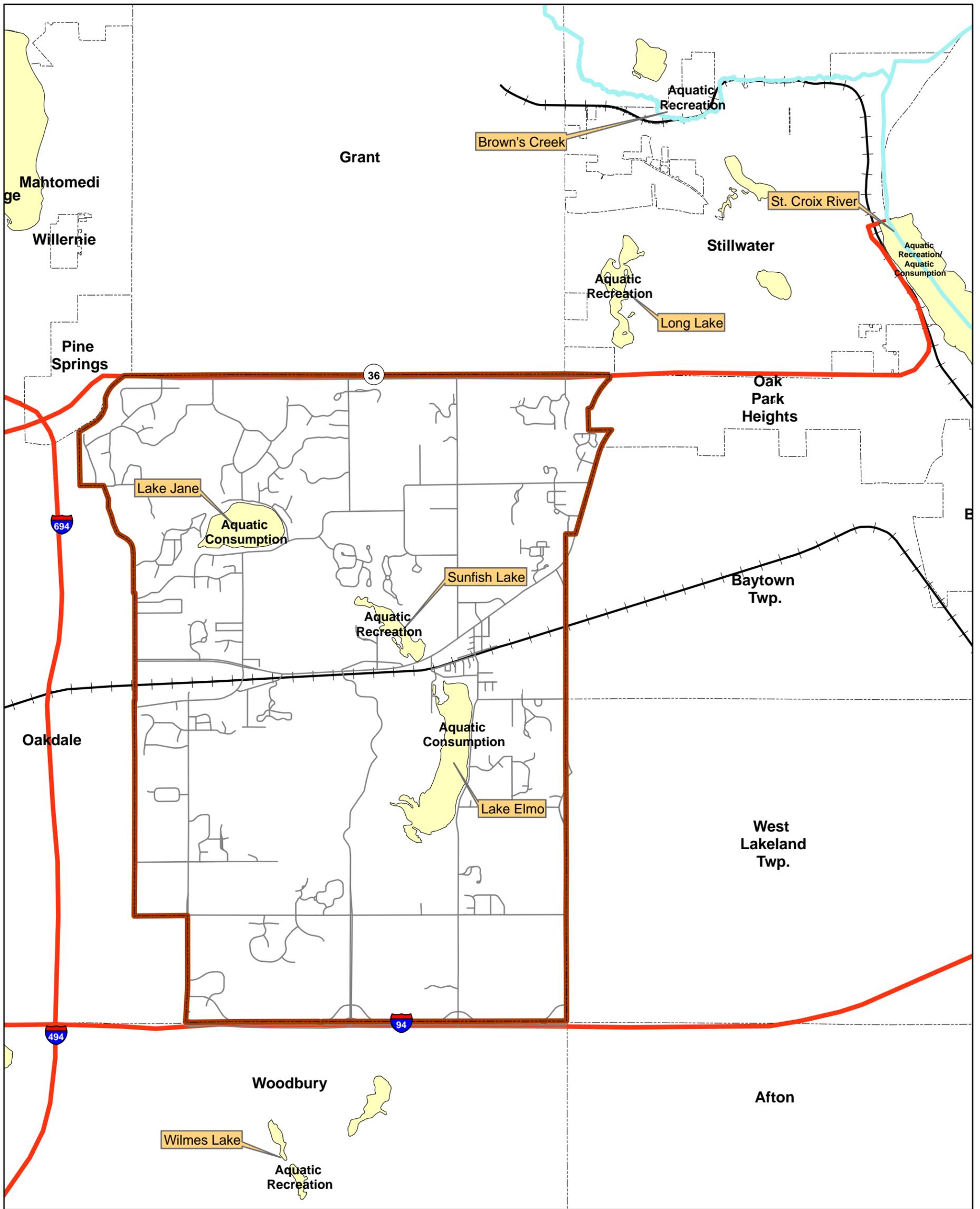
Adopt rules for all new developments to control storm water runoff volume and establish performance standards. Sections 4.6.7 and 4.4.7 of the County Ground water Plan call for the development of infiltration/volume control requirements.

Develop and adopt rules or policies on the quantity of water used in areas where existing wells and/or ground water dependent natural resources could be negatively impacted by overuse of ground water. Section 4.6.7 of the County Ground water Plan calls for the possible development of a VBWD ground water appropriations permitting program.

- ◆ *Proposed Action:* The City will cooperate with Washington County, VBWD, SWWD, BCWD, and other jurisdictions to implement the County's Ground water Plan.
- ◆ *Proposed Action:* The City is currently completing its Spill Response and Spill Containment Plans. These plans are scheduled for completion by the end of 2009.
- ◆ *Proposed Action:* The City will incorporate ground water quality and quantity issues as the City reviews and updates its ordinances and other regulations as part of implementing this Plan.

6. Natural Resource Issues

- Greenway Corridor
 - ◆ *Assessment of Problem:* The South Washington Watershed District has identified a Greenway Corridor connecting natural resource areas within the District. Two gaps exist within the Northern Subwatershed area, including Lake Elmo. The District requests that Cities adopt the corridor in their local plans, and assist with corridor protection and implementation.
 - ◆ *Proposed Action:* The City will include the Greenway Corridor identified by the SWWD in the natural resource and land use analysis and maps included in its Comprehensive Plan, and will work with the District on land use issues and development proposals to provide protection to the corridor and its resources.

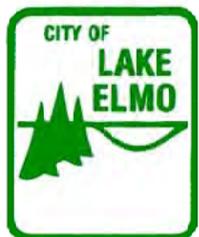


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FIGURE 20: IMPAIRED WATERS

Surface Water Management Plan

2030 Comprehensive Plan
City of Lake Elmo, Minnesota



Map date: February 2009
Prepared by:



LIMITATION OF LIABILITY
This document is not a legally recorded map or survey and is not intended to be used as one. This map is a compilation of records and information from various state, county, and city offices, and other sources.

Legend

-  City Boundary
-  2008 TMDL Lakes
-  2008 TMDL Streams

Sources: MnDNR, TKDA

G. Implementation

1. Actions to Implement this Plan and Address Identified Issues

The City will complete the following specific implementation actions to implement the LSWMP and address issues identified in Section F:

- The City concurs with and adopts the Watershed Districts Water Management Plans, standards, and rules. The Watershed Districts will continue to enforce surface water regulations and permitting within the City within their geographic areas. The City will coordinate its review of development proposals with the Watershed Districts and will manage land use to support protection of surface and ground waters through its Zoning and Subdivision Ordinance.
- The City will support the Watershed Districts' implementation of their standards for management of water quantity and quality, including control of peak runoff, volume control, infiltration and filtration, wetland quality, and best management practices to control Total Suspended Solids (TSS), Total Phosphorus (TP), and runoff from development or redevelopment within the City. The Districts will play the primary role in reviewing the storm water plans for development applications within the City, and implement their rules through the review and permit process. The City will provide comments on development applications to the Watershed Districts during the review process.
- The City will work with the Brown's Creek Watershed District to develop a definitive process for review of development proposals, including a timeline for City comment on BCWD permits.
- The City will update its ordinances to be consistent Watershed plans, standards and rules, and with NPDES construction storm water permit requirements for erosion and sediment control. The City is in the process of updating their Storm water and Erosion and Sediment Control Ordinance. Currently, the City Code does include provisions which outline the requirements for storm water management and erosion and sediment control; however, the update process will revise language, provide clear, consistent procedures, and consolidate the information in one location. The MPCA has granted an extension for completion of this ordinance to June 30, 2009. A copy of this letter is included in the Appendix. The City will update its other ordinances within 180 days of the approval of this LSWMP.
- The City will cooperate with the Watershed Districts to address concerns related to impaired waters and as the Districts complete

TMDL studies, and will manage land use to avoid impacts to water resources within the City.

- The City will work to implement the mitigation plan adopted in the Lake Elmo Old Village Area AUAR as the area develops, to protect resources in the Down's Lake Watershed and downstream.
- Complete the MPCA requirements for ORVW by the end of 2009.
- The City will work directly with the VBWD to continue to monitor the situation in the Friedrich's Pond area. If potential flooding risks are identified, the City will take the lead with the VBWD assisting in analyzing the problem and determine the appropriate solution. Any permit applications for this area will be reviewed per the City of Lake Elmo Flood Plain Ordinance.
- The City would consider all options provided in the VBWD Plan for addressing flooding issues near Legion Pond. The preferred corrective action will depend on the timing, urgency, public comment, agency comment, and available funding. The City will work directly with the VBWD to continue to monitor the situation. If potential flooding risks are identified, the City will take the lead with the VBWD assisting in analyzing the problem and determine the appropriate solution. Any permit applications for this area will be reviewed per the City of Lake Elmo Flood Plain Ordinance.
- The City will work with the SWWD to identify additional flood storage in the Wilmes Lake subwatershed, and provide additional storage as development or redevelopment occurs within the subwatershed.
- The City will complete its illicit discharge ordinance and spill containment plan in 2009. The City has developed a storm sewer map to identify the drainage path of a spill contaminant (see storm sewer map). The City is working on gathering and surveying additional information to develop a regulatory control program. Per the SWPPP, the City will also create an illicit discharge ordinance in 2009. The City will continue to evaluate the effectiveness of the illicit discharge detection and elimination program.
- Implement the City's MS4 Permit and SWPPP requirements.
 - ◆ The City's inspection and maintenance program and pollution prevention/good housekeeping is completed under the MS4 Permit and documented per the SWPPP.

2. Funding Mechanisms

The City uses general fund revenues and storm water utility funds to fund improvements when needed to address water quality and quantity concerns and maintain City-owned storm water management facilities. The City’s commitments to system maintenance are described in detail in its MS4 permit and SWPPP.

The City requires that developers finance the improvements that are required with new development and redevelopment to ensure that private developments meet City and watershed requirements.

3. Capital Improvement Plan (CIP)

The City’s current Capital Improvement Plan (CIP) is included in the Appendix.

4. City Ordinances

The City has adopted ordinances that provide standards and regulations to manage water resources. These include the following:

Chapter 53 Storm water Management Utility

Chapter 91 Forests and Trees

Chapter 152 Flood Plain Management

Chapter 153 Subdivision Regulations

Chapter 154 Zoning Code

After the SWMP and 2030 Comprehensive Plan are adopted, the City will revise or update its ordinances as described in the Goals and Policies section of this plan, to ensure that they meet state requirements and are consistent with the goals of this Plan. Ordinance updates will be completed within 180 days of the adoption of the Comprehensive Plan and LSWMP.

5. City Process

The City of Lake Elmo reviews proposed development per its Subdivision Ordinance. Design must be in compliance with Engineering Design Standards. An approved Watershed District permit is required prior to final plat acceptance. WCD approval of any wetland impact must be provided if located in BCWD or SWWD. Any impacts to public waters must be reviewed by the DNR. An NPDES Permit must be received from the MPCA when applicable. An approved SWPPP must be

provided for all subdivisions. No building permit will be issued until the following has been completed:

- a. All required recordings are documented.
- b. Record Grading Plan is received and approved for the development (permitted model home(s) are the exception).
- c. A drainage and utility easement must be provided to the 100-year flood elevations for all storm water facilities.
- d. All Low Floor elevations must be shown on the Record Plans and recorded with Washington County (recording of low floors required in VBWD only).
- e. The building permit process must follow the attached procedure before a Certificate of Occupancy is given.

The City has developed a handout to assist in the process for new home development. A copy of this handout is available in the Appendix.

H. Administration

1. Review and Adoption Process

The City will provide draft copies of this Local Surface Water Management Plan to the local Watershed Districts for review and comment. The plan will be submitted to the Metropolitan Council as part of the City’s Comprehensive Plan, and will be adopted by the City when approved by the Metropolitan Council.

2. Plan Amendments and Updates

City Comprehensive Plans are updated every ten years. Local Surface Water Management Plans must be updated within two years of completion of the Watershed Districts’ Watershed Management Plans. The City will update its Local Surface Water Plan along with its Comprehensive Plan, or as needed to comply with state rules related to LSWMP updates to be consistent with Watershed Plans.

The Valley Branch Watershed District adopted its current plan in 2005, and will update its plan in 2015. The South Washington and Brown’s Creek Watershed Districts adopted their current plans in 2007, and will update their plans in 2017. Substantive revisions to the goals and objectives, the adoption of new or revised standards or rules, and major revisions to the CIP or administrative procedures of the watershed plans will require an amendment to this plan and approval by the City Council.

Annual work plans completed during the beginning of the calendar year by the City Council will serve to guide the immediate activities of the City. The periodic CIP updates will help focus the work plans by identifying projects requiring substantial planning and financial resources for successful completion. Capital storm water improvements may be proposed by other local, state, and federal agencies as well. Understanding capital improvements planned by others is important because of the potential impact to the water resources of the City.