

Final Wellhead Protection Plan Part II
Inventory of Potential Contaminant Sources
Plan of Action to Manage Potential Contaminant Sources
Alternate Water Supply and Contingency Strategy

City of Edina, Minnesota

April 2013

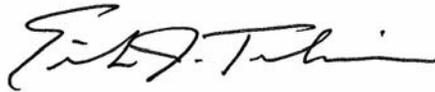


**Wellhead Protection Plan Part II
City of Edina, Minnesota
April 2013**

SEH No. EDINA 110899

Source Water Solutions, LLC

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



Erik J. Tomlinson, PG, LEED AP

Date: 04/08/13 Lic. No.: 46739

Reviewed by: APPROVED 04/01/2013
John Freitag, MDH Date

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January 2, 2013

Ms. Trudi Witkowski
Minnesota Department of Health
Source Water Protection Unit
P.O. Box 64975
St. Paul, Minnesota 55164-0975

Dear Ms. Witkowski:

Re: City of Edina, MN Wellhead Protection Plan, Part II Update

The City of Edina has completed the process of updating its Wellhead Protection Plan for its drinking water supply wells. At this time, Source Water Solutions, on behalf of the City of Edina, formally requests that the Minnesota Department of Health review the Wellhead Protection Plan, Part II Update, for approval as required by the Minnesota Wellhead Protection Rule (part 4720.5360, subpart 1). As required by the wellhead protection rule, enclosed are six copies of the plan.

The Edina City Council has reviewed the plan and approved it as part of a Public Hearing on December 18, 2012. Mr. Freitag from MDH was in attendance of that meeting.

We thank you for your assistance and look forward to hearing from you.

Sincerely,

A handwritten signature in black ink, appearing to read "Erik J. Tomlinson".

Erik J. Tomlinson, PG
Source Water Solutions, LLC

Enclosures

Cc: John Freitag, Minnesota Department of Health
Ross Bintner, City of Edina
Wayne Houle, City of Edina
Al Sunderman, SEH
Paul Pasko, SEH



COPY

Protecting, maintaining and improving the health of all Minnesotans

April 1, 2013

Mr. Wayne Houle
Director of Engineering
City of Edina
7450 Metro Boulevard
Edina, Minnesota 55439

Dear Mr. Houle:

Subject: Final Approval of the Wellhead Protection Plan Part II, City of Edina, Minnesota

I have reviewed the remaining part of the amended wellhead protection plan (Part II) for the city of Edina, received on January 2, 2013, according to the requirements of Minnesota Rules, part 4720.5555, subparts 1 and 2. The following principles were used as a basis for review:

- **Compliance with the rule** - the wellhead protection plan must be in compliance with parts 4720.5100 to 4720.5590.
- **Sound management of water resources** - includes evaluations concerning whether significant up- or down-gradient effects on groundwater may result from management controls specified in the plan. Source management options should be based on sound data and technical analysis, and the interactions between surface water and groundwater are considered. Also, the effects of short- and long-term variations in precipitation must be evaluated for their impacts on source management.
- **Effective health and environmental protection** - includes preventing potential water and related land resource problems which may impact the public wells, identifying anticipated and appropriate improvements in the quality of the environment within the drinking water supply management area, and promoting public health and safety.
- **Efficient management of potential contaminant sources** - includes estimating the cost of implementing the wellhead protection plan. Also, the management approach must identify 1) mechanisms for funding plan implementation, 2) how coordination will be achieved with participating state and local agencies, 3) approaches that were used to identify source management problems and opportunities to correct them, and 4) how water conservation practices will be used to support wellhead protection goals.

The plan provides an adequate assessment of the city's source waters and contains goals, objectives, and action strategies for the potential sources covered by the plan. The city of Edina is commended for their efforts in amending their plan to protect their drinking water supply from contamination.

Mr. Wayne Houle
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April 1, 2013

The purpose of this letter is to notify you that the Minnesota Department of Health finds the plan amendment to be consistent with Minnesota's wellhead protection rules and approves your plan for:

Well No.	Well No.
2	208399
3	240630
4	200561
5	206377
6	200564
7	206474
8	204884
10	206184
11	206183
12	203614
13	203613
15	207674
16	203101
17	200914
18	200918
19	505626
20	686286

Upon receipt of this letter, the city of Edina has up to 60 days to: 1) begin implementation of your wellhead protection plan amendment (Minnesota Rules, part 4720.5560, subpart 1); and 2) notify all local units of government within the drinking water supply management area of the adoption of your plan amendment (Minnesota Rules, part 4720.5560, subpart 2).

Should you have any questions in the future or would like assistance with the implementation of your plan, please contact me at john.freitag@state.mn.us or (651) 201-4669.

Sincerely,



John Freitag, Planner Principal
Source Water Protection Unit
Environmental Health Division
P.O. Box 64975
St. Paul, Minnesota 55164-0975

JF:TVW

cc: Mr. Ross Bintner, Environmental Engineer, City of Edina
Mr. Erik Tomlinson, Source Water Solutions
Mr. Isaac Bradlich, Engineer, Community Public Water Supply Unit, Metro Office

Public Water Supply Profile

PUBLIC WATER SUPPLY

Name: City of Edina, Minnesota
Address: 7450 Metro Boulevard
Edina, MN 55439
Phone Number: 952.826.0376
Email: mail@edinaMN.gov

WELLHEAD PROTECTION MANAGER

Name: Ross Bintner, PE
Environmental Engineer
Address: City of Edina Public Works
7450 Metro Boulevard
Edina, MN 55439
Phone Number: 952.903.5713
Email: rbintner@edinaMN.gov

CONSULTANT

Name: Erik J. Tomlinson, PG
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Saint Paul, MN 55101
Phone Number: 612.354.2549
E-Mail: erik@sourcewater-solutions.com

Documentation List

<u>STEP</u>	<u>DATE PERFORMED</u>
Scoping Decision Notice Received (MN Rules Section 4720.5340, subp. 2)	October 24, 2011
Remaining Portion of Plan Submitted to Local Units of Government (LGUs) (MN Rules Section 4720.5350, subp. 1 & 2)	July 15, 2012
Reviews Received From Local Units of Government (MN Rules Section 4720.5350, subp. 2)	September 15, 2012
Reviews Considered (MN Rules Section 4720.5350, subp. 3)	December 2012
Public Hearing Conducted (MN Rules Section 4720.5350, subp. 4)	December 18, 2012
Remaining Portion Wellhead Protection Plan Submitted (MN Rules Section 4720.5360, subp. 1)	December 21, 2012
Approved Review Notice Received	April 1, 2013

Executive Summary

The City of Edina was one of the first communities in the State of Minnesota to initiate wellhead protection planning efforts for their municipal wells. The City's original Part II Wellhead Protection Plan was completed and approved by the Minnesota Department of Health (MDH) in February 2001. Per MN Rule 4720.5570, a public water supplier must review and amend a wellhead protection plan every ten years from the date of the last approval of a plan by the department (MDH). Therefore, Edina is also one of the first communities in the metro area to update their WHP Plan. The Part I portion of the City's wellhead protection plan was approved in August 2011. This portion of the wellhead and source water protection plan update (Part II Wellhead Protection Plan) for the City of Edina, Minnesota (The City) includes:

- an assessment of applicable data elements,
- the results of the potential contaminant source inventory,
- management strategies for the potential contaminant sources,
- the City of Edina Water Emergency and Conservation Plan, and
- an Evaluation Plan for the City of Edina Wellhead Protection Program.

Part I of the Wellhead Protection Plan Update presented the delineation of the wellhead protection area (WHPA) and the drinking water supply management area (DWSMA) and included the vulnerability assessments for the City's wells and source water aquifers within the DWSMA. Part I of the Wellhead Protection Plan Update was submitted to the Minnesota Department of Health (MDH) and approved. The boundaries of the WHPA and DWSMA and the vulnerability of the source water aquifers are presented in Figure 1. An electronic copy of Part I Update of the City of Edina Wellhead Protection Plan is provided as **Appendix A**.

The City of Edina public water supply system currently uses and relies upon three source water aquifers – the Prairie du Chien, Jordan, and Mt. Simon aquifers. Municipal Wells 2, 3, 4, 5, 8, 15, 16, and 20 are open to the Prairie du Chien aquifer. Wells 6, 7, 11, 13, 14, 17, 18, and 19 are open to the Jordan aquifer and Wells 9, 10, and 12 are open to the Mt. Simon aquifer. Wells 9 and 14 are classified as emergency wells, however Well 14 is no longer part of the drinking water system. Based on the local geologic conditions, the DWSMA has been delineated with areas of low, moderate, and high vulnerability (**Figure 1**). Potential contaminant source information, and those potential sources required to be identified based upon the DWSMA vulnerability, were presented during the Second Scoping Meeting held with MDH staff on September 30, 2011. At this meeting, the requirements for the content of the Part II Plan were outlined and discussed in detail.

As part of the Edina Part I Plan update, because a more recent and detailed model existed (Metro Model 2.0) and a fracture flow delineation was required for many of the City's wells, the City saw their DWSMAs grow substantially and merge into one large DWSMA. The City of Edina DWSMA now includes almost the entire City of Edina, the entire City of Hopkins and portions of Minneapolis, Richfield, Bloomington, Eden Prairie, Minnetonka, Plymouth, and Golden Valley. As other municipalities update their own Plans, it is anticipated that their DWSMAs will increase in size as well. More information about the fracture flow delineation can be found in the Part I portion of the Plan (**Appendix A**).

One of the requirements of the Part II Plan is to conduct a potential contaminant source inventory. As part of the City's original Plan, 183 potential contaminant sources were identified within the City's DWSMAs. Due to the increased size of the City's DWSMA as well as the increased data availability and documentation, the number of potential contaminant sources increased to over 1,600 sites, over 900 of those being wells. The potential contaminant source inventory is discussed in more detail in Section 4.0.

The information and data contained in Sections 1.0 – 4.0 of this portion of the Wellhead Protection Plan (hereafter referred to as Part II of the Plan) support the approaches taken to address potential

Executive Summary (Continued)

contamination sources that have been identified as potentially affecting the aquifer used for the public water supply. The reader is encouraged to concentrate attention on Sections 1.0 – 5.0 in order to better understand why the particular management strategies are included in Section 6.0.

Section 1.0 provides background for the City's municipal water supply wells and wellhead protection planning process thus far.

In Section 2.0, the required data elements indicated by the MDH in the *Scoping 2 Decision Notice* are addressed, as well as the data's degree of reliability. Pertinent data elements include information about the geology, water quality, and water quantity. The data elements and information supplied in Part I of the Plan were the basis for the assessment that the aquifers providing drinking water for Edina are vulnerable to certain land uses and activities, and other wells that penetrate the aquifer.

Section 3.0 addresses the possible impacts that changes in the physical environment, land use, and water resources have on the public water supply. No significant changes are anticipated in the city within the next ten-year period, and City staff has evaluated the support necessary to implement this Plan.

The problems and opportunities concerning land use issues relating to the aquifers, well water, and the DWSMA, are addressed in Section 4.0. The vulnerability status of the aquifer and wells, and the quality of water currently produced by the municipal wells result in the following major concerns: 1) preventing groundwater contamination to the source water aquifers from existing and future land uses and 2) other wells located within the DWSMA that could become pathways for contamination to enter the aquifer.

The drinking water protection goals that the City would like to achieve with this Plan are listed in Section 5.0. In essence, the overall goals of this Plan are to 1) prevent contamination of the source water aquifers, and 2) manage the source water aquifers cooperatively with other local government units to assure sustainable water supplies of all users in the future.

The objectives and action plans for managing the potential sources of contamination are contained in Section 6.0. Actions aimed toward educating the general public about groundwater issues, gathering information about other wells, and collecting data relevant to wellhead and source water protection planning are the general focus.

Section 7.0 contains a guide to evaluate the implementation of the identified management strategies of Section 6.0. The wellhead protection program for the City of Edina will be evaluated on an annual basis prior to its budgeting process.

An emergency/contingency water plan is included to address the possibility that the water supply system is interrupted due to either emergency situations or drought. Section 8.0 references the City of Edina's *Water Emergency and Conservation Plan* approved by the Department of Natural Resources.

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Glossary of Terms

Data Element. A specific type of information required by the Minnesota Department of Health to prepare a wellhead protection plan.

Drinking Water Supply Management Area (DWSMA). The area delineated using identifiable land marks that reflects the scientifically calculated wellhead protection area boundaries as closely as possible (Minnesota Rules, part 4720.5100, subpart 13).

Drinking Water Supply Management Area Vulnerability. An assessment of the likelihood that the aquifer within the DWSMA is subject to impact from land and water uses within the wellhead protection area. It is based upon criteria that are specified under Minnesota Rules, part 4720.5210, subpart 3.

Emergency Response Area (ERA). The part of the wellhead protection area that is defined by a one-year time of travel within the aquifer that is used by the public water supply well (Minnesota Rules, part 4720.5250, subpart 3). It is used to set priorities for managing potential contamination sources within the DWSMA.

Inner Wellhead Management Zone (IWMZ). The land that is within 200 feet of a public water supply well (Minnesota Rules, part 4720.5100, subpart 19). The public water supplier must manage the IWMZ to help protect it from sources of pathogen or chemical contamination that may cause an acute health effect.

Wellhead Protection (WHP). A method of preventing well contamination by effectively managing potential contamination sources in all or a portion of the well's recharge area.

Wellhead Protection Area (WHPA). The surface and subsurface area surrounding a well or well field that supplies a public water system, through which contaminants are likely to move toward and reach the well or well field (Minnesota Statutes, section 103I.005, subdivision 24).

Well Vulnerability. An assessment of the likelihood that a well is at risk to human-caused contamination, either due to its construction or indicated by criteria that are specified under Minnesota Rules, part 4720.5550, subpart 2.

Acronyms

CDJN - Jordan Aquifer

CWI - County Well Index

DNR - Minnesota Department of Natural Resources

EPA - United States Environmental Protection Agency

IWMZ – Inner Wellhead Management Zone

MDA - Minnesota Department of Agriculture

MDH - Minnesota Department of Health

MGS - Minnesota Geological Survey

MnDOT - Minnesota Department of Transportation

MPCA - Minnesota Pollution Control Agency

OPCJ - Prairie Du Chien- Jordan Aquifer

PCSI – Potential Contaminant Source Inventory

SWCD - Soil and Water Conservation District

UMN - University of Minnesota

USDA - United States Department of Agriculture

USGS - United States Geological Survey

Wellhead Protection Plan Part II

Inventory of Potential Contaminant Sources Plan of Action to Manage Potential Contaminant Sources Alternate Water Supply and Contingency Strategy

Prepared for the City of Edina, Minnesota

1.0 Project History and Background

Wellhead Protection is designed to protect public water supply wells. States are required to have wellhead protection programs under the provisions of the 1986 amendments to the federal Safe Drinking Water Act. The Minnesota Department of Health (MDH) administers the state wellhead protection rule, Minnesota Rules, Chapter 4720.5100 – 4720.5590, that sets standards for wellhead protection planning. The City of Edina (The City) has completed this Part 2 portion of the Wellhead Protection (WHP) Plan Update, in accordance with Minnesota Rules Chapter 4720.5300. The City has identified a WHP Manager to oversee the development of the plan.

The Wellhead Protection Area (WHPA) is the region that supplies groundwater to The City. The area around it, which is to be protected and managed, is defined as the Drinking Water Supply Management Area (DWSMA). These areas were delineated in Part 1 of the Wellhead Protection Plan Update (**Appendix A**). Geographic landmarks, such as roads and property lines, were used to map the boundaries of the DWSMA so that it is readily identifiable. The location of the DWSMA, relative to other communities, is shown on **Figure 1**. The well vulnerabilities, WHPA, and DWSMA were approved by the MDH in August 2011 and are also shown on **Figure 1**. The City utilizes seventeen municipal wells. Well information is summarized in **Table 1** below.

Table 1 Municipal Well Details

Local Well Name	Unique Number	Use/ Status	XUTM	YUTM	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Aquifer	Aquifer Thickness (ft)*	Well Elevation	Static Water Level**	Static Water Elevation (ft msl)
Well 2	208399	Primary	473055	4973236	20x16x12	266	448	OPCJ	188	882	80	802
Well 3	240630	Seasonal	473877	4972740	12	265	496	OPCJ	231	875	72	803
Well 4	200561	Primary	472735	4971840	24x16	266	500	OPCJ	234	895	80	815
Well 5	206377	Seasonal	474068	4969468	24x20x16	257	443	OPCJ	206	869	78	791
Well 6	200564	Primary	472527	4971541	24x16	316	503	CDJN	215	902	90	812
Well 7	206474	Seasonal	471863	4972656	24x16	350	547	CDJN	221	951	112	839
Well 8	204884	Seasonal	471630	4970067	24x16	232	472	OPCJ	225	869	49	820
Well 9	206588	Emergency	471483	4971517	16x16x10	1010	1130	Mt. Simon	260	928	325	603
Well 10	206184	Primary	473176	4968046	24x20x16	881	1001	Mt. Simon	271	826	144	682
Well 11	206183	Primary	473197	4968034	24x16	321	403	CJDN	98	826	22	804
Well 12	203614	Primary	468781	4974160	24x16	955	1080	Mt. Simon	248	941	252	689
Well 13	203613	Primary	468781	4974160	24x16	429	495	CJDN	82	944	97	847
Well 14	200913	Emergency	469878	4968167	16	325	420	CJDN	99	869	38	831

Local Well Name	Unique Number	Use/ Status	XUTM	YUTM	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Aquifer	Aquifer Thickness (ft)*	Well Elevation	Static Water Level**	Static Water Elevation (ft msl)
Well 15	207674	Seasonal	470874	4973231	30x24x20	275	475	OPCJ	210	902	112	790
Well 16	203101	Seasonal	469482	4970571	30x20	265	381	OPCJ	126	895	66	829
Well 17	200914	Primary	473561	4971433	30x24	373	461	CJDN	98	869	59	810
Well 18	200918	Seasonal	474656	4968640	30x24x16	365	446	CJDN	93	859	61	798
Well 19	505626	Seasonal	470092	4969770	30x24x18	440	521	CJDN	93	944	163	781
Well 20	686286	Seasonal	469502	4970896	30x24x18	265	467	OPCJ	212	881	90	791

*Total aquifer thickness as described on the well log

** Based on well log

1.1 Wellhead Protection Area Delineation Criteria

The criteria listed below were used to delineate the City of Edina's WHPA. Please refer to Part I of this Plan (**Appendix A**) for detailed documentation regarding how the following criteria were applied in determining the boundaries of the WHPA:

Time of Travel - 10 years

Flow Boundaries - based on geologic information

Daily Volume - provided by the City

Groundwater Flow Field - delineation method was computer modeling

Aquifer Transmissivity - determined from aquifer pumping tests

Based on the local geologic conditions, the DWSMA has been delineated with areas of low to high vulnerability. Consequently, the potential sources of contamination to the source water aquifers include all land uses and other wells that penetrate the aquifer. This information was presented during the Second Scoping Meeting held with MDH staff on September 30, 2011 when the necessary requirements for the content of Part II were outlined and discussed in detail.

2.0 Identification and Assessment of Required Data Elements

The following sections identify the required data elements as outlined in Minnesota Rules Chapter 4720.5200, as well as an assessment of the present and future implications of the data elements. The required data elements were outlined in the Minnesota Department of Health (MDH) Second Scoping Decision Notice dated October 24, 2011 (**Appendix B**). They include data, covering the following topics:

- Physical Environment
- Land Use
- Water Quantity
- Water Quality

2.1 Physical Environment Data Elements

The following sections describe the physical features evaluated for this report.

2.1.1 Precipitation

This data element specifically relates to the highly vulnerable areas of the Drinking Water Supply Management Area (DWSMA) because there is a direct hydraulic connection between surface waters and the highly vulnerable portions of the DWSMA. **Table 2** summarizes the last 5 years of total precipitation near Edina at the Golden Valley gage station. The locations of rain gages are depicted in **Figure 1**. Precipitation plays a direct role in recharging the aquifers. The City does not have any control over precipitation rates or volumes, however, if precipitation decreases, so does natural recharge to the aquifers.

Table 2 - Precipitation Data

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
2007	0.35	1.20	4.11	1.75	3.03	1.78	2.02	7.69	6.10	5.04	0.15	1.84	35.06
2008	0.16	0.50	1.30	3.06	1.92	2.44	1.06	3.13	2.48	1.77	1.25	1.02	23.09
2009	0.40	1.23	1.34	1.02	0.48	3.48	1.19	8.75	0.99	6.35	0.39	2.15	27.77
2010	0.61	0.73	1.05	2.95	2.76	4.71	3.74	5.77	4.85	2.41	2.19	2.81	34.58
2011	1.04	1.07	2.61	2.86	6.41	4.06	6.19	3.81	0.34	1.12	0.23	1.04	30.78

Notes: All values are in inches.

Data obtained from MN Climatology Working Group for Golden Valley station (State Climatology Office - DNR Waters, phone: 651-296-4214, web: <http://climate.umn.edu>).

2.1.2 Geology

This data element is required for, and was presented in, the first part of the Wellhead Protection Plan (please refer to **Appendix A**). The subsurface data used in the Part I report and the determination of subsurface stratigraphic relationships were derived from the use of public – domain well records and local and regional geologic studies and publications. Bedrock geology of the area is presented in **Figure 2** and surficial geology of the area is presented as **Figure 3**. The geologic conditions present below the City of Edina are not anticipated to change during the life of this plan. During the assignment of DWSMA vulnerability in Part I (**Appendix A**), the geologic conditions were assessed in more detail. The areas of high vulnerability have geologic conditions

that provide a low level of protection to the City’s water supply. The areas of low to moderate vulnerability have geologic conditions that provide a higher level of protection to the City’s water supply. **Figure 1** depicts the zones of DWSMA vulnerability.

2.1.3 Soils

The characteristics of the soils within the DWSMA apply to this Plan because there appears to be a hydraulic connection between surface waters and the aquifers serving this water supply system, particularly within the highly-vulnerable areas of the DWSMA. Soils with higher permeabilities will allow potential contaminants to migrate faster into the subsurface, and have a higher risk of impacting vulnerable source water aquifers. Soils information was obtained from the Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database. **Figure 4** depicts the soil types within the DWSMA. The associated physical soil properties for each soil type are reported in **Appendix C**.

2.1.4 Water Resources

Generally, this data element applies to this Plan because there is a direct hydraulic connection between surface waters and the source water aquifers serving this water supply system within the highly vulnerable areas of the DWSMA. In addition, this data applies as it relates to future groundwater uses that may influence the ability of the aquifer to yield water to the public water supply. It was determined in the Part I WHPP that the surface water features surrounding Edina are not assumed to directly influence the WHPAs and DWSMAs of the municipal well.

The City of Edina and its municipal wells are located within the Lower Minnesota River and Mississippi River – Twin Cities major watersheds. The City’s wells lie within two minor watersheds: Minnehaha Creek and Ninemile Creek watersheds. The City of Edina has adopted a Comprehensive Water Resource Management Plan. This document serves as a guiding document for water resource management in the City of Edina.

Thirty-seven lakes exist within the City’s DWSMA, consisting of 697 acres of surface area, exist within the DWSMA. Fourteen lakes are un-named shallow lakes. Twenty-four named lakes exist within the City’s DWSMA. The shoreland classification for each lake within Edina’s DWSMA is provided in **Table 3**. No information could be located regarding Nine Mile or Minnehaha Creek DNR shoreland classification. **Figure 7** depicts the hydrologic features in the DWSMA and general area.

General information describing the groundwater resources and the City’s public water supply system was presented in the Part I of the Plan provided in **Appendix A**, and the *Source Water Assessment (SWA)* found in **Appendix F** of this Plan.

Table 3 - Lake Shoreland Classification

Lake Name	City	Lake Size (Acres)	Shoreland Classification
Unnamed (Centennial Lakes Park)	Edina	2.43	Unclassified
Unnamed	Edina	3.01	Unclassified
Centennial	Edina	3.33	Unclassified
Unnamed	Edina	3.39	Unclassified
Unnamed	Saint Louis Park	3.55	Unclassified
Pamela Pond	Edina	3.79	Unclassified
Unnamed	Edina	3.89	Unclassified
Minnehaha Marsh	Minnetonka	4.02	Unclassified

Lake Name	City	Lake Size (Acres)	Shoreland Classification
Unnamed	Hopkins	4.63	Unclassified
Unnamed	Minnetonka	5.09	Unclassified
Garrison Pond	Eden Prairie	5.4	Unclassified
Unnamed (Cedar Manor)	Saint Louis Park	5.72	Unclassified
Hawkes	Edina	6.04	General Development
Harvey	Edina	6.62	Unclassified
Unnamed	Edina	7.04	Unclassified
Victoria	Saint Louis Park	8.69	Recreational Development
Unnamed (Cobblecrest)	Saint Louis Park	8.84	Unclassified
Unnamed	Edina	9.31	Unclassified
Unnamed (Braemer Water Hazard)	Edina	9.36	Unclassified
Melody	Edina	9.73	Unclassified
Highland Park Pond	Edina	10.39	Unclassified
Unnamed	Minnetonka	11	Unclassified
Windsor	Minnetonka	13.45	Recreational Development
Indianhead	Edina	14.89	Recreational Development
Edina Mill Pond	Edina	15.42	Recreational Development
Wanda Miller	Bloomington	16.56	Unclassified
Lone	Minnetonka	16.79	Recreational Development
Meadowbrook	Saint Louis Park	19.59	Natural Environment
Mirror	Edina	20.95	Recreational Development
Arrowhead	Edina	22.03	Recreational Development
Edina	Edina	23.54	General Development
Hannan	Saint Louis Park	29.34	Recreational Development
Westwood	Saint Louis Park	41.81	Unclassified
Cornelia	Edina	58.24	Recreational Development
Shady Oak	Minnetonka	90.61	Recreational Development
Bryant	Eden Prairie	177.62	Recreational Development

2.2 Land Use Data Elements

2.2.1 City Zoning and Land Use

Table 4 summarizes the most recent 2006 NLCD land use classifications for the City of Edina DWSMA. **Figure 5** shows the 2006 National Land Cover Database (NLCD2006) land use within the DWSMA. The City of Edina DWSMA crosses political boundaries and extends beyond the city limits of Edina into the Cities of Hopkins, St. Louis Park, Golden Valley, Minnetonka, Eden Prairie, Bloomington, Richfield and Minneapolis. This will make it more difficult for the City to administer some actions. There will be a great need for collaboration, within the City of Edina and with neighboring communities, to effectively protect the City's drinking water resources.

Land use information and the extent and limits of the WHPA and DWSMA will be helpful to decision-makers in future planning efforts, by considering groundwater quality issues and wellhead and source water protection. **Table 5** summarizes the zoned land use within the City of Edina. **Figure 6** depicts

the existing zoned land use within the City of Edina. The City of Edina's zoning is discussed further in Section 5 when assessing risk and prioritizing actions and strategies.

Table 4 - DWSMA Land Use Summary

NLCD Land Use Classification	Percent of Land Area In DWSMA
Cultivated Crops	0.06
Deciduous Forest	10.87
Developed, High Intensity	13.90
Developed, Low Intensity	34.12
Developed, Medium Intensity	17.97
Developed, Open Space	17.76
Emergent Herbaceous Wetlands	2.25
Evergreen Forest	0.40
Grasslands/Herbaceous	0.07
Mixed Forest	0.01
Open Water	1.70
Pasture/Hay	0.16
Shrub/Scrub	0.05
Woody Wetlands	0.68

Table 5 - Existing Zoned Land Use in Edina

Land Use	Percent of Land Area In Edina
Commercial	7.6
Industrial	4.6
Multiple Family Residential	7.6
Parks and Recreation	16.0
Public/Semi-Public	8.7
Single Family Residential	55.1
Unclassified	0.4

Since there are areas within the DWSMA where the source water aquifers have been classified as moderate and highly vulnerable, most land uses have also been considered as part of the potential contaminant source inventory (please refer to Section 1.1.2.3) and are discussed in more detail in Section 5 . The City of Edina has also considered the presence and use of other wells within the DWSMA when developing this Plan.

2.2.2 Public Utility Services

Records of well construction and maintenance apply to this portion of the plan due to the information available regarding the wells and the quality and quantity of the water supplying this system. This information was provided in Part I of the Plan and was used to support the development of Section 6 of this Plan, which details a water emergency and conservation plan for this system.

City sanitary sewer is depicted in the **Figure 8** and the location of the transportation corridors and the locations of storm sewer for Edina in **Figure 9**. The City’s water force mains are shown in **Figure 10**.

2.3 Water Quantity Data Elements

2.3.1 Surface Water Quantity

This data element applies to this Plan because there appears to be a hydraulic connection between surface waters and the aquifers serving this water supply system, specifically in the high

vulnerability portions of the DWSMA. Minnehaha and Nine Mile Creeks cross the DWSMA. Minnehaha Creek flows primarily through the low vulnerability portion, but does cross over some moderately vulnerable areas. Nine Mile Creek flows through the moderately and highly vulnerable portions of the DWSMA (see **Figure 7**). A flow gaging station is located just upstream of where Minnehaha Creek enters the DWSMA boundary at Minnetonka Mills. No flow data was available for the Nine Mile Creek within the DWSMA. A gaging station is located approximately 5.5 miles downstream of the DWSMA boundary.

There are currently three active surface water appropriation permits approved by the DNR located within the City's DWSMA. Three are for lake level maintenance and one is for golf course irrigation. More information is provided in **Table 6**.

Table 6 - Active Surface Water Appropriation Permits

Permittee	Use Name	Category	Resource Name	2010*	2009*	2008*	2007*	2006*	2005*
DEWEY HILL III TOWNHOMES	Basin/Lake Level Maintenance	Water Level Maintenance	DEWEY HILL III	0	0	1.944	1.496	3.63	3.63
CITY OF EDINA	Basin/Lake Level Maintenance	Water Level Maintenance	INDIANHEAD LAKE	0	0	0	0	0	0
CITY OF EDINA	Basin/Lake Level Maintenance	Water Level Maintenance	ARROWHEAD LAKE	0	0	8	0	0	0
MINNEAPOLIS PARK & REC BOARD	Golf Course Irrigation	Non-Crop Irrigation	MEADOWBROOK	12.8	21.48	16.57	22.05	9.52	6.27

*Volumes are in million gallons per year.

2.3.2 Groundwater Quantity

Groundwater levels in the source water aquifers appear stable and adequate for the amounts that Edina is currently permitted to withdraw under the water appropriation program administered by the Minnesota Department of Natural Resources (MNDNR).

An Appropriation Permit is required for any person or business that uses more than 10,000 gallons of water per day or 1,000,000 gallons per year. The permits are cataloged in the State Water Use Data System. This database was queried for Part I of the Plan to identify high-capacity wells that could potentially influence or impact the local groundwater flow fields and the City's municipal wells. There are 77 additional high-capacity wells located within the DWSMA. High yield wells located within the DWSMA and near the City of Edina are shown in **Figure 1**. **Table 7** below identifies water appropriation permitted wells within the DWSMA. There are currently no high-capacity wells within the DWSMA from which well interference complaints with the city's wells have been documented.

Table 7 - Groundwater Appropriation Permit Information

Permit Number	Permittee	Use	Aquifer	Unique Well ID	2010	2009	2008	2007	2006
1960-0231	INDIANHEAD LAKE IMPROVEMENT ASSOC	Basin/Lake Level Maintenance	OSTPCJDN	222905	3.4	6.7	3.2	4.1	1.0
1966-1167	OAK RIDGE COUNTRY CLUB	Golf Course Irrigation	OPDCCJDN	204072	29.1	16.5	23.0	18.9	17.8
1969-0490	INTERLACHEN COUNTRY CLUB	Golf Course Irrigation	OPCJ	NA	2.8	2.3	1.4	1.3	1.3
1969-0490	INTERLACHEN COUNTRY CLUB	Golf Course Irrigation	OPCJ	NA	6.6	12.0	11.1	14.7	14.4

Permit Number	Permittee	Use	Aquifer	Unique Well ID	2010	2009	2008	2007	2006
1969-0490	INTERLACHEN COUNTRY CLUB	Golf Course Irrigation	OPCJ	453805	12.5	17.6	15.5	15.9	15.1
1972-1231	EDINA COUNTRY CLUB	Golf Course Irrigation	OPDCCJDN	236157	15.1	13.9	12.7	27.4	0.0
1972-1231	EDINA COUNTRY CLUB	Golf Course Irrigation	OPDCCJDN	161443	4.9	12.6	9.7	9.8	11.2
1973-1007	ST LOUIS PARK, CITY OF	Municipal Waterworks	OPVLOSTP	206440	0.1	4.7	13.3	18.7	32.0
1973-1007	ST LOUIS PARK, CITY OF	Municipal Waterworks	OPDCCJDN	200542	525.0	513.0	483.4	491.4	400.9
1973-1007	ST LOUIS PARK, CITY OF	Municipal Waterworks	OPDCCJDN	206457	0.2	0.3	0.2	0.2	1.3
1973-1007	ST LOUIS PARK, CITY OF	Municipal Waterworks	OPDCCJDN	206436	0.0	0.0	0.0	0.0	0.0
1973-1007	ST LOUIS PARK, CITY OF	Municipal Waterworks	OPDCCJDN	203678	545.9	296.2	292.2	468.1	559.1
1973-1007	ST LOUIS PARK, CITY OF	Municipal Waterworks	OPDCCJDN	206437	0.0	0.0	0.0	0.0	0.0
1973-1007	ST LOUIS PARK, CITY OF	Municipal Waterworks	OPDCCJDN	206442	133.2	207.0	351.7	309.5	341.0
1973-1007	ST LOUIS PARK, CITY OF	Municipal Waterworks	CMTS	206439	58.7	122.2	67.0	83.0	62.8
1973-1007	ST LOUIS PARK, CITY OF	Municipal Waterworks	CMTS	206456	307.2	362.1	357.6	320.2	358.5
1973-1007	ST LOUIS PARK, CITY OF	Municipal Waterworks	OPDCCJDN	215447	0.0	55.2	0.1	0.0	0.0
1973-1007	ST LOUIS PARK, CITY OF	Municipal Waterworks	CJDN	203187	273.5	375.8	371.3	192.1	215.8
1973-1007	ST LOUIS PARK, CITY OF	Municipal Waterworks	CMTS	147459	0.0	0.0	0.0	0.0	0.0
1973-1119	EDINA, CITY OF	Municipal Waterworks	OPDCCJDN	208399	362.3	258.3	343.0	328.5	58.0
1973-1119	EDINA, CITY OF	Municipal Waterworks	OPDCCJDN	240630	45.8	174.6	1.9	6.2	10.4
1973-1119	EDINA, CITY OF	Municipal Waterworks	OPDCCJDN	200561	250.6	314.5	207.7	73.9	189.5
1973-1119	EDINA, CITY OF	Municipal Waterworks	OPDCCJDN	206377	79.9	111.8	106.6	239.4	208.5
1973-1119	EDINA, CITY OF	Municipal Waterworks	OPDCCJDN	200564	218.3	226.8	325.8	313.9	358.8
1973-1119	EDINA, CITY OF	Municipal Waterworks	OPDCCJDN	206474	0.0	0.0	0.0	0.0	0.0
1973-1119	EDINA, CITY OF	Municipal Waterworks	OPDCCJDN	204884	4.8	10.2	22.2	49.3	62.8
1973-1119	EDINA, CITY OF	Municipal Waterworks	PMHNPML	206588	19.5	0.8	0.5	7.9	0.8
1973-1119	EDINA, CITY OF	Municipal Waterworks	CMTS	206184	252.5	268.0	245.1	134.1	171.0
1973-1119	EDINA, CITY OF	Municipal Waterworks	CJDN	206183	421.7	479.0	459.2	259.0	360.9
1973-1119	EDINA, CITY OF	Municipal Waterworks	CMTS	203614	105.6	128.4	246.5	118.2	143.6
1973-1119	EDINA, CITY OF	Municipal Waterworks	CJDN	203613	381.8	323.5	382.9	459.9	250.1
1973-1119	EDINA, CITY OF	Municipal Waterworks	OPDCCJDN	207674	14.6	11.8	20.8	77.7	51.5
1973-1119	EDINA, CITY OF	Municipal Waterworks	OPDCCJDN	203101	82.8	57.8	94.4	167.0	276.6
1973-1119	EDINA, CITY OF	Municipal Waterworks	CJDN	200914	26.6	55.2	20.7	10.8	8.3
1973-1119	EDINA, CITY OF	Municipal Waterworks	CJDN	200918	31.9	57.8	74.2	181.9	252.3
1973-1119	EDINA, CITY OF	Municipal Waterworks	CJDN	505626	46.3	138.5	140.9	259.1	299.3

Permit Number	Permittee	Use	Aquifer	Unique Well ID	2010	2009	2008	2007	2006
1973-1119	EDINA, CITY OF	Municipal Waterworks	CJDN	686286	133.3	155.5	0.0	0.0	0.0
1975-6245	HOPKINS, CITY OF	Municipal Waterworks	OPDCCIGL	204573	0.0	0.0	0.0	0.0	0.0
1975-6245	HOPKINS, CITY OF	Municipal Waterworks	OPDCCJDN	204068	476.9	444.8	429.9	771.4	949.9
1975-6245	HOPKINS, CITY OF	Municipal Waterworks	OPDCCJDN	204570	0.0	0.0	4.7	22.5	3.4
1975-6245	HOPKINS, CITY OF	Municipal Waterworks	OPDCCJDN	112228	317.1	368.4	407.2	127.0	1.6
1975-6248	MINIKAHDA CLUB	Golf Course Irrigation	OPCJ	200534	19.3	11.5	21.3	23.7	21.2
1975-6248	MINIKAHDA CLUB	Golf Course Irrigation	OPDCCJDN	161436	4.7	17.3	7.3	8.9	5.8
1975-6260	DUKE REALTY LTD PARTNERSHIP	Landscaping/ Athletic Fields	OPDC	119302	0.0	0.1	0.1	0.1	0.1
1975-6269	SOUTHDALE LTD PARTNERSHIP	Once-through heating or A/C	OPCJ	433288	0.0	39.8	32.4	41.1	36.0
1975-6269	SOUTHDALE LTD PARTNERSHIP	Landscaping/ Athletic Fields	OPCJ	433288	6.3	0.0	0.0	0.0	0.0
1979-6207	MINNETONKA, CITY OF	Municipal Waterworks	CJDN	204054	110.7	98.0	146.9	163.3	105.1
1979-6207	MINNETONKA, CITY OF	Municipal Waterworks	OPDCCJDN	205165	76.6	119.9	120.4	170.3	184.6
1979-6207	MINNETONKA, CITY OF	Municipal Waterworks	OPDCCJDN	132263	134.1	121.1	124.2	149.8	108.2
1979-6207	MINNETONKA, CITY OF	Municipal Waterworks	CJDN	208012	110.7	98.0	146.9	163.3	105.1
1981-6197	OXMOOR LAKE ASSOCIATION	Basin/Lake Level	OPCJ	147864	2.9	1.9	3.1	2.5	2.7
1985-6073	FAIRVIEW SOUTHDAL HOSPITAL	Commercial/ Institutional Waterworks	OPDC	206373	0.0	0.0	0.0	0.0	0.0
1985-6073	FAIRVIEW SOUTHDAL HOSPITAL	Other Power Generation	OPDC	206373	0.0	0.0	0.0	0.0	0.0
1985-6073	FAIRVIEW SOUTHDAL HOSPITAL	Once-through heating or A/C	OPDC	206373	0.0	0.0	0.0	0.0	0.0
1985-6073	FAIRVIEW SOUTHDAL HOSPITAL	Landscaping/ Athletic Fields	OPDC	206373	2.5	2.9	2.9	2.5	2.8
1986-6083	MINNEAPOLIS GOLF CLUB	Golf Course Irrigation	OPDCCJDN	203183	12.7	13.6	12.9	13.5	13.8
1986-6083	MINNEAPOLIS GOLF CLUB	Golf Course Irrigation	NA	NA	21.1	26.6	26.0	26.0	24.0
1986-6125	MINNEAPOLIS PARK & REC BOARD	Golf Course Irrigation	MEADOWB ROOK	NA	12.8	21.5	16.6	22.1	9.5
1986-6125	MINNEAPOLIS PARK & REC BOARD	Golf Course Irrigation	OPDCCJDN	216009	3.2	0.0	0.0	0.0	0.0
1987-6212	ST LOUIS PARK, CITY OF	Pollution Containment	QBAA	434045	25.8	26.3	8.6	22.6	18.0
1987-6212	ST LOUIS PARK, CITY OF	Pollution Containment	OPVL	434044	10.3	6.3	5.2	13.1	15.4
1987-6212	ST LOUIS PARK, CITY OF	Pollution Containment	QBAA	434043	0.0	0.0	0.0	0.0	0.0
1988-6212	ST LOUIS PARK, CITY OF	Pollution Containment	CIGL	200979	0.0	0.0	0.0	0.0	0.0
1988-6213	ST LOUIS PARK, CITY OF	Pollution Containment	OPCJ	216050	28.9	28.6	25.6	28.1	27.9
1990-6036	ST LOUIS PARK, CITY OF	Pollution Containment	OSTP	434042	30.4	23.8	11.5	30.1	36.4
1992-6099	THERMOTECH	Industrial Process Cooling Once-through	OPDC	227132	94.8	85.7	0.0	0.0	0.0

Permit Number	Permittee	Use	Aquifer	Unique Well ID	2010	2009	2008	2007	2006
1993-6208	DEWEY HILL III TOWNHOMES	Basin/Lake Level Maintenance	DEWEY HILL III	NA	0.0	0.0	1.9	1.5	3.6
1995-6047	ST LOUIS PARK, CITY OF	Pollution Containment	QWTA	538134	25.3	22.2	10.5	24.6	29.0
1998-6029	EDINA, CITY OF	Basin/Lake Level Maintenance	INDIANHE AD LAKE	NA	0.0	0.0	0.0	0.0	0.0
1998-6041	EDINA, CITY OF	Basin/Lake Level Maintenance	ARROWHE AD LAKE	NA	0.0	0.0	8.0	0.0	0.0
1999-6058	FILMTEC CORPORATION	Other Industrial Processing	CJDN	617378	47.1	50.1	54.3	53.9	55.1
2003-3049	EDINA, CITY OF	Golf Course Irrigation	OPDCCJDN	112250	8.1	11.8	10.5	12.5	8.2
2003-3049	EDINA, CITY OF	Golf Course Irrigation	OPDCCJDN	112249	26.7	34.1	29.2	34.2	32.6
2003-3049	EDINA, CITY OF	Golf Course Irrigation	CJDN	200913	0.0	0.0	0.0	0.0	0.0
2005-3101	FILMTEC CORPORATION	Other Industrial Processing	CJDN	718192	93.1	96.9	107.7	93.9	59.5
2007-0209	GENERAL MILLS INC	Fire Protection	OPDCCJDN	224098	0.8	0.5	0.2	3.0	1.3
2007-0210	GENERAL MILLS INC	Landscaping/ Athletic Fields	OPDCCJDN	224099	23.2	32.2	31.3	30.5	41.2

At this time it appears that the source water aquifers used by the public water supply system are sufficient and adequate in quantity and capacity to provide water to Edina residents during the life of this Plan and into the future. At this time, there are no indications that the performance of source water aquifers are decreasing or degrading in general.

2.4 Water Quality Data Elements

2.4.1 Surface Water Quality

This data element applies to the highly vulnerable areas of the DWSMA because there appears to be a hydraulic connection between surface waters and the aquifers serving this water supply system. Minnehaha Creek runs northwest to southeast through the DWSMA in an area of low to moderate vulnerability. As stated above, Nine Mile Creek flows through the highly vulnerable areas of the DWSMA. Nine Mile Creek has been identified as an impaired water body by the MPCA.

Wanda Miller Lake, Edina Lake and four small unnamed lakes areas located in the highly vulnerable portion of the DWSMA. Lake Edina is the only lake body within the highly vulnerable portion of the DWSMA that has been identified as an impaired water body by the MPCA.

Nine surface water quality sampling points, located within the highly vulnerable portions of the DWSMA, have been identified from MPCA water quality monitoring station data. Surface water sampling locations are depicted on **Figure 7**. The sampling dates, intervals, and analytes vary for each site based upon each sampling event and location purpose. Available historic surface water quality data for those sites located within the highly vulnerable portion of the DWSMA is provided as **Appendix D**.

2.4.2 Groundwater Quality

The quality of groundwater in the source water aquifers, and in the Edina area specifically, must be evaluated and assessed for this Plan. Groundwater contamination and undesirable groundwater quality will directly impact the public water supply system.

The overall quality of groundwater in Edina is good and quite similar for all the aquifers. No contaminants were detected at levels that violated federal drinking water standards. Some were detected in trace amounts that were below legal limits.

Samples from the Edina wells and public water supply system are routinely collected and analyzed by the MDH as required under the Minnesota Public Water Supply Program and the federal Safe Drinking Water Act. The samples are tested for microorganisms, inorganic compounds, metals, organic and synthetic chemicals, pesticides, herbicides, and radioactive pollutants. The City is required by the federal government to publish and distribute an annual *Drinking Water Consumer Confidence Report* to all citizens using its public water supply system.

Trace amounts of regulated substances detected in the city's public water supply. The water in the City of Edina supply system currently meets or exceeds all state and federal requirements and limits for these and all other regulated compounds and chemicals.

The City of Edina's 2011 Consumer Confidence Report (**2012 Water Report For the Year 2011**) is available on the City's website at: http://www.edinamn.gov/files/2012_WaterReport_web.pdf. A copy of the **2012 Water Report For the Year 2011** is also provided in **Appendix E**.

Well No.7 Contamination

Edina's Well No. 7 (Unique No. 206474), located in Sherwood Park, is a seasonal well that has tested above the Maximum Contaminant Level (MCL) set by the Environmental Protection Agency (EPA) for vinyl chloride. The well was shut down in October 2003. The source of the contaminant in Well No. 7 has not yet been determined, however, the City is working with the MDH and MPCA to determine the best way to treat the well.

In 2002, as reported in that year's Consumer Confidence Report, the average level of vinyl chloride in Well No. 7 was 2.3 ppb. Four quarterly samples are required to determine an average compliance value for this contaminant. Two more samples were collected by MDH in 2003 and levels of vinyl chloride exceeded the MCL of 2.0 ppb. Well No. 7 was shut down in early October 2003.

The City has kept the well shut down while working with a local engineering firm to treat Well No. 7 water to reduce the levels of vinyl chloride. Design phase for a new water treatment plant has been completed and it is now online.

Additional groundwater quality data will be collected over the ten-year life of the Plan. Groundwater quality information (i.e. isotopic analyses) will be used to determine the potential sources of contamination that need to be inventoried and managed in the moderately, highly vulnerable areas of the DWSMA.

3.0 Impact of Land and Water Use Changes on the Public Water Supply Wells

The City estimates that the following changes to the physical environment, land use, surface water, and groundwater may occur over the 10-year period that the WHP is in effect. This is needed to determine whether new potential sources of contamination may be introduced in the future and to identify future actions for addressing these anticipated sources. Land and water use changes may introduce new contamination sources or result in changes to groundwater use and quality. The anticipated changes may occur within the jurisdictional authority of the City, although some may not. The sections below describe the anticipated changes to the physical environment, land use, and surface water or groundwater in relationship to the 1) influence that existing governmental land and water programs and regulations may have on the anticipated change, and 2) administrative, technical, and financial considerations of the Public Water Supplier and property owners within the DWSMA.

3.1 Changes Identified in the Physical Environment

Large-scale changes in the physical environment within the DWSMA are not anticipated during the 10-year period that this Plan is in effect. The hydrogeologic conditions of the source water aquifers are such that changes in physical environment could have some effect on the source water aquifers within the DWSMA.

3.2 Changes Identified in Land Use

The City of Edina is unable to effectively control land use changes beyond its own municipal boundaries and will be dependent upon neighboring communities and government units to assist in protecting the source water aquifers used by Edina. As stated in Section 2.2.1, there will be a great need for collaboration, within the City of Edina and with neighboring communities.

Due to the extent of the DWSMA, it is likely that land uses will be altered within the DWSMA over the 10 year life of this Plan. Expansion and new development of Edina is unlikely in the next 10 years, however re-development of existing properties is likely to occur. The City of Edina will cooperate and collaborate with other local government units to develop and implement wellhead and source water protection policies and strategies.

3.3 Changes Identified in Surface Water

There appears to be a hydraulic connection between surface waters and the aquifers used by the City as a drinking water source in the highly vulnerable areas of the DWSMA. Therefore, changes to the conditions of surface waters may have an impact on the quality or quantity of the public water supply.

As described in previous sections, there are a large number of lakes located within the City's DWSMA, however most of these water bodies are located in low to moderately vulnerable zones of the DWSMA. **Figure 7** shows the spatial relationship between the surface water features and DWSMA vulnerability zones. Edina Lake and Nine Mile Creek are the major surface water bodies located within highly vulnerable portions of the DWSMA. Any changes in surface water use or quality will follow the guidelines defined in the City of Edina's Comprehensive Water Resources Management Plan.

3.4 Changes Identified in Groundwater Conditions

With its existing public water supply system, the City provides good quality and sufficient quantity of water to its residents. Current groundwater withdrawals do not appear to be having a negative

impact on the groundwater supply. Large changes in groundwater use are not expected in the City of Edina over the life of this plan.

3.5 Expected Changes in Water Use

The City does not anticipate that its water use will increase significantly during the life of this Plan. New high-capacity wells or changes to existing Water Appropriation Permits near the municipal wells could impact the performance of the wells, decrease the capacities of source water aquifers, and/or alter the groundwater flow fields and WHPA.

3.6 Influence of Existing Water and Land Use Government Programs and Regulations

The Minnesota Pollution Control Agency (MPCA) is the government agency responsible for regulating and overseeing most of the potential contaminant sources related to the environment such as hazardous waste generators, underground and aboveground storage tanks, spills, leaking underground storage tank sites, voluntary investigation and cleanup sites, dumps, Superfund Sites, etc. The Minnesota Department of Agriculture (MDA) is responsible for regulating facilities, spills, and releases related to agriculture-based chemicals and substances (i.e. manufacturers, retailers, or users of pesticides, herbicides, fertilizers, etc.). The City will continue to rely on these State agencies and their programs and policies to enforce existing State regulations. In addition, the City will continue to work with Hennepin County and its programs and policies related to wetland and land management, zoning and land use ordinances, and others. The Minnesota Technical Assistance Program is another resource the City can utilize to assist in preventing pollution and reducing waste from local businesses.

According to Section 3.7 of the City of Edina Comprehensive Water Resources Management Plan (2009), the City has adopted the following policies to protect the quality and quantity of groundwater resources:

- The City will encourage groundwater recharge and protect recharge areas from potential sources of contamination. The City will provide increased greenspace, native vegetation, and pond “dead” storage wherever possible and appropriate to allow for the infiltration of stormwater runoff and promote groundwater recharge.
- The City will encourage use of grassed waterways to maximize infiltration where not detrimental to groundwater supplies.
- The City will promote awareness of groundwater resource issues through public education and information programs.

It is important that the above stated policies be adhered to, specifically to the surface water bodies located in the high vulnerability areas of the DWSMA.

3.7 Administrative, Technical, and Financial Considerations

For this Plan to be effective:

1. The City will need to identify and document potential sources of contamination to prevent contamination of its source water aquifers.
2. The City will need to raise public awareness of the issues affecting its drinking water supply through public educational programs.
3. Administrative duties will remain with the Wellhead Protection Manager, who will report to the City, coordinate the implementation of wellhead protection management action plans, and conduct regular meetings.

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4. Support of wellhead and source water protection activities will be provided by funds from the City of Edina utility water operating fund. Other sources of funding or in-kind services to help achieve the goals set forth in this Plan's Section 4.0 include:
 - a. MDH wellhead implementation grants;
 - b. the MPCA and MDA and their environmental contamination prevention and cleanup programs;
 - c. the MDH Drinking Water Protection Section in monitoring the quality of the public water supply system;
 - d. the MDH assisting with determining the correct measures for sealing unused wells, constructing new wells, and requiring the sealing of unused wells if this becomes necessary; and
 - e. the Minnesota Rural Water Association providing technical assistance during the wellhead protection implementation phase.

The costs of implementing wellhead and source water protection activities will be evaluated on an annual basis to determine whether the original cost estimates match the scope of the management practices identified in this part of the Plan. The City will discuss changes in Plan implementation costs with MDH to determine the availability of state or federal funding for offsetting increased costs of plan implementation.

4.0 Establishing Priorities and Assigning Risk to Potential Contaminant Sources

The management strategies selected and documented in Section 6.0 of this Plan focus on land use activities that have the highest potential to impact the vulnerable aquifers the City is using for its drinking water supply.

When the City of Edina completed its initial DWSMA delineations 1998 and then the WHP Plan portion in 2001, the capture zones were much smaller than the updated (2011) delineations. In 2001, only 183 potential contaminant sites were identified within the City well DWSMAs and the DWSMAs only extended into two other municipalities. All 183 PCS sites were verified during the original plan development.

4.1 Potential Contaminant Source Identification and Verification Process

As part of the Edina Part I Plan update, because a more recent and detailed model existed (Metro Model 2.0) and a fracture flow delineation was required for many of the City's wells, the City saw their WHPAs grow substantially and merge into one large DWSMA. The City of Edina DWSMA now includes almost the entire City of Edina, the entire City of Hopkins and portions of Minneapolis, Richfield, Bloomington, Eden Prairie, Minnetonka, Plymouth, and Golden Valley.

Since portions of the City DWSMA have been classified as highly vulnerable to contamination, a comprehensive potential contaminant source inventory was completed for this Plan Update. In order to conduct a Potential Contaminant Source Inventory (PCSI) for the City DWSMA, information obtained from the MPCA, MDH, MDA, the City of Edina, and Hennepin County were used as starting points.

An initial query of the MPCA, MDA and MDH's databases, prior to site verification, returned over 600 potential contaminant sites and 929 wells. The City of Edina also maintained a database of an additional 400 private wells.

Edina is one of the first communities in the metro area to update their WHP Plan. As other municipalities update their own Plans, it is anticipated that their DWSMAs will increase in size as well and further DWSMA overlap is anticipated.

The verification of over 1,900 sites is a very large task for any City to undertake alone and all at once. The MDH provided approval for the City of Edina to update and verify the locations for its potential contaminant source inventory in a three phased approach.

The first two phases would consist of the verification of the wells and potential contaminant sources within the DWSMA area that lies within the City of Edina. During the first phase, completed as part of this Part II Plan Update, the City verified the locations of 409 privately owned wells from the City's database as well as an additional 187 from the MDH County Well Index. The City then followed the "25 Policy", as outlined in MDH PCSI Fact Sheets for Wellhead Protection Teams, Fact Sheet 3: Land Uses and Potential Contaminant Source Categories to be Inventoried, for the other potential contaminant site categories. The "25 Policy" was focused on those sites within the City of Edina municipal boundary.

The second phase of PCSI site verification will consist of the verification of the remaining MPCA, MDA sites and well sites within the City boundary. The third phase has been proposed to be a collaborative approach working with the neighboring Cities. As neighboring Cities update their WHPPs, there is very likely to be DWSMA overlap. It is anticipated that there will be coordination and sharing of verified site data they update their own WHPPs.

A PCSI meeting was held with personnel from Edina Public Works, SEH, Source Water Solutions, and MDH to evaluate the status of contaminant sources. Those present at the meeting also brought forth additional potential contaminant sources, which are addressed in this report. An update to the City's Inner Wellhead Management Zone (IWMZ) Inventory is included as **Appendix H**.

The DWSMA vulnerability classification determines the type of land uses and contaminant sources that need to be inventoried. The GIS point datasets, when addresses were available, were geocoded and moved to the appropriate address location. These datasets were pared down based upon the vulnerability of the DWSMA where the site address had been matched. The new locations were then manually cross checked to the address of the nearby parcels in the Hennepin County parcel polygon dataset. If they matched, the point was manually moved inside the appropriate parcel polygon. If it did not, the point was left in the roadway. A spatial join was then conducted to match the point to the appropriate Parcel Identification Number (PIN). The site records that returned a populated PIN field were added to the verified dataset and those that did not were added to an unverified dataset.

The verified shapefile attribute table was then updated with Potential Contaminant Source (PCS) and Material Codes.

4.2 Potential Contaminant Source Inventory Results

Table 8 summarizes the potential contaminant sites identified within the City of Edina DWSMA, the sites within the City of Edina, and the number of sites verified as part of this Update. **Figures 11 and 12** depict the location of these sites. **Figures 11-1** through **11-4** depict the verified sites and **Figures 12-1** through **12-6** show the "expected" locations of the sites yet to be verified or those that lie outside the City of Edina.

Tables summarizing the potential contaminant source information related to the identified land uses and activities within the DWSMA are provided in **Appendix G**. The addresses affiliated with these sites have been cross-referenced with Parcel Identification Numbers where feasible to verify the locations of the potential contaminant sources. The MPCA database contains a single record for a site location. If that location has multiple activities associated with it, the record is denoted as "multiple activities". For the sites located within the Edina municipal boundaries, those records were expanded to include all activities. For those located outside the municipal boundary, they were left as one record. This is noted as there are over 350 sites denoted as multiple activities located within the DWSMA, outside the Edina municipal boundary. The remaining "multiple activity" sites outside the City of Edina is provided in a footnote for **Table 8**. As these records are expanded, the total number of sites for any particular category will increase accordingly.

Table 8 - DWSMA Potential Contaminant Source Inventory Summary

High Risk Sites	Total in DWSMA	Total in City of Edina	Total in ERA (1 yr.)	Verified Sites
Wells	1554	1079	45 Verified 22 Unverified	644
Leak Sites	11 Active 65 Inactive	7 Active 53 Inactive	8 Inactive	4 Active 29 Inactive
Registered Storage Tank Sites	88 Active 68 Inactive	68 Active 52 Inactive	16 Active 9 Inactive	34 Active 34 Inactive
Petroleum Brownfield Sites	2 Active 1 Inactive	2 Active 1 Inactive	None	1 Active 1 Inactive
Superfund Sites	2 Active (located in Low Vulnerability Zone of DWSMA)	1 Active	None	2 Active
Voluntary Investigation and Cleanup (VIC) Sites	13 Active 17 Inactive	3 Active 6 Inactive	1 Inactive	2 Active 3 Inactive
Large Quantity Hazardous Waste Generators	3 Active	3 Active	None	2 Active
Medium Risk Sites	Total in DWSMA	Total in City of Edina	Total in ERA (1 yr.)	Verified Sites
Small to Minimal Quantity Hazardous Waste Generator Permits	114 Active 56 Inactive	87 Active 40 Inactive	6 Active 2 Inactive	59 Active 16 Inactive
Industrial Stormwater Permits	12 Active 15 Inactive	9 Active 4 Inactive	None	4 Active 1 Inactive
Construction Stormwater Permits	3 Active 5 Inactive	2 Active 3 Inactive	None	1 Active 2 Inactive
Wastewater Dischargers	8 Inactive	7 Inactive	2 Inactive	4 Inactive

*91 Active Multiple Activities Records outside Edina municipal boundary. *21 Inactive Multiple Activities Records outside Edina municipal boundary.

For this Plan Update, the City focused its efforts on verifying the locations of private wells, which were identified as the highest risk potential contaminant sources. Efforts were focused on verifying those wells within the city municipal boundary. In the next few years and for future updates to the Plan, the City intends to extend its detailed review of potential contaminant sources whose location and ownership were difficult to identify. Section 7, of this Plan, details management strategies proposed to address the potential sources of groundwater contamination.

5.0 Land Use Issues, Problems and Opportunities

The City of Edina has identified water and land use issues, problems and opportunities related to:

- the aquifers used by the City water supply wells,
- the quality of the well water, or
- land or water use within the DWSMA.

The City assessed input from public meetings and written comments it received, the data elements identified by MDH during the scoping meetings, and the status and adequacy of the City's official controls and plans on land and water uses, in addition to those of local, state, and federal government programs. Identifying issues, problems and opportunities, including resource needs, enables the City to take advantage of opportunities that may be available to make effective use of existing resources, set meaningful priorities for source management, and solicit support for implementing specific source management strategies.

Due to the number of potential contaminant sources within the DWSMA, the City has elected to address them, based upon risk, in the following prioritized order.

1. High-risk potential sources of contamination within highly vulnerable areas of the DWSMA within the City of Edina municipal boundary.
2. Medium-risk potential sources of contamination within highly vulnerable areas of the DWSMA within the City of Edina municipal boundary.
3. High-risk potential sources of contamination within moderately vulnerable areas of the DWSMA within the City of Edina municipal boundary.
4. High-risk potential sources of contamination within highly vulnerable areas of the DWSMA outside the City of Edina municipal boundary.
5. Medium-risk potential sources of contamination within highly vulnerable areas of the DWSMA outside the City of Edina municipal boundary.
6. High-risk potential sources of contamination within moderately vulnerable areas of the DWSMA outside the City of Edina municipal boundary.
7. Medium-risk potential sources of contamination within the DWSMA within the City of Edina municipal boundary.
8. Medium-risk potential sources of contamination within the DWSMA outside the City of Edina municipal boundary.

How these sites will be addressed is discussed in further detail in Section 7.0.

5.1 Issues, Problems, and Opportunities Related to the Aquifer

The source water aquifers could be adversely affected by many land use activities and potential contaminant sources in highly vulnerable areas, as well as other wells that penetrate the same aquifers.

Table 9 identifies Edina's zoned land use types and the potential risk each land use may pose to the City's aquifer. **Table 10** identifies the percent of current zoned land use based upon DWSMA vulnerability classification and risk for contamination.

Table 9 - Existing Zoned Land Use in Edina

Land Use	Potential Risk to Aquifer
Commercial	Moderate to High Risk (potential spills, surface water runoff)
Industrial	High to Moderate Risk (potential spills, surface water runoff)
Multiple Family Residential	Low to Moderate Risk (surface water runoff)
Parks and Recreation	Low Risk (fertilizer runoff to surface waters)
Public/Semi-Public	Low Risk (lawn fertilizers, surface water runoff)
Single Family Residential	Low to Moderate Risk (lawn fertilizers, surface water runoff)

Table 10 - Edina's Zoned Land Use Based Upon Vulnerability Classification

Landuse	High Vulnerability	Moderate Vulnerability	Low Vulnerability
Commercial	13.1%	7.5%	4.6%
Industrial	12.8%	1.6%	0.0%
Multiple Family Residential	9.5%	8.4%	3.0%
Parks and Recreation	31.3%	20.8%	10.3%
Public/Semi-Public	4.1%	10.2%	14.5%
Single Family Residential	29.2%	51.5%	67.6%
Total	100%	100%	100%

Risk for Contamination	Highest	High	Moderate	Low	Minimal
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Table 11 summarizes the Potential Contaminant Sites by the priorities identified in Section 5.0.

Table 11 - Potential Contaminant Source Inventory Summary Based Upon DWSMA Vulnerability

DWSMA Vulnerability	High Risk Sites	Total in City of Edina	Total Outside City of Edina
High	Wells	66	61
High	Leak Sites	21	3
High	Registered Storage Tank Sites	51	6
High	Petroleum Brownfield Sites	1	0
High	Superfund Sites	0	0
High	Unpermitted Dump Sites	0	0
High	Voluntary Investigation and Cleanup (VIC) Sites	5	8
High	Large Quantity Hazardous Waste Generators	1	0
High	Landfills(Closed)	0	0
DWSMA Vulnerability	Medium Risk Sites	Total in City of Edina	Total Outside City of Edina
High	Small to Minimal Quantity Hazardous Waste Generator Permits	127	22
High	Industrial Stormwater Permits	9	3
High	Construction Stormwater Permits	4	4
High	Wastewater Dischargers	1	1

DWSMA Vulnerability	High Risk Sites	Total in City of Edina	Total Outside City of Edina
Medium	Wells	641	75
Medium	Leak Sites	39	13
Medium	Registered Storage Tank Sites	71	62
Medium	Petroleum Brownfield Sites	2	0
Medium	Superfund Sites	0	0
Medium	Unpermitted Dump Sites	0	0
Medium	Voluntary Investigation and Cleanup (VIC) Sites	4	13
Medium	Large Quantity Hazardous Waste Generators	2	0
DWSMA Vulnerability	Medium Risk Sites	Total in City of Edina	Total Outside City of Edina
Medium	Small to Minimal Quantity Hazardous Waste Generator Permits		
Medium	Industrial Stormwater Permits	4	11
Medium	Construction Stormwater Permits	0	0
Medium	Wastewater Dischargers	6	0
DWSMA Vulnerability	High Risk Sites	Total in City of Edina	Total Outside City of Edina
Low	Wells	312	395

	Priority 1		Priority 3		Priority 5		Priority 7
	Priority 2		Priority 4		Priority 6		Priority 8

5.1.1 Wells

There were 1,554 wells identified within the DWSMA. These wells were identified by merging the MDH county well database with a private well database that the City of Edina currently maintains and removing the common well records. The original CWI dataset contained 1145 wells located within Edina’s DWSMA. The City maintained a database containing 409 reported private wells within the City limits. There were only 48 common well records identified between the two datasets.

For this Plan Update, the City focused its efforts on verifying the locations of wells within the City’s municipal boundary. Wells were identified as the highest risk potential contaminant sources for the City’s source water aquifers. The CWI well dataset was clipped down to well records located within the Edina municipal boundary. The City’s private well dataset contained an additional 409 records. Based upon a comparison of Hennepin County parcel IDs assigned to each dataset, 48 common wells were identified in the CWI and the City’s database. The address locations of 644 wells were verified as part of this Plan Update, leaving 435 potential well locations to be verified within the City of Edina. In the next few years and for future updates to the Plan, the City intends to extend its detailed review of potential contaminant sources whose location and ownership were difficult to identify.

The City of Edina will work with surrounding municipalities to verify the remaining well locations, outside their municipal boundary as those municipalities update their well databases.

5.1.2 Leak Sites

Leak Sites are classified in this Plan as high risks for groundwater contamination. As discussed in the previous section, these sites have had a storage tank release its contents into or onto the ground. Although many have been “cleaned” and “closed” by the MPCA, some of these sites may still have remaining soil and/or groundwater contamination.

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- 5.1.3 Tank Sites**
Underground and aboveground storage tanks used to store large quantities of liquid chemicals and potentially hazardous substances are classified in this plan as high risks for groundwater contamination. These storage tanks include residential fuel oil tanks. If leaking or ruptured, these tanks could release large quantities of chemicals into the subsurface, which could eventually enter the source water aquifers and public water supply wells.
- 5.1.4 Petroleum Brownfield Sites**
Petroleum brownfield sites, like leak sites pose a threat to groundwater supplies. Although many have been “cleaned” and “closed” by the MPCA, some of these sites may still have remaining soil and/or groundwater contamination.
- 5.1.5 Superfund (CERCLIS) Sites**
Contamination migrating from identified superfund sites may impact groundwater supplies.
- 5.1.6 Unpermitted Dump Sites**
Unpermitted dump sites pose a threat to groundwater and are identified in this plan as posing a high risk for groundwater contamination.
- 5.1.7 Voluntary Investigation & Cleanup (VIC) Sites**
Like the leak and petroleum brownfield sites above, VIC sites pose a contamination threat to groundwater supplies. Although many have been “cleaned” and “closed” by the MPCA, some of these sites may still have remaining soil and/or groundwater contamination.
- 5.1.8 Landfill (Closed)**
Closed landfill sites pose a threat to groundwater and are identified in this plan as posing a high risk for groundwater contamination.
- 5.1.9 Agchem Facilities**
Agchem facilities are businesses, facilities, or properties that manufacture, use, sell, or store large quantities of chemicals, solvents, and substances for agricultural purposes. These types of sites are considered high risks for groundwater contamination in this Plan. No Agchem Facilities were identified within the DWSMA.
- 5.1.10 Hazardous Waste Generators**
Hazardous waste generators are facilities or businesses registered and regulated by the State that generate a specified amount of hazardous waste per month. These types of sites are typically considered to be medium risks for groundwater contamination.
- 5.1.11 Petroleum Pipeline**
No large-scale petroleum pipelines were found in the DWSMA. Spills and releases from pipelines are a concern where they are present.
- 5.1.12 Other Sites**
Surface water discharge permits were included in the potential contaminant source inventory as there appears to be a connection between surface and groundwater in some areas of the DWSMA. It is important to recognize that surface water discharge to water bodies, specifically those in the high vulnerability areas, pose a potential threat to groundwater supplies.

In conducting the Potential Contaminant Source Inventory, a table top exercise was held at the Edina Public Works building to gather local information to refine and augment the inventory of contamination concerns. Participants included City staff and MDH staff familiar with the City's current and past land use. During the course of that meeting, it appeared that the State databases were very complete and comprehensive. No additional sites were identified during the PCSI verification meeting.

5.2 Issues, Problems, and Opportunities Related to The Well Water

This Plan is primarily concerned with potential contaminant sources near the public water supply wells and within the DWSMA that pose a high risk for causing groundwater contamination that could viably impact the source water aquifer and/or public water supply wells. Based on the potential contaminant source inventory, these types of sites, facilities, land uses, or activities include: leaking underground storage tank sites, tank sites, small to minimal quantity hazardous generator, Voluntary Investigation & Cleanup (VIC) sites, private wells, and two superfund sites.

The placement of additional high-capacity wells, increased pumping from existing wells, or significant changes in current groundwater appropriations within the DWSMA may have an impact on groundwater availability to all users, or increased risk that contamination may enter the part of the aquifer used by the public water supply wells.

5.3 Issues, Problems, and Opportunities Related to The Drinking Water Supply Management Area

Several potential contaminant sources were identified within the City's DWSMA. Some of these sources are within areas of the DWSMA where the source water aquifers have been determined to have a high vulnerability to contamination. The City will need to rely on state agencies such as the MPCA and MDA to regulate and manage many of these land uses.

A large portion of the Edina DWSMA is located outside of the limits of the City. The updated DWSMA for the City of Edina extends into the Cities of St. Louis Park, Plymouth, Minnetonka, Golden Valley, Hopkins, Eden Prairie, Bloomington, Richfield, and Minneapolis. This will make it more difficult for the City to effectively implement the management strategies for the potential sources of contamination in that area. It also appears that the existing DWSMAs for the Cities of Minnetonka, Richfield, Hopkins, Bloomington, and St. Louis Park overlap a portion of the updated Edina DWSMA. Edina will need to actively cooperate and collaborate with other local government units (LGUs) and neighboring communities to ensure protection of the source water aquifers.

A principal concern of the City is to ensure consistent and long-term management of water wells, environmental boreholes, and observation wells within the DWSMA. The public water supply has limited legal capabilities to regulate well construction and sealing in the areas of the DWSMA beyond its legal authority. Changes in land use that increase pumping of the aquifers used by the public water supply wells need to be assessed for possible impacts on water availability and quality. Finally, the City has no regulatory authority over water appropriations and must rely on the MNDNR to address issues and concerns related to pumping.

5.4 Problems and Opportunities Disclosed at Public Meetings and in Written Comment

Per Minnesota Rule 4720.5350, the City is required to submit a copy of the WHPP to:

- Local units of government wholly or partly within the wellhead protection area,
- The regional development commission, if any, and
- Watershed districts and watershed management organizations wholly or partly within the wellhead protection area.

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- To be completed after LGU review

5.5 Problems and Opportunities Regarding Existing Data Elements

For this Plan, the City has attempted to identify and specifically locate as many potential contaminant sources as possible and feasible given the current level of information, and available resources. However, some potential contaminant sources may exist within the DWSMA that have not yet been identified or accurately located. Over time the City will continue to comprehensively review and catalog potential threats to its public water supply wells and source water aquifers for future updates to this Plan.

The City plans to utilize public education opportunities, both existing and proposed, to address preventing contamination of the source water aquifers by potential sources of contamination. Additionally, the City will work in cooperation with local and regional governmental agencies to utilize existing programs when currently available and applicable.

The City will set a high priority on well sealing for existing wells that are unused or not properly maintained. Specifically, the City will work with the MDH to 1) identify proposed wells that may present these additional concerns, 2) ensure new wells are properly constructed, 3) determine whether an alternative aquifer could be used, and 4) identify water-use and conservation requirements that the MNDNR may specify with their water appropriations permit.

Edina intends to continue to focus its data collection efforts on the following activities throughout the ten-year life of this Plan:

1. Collect more detailed information on all potential sources of contamination within the DWSMA and maintain and update this information in a database.
2. The MDH and/or the Minnesota Rural Water Association will assist the City in evaluating and prioritizing the potential sources of contamination within the DWSMA and assist in implementing the management strategies in this Plan.
3. The City will work with the MPCA to identify sites and facilities that could viably contaminate groundwater and evaluate the likelihood and risk of impacting the source water aquifers or public water supply wells.
4. The City will work with MDH to identify new wells that are constructed within the DWSMA and to verify their locations.
5. The City will inform MDH when any public water supply well is repaired so that information regarding well construction, static water level, and pumping capacity can be verified or updated.
6. The City and MDH will inform each other of additional high-capacity wells that are to be constructed within the DWSMA or within a mile of its boundary. MDH will determine with the MNDNR whether the applicant for a water appropriations permit needs to conduct an aquifer test to evaluate the long-term pumping impacts on the City's water supply wells.
7. The MDH will be informed of any wells that are to be properly sealed within the DWSMA so that the Minnesota Geological Survey can be notified and determine whether it can perform a borehole geophysical survey of the wells prior to their sealing.

5.6 Status and Adequacy of Official Controls, Plans, and Other Local, State and Federal Programs on Water Use and Land Use

There are many tools available through regulating and governmental agencies that may be used to achieve the wellhead and source water protection planning goals identified in this Plan. Existing state and local governmental units and their responsibilities, available to Edina include:

- wellhead and source water protection - *MN Rural Water Association*
- well construction – *MDH*
- well sealing – *MDH*
- groundwater appropriation permits – *MNDNR*
- public water supply quality – *MDH*
- setbacks for specific contaminant sources from a well – *MDH and local governments through conditional use permitting,*
- petroleum pipelines - *Office of Pipeline Safety and the MPCA*
- land use controls - *local governments and Hennepin County Planning and Zoning*
- hazardous waste generator regulation – *MPCA*
- storage tank regulation – *MPCA*
- leaking storage tank sites – *MPCA*
- agchem facilities regulation – *MDA*
- hazardous waste recycling and management – *MPCA*
- natural resources protection – *Hennepin County and MNDNR*
- environmental enforcement and education - *MPCA*
- environmental education - *MPCA*
- free, non-regulatory, confidential environmental assistance - *MPCA Small Business Assistance Program*
- environmental waste reduction and education – *MPCA Office of Environmental Assistance*
- technical assistance with pollution prevention - *MN Technical Assistance Program*
- technical assistance for members - *MN Waste Wise (MN Chamber of Commerce)*
- hazardous waste disposal for very small quantity generators - *Hennepin County Environmental Service Commercial Hazardous Waste Unit*
- county solid waste and recycling education/enforcement – *Hennepin County Environmental Services*

The City is confident that local issues may be adequately addressed through existing policies and processes. These processes include:

- existing and proposed public education programs,
- use of best management practices for storage tanks, hazardous waste management, well maintenance, and water conservation,
- open lines of communication with residents and landowners within the DWSMA,
- the testing/monitoring of important or appropriate private or existing monitoring wells.

The availability of cost-share funds to assist with the sealing of identified unused/unsealed wells within the DWSMA will be further investigated with the MDH and Hennepin County.

6.0 Wellhead Protection Goals

Due to the regional and local geologic setting, the Edina DWSMA was divided into three vulnerability designations: high, moderate, and low. As such, this Plan focuses on addressing and managing potential sources of groundwater contamination and other wells based upon the DWSMA vulnerability zones. Additional information regarding how these designations were determined can be found in the Edina Part I Wellhead Plan Update (**Appendix A**).

The City's public water supply system has enjoyed a sufficient water supply in the past, and proposes through the implementation of this Plan to continue to manage risk and assess threats to its water supply, change water consumption behavior, plan for emergencies while continue to supply safe, potable water for its customers into the future.

The overall goals of this Plan are to 1) prevent contamination of the source water aquifers, and 2) manage the source water aquifers cooperatively with other local government units to assure sustainable water supplies of all users in the future.

The City identified the following goals to be achieved with the action items contained in this Plan:

- Provide an adequate water supply and maintain the current level of water quality, which meets or exceeds all state and federal standards.
- Educate public officials, landowners and the general public about the importance of wellhead protection to protect the public drinking water supply.
- Develop, with appropriate First Response and State and Local Organizations, an emergency response plan for addressing spills within the 1-yr capture zone (Emergency Response Area).
- Continue to evaluate and efficiently employ technological advancements in providing water services, as well as monitor source water aquifers for water quality and quantity (water levels).
- Provide ongoing collection of data (i.e. water quality and quantity) to support future wellhead protection efforts.
- Continue general public awareness of groundwater issues and emphasize water conservation.
- Assess the impact on the source water aquifer from existing and planned wells within the DWSMA.
- Address risk based priority actions regarding identification and inventory of wells within the DWSMA.
- Address risk based priority actions relating to management of tanks sites within the DWSMA.
- Address risk based priority actions regarding active Voluntary Investigation & Cleanup (VIC) and leak sites within the DWSMA.
- Address risk based priority actions relating to management of small quantity hazardous waste generators.

7.0 Objectives and Plans of Action

Below are four primary objectives of this Plan.

1. Develop and Continually Update a Central Database of Potential Contaminant Sources to Document and Catalog Sites and Land Uses that Pose a Threat to the City of Edina's Groundwater Supply.
2. Continue to Educate and Work with the Public and Businesses on Wellhead and Groundwater Protection to Create a Better Collective Understanding of How Behaviors May Affect the Quality and Quantity of the City's Water Supply.
3. Continue to Collect Water Quality, Quantity, and Hydrogeologic Data to Better Understand the Source of Edina's Water Supply.
4. Work Cooperatively and Collaboratively with Other City Departments and Surrounding Municipalities to Better Understand the Groundwater System as a Whole and Accomplish the Above Listed Objectives.

7.1 Documentation and Cataloging of Sites the Pose a Contamination Risk to the City's Wells
7.1.1 Development of Comprehensive Wellhead Protection Database

An accurate, comprehensive potential contaminant source inventory database does not currently exist. Often, state and local agencies each have separate datasets with inaccurate or contradictory information. This is not an uncommon occurrence when dealing with datasets collected over time. The City will utilize the information collected for this Plan to develop a comprehensive database of potential sources of groundwater contamination within the DWSMA that fits its existing needs and data infrastructure. The City will continue to identify new sources of potential contaminant source data, working with agencies identified in Section 5.6, and incorporate that data into its own database structure.

This database will be updated based upon the priorities set in Section 5.0. When complete, it will be comprised of a detailed inventory of all land uses, existing and abandoned wells, and documented sites with contamination in the DWSMA based on the uses identified in the MDH PCSI Code definitions.

The City will continue to add information to the database as additional potential contaminant sites are identified through working with various local and state government agencies. All current and future information collected for the database will be compatible with GIS mapping software. Information and data currently incomplete in the database will be added over time. The PCSI will also be updated with additional information is gathered through other actions identified below.

The development of an electronic PCS contact database will also be part of this task. The City will work to develop a system of collecting PCS owner information (i.e. emails, websites, and additional pertinent contact information). This will streamline, make more efficient and reduce the cost to notify the public and businesses of education activities. Also included in this database will be contact information for cooperative and collaborative partners identified in tasks described in the following sections as well as appropriate state and local agency staff. As staff changes occur, the database will be updated to reflect the most recent available information.

Since the DWSMA for Edina extends beyond the boundaries of the City and the number of potential contaminant sources is extremely large, the actions and strategies presented in this Plan had to be prioritized to be effectively implemented. As identified in previous sections, due to the number of potential contaminant sources within the DWSMA, the City has elected to address them in the following order:

1. High-risk potential sources of contamination within highly vulnerable areas of the DWSMA within the City of Edina municipal boundary.
2. Medium-risk potential sources of contamination within highly vulnerable areas of the DWSMA within the City of Edina municipal boundary.
3. High-risk potential sources of contamination within moderately vulnerable areas of the DWSMA within the City of Edina municipal boundary.
4. High-risk potential sources of contamination within highly vulnerable areas of the DWSMA outside the City of Edina municipal boundary.
5. Medium-risk potential sources of contamination within highly vulnerable areas of the DWSMA outside the City of Edina municipal boundary.
6. High-risk potential sources of contamination within moderately vulnerable areas of the DWSMA outside the City of Edina municipal boundary.

-
7. Low-risk potential sources of contamination within the entire DWSMA within the City of Edina municipal boundary.
 8. Low-risk potential sources of contamination within the entire DWSMA outside the City of Edina municipal boundary.

- Source of Action

City of Edina, MN

- Cooperators

Local and state agencies including Hennepin County, the MN Department of Natural Resources, the MN Pollution Control Agency, the MN Department of Health, the MN Department of Agriculture, and the USGS. Other cooperators may include surrounding municipalities including St. Louis Park, Plymouth, Minnetonka, Minneapolis, Richfield, Bloomington, Eden Prairie, Hopkins, and Golden Valley.

- Time Frame

Initiated in 2012 and ongoing thereafter.

- Estimated Cost

It is anticipated that the cost for completing the PCSI verification tasks can be done through a MDH WHP Implementation Grant.

- Goal(s) Achieved

By the completion of this task, the City will have a useful tool to track, catalog, and document: a) releases of compounds potentially threatening the public water supply, b) cleanup activities should a release occur, c) well sealings/abandonments and installations, d) installation and/or removal of storage tanks containing hazardous materials/substances, e) changes in land uses and activities within the DWSMA, and f) locations of hazardous wastes and materials that could impact the public water supply, g) contact information of PCS owners, h) contact information for wellhead cooperators. This information will also be valuable in drafting new or revised future regulations relating to specific land uses/activities in the DWSMA, as deemed necessary.

7.1.2**Identify and Document Sites with Documented Environmental Contamination**

As the PCS database develops, and sites are identified that the City wishes to document further, the City will develop, create, and keep active files on each of these sites. The MPCA, or possibly surrounding municipalities, will likely be the source of these files. Reports can be requested electronically if they exist, or scanned from hard copy reports. These electronic files will be tied to the PCSI database so that information can be easily accessed through the database.

- Source of Action
Edina Wellhead Protection Manager
- Cooperators
MPCA staff, Cities of St. Louis Park, Plymouth, Minnetonka, Golden Valley, Hopkins, Eden Prairie, Bloomington, Richfield, and Minneapolis.
- Time Frame
The MPCA will be initially contacted in 2013 and then annually thereafter.
- Estimated Cost
There may be document duplication costs for copying or requesting electronic MPCA document files. It is expected that this task will require approximately 8 - 16 hours of staff time per year.
- Goal(s) Achieved
Obtaining information regarding environmentally contaminated sites within the DWSMA will foster communication with the MPCA and inform them of the vulnerability of the source water aquifers in Edina. By connecting these documents directly to the PCSI database, accessing the reports and documents will be streamlined and more efficient.

7.2 Public Education Tasks
7.2.1 Well Owner Education

The City of Edina has a large number of private well owners. To better educate well owners about their wells, utilizing the electronic contact information portion of the PCSI Database, the City will email MDH pamphlets and brochures related to operating and maintaining wells to all identified well owners located in the DWSMA. The documents will also be made available at the Edina City Hall and on the City's website. An online questionnaire will be developed and a link to that questionnaire will be included in the water bill. As citizens complete the questionnaires, updated owner, well location, and status information will be gained and will be incorporated and continually updated into the PCSI database.

Over the life of this plan, the City will continue to develop an efficient electronic method to distribute information to well owners.

- Source of Action
City of Edina
- Cooperators
MDH; well owners within the DWSMA
- Time Frame
To begin in 2012 and ongoing thereafter
- Estimated Cost
The documents and materials will be provided, free of charge, from the MDH. The staff time required for this task will be incorporated through other existing city programs, projects, and budgets.
- Goal(s) Achieved
This action will assist Edina in identifying, verifying, cataloging, and educating well owners in the DWSMA about proper use and maintenance of wells. Proper operation and maintenance of wells will reduce the potential risk that these wells will become direct pathways for contamination of the source water aquifers.

7.2.2 Public Education for Owners or Users of Underground and Aboveground Storage Tanks

The City proposes to send reminder notices regarding state and federal regulations and the importance of early leak detection to owners and users of new and existing storage tanks located within the DWSMA. . An online questionnaire will be developed and a link to that questionnaire will be distributed on water bills. A request will be made to fuel oil suppliers to include a similar notice with their fuel oil bill. As citizens and businesses complete the questionnaires, updated owner, tank location, and status information will be gained and will be incorporated and continually updated into the PCSI database.

To better educate tank owners about wellhead protection and the role they can play in protecting the water supply, utilizing the electronic contact information portion of the PCSI Database, the City will email MPCA pamphlets and brochures related to operating and maintaining tanks to all identified tank owners located in the DWSMA. The documents will also be made available at the Edina City Hall and on the City's website.

- Source of Action
City of Edina
- Cooperators
City Planning and Fire Departments; MPCA; storage tank owners; fuel oil suppliers
- Time Frame
To begin in 2012 and annually thereafter.
- Estimated Cost
It is assumed that the pamphlets and informational brochures will be provided by the MPCA free of charge. This task is projected to require approximately 16 hours of staff time per year.
- Goal(s) Achieved
This action will assist Edina in identifying, verifying, cataloging, and educating storage tank owners and users that they are located within an environmentally sensitive area. Helping to ensure that they are meeting applicable regulations, will help prevent or minimize the number and severity of petroleum product releases from storage tanks.

7.2.3

Educate Owners of Properties that Generate Hazardous Wastes or Use Hazardous Materials and Chemicals

Due to the large number of small to minimal quantity hazardous waste generators within the DWSMA, the City intends to contact the MPCA, the state agency responsible for regulating and permitting hazardous waste generators, on an annual basis to inquire about the status of hazardous waste users and generators located within the DWSMA. This information will be incorporated into the City's PCSI Database. As contact information is added to the database, the City will also send out information electronically to owners of these properties to educate them about Wellhead Protection and inform them of the hazardous waste drop-off events that Hennepin County hosts one or more times per year.

- Source of Action
The City of Edina
- Cooperators
MPCA; businesses and residents that use or generate hazardous wastes, materials, or chemicals.
- Time Frame
Some programs ongoing, other to begin in 2013 and conducted annually thereafter.
- Estimated Cost
This task is expected to require approximately 16 hours of staff time per year.
- Goal(s) Achieved
This action will assist Edina in identifying, verifying, cataloging, and educating hazardous waste generators. It will help to ensure that improper handling and/or storage of wastes is not being conducted within the DWSMA. Education of site owners will remind them that their behavior can reduce the potential impacts to the upper source water aquifers.

7.2.4 Facilitate Storage Tank Owners Training Sessions

The City of Edina will coordinate with the MPCA and surrounding LGUs to facilitate and sponsor a training session for local storage tank owners and users.

- Source of Action
The City of Edina and Edina Fire Department
- Cooperators
MPCA staff; surrounding LGUs, storage tank owners and users
- Time Frame
It is anticipated that the first training session to be offered in 2014. Based upon owner information collected and response to initial training, additional sessions will be scheduled as deemed appropriate thereafter.
- Estimated Cost
This task will require approximately 20 hours of staff time per year.
- Goal(s) Achieved
Storage tank owners within the DWSMA will be notified that they are in an environmentally-sensitive area and releases from storage tanks could threaten or damage the public water supply system. They will be better informed on the consequences of leaks and releases from storage tanks and will be educated in ways to prevent them. This should result in fewer future storage tank releases, and will diminish the risk of impacting the vulnerable source water aquifers.

7.2.5 Publish the *Drinking Water Consumer Confidence Report*

The City will continue distributing the *Drinking Water Consumer Confidence Report* to all users of the Edina public water supply via the City’s website and other media. The report provides information regarding the City’s public water supply system and its water quality. A private well questionnaire/survey may be integrated into the report. The questionnaire will provide ways in which the public can assist the City in updating accuracy of the wellhead PCSI database.

- Source of Action
City of Edina
- Cooperators
MDH
- Time Frame
Ongoing, annually distributed as required by federal regulations.
- Estimated Cost
No new or additional costs are expected for this activity. The staff time and costs associated with this task are already allocated through existing city programs, projects, and budgets.
- Goal(s) Achieved
Increased public awareness of federal water quality requirements and overall water quality of the City’s public water supply. Providing ways for public feedback and input will also empower the public to help protect their water supply.

7.2.6 Informational New Releases

The City will continue to post wellhead and water related information on its website, Public Works blog and Facebook page. Information will include articles and information related to wellhead and source water protection, as well as potential contaminant source management such as wells, hazardous waste disposal, turf management, and others. Edina will combine efforts with the policies, goals, and actions outlined in neighboring communities' wellhead protection plans and applicable Hennepin County management plans.

- Source of Action
City of Edina
- Cooperators
City staff; MDH; Hennepin County
- Time Frame
To begin in 2013 and as appropriate thereafter.
- Estimated Cost
No new or additional costs are anticipated for this task. The staff time and costs associated with completing this action are already allocated through other city programs, projects, and budgets.
- Goals Achieved
The general public and property owners in the DWSMA as well as citywide, will become more aware of the Edina wellhead and source water protection program, groundwater protection principles, and steps that everyone can take to protect the City's public water supply. It will also inform citizens of the ongoing collaborative efforts of local and state agencies and governmental units.

7.3 Coordination and Collaborative Tasks

7.3.1 Incorporate Wellhead and Source Water Protection into the City's Planning Process

The City will include a review of this Wellhead and Source Water Protection Plan as part of their normal zoning and land use planning processes. Copies of the Plan will be distributed to the City's Planner, and Hennepin County.

The previous version of Edina's WHPP has been identified in the City's Comprehensive Plan. In 2008, the City of Edina developed a Comprehensive Water Resources Management Plan which focused on surface water management. The City has also been proactive and enrolled in the MPCA Green Step Cities program which identifies conservation measures that can help a community become more sustainable. The City of Edina was also awarded a Blue Star Award for its storm water management practices. All of these projects deal with cross cutting water management issues in one form or another. The City of Edina will continue to identify these management issues and identify wellhead protection in future projects when appropriate.

In addition, the City will evaluate the feasibility of creating an Overlay Zoning District corresponding to the DWSMA, and will review this document and its goals and objectives to identify any conflicts with the City's Comprehensive Plan. Any formal proposal for an Overlay District will include a description of its purpose, aims, goals, and types of control, and will need to be approved by the City.

- Source of Action
Edina Engineering & Public Works and Planning Departments, MPCA
- Cooperators
Edina City Council
- Time Frame
This will be an ongoing activity beginning with the formal approval of this Plan by the MDH.
- Estimated Cost
No new or additional costs are anticipated. The staff time and costs associated with this task are already allocated through existing city programs, projects, and budgets.
- Goal(s) Achieved
Wellhead and source water protection efforts will be extended and incorporated into future planning and projects for the City. Potential pollution risks to the public water supply system will be reduced.

7.3.2 Collaboration with Neighboring Communities

Since a large portion of the DWSMA is outside of the City's limits, Edina will collaborate source water protection efforts with the Cities of St. Louis Park, Plymouth, Minnetonka, Golden Valley, Hopkins, Eden Prairie, Bloomington, Richfield, and Minneapolis and Hennepin County. City staff will contact staff in the surrounding cities, to share wellhead and source water protection information and ideas and discuss ways to combine efforts, actions, and strategies to protect the regional source water aquifers, and save costs. The City of Edina will initiate a conversation with surrounding LGUs (municipalities, WMOs, etc.) regarding the formation of a southwest metro regional wellhead protection task force.

- Source of Action
City of Edina
- Cooperators
Cities of St. Louis Park, Plymouth, Minnetonka, Golden Valley, Hopkins, Eden Prairie, Bloomington, Richfield, and Minneapolis, Hennepin County.
- Time Frame
First contact to occur in 2013 and meetings as necessary thereafter.
- Estimated Costs
Task will require approximately 8 hours per year for the City's Wellhead Protection Manager. No new or additional costs anticipated.
- Goal(s) Achieved
The teamed efforts between neighboring communities and governmental units that utilize the same regional source water aquifers should enhance the proposed protection measures, will facilitate better communication and information sharing between communities, and result in cost-effective and improved resource protection related to public water supply.

7.3.3**Promoting the Sealing of Unused, Poorly-Maintained, Damaged, or Abandoned Wells**

The City will promote any well sealing or cost-sharing programs available through the MDH or Hennepin County that may assist or reimburse the costs and administration of sealing unused, poorly-maintained, damaged or abandoned private wells located within the DWSMA.

- Source of Action
City of Edina
- Cooperators
MDH, Hennepin County Environmental Services, Surrounding LGUs
- Time Frame
Beginning in 2013 and ongoing thereafter
- Estimated Cost
This task is expected to require approximately 16 hours of staff time per year. The City will consider participating in available, existing cost-sharing programs through the Hennepin County, and/or reimbursing a portion of the well sealing costs to local residents.
- Goal(s) Achieved
This action will assist with the goal of eliminating potential pollutant sources to the vulnerable source water aquifers used for public water supplies. The number of wells in the DWSMA will be reduced.

7.3.4 Identify New High-Capacity Wells and Changes to Appropriations of Existing High-Capacity Wells

City staff and MDH staff in the Source Water Protection Unit will set up a line of communication with the appropriate MNDNR Appropriations Program personnel to identify any new, high-capacity wells proposed within the City’s DWSMA. They will also identify any significant changes to existing Water Appropriation Permits for existing high-capacity wells. Any new high-capacity wells or changes to current Appropriation Permits may be evaluated by MDH staff to determine whether the proposed pumping will change the boundaries of the City’s WHPA and corresponding DWSMA. If a change is identified, the City, MDH and MNDNR staff may participate in a meeting with the well owner(s) to inform them of the potential impacts the new or existing wells may have on the City’s wellhead and source water protection efforts, and discuss responsibility for changes to the City’s Plan, that may be necessary.

- Source of Action
City of Edina; MDH; MN DNR
- Cooperators
Well owners, property/business owners, and local residents
- Time Frame
Beginning at the time the Wellhead Protection Plan is approved and ongoing thereafter
- Estimated Cost
No new or additional costs are anticipated. The staff time and costs associated with this task are already allocated through existing City programs, projects, and budgets.
- Goal(s) Achieved
This action will assist the City in identifying new wells proposed to be constructed in the DWSMA, and determine whether the pumping of new or existing wells will affect the Edina Wellhead Protection Plan. This action will also provide opportunities to bring well owners into wellhead and source water protection educational programs.

7.4 Additional Data Collection

7.4.1 Monitoring Static and Pumping Levels in Municipal Wells

The City will continue to routinely monitor and record the static and pumping levels of the groundwater in the municipal wells. Water levels in all the municipal wells will be recorded at least monthly.

- Source of Action

City of Edina

- Cooperators

None

- Time Frame

Ongoing

- Estimated Cost

No new or additional costs are anticipated for this task. The City staff time and costs associated with this activity are already allocated through existing city programs, projects, and budgets.

- Goal(s) Achieved

By routinely recording the groundwater levels in the municipal wells, the City can monitor groundwater elevation trends over time. If the static water levels in the wells show a consistent decreasing trend, the city may pursue more restricted water use measures and/or more effective methods to control public water supply use. This data can also be useful to verify the groundwater flow fields in the source water aquifers.

7.4.2 Geologic and Hydrogeologic Studies and Data Gathering

The City intends to obtain additional geologic and hydrogeologic information and data regarding the Edina area. Specifically, the City will work with the MPCA and the City of St. Louis Park with groundwater quality sampling and geologic investigation work being performed there. The City will coordinate with the MDH the collection of samples to be tested for tritium from municipal wells open to different bedrock aquifers. This sampling will happen every decade. The City will also cooperate and collaborate with various groups conducting geologic or hydrogeologic studies as feasible and applicable.

- Source of Action
City of Edina
- Cooperators
MDH, Agencies or groups conducting geologic or hydrogeologic studies, well drilling companies, and others.
- Time Frame
A single sampling event will occur over the 10 year life of this plan. Collaboration on other projects as they occur and as appropriate.
- Estimated Cost
No new or additional costs are anticipated for this task.
- Goal(s) Achieved
By obtaining additional geologic and hydrogeologic information specifically focused on the Edina area, more accurate data will be available to delineate future, revised WHPA and DWSMA for existing and future municipal wells. The additional isotope analyses will provide updated information on the vulnerability of the aquifers to land surface activities. This information will be valuable for future, required updates to this Plan. Updated and more accurate vulnerability assessments will also result.

7.5 Annual Evaluation Program

The success of the Edina Wellhead Protection program must be routinely evaluated in order to determine whether the Plan is actually accomplishing the intentions of the City.

Some of the goals of annual evaluations are to:

- Track the implementation of the objectives identified in Section 3.0 of this Plan
- Determine the effectiveness of specific management strategies regarding the protection of the public water supply
- Identify possible changes to these strategies which may improve their effectiveness
- Determine the adequacy of financial resources and staff availability to carry out the management strategies planned for the coming year

In order to meet these evaluation goals, the following activities will be implemented:

1. Continue to cooperate with the MDH in the water quality monitoring of the water supply system to determine whether the management strategies are having a positive effect and to identify water quality problems that may arise that must be addressed.
2. Request members of the Public Works staff, City staff, the governing authority, and the Wellhead Protection Manager travel through the DWSMA on a regular basis to identify any changes in land use or potential contaminant source management practices which may adversely impact the public water supply.
3. One annual meeting will occur, to review the results of each strategy implemented during the previous plan year and to identify and discuss whether modifications are needed for those strategies and additional strategies for the coming year.
4. An annual report will be written to the City regarding progress in implementing the wellhead protection management objectives of this Plan. The annual reports will be compiled and used to review the overall progress in implementing source management strategies when the Edina Wellhead Protection Plan is updated in 10 years. A copy of the report will be sent to the MDH Source Water Protection Unit in St. Paul and another copy will be placed in the City's wellhead and source water protection file.
 - Source of Action
City of Edina Wellhead Protection Manager
 - Cooperators
City of Edina, Surrounding LGUs, MDH
 - Time Frame
Annually beginning in 2013
 - Estimated Cost
8 Hours of staff time is expected for this task.
 - Goal(s) Achieved
By reviewing the WHP Program on an annual basis, the wellhead protection manager can evaluate what is working, what is not, what changes need to be made, etc.

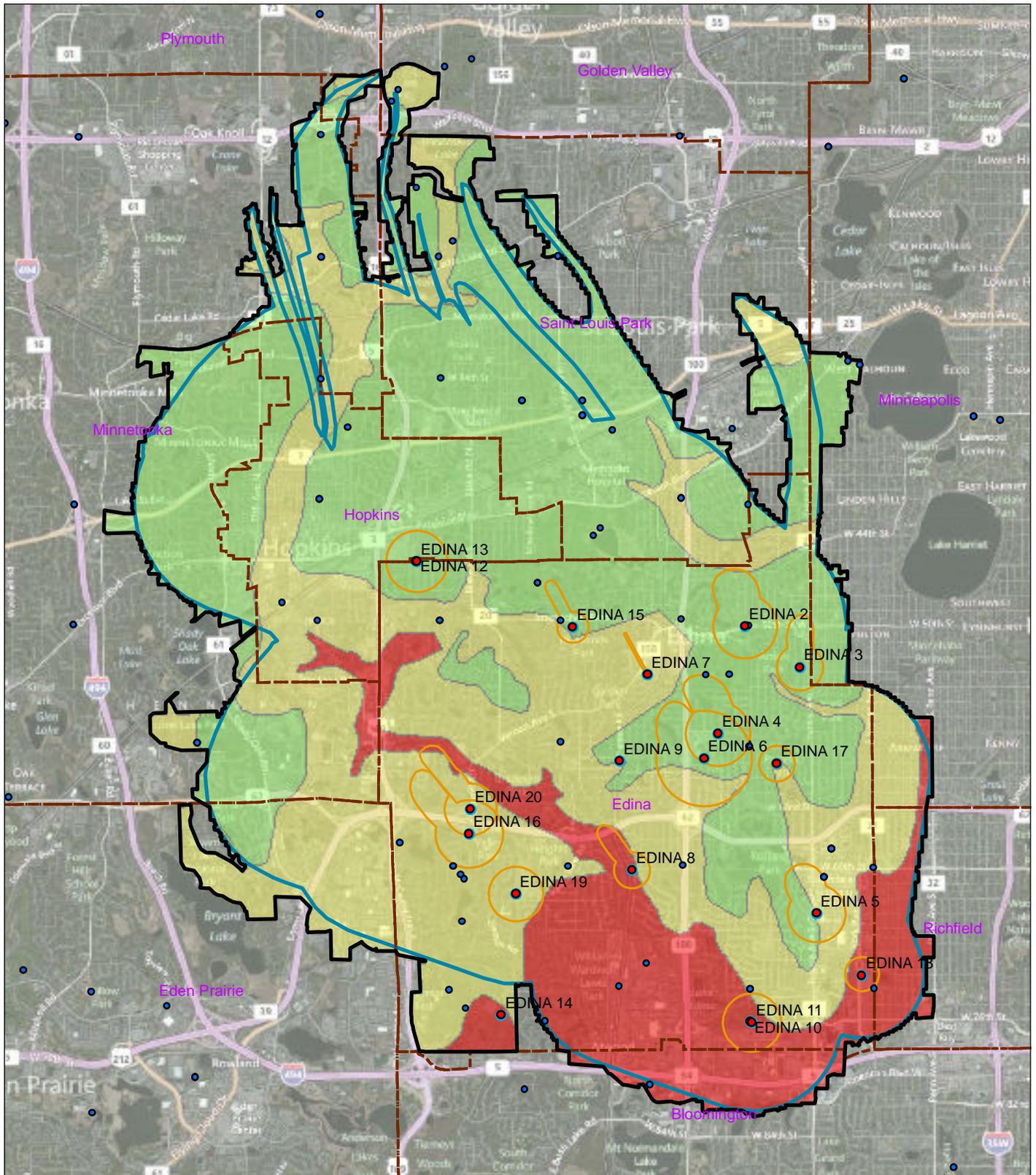
8.0 **Alternative Water Supply and Contingency Strategy**

According to the City of Edina's 2008 Comprehensive Plan Update, the City of Edina provides water service to the majority of the residents and businesses located in the City. Several smaller residential and commercial areas in Edina are served by the cities of Bloomington, Eden Prairie, Minneapolis, and St. Louis Park, based on geographic boundaries depicted in **Figure 1**. Through these areas, the City of Edina has the ability to interconnect in the event of emergency with water supplied by the cities of Bloomington, Eden Prairie, St. Louis Park, Hopkins and Minneapolis, and vice versa. Absent an emergency, should the City of Edina seek to shift any or all of these areas to water supplied by and from the City of Edina, it first will conduct full public process, including written notice to, and written survey of, all affected residents and property owners, public hearings, and City Council approval.

The WHP plan must have a contingency strategy to address the disruption of the water supply due to mechanical failure or contamination (MR 4720.5280). The City of Edina has a Water Supply Plans that has been approved by the Minnesota Department of Natural Resources. Under the provisions of Minnesota Statutes 186 and Minnesota Rules, part 6115.0770, the Water Supply Plan is considered equivalent to an approved WHP contingency plan. Edina's Water Supply Plan is provided as **Appendix I**.

Figures

- Figure 1** – DWSMA Vulnerability
- Figure 2** - Bedrock Geology
- Figure 3** - Surficial Geology
- Figure 4** –Soils
- Figure 5** – City of Edina DWSMA Land Use
- Figure 6** –City of Edina Zoning
- Figure 7** – Water Resources
- Figure 8** – Sanitary Sewer Coverage
- Figure 9** – Storm Sewer and Major Transportation Corridor
- Figure 10** – Water Distribution System
- Figure 11** - City of Edina PCSI Verified Sites (Overview Map)
 - Figure 11-1** - City of Edina PCSI Verified Sites
 - Figure 11-2** - City of Edina PCSI Verified Sites
 - Figure 11-3** - City of Edina PCSI Verified Sites
 - Figure 11-4** - City of Edina PCSI Verified Sites
- Figure 12** - City of Edina PCSI Unverified Sites (Overview Map)
 - Figure 12-1** - City of Edina PCSI Unverified Sites
 - Figure 12-2** - City of Edina PCSI Unverified Sites
 - Figure 12-3** - City of Edina PCSI Unverified Sites
 - Figure 12-4** - City of Edina PCSI Unverified Sites
 - Figure 12-5** - City of Edina PCSI Unverified Sites
 - Figure 12-6** - City of Edina PCSI Unverified Sites



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Legend

- Edina Wells
 - High Yield Wells
 - ▭ Drinking Water Supply Management Area
 - ▭ Municipal Boundaries
 - ▭ Wellhead Protection Area
 - ▭ Inner Wellhead Management Zone
 - ▭ Emergency Response Area (ERA)
- Vulnerability Classification**
- ▭ Low
 - ▭ Moderate
 - ▭ High



Figure 1

DWSMA
 Vulnerability

Edina Wellhead
 Protection Plan

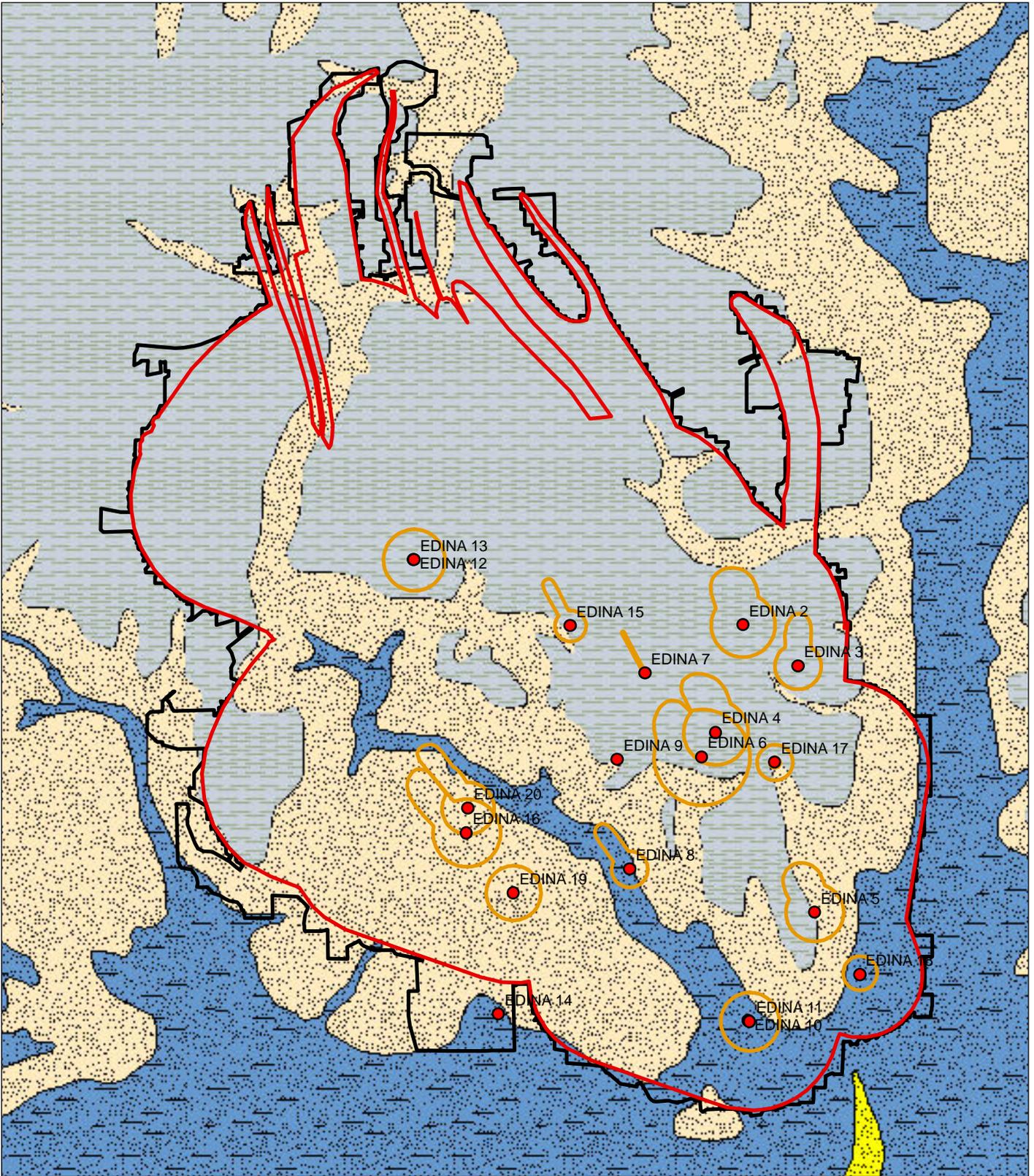


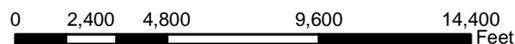
Figure 2
 Bedrock Geology
 Edina Wellhead Protection Plan



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Legend

- Edina Wells
- Wellhead Protection Area
- Drinking Water Supply Management Area
- Emergency Response Area (ERA)
- Jordan Sandstone
- Prairie du Chien Group
- Platteville and Glenwood Fms.
- St. Peter Sandstone



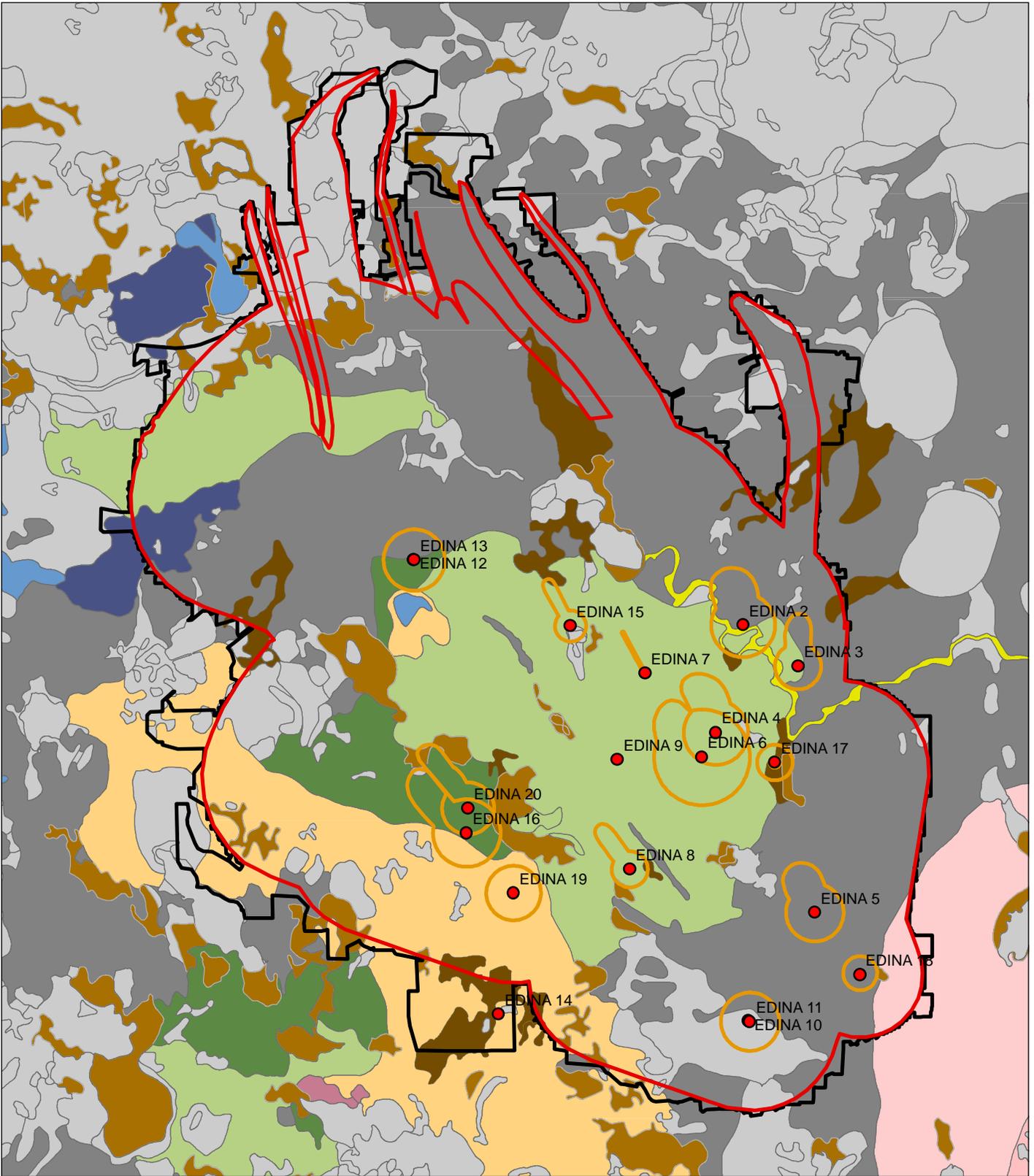


Figure 3

Surficial Geology

Edina Wellhead Protection Plan



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- Legend**
- Edina Wells
 - ▭ Drinking Water Supply Management Area
 - ▭ Wellhead Protection Area
 - ▭ Emergency Response Area (ERA)
 - ▭ Description Missing
 - ▭ Organic Deposits
 - ▭ Organic Deposits, Drained and Filled
 - ▭ Floodplain Alluvium (Sandy)
 - ▭ Middle Terrace
 - ▭ Upper Terrace
 - ▭ Lacustrine Clay and Silt
 - ▭ Ice-Contact Stratified Deposits
 - ▭ Glacial Till
 - ▭ Sandy Till
 - ▭ Loamy Till
 - ▭ Till of Mixed Composition
 - ▭ Outwash

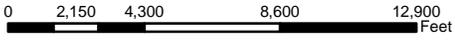
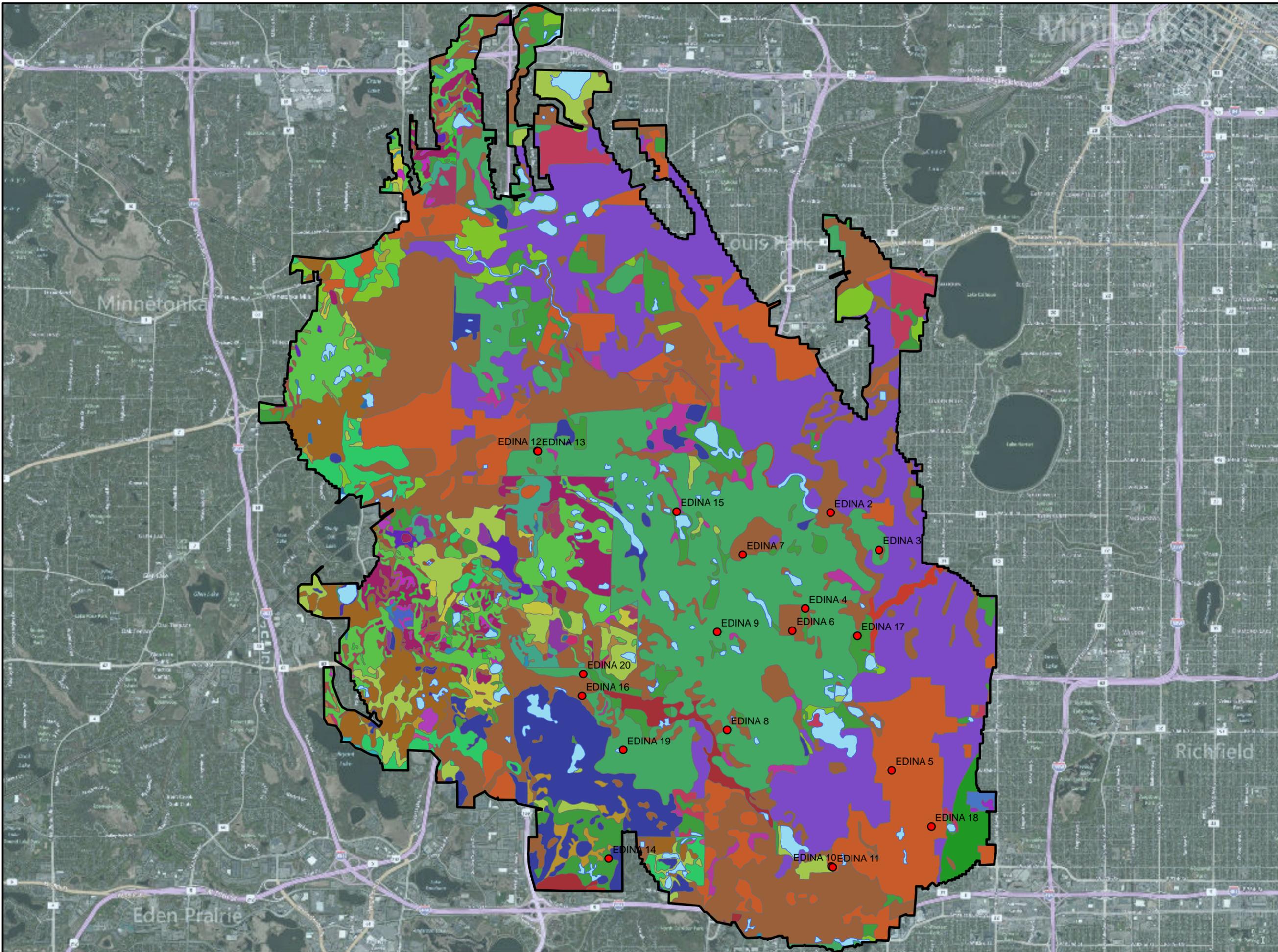


Figure 4
Soils
SSURGO



- Legend**
- Municipal Wells
 - DWSSMA
 - Map Unit Name**
 - Angus
 - Angus-Kilkenny
 - Angus-Malardi
 - Angus-Moon
 - Biscay
 - Canisteo
 - Cordova
 - Crowfork
 - Duelm
 - Dundas-Cordova
 - Forestcity-Lundlake
 - Glencoe
 - Hamel
 - Hamel-Glencoe
 - Houghton and Muskego
 - Hubbard
 - Kingsley-Gotham
 - Klossner
 - Klossner, Okoboji, and Glencoe
 - Koronis-Kingsley
 - Koronis-Kingsley-Malardi
 - Le Sueur
 - Lester
 - Lester-Malardi
 - Lester-Metea
 - Lundlake
 - Malardi-Hawick
 - Medo
 - Muskego and Klossner
 - Muskego, Blue Earth, and Houghton
 - Nessel
 - Pits, gravel-Udipsammentsl
 - Rasset
 - Shorewood
 - Suckercreek
 - Tadkee-Tadkee
 - Tomall
 - Udorthents
 - Urban land-Dundas
 - Urban land-Hubbard
 - Urban land-Lester
 - Urban land-Malardi
 - Urban land-Udipsamments
 - Urban land-Udorthents
 - Water

Source: USDA NRCS SSURGO Database

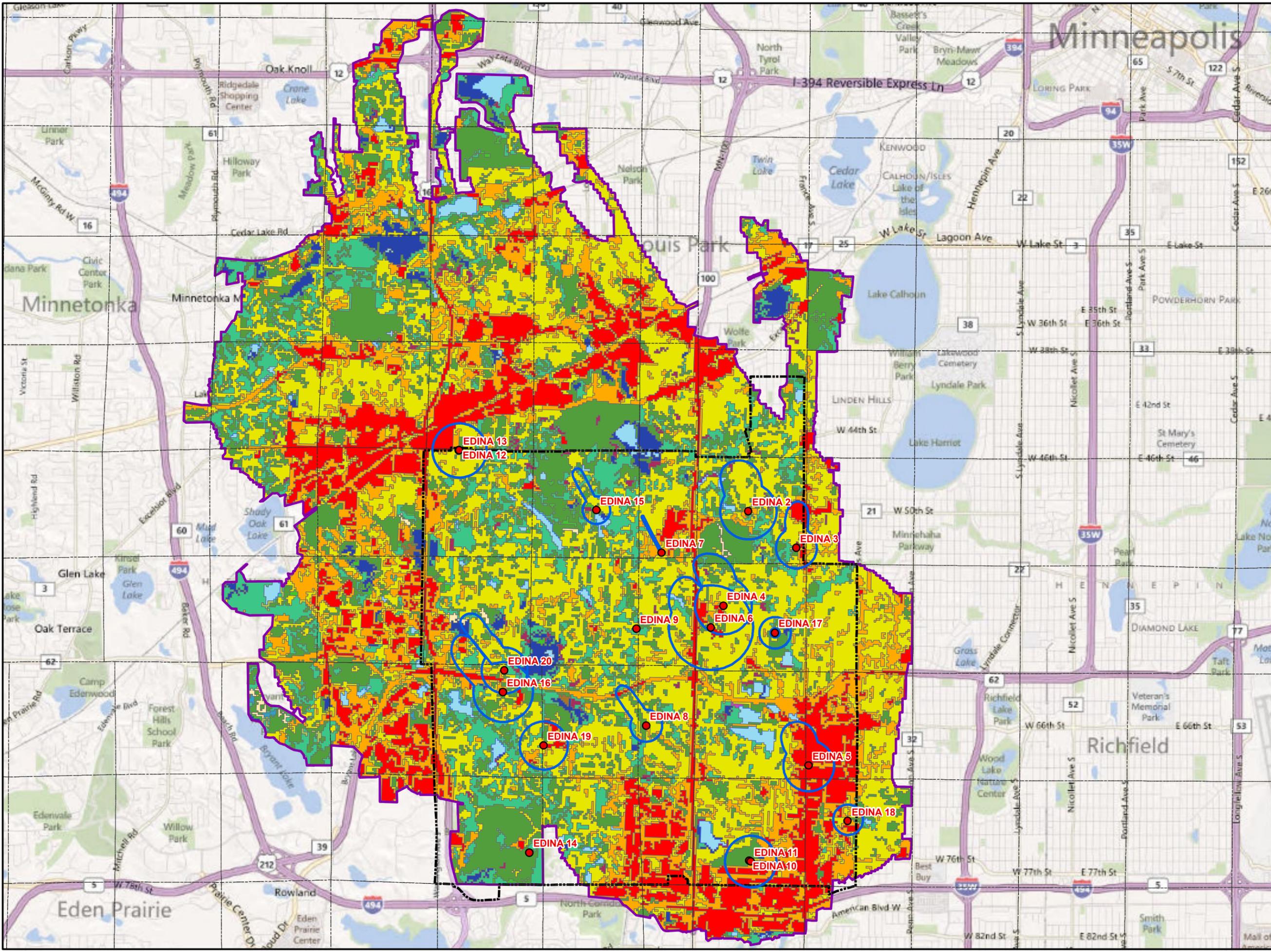


0 1,250 2,500 5,000 7,500 Feet



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Figure 5
City of Edina
DWSMA Land Use



- Legend**
- Municipal Wells
 - Emergency Response Area (ERA)
 - Twp Rng Sec Line
 - ▭ Municipal Boundary
 - ▭ DWSMA
- Land Use**
- Cultivated Crops
 - Deciduous Forest
 - Developed, High Intensity
 - Developed, Low Intensity
 - Developed, Medium Intensity
 - Developed, Open Space
 - Emergent Herbaceous Wetlands
 - Evergreen Forest
 - Grassland/Herbaceous
 - Mixed Forest
 - Open Water
 - Pasture/Hay
 - Shrub/Scrub
 - Woody Wetlands

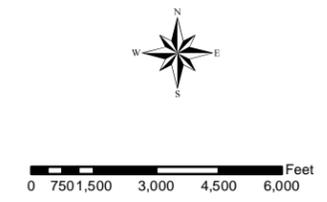
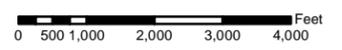
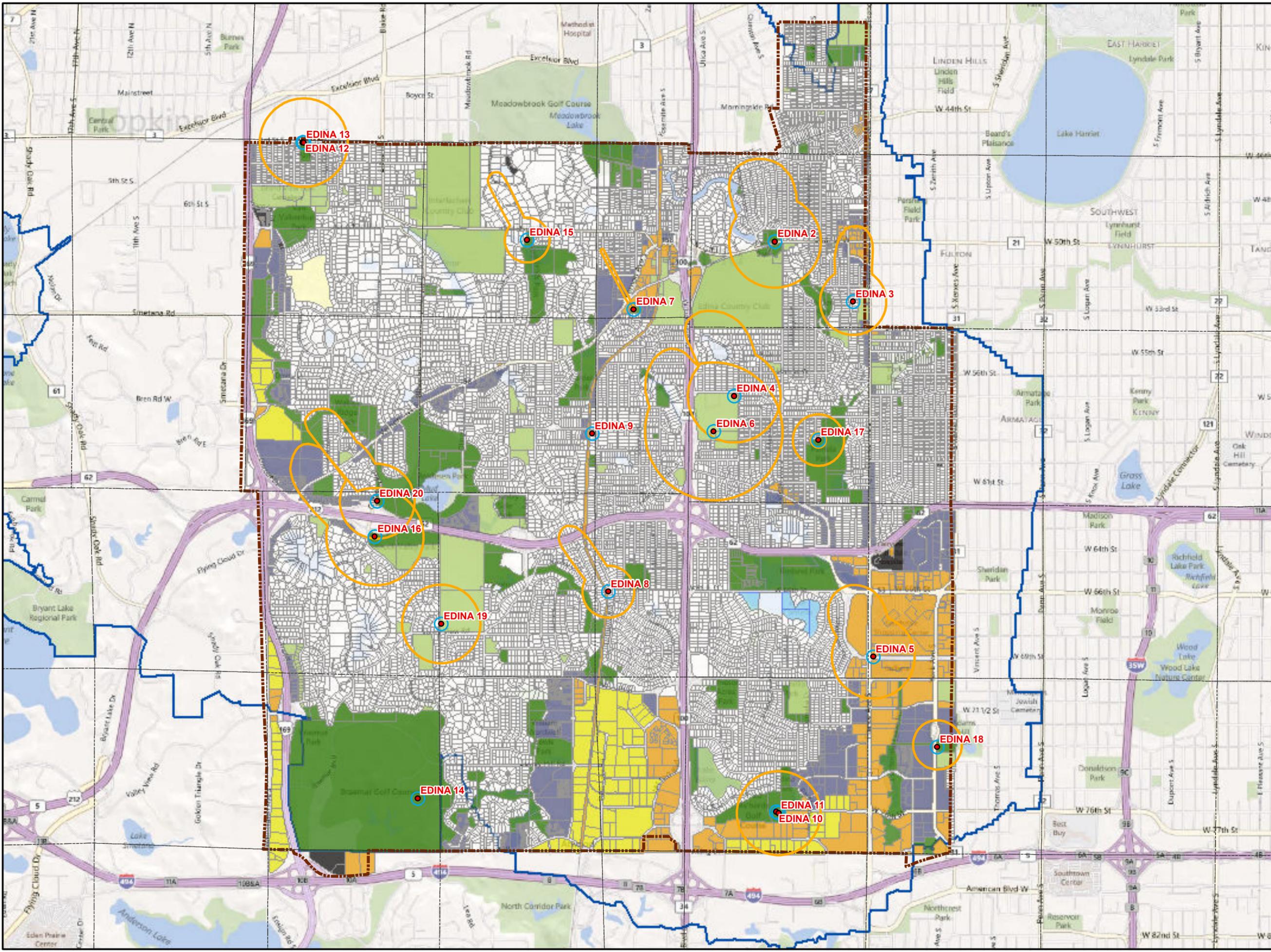


Figure 6

City of Edina
Zoning

Legend

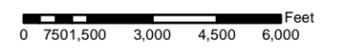
-  Municipal Wells
-  Inner Wellhead Management Zone
-  Emergency Response Area (ERA)
-  DWSMA
-  Twp Rng Sec Line
-  Municipal Boundary
- Zoning**
- LANDUSE**
-  Commercial
-  Industrial
-  Multiple Family Residential
-  Open Water
-  Parks & Recreation
-  Public/Semi-Public
-  Single Family Residential
-  Vacant
-  No Data Available



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Figure 7
City of Edina
Water Resources

- Legend**
- Municipal Wells
 - Surface Water Sampling Sites
 - Groundwater Sampling Sites
 - ▲ Surface Water Appropriation
 - Emergency Response Area (ERA)
 - Watershed Boundary
- Impaired Lakes**
- Nutrients
- Impaired Streams**
- Cl-, F-IBI
- Lakes
 - Streams
 - FEMA Floodplain
 - Wetlands
- DWSMA Vulnerability**
- High
 - Moderate
 - Low



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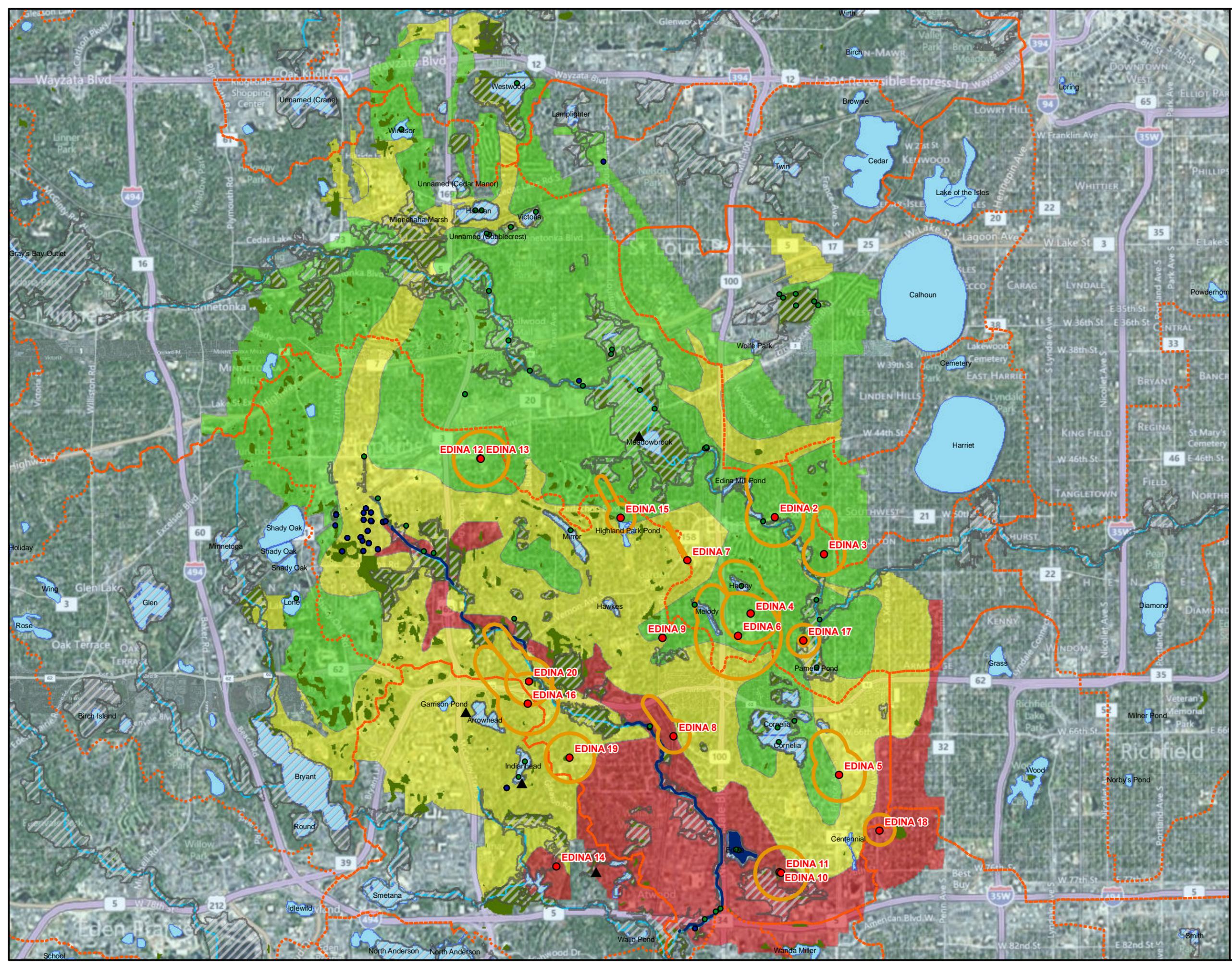


Figure 7
City of Edina Water Resources

Legend

- Municipal Wells
- Surface Water Sampling Sites
- Groundwater Sampling Sites
- ▲ Surface Water Appropriation
- Emergency Response Area (ERA)
- Watershed Boundary

Impaired Lakes

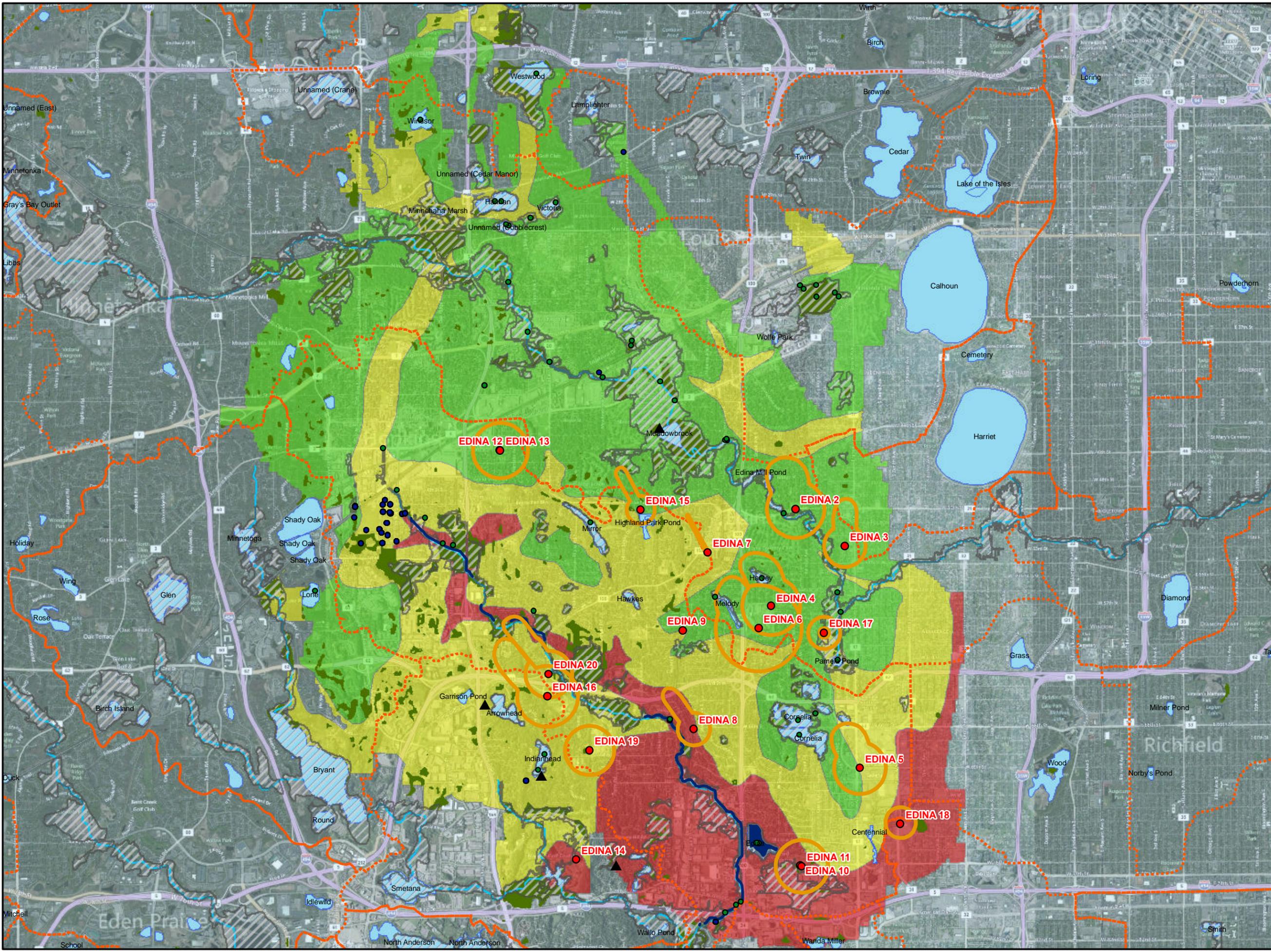
- Nutrients

Impaired Streams

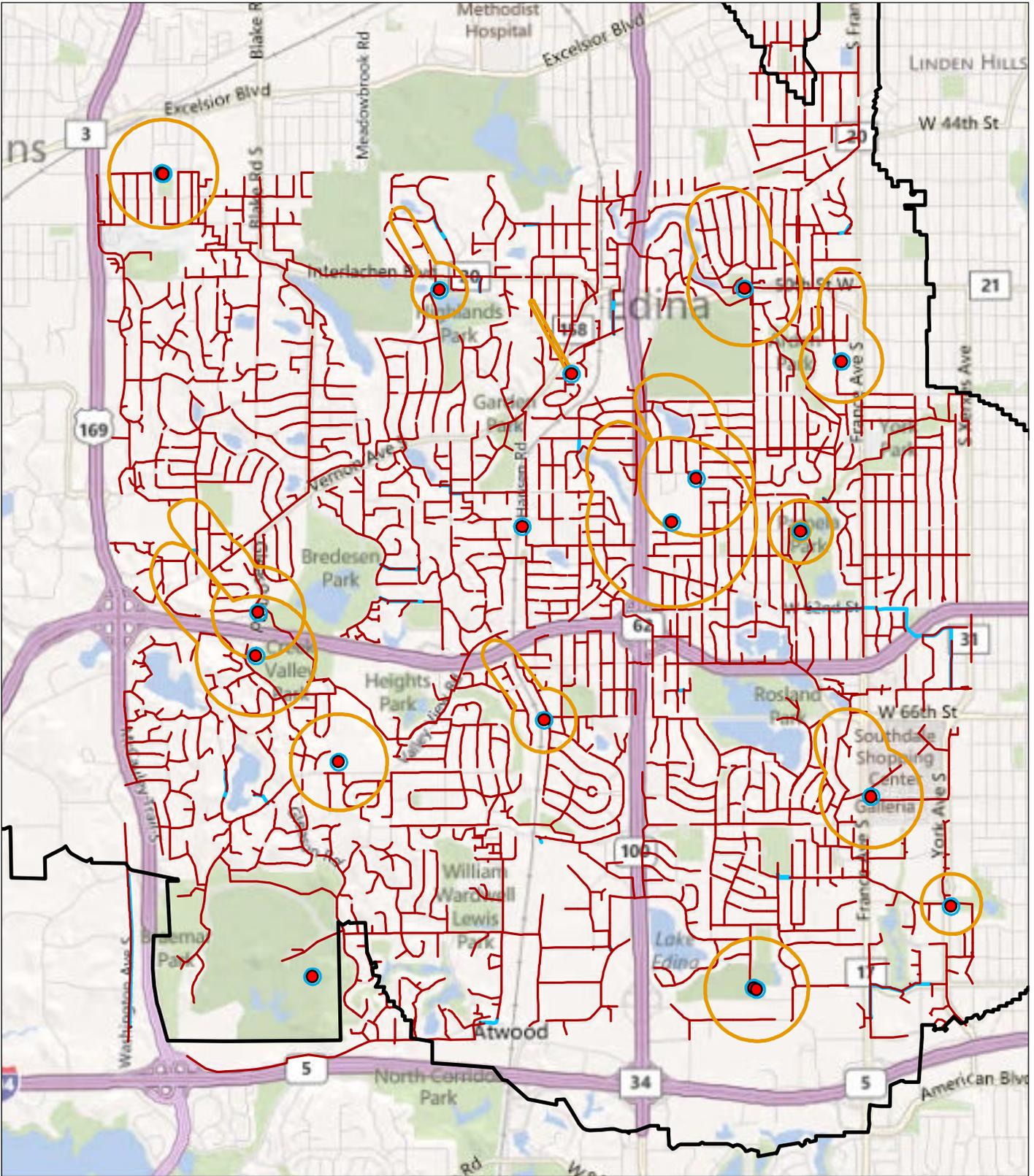
- CI-, F-IBI
- Lakes
- Streams
- FEMA Floodplain
- Wetlands

DWSMA Vulnerability

- High
- Moderate
- Low



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Legend

- Inner Wellhead Management Zone
- Emergency Response Area (ERA)
- Drinking Water Supply Management Area
- Edina Wells
- Gravity Main
- Pressurized Main

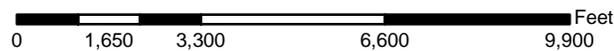
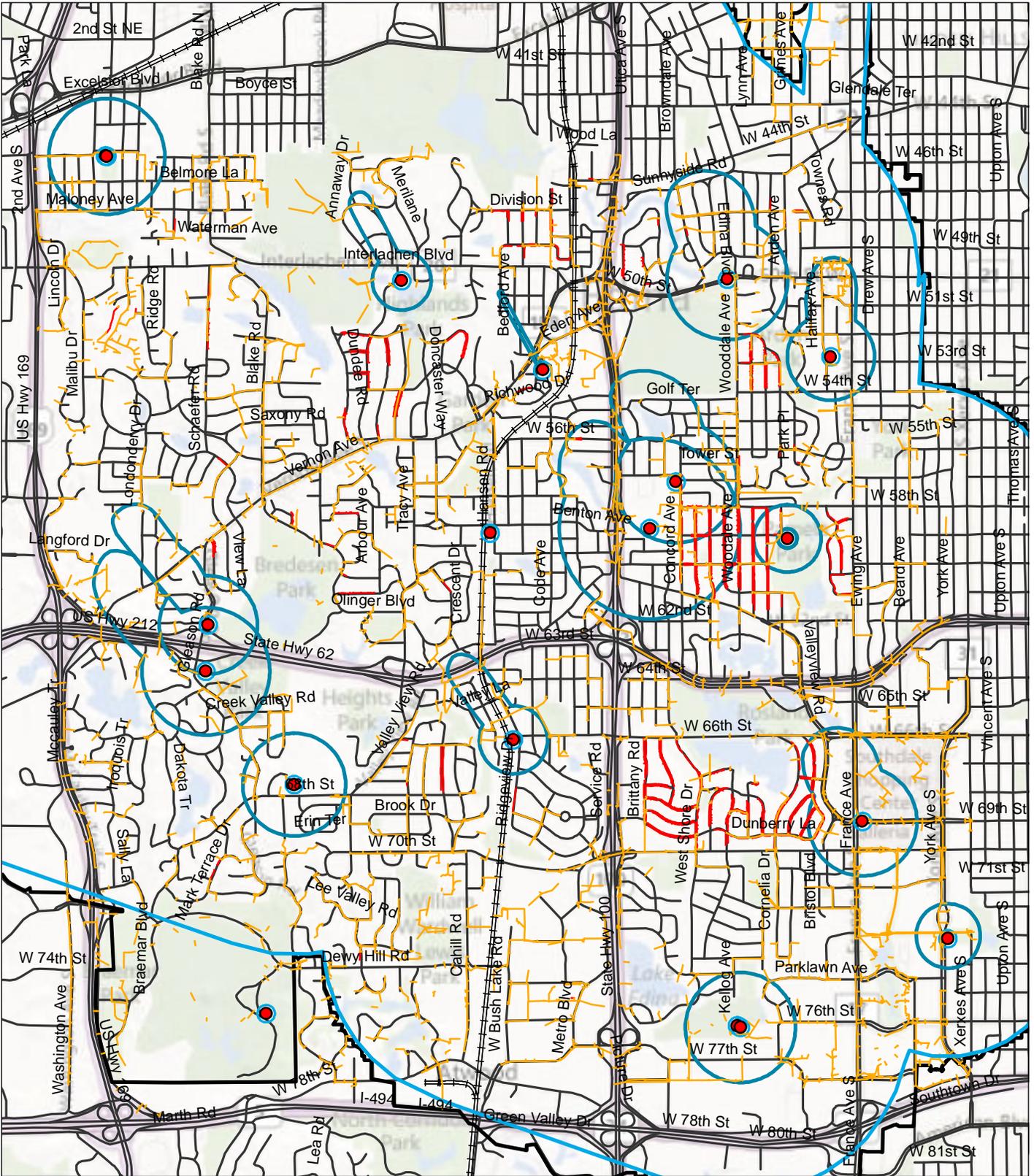


Figure 8

Sanitary Sewer Coverage

Edina Wellhead Protection Plan



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Legend

- Edina Wells
- Wellhead Protection Area
- Drinking Water Supply Management Area
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone
- Railroads
- Roads
- Gravity Main
- Sump Draintile

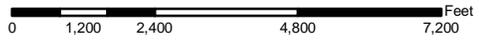
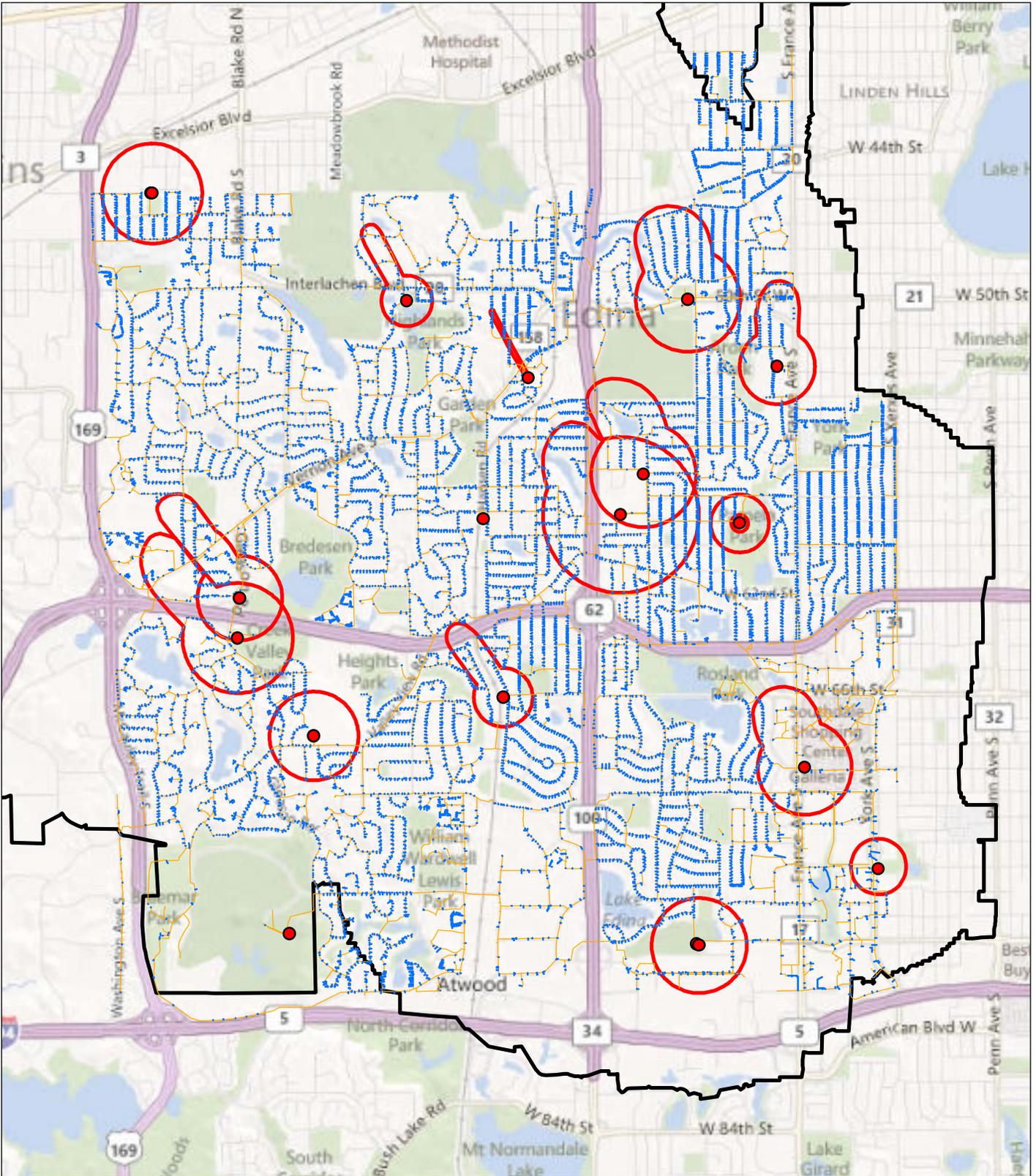


Figure 9

Storm Sewer and Major Transportation Corridor

Edina Wellhead Protection Plan



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Legend

-  Drinking Water Supply Management Area
 -  Emergency Response Area (ERA)
 -  Service Line
 -  Pressurized Main
 -  Edina Wells
- 0 1,250 2,500 5,000 7,500 Feet



Figure 10

Water Distribution System

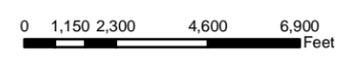
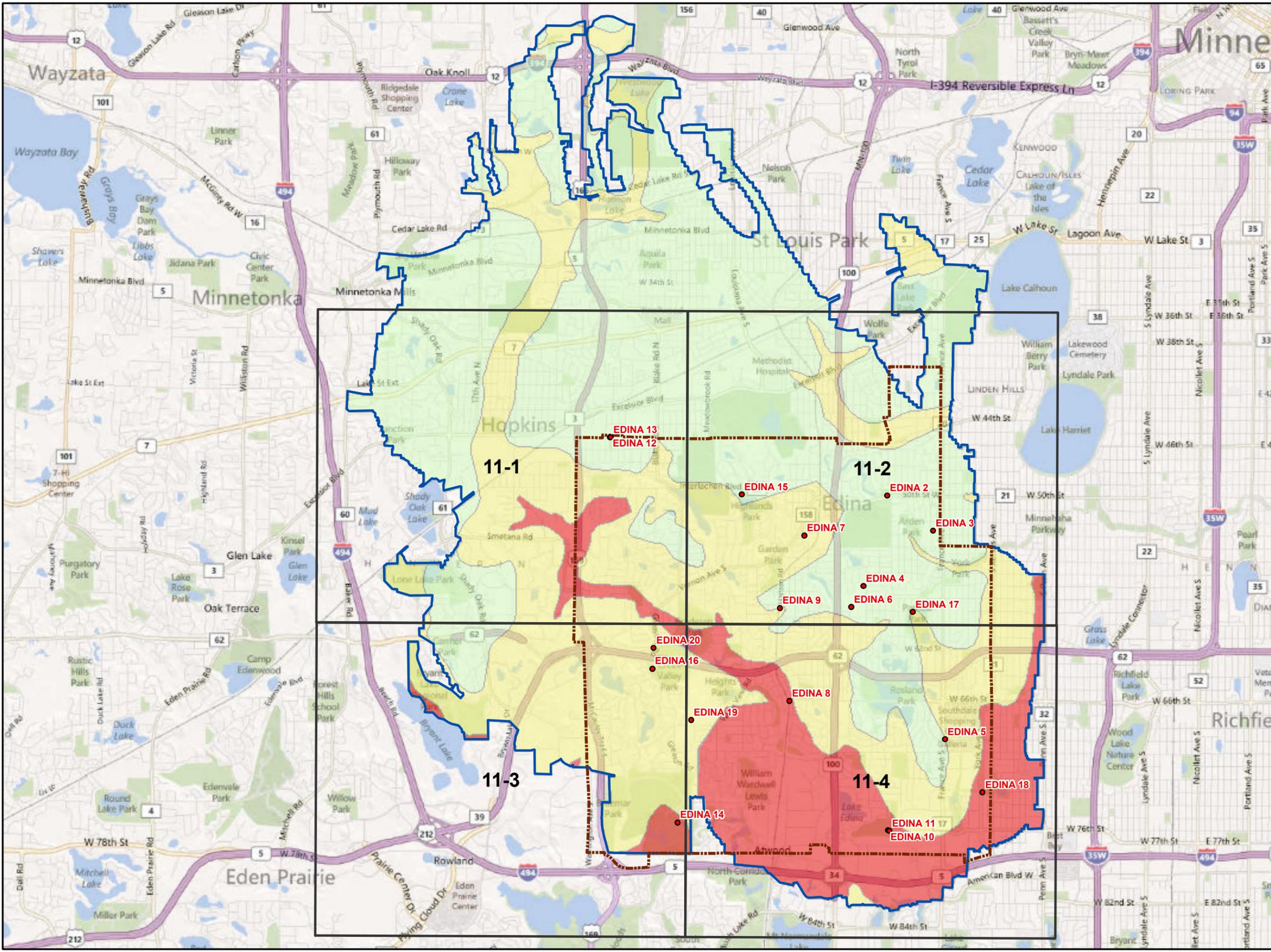
Edina Wellhead Protection Plan

Figure 11

City of Edina
PCSI Verified Sites

Legend

- Municipal Wells
- ▭ Municipal Boundary
- ▭ DWSMA
- Vulnerability**
- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability



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Figure 11-1
City of Edina
PCSI Verified Sites

- Legend**
- MDH County Well Index (Verified)
 - Edina Private Well Database (Verified)
 - Municipal Wells
- Verified PCSI Sites**
- Construction Stormwater Permit
 - ▲ Hazardous Waste, LQG
 - ▲ Hazardous Waste, Small to Minimal QG
 - Industrial Stormwater Permit
 - Leak Site
 - ▲ Multiple Activities
 - ★ Petroleum Brownfield
 - Tank Site
 - ▼ Voluntary Investigation & Cleanup (VIC)
 - Wastewater Discharger
- Vulnerability**
- High Vulnerability
 - Moderate Vulnerability
 - Low Vulnerability

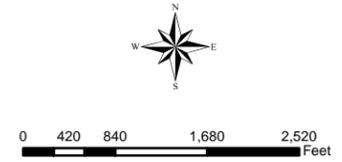
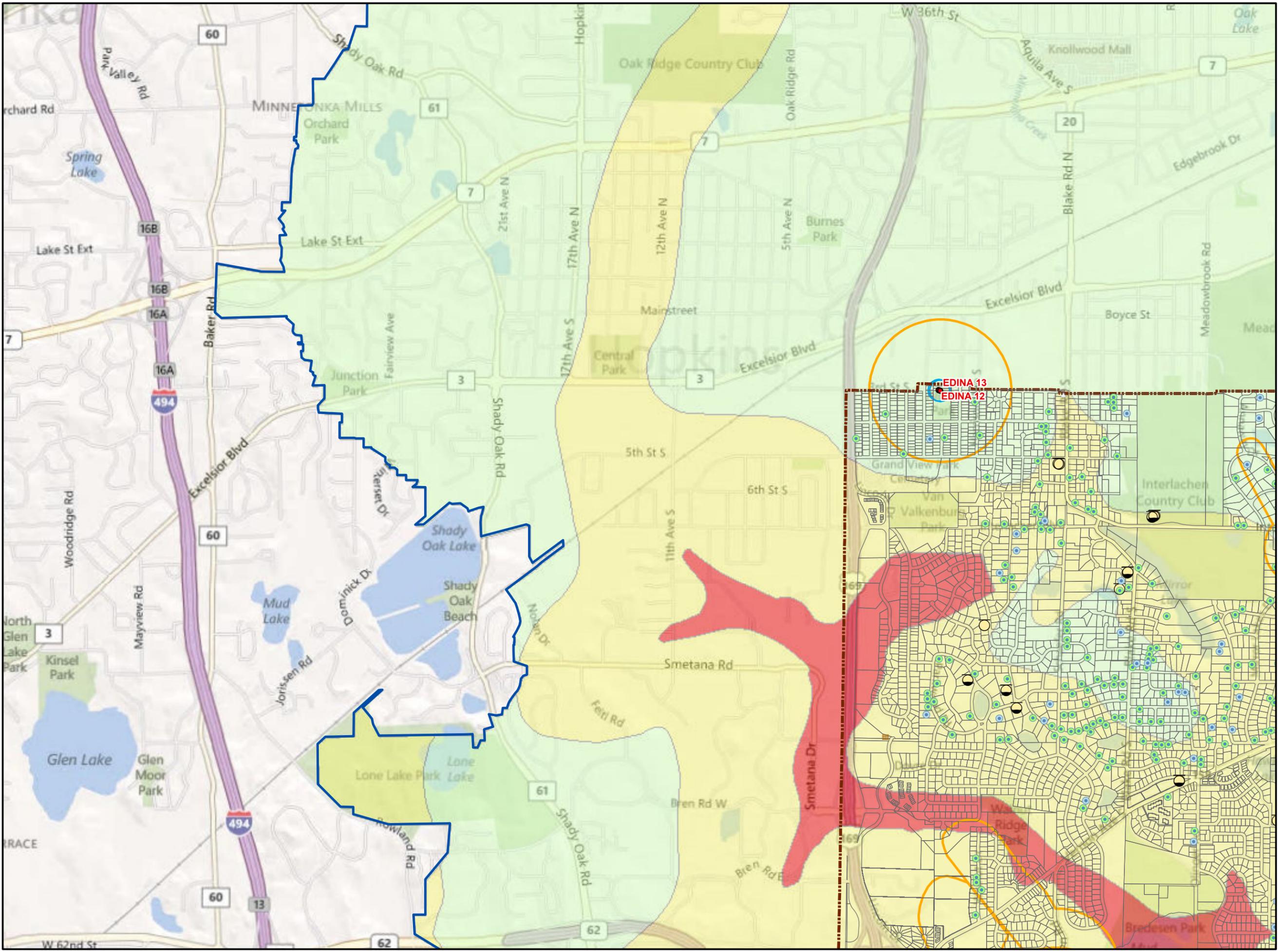


Figure 11-2
City of Edina
PCSI Verified Sites

- Legend**
- MDH County Well Index (Verified)
 - Edina Private Well Database (Verified)
 - Municipal Wells
- Verified PCSI Sites**
- Construction Stormwater Permit
 - ▲ Hazardous Waste, LQG
 - ▲ Hazardous Waste, Small to Minimal QG
 - Industrial Stormwater Permit
 - Leak Site
 - ▲ Multiple Activities
 - ★ Petroleum Brownfield
 - Tank Site
 - ▲ Voluntary Investigation & Cleanup (VIC)
 - Wastewater Discharger
- EdinaParcels_Munboundary
- Municipal Boundary
- DWSMA
- Inner Wellhead Management Zone
- Emergency Response Area (ERA)
- Vulnerability**
- High Vulnerability
 - Moderate Vulnerability
 - Low Vulnerability

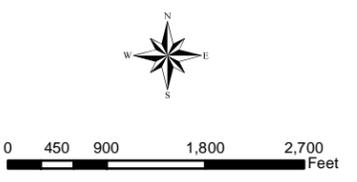
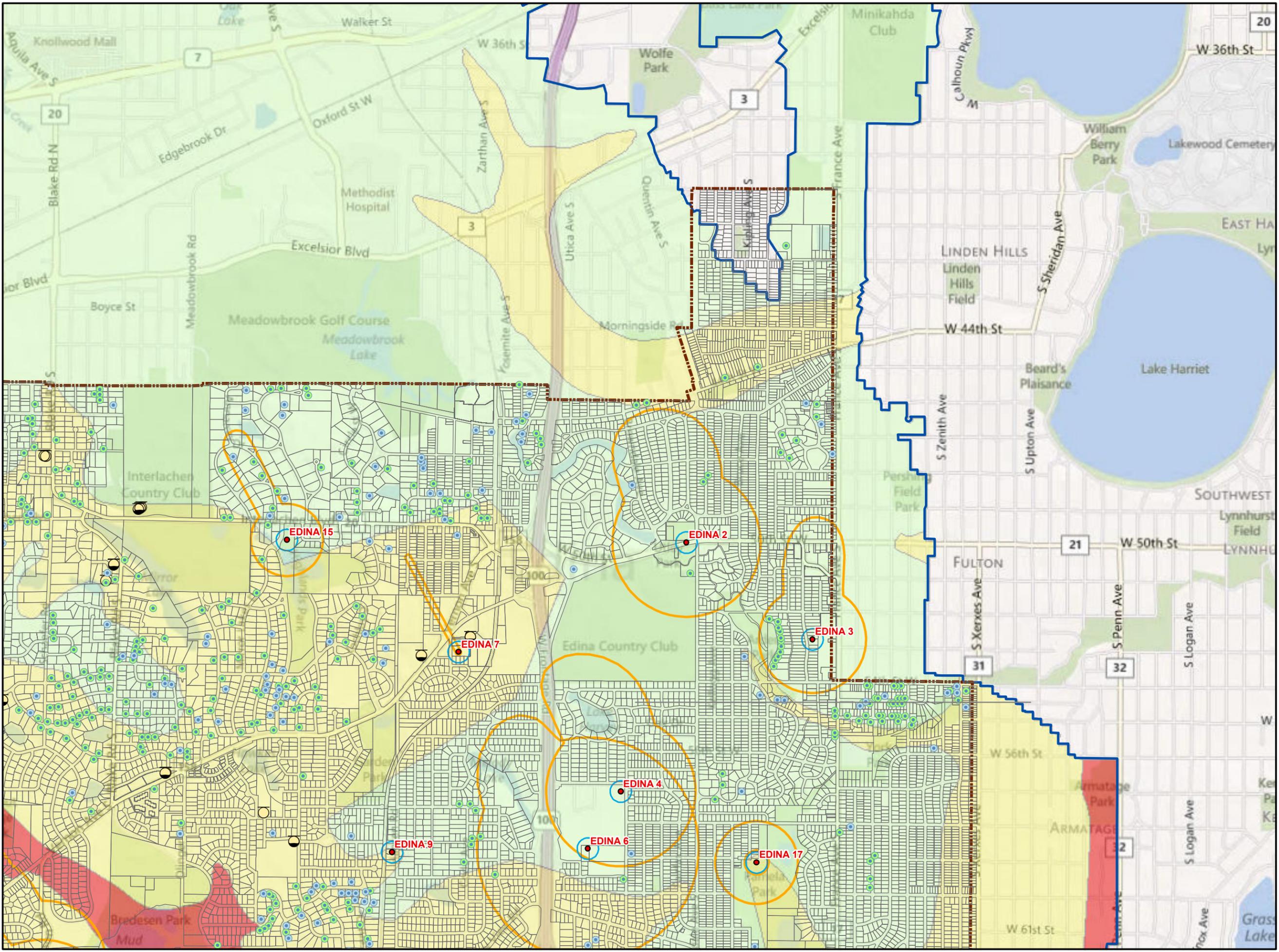
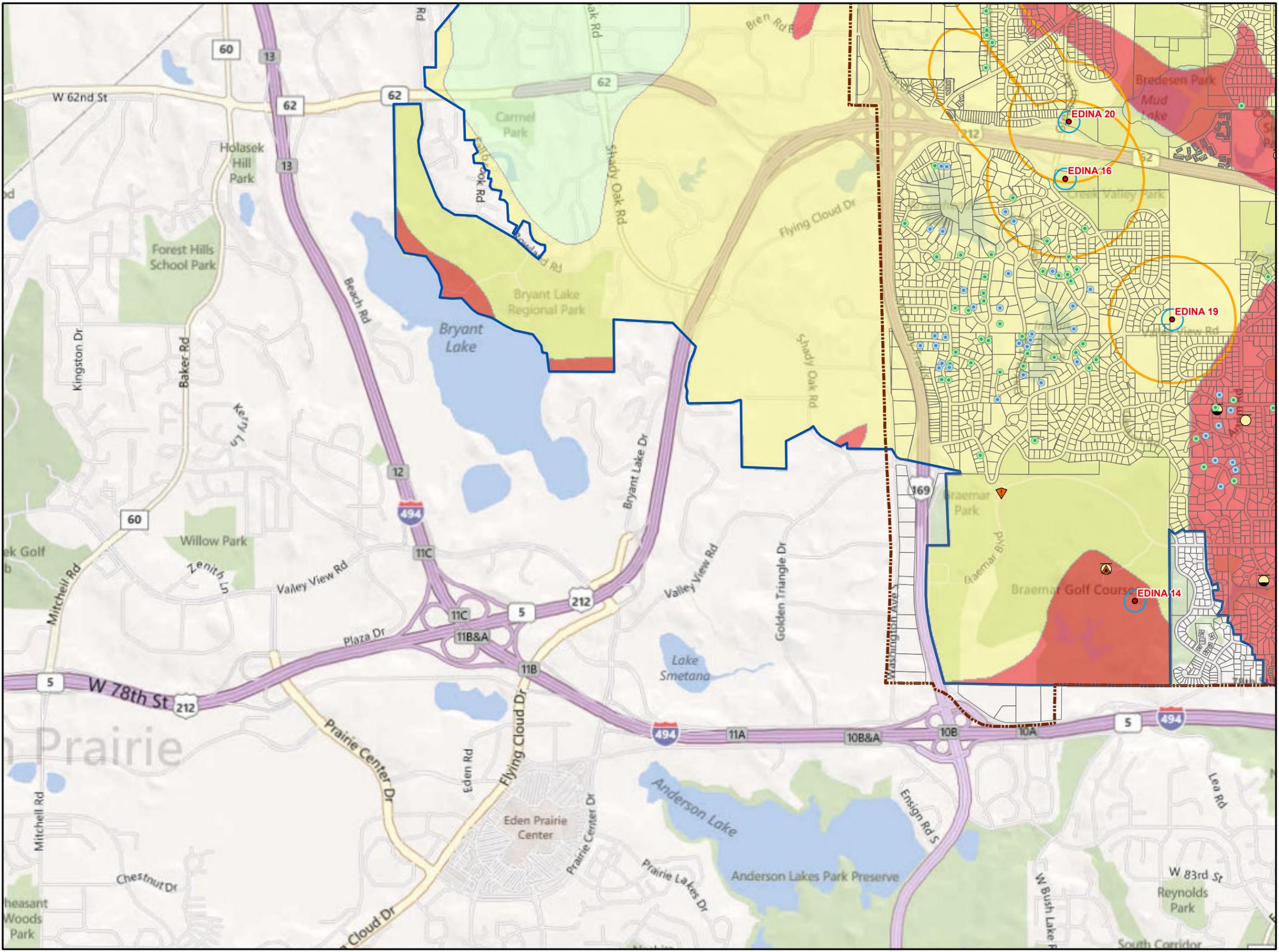


Figure 11-3
City of Edina
PCSI Verified Sites

- Legend**
- MDH County Well Index (Verified)
 - Edina Private Well Database (Verified)
 - Municipal Wells
- Verified PCSI Sites**
- Construction Stormwater Permit
 - ▲ Hazardous Waste, LQG
 - ▲ Hazardous Waste, Small to Minimal QG
 - Industrial Stormwater Permit
 - Leak Site
 - ▲ Multiple Activities
 - ◆ Petroleum Brownfield
 - Tank Site
 - ▼ Voluntary Investigation & Cleanup (VIC)
 - Wastewater Discharger
- Boundaries**
- ▭ EdinaParcels_Munboundary
 - ▭ Municipal Boundary
 - ▭ DWSMA
 - ▭ Inner Wellhead Management Zone
 - ▭ Emergency Response Area (ERA)
- Vulnerability**
- High Vulnerability
 - Moderate Vulnerability
 - Low Vulnerability



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Figure 11-4
City of Edina
PCSI Verified Sites

- Legend**
- MDH County Well Index (Verified)
 - Edina Private Well Database (Verified)
 - Municipal Wells
- Verified PCSI Sites**
- Construction Stormwater Permit
 - ▲ Hazardous Waste, LQG
 - ▲ Hazardous Waste, Small to Minimal QG
 - Industrial Stormwater Permit
 - Leak Site
 - ▲ Multiple Activities
 - ★ Petroleum Brownfield
 - Tank Site
 - ▼ Voluntary Investigation & Cleanup (VIC)
 - Wastewater Discharger
- Vulnerability**
- High Vulnerability
 - Moderate Vulnerability
 - Low Vulnerability

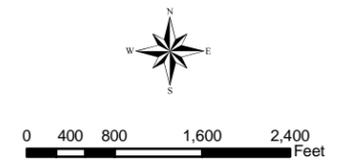
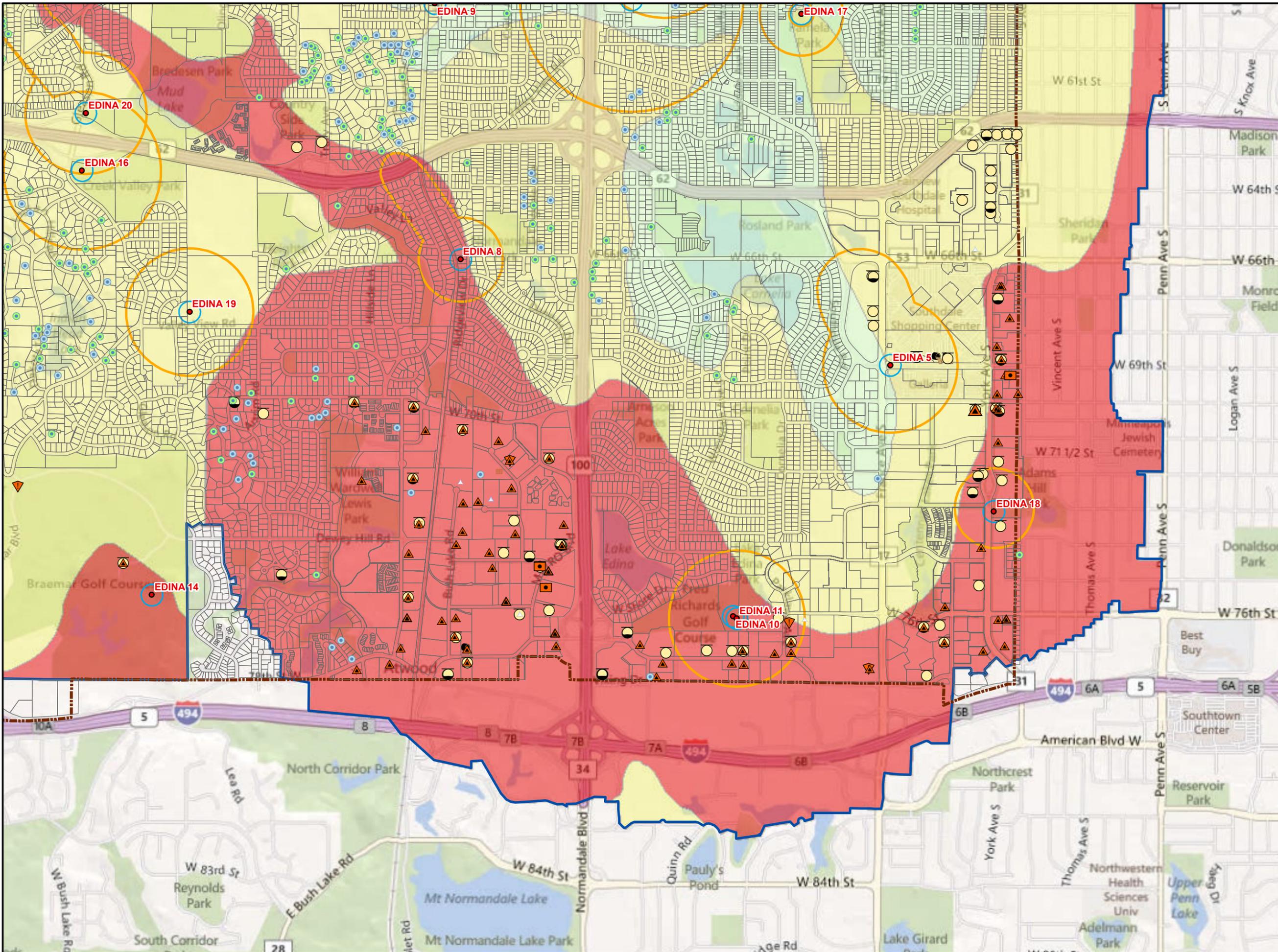


Figure 12
City of Edina
PCSI Unverified Sites

Legend

- Municipal Wells
- ▭ Municipal Boundary
- ▭ DWSMA
- Vulnerability**
- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

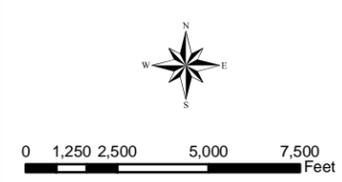
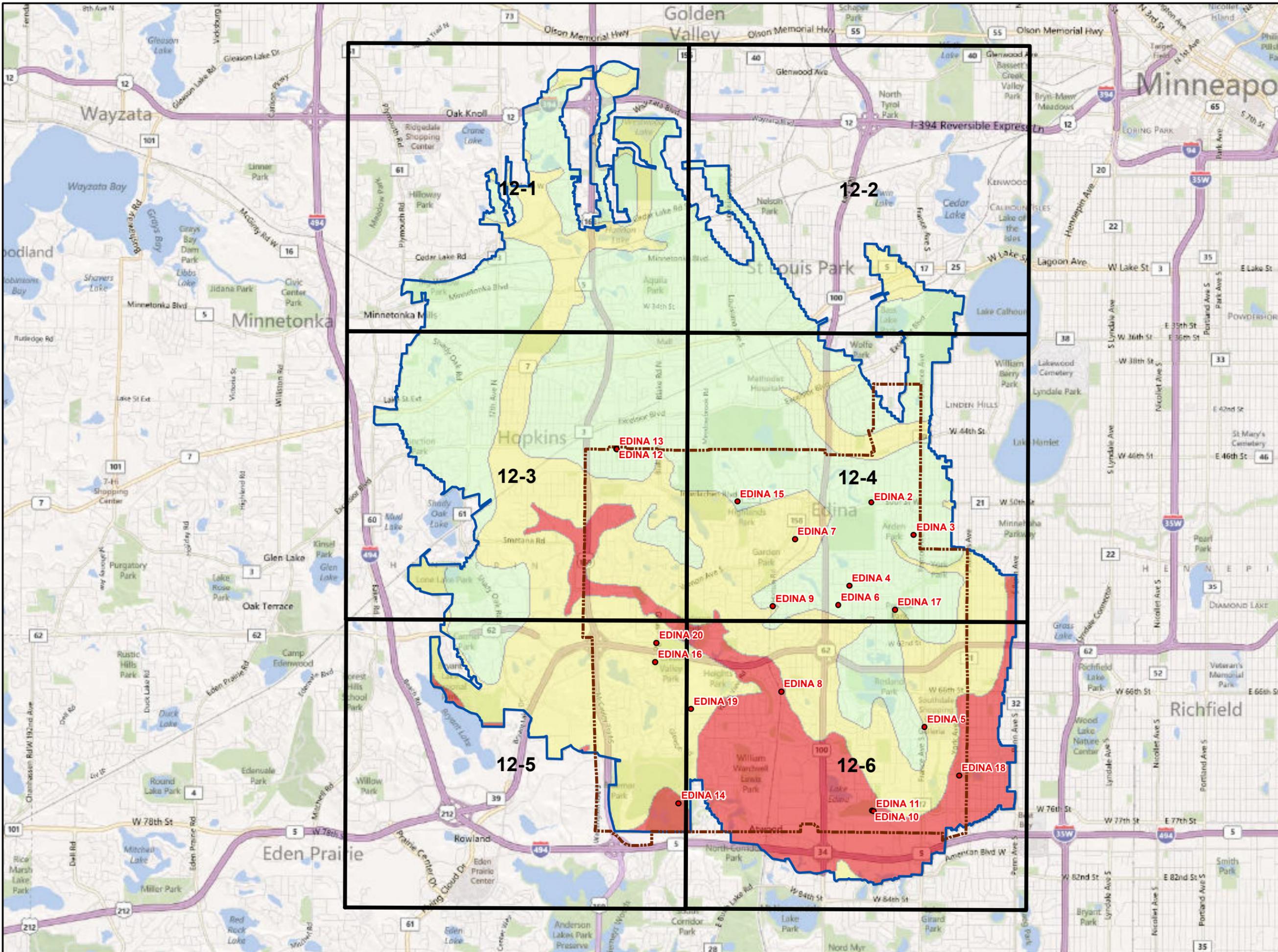


Figure 12-1
City of Edina
PCSI Unverified Sites

- Legend**
- EDA_notinunverified
 - MDH County Well Index (Unverified)
 - Municipal Wells
- Unverified PCSI Sites**
- Construction Stormwater Permit
 - ▲ Hazardous Waste, LQG
 - ▲ Hazardous Waste, Small to Minimal QG
 - Industrial Stormwater Permit
 - Leak Site
 - ▲ Multiple Activities
 - ★ Petroleum Brownfield
 - Tank Site
 - ▼ Voluntary Investigation & Cleanup (VIC)
 - Wastewater Discharger
- Boundaries**
- ▭ Municipal Boundary
 - ▭ DWSMA
 - ▭ Inner Wellhead Management Zone
 - ▭ Emergency Response Area (ERA)
- Vulnerability**
- High Vulnerability
 - Moderate Vulnerability
 - Low Vulnerability

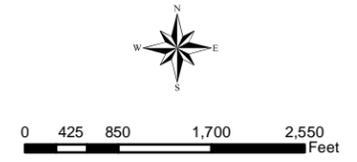
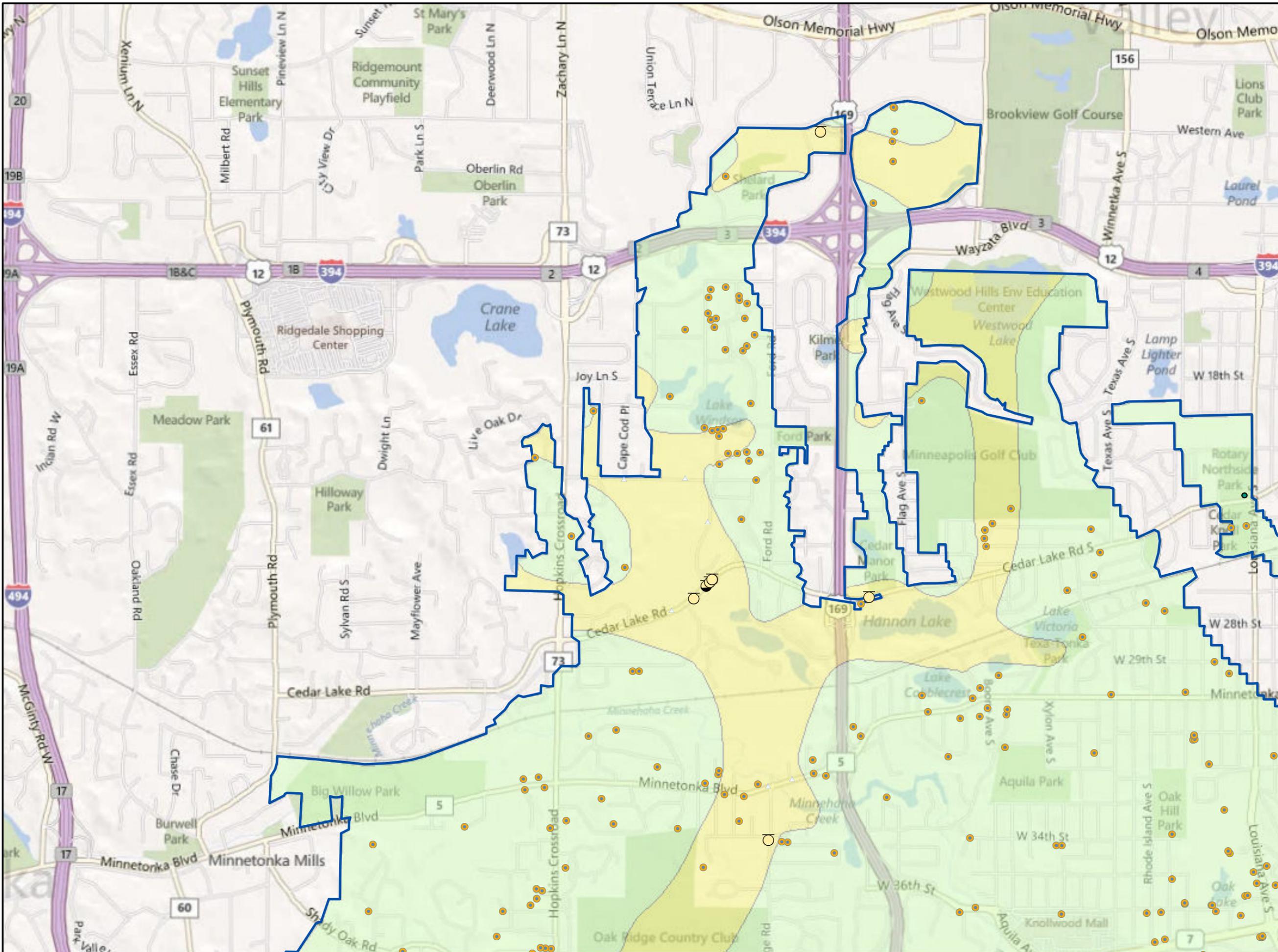


Figure 12-2

City of Edina
PCSI Unverified Sites

- Legend**
- EDA_notinunverified
 - MDH County Well Index (Unverified)
 - Municipal Wells
- Unverified PCSI Sites**
- Construction Stormwater Permit
 - Hazardous Waste, LQG
 - Hazardous Waste, Small to Minimal QG
 - Industrial Stormwater Permit
 - Leak Site
 - Multiple Activities
 - Petroleum Brownfield
 - Tank Site
 - Voluntary Investigation & Cleanup (VIC)
 - Wastewater Discharger
- Boundaries**
- Municipal Boundary
 - DWSMA
 - Inner Wellhead Management Zone
 - Emergency Response Area (ERA)
- Vulnerability**
- High Vulnerability
 - Moderate Vulnerability
 - Low Vulnerability

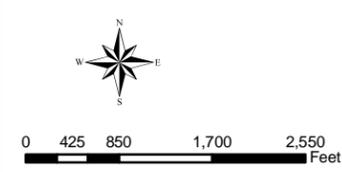
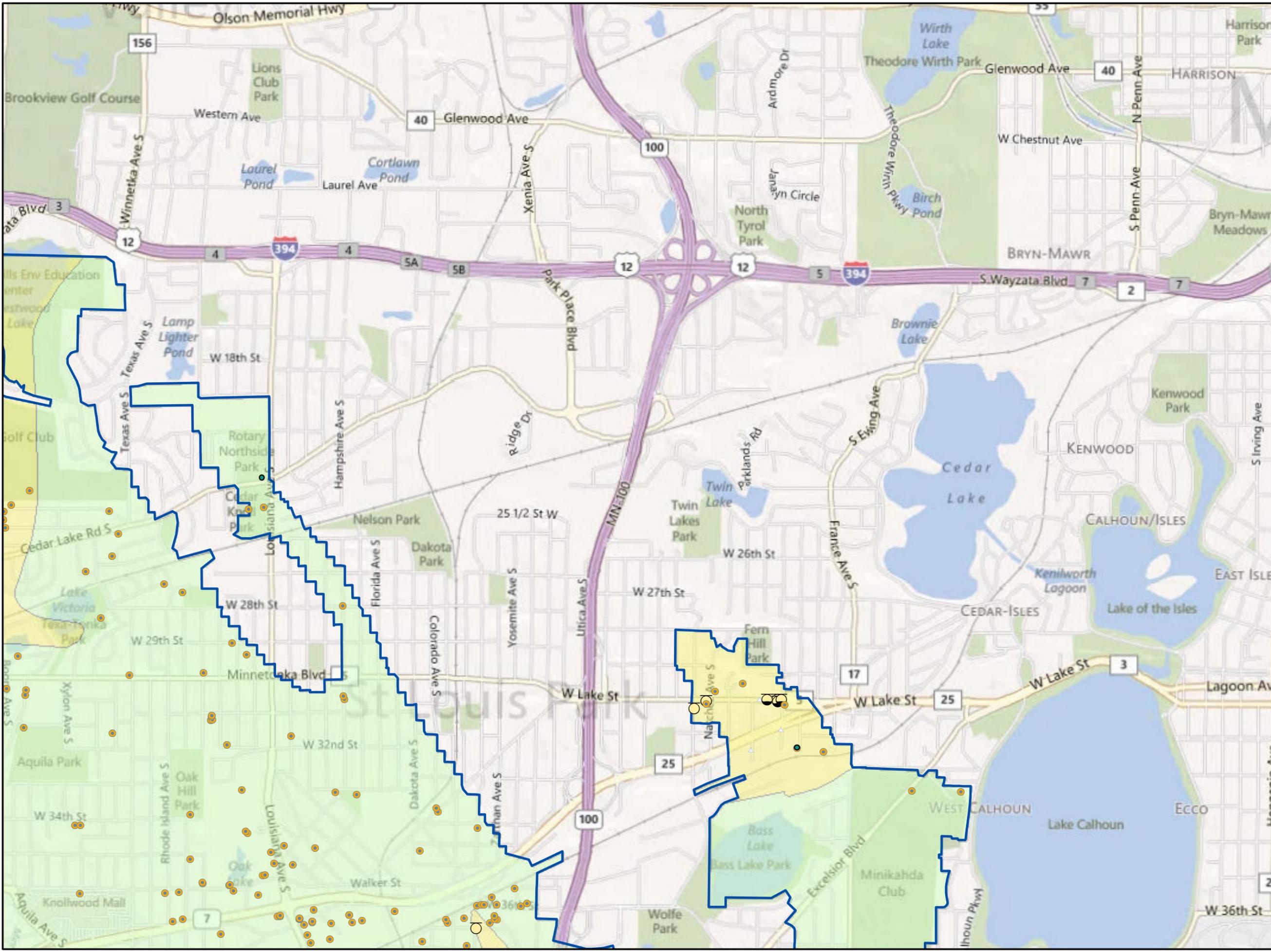


Figure 12-3
City of Edina
PCSI Unverified Sites

- Legend**
- EDA_notinunverified
 - MDH County Well Index (Unverified)
 - Municipal Wells
- Unverified PCSI Sites**
- Construction Stormwater Permit
 - ▲ Hazardous Waste, LQG
 - ▲ Hazardous Waste, Small to Minimal QG
 - Industrial Stormwater Permit
 - Leak Site
 - ▲ Multiple Activities
 - ★ Petroleum Brownfield
 - Tank Site
 - ▼ Voluntary Investigation & Cleanup (VIC)
 - Wastewater Discharger
- Boundaries**
- ▭ Municipal Boundary
 - ▭ DWSMA
 - ▭ Inner Wellhead Management Zone
 - ▭ Emergency Response Area (ERA)
- Vulnerability**
- High Vulnerability
 - Moderate Vulnerability
 - Low Vulnerability

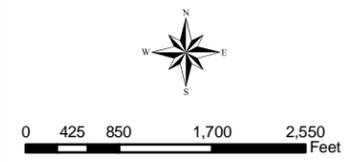
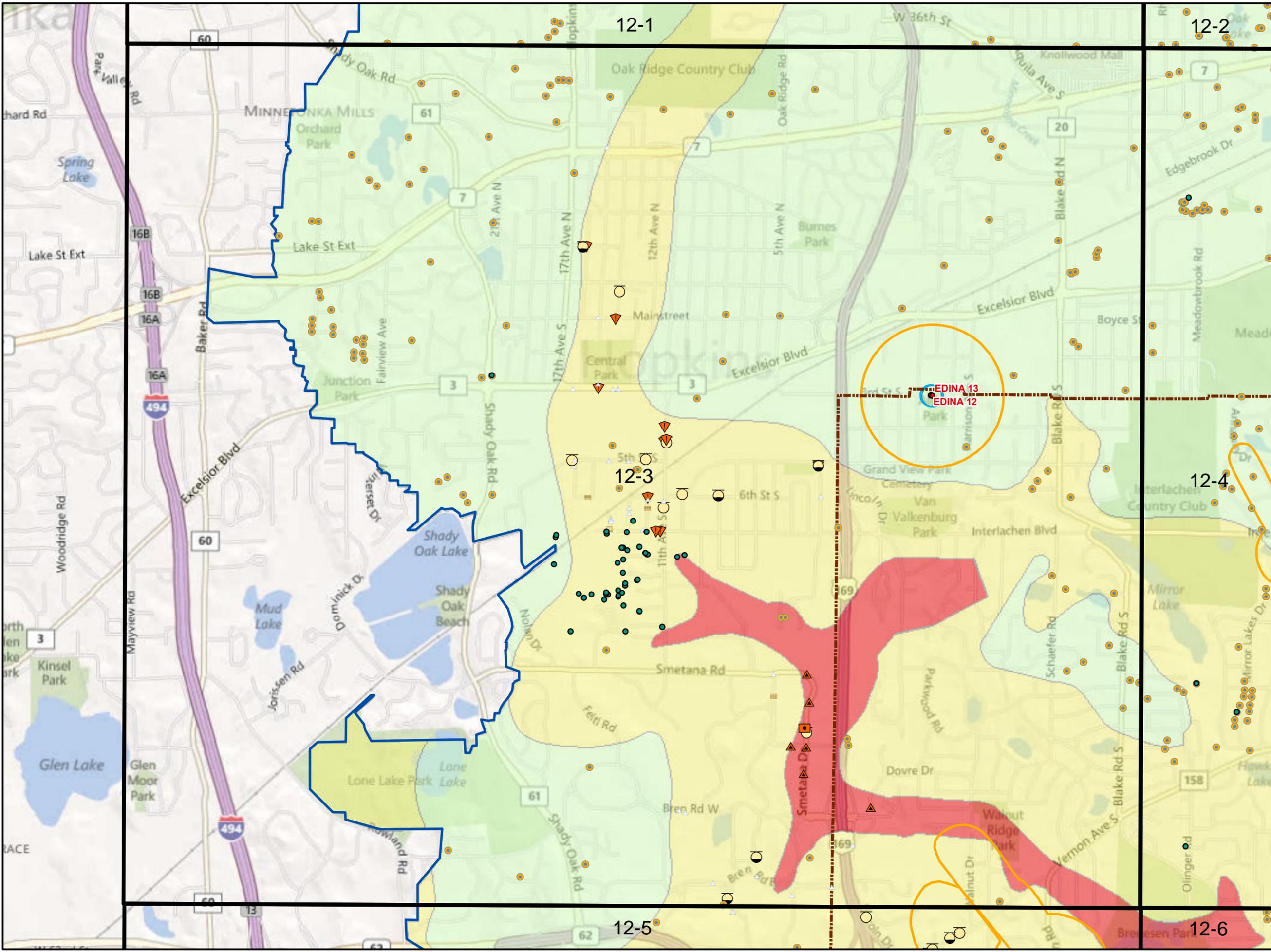


Figure 12-4
City of Edina
PCSI Unverified Sites

- Legend**
- EDA_notinunverified
 - MDH County Well Index (Unverified)
 - Municipal Wells
- Unverified PCSI Sites**
- Construction Stormwater Permit
 - ▲ Hazardous Waste, LQG
 - ▲ Hazardous Waste, Small to Minimal QG
 - Industrial Stormwater Permit
 - Leak Site
 - ▲ Multiple Activities
 - ◆ Petroleum Brownfield
 - Tank Site
 - ▼ Voluntary Investigation & Cleanup (VIC)
 - Wastewater Discharger
- Boundaries**
- ▭ Municipal Boundary
 - ▭ DWSMA
 - ▭ Inner Wellhead Management Zone
 - ▭ Emergency Response Area (ERA)
- Vulnerability**
- High Vulnerability
 - Moderate Vulnerability
 - Low Vulnerability

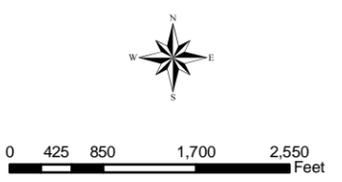
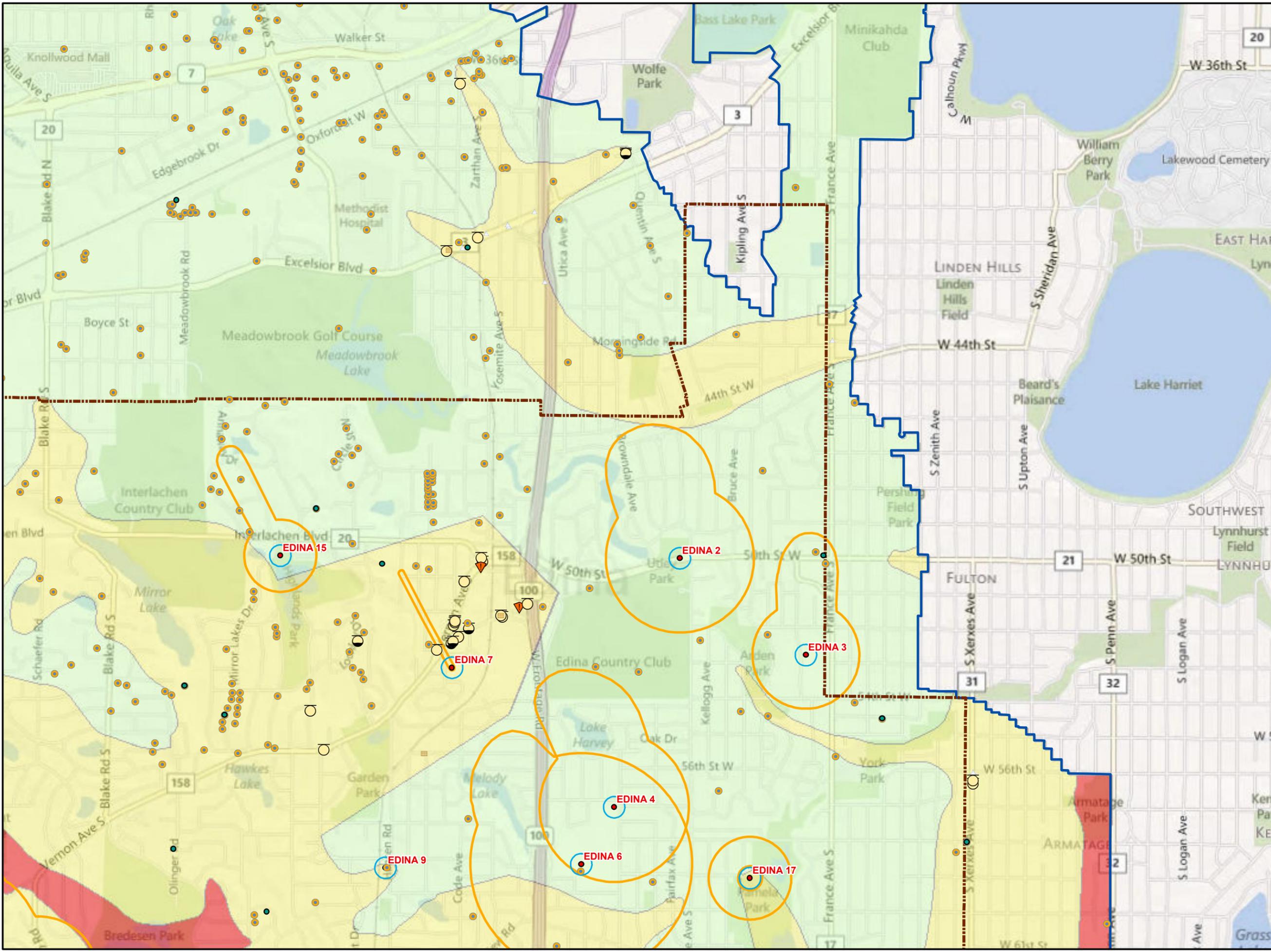
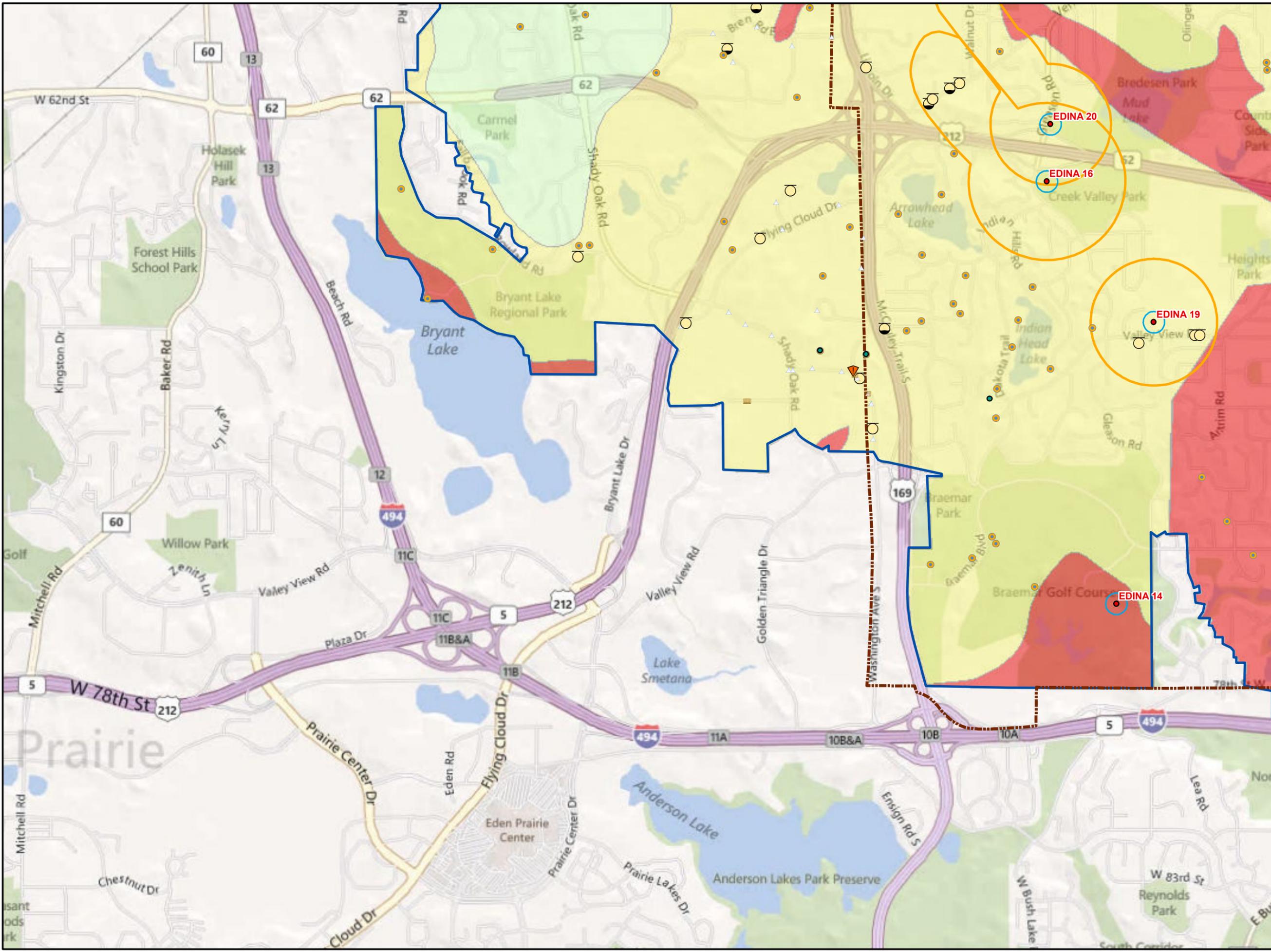


Figure 12-5
City of Edina
PCSI Unverified Sites

- Legend**
- EDA_notinunverified
 - MDH County Well Index (Unverified)
 - Municipal Wells
- Unverified PCSI Sites**
- Construction Stormwater Permit
 - ▲ Hazardous Waste, LQG
 - ▲ Hazardous Waste, Small to Minimal QG
 - Industrial Stormwater Permit
 - Leak Site
 - ▲ Multiple Activities
 - ◆ Petroleum Brownfield
 - Tank Site
 - ▼ Voluntary Investigation & Cleanup (VIC)
 - Wastewater Discharger
- Municipal Boundary**
- Municipal Boundary
 - DWSMA
 - Inner Wellhead Management Zone
 - Emergency Response Area (ERA)
- Vulnerability**
- High Vulnerability
 - Moderate Vulnerability
 - Low Vulnerability



0 425 850 1,700 2,550 Feet



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Figure 12-6
City of Edina
PCSI Unverified Sites

- Legend**
- EDA_notinunverified
 - MDH County Well Index (Unverified)
 - Municipal Wells
- Unverified PCSI Sites**
- Construction Stormwater Permit
 - ▲ Hazardous Waste, LQG
 - ▲ Hazardous Waste, Small to Minimal QG
 - Industrial Stormwater Permit
 - Leak Site
 - ▲ Multiple Activities
 - ◆ Petroleum Brownfield
 - Tank Site
 - ▼ Voluntary Investigation & Cleanup (VIC)
 - Wastewater Discharger
- Vulnerability**
- High Vulnerability
 - Moderate Vulnerability
 - Low Vulnerability

