

Excelsior



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2015 WELLHEAD PROTECTION PLAN

..... Part 2

WSB Project No. 2073-21



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Wellhead Protection Plan
Part 2
City of Excelsior, Minnesota

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PUBLIC WATER SUPPLY PROFILE

PUBLIC WATER SUPPLY

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GENERAL INFORMATION

Unique Well Number(s): 205674, 205675, 232336
Size of Population Served by Municipal Water: Approximately 2,235 (2012 estimate)
County: Hennepin

PUBLIC WATER SUPPLY WELLS

Local Well Name	Unique Number	Aquifer	Casing Depth (ft)	Well Depth (ft)	Date Constructed
Well No. 1	205674	Prairie du Chien and Jordan	303	465	1957
Well No. 2	205675	Prairie du Chien and Jordan	290	448	1957
Well No. 3	232336	Prairie du Chien and Jordan	310	460	1973

DOCUMENTATION LIST

Step	Date Performed
Part I Approval Notice Received from MDH	December, 2011
Scoping 2 Meeting Held (4720.5349, subp. 1)	March 13, 2013
Scoping Decision Notice Received (4720.5340, subp. 2)	May 22, 2013
Remaining Portion of Plan Submitted to Local Government Units (LGUs) (4720.5350, subp. 1 & 2)	September 22, 2014
Review Considered (4720.5350, subp. 3)	October – November, 2014
Public Hearing Conducted (4720.5350, subp. 4)	December 1, 2014
Remaining Portion WHP Plan Submitted (4720.5360, subp. 1)	December 15, 2014
Approved Review Notice Received	November 9, 2015

EXECUTIVE SUMMARY

The Wellhead Protection Plan (WHP Plan) for the City of Excelsior addresses the three municipal water supply wells used by the City (Wells No. 1, 2, and 3) and the associated source water aquifers (Prairie du Chien and Jordan – the aquifers from which the municipal wells pump water).

Part 1 of the Plan was completed and approved in December of 2011 by the Minnesota Department of Health (MDH). The WHP Plan (Part 1) presents the delineation of the Wellhead Protection Area (WHPA); the drinking water supply management area (DWSMA); and the vulnerability assessments for the system's wells and aquifers within the DWSMA. The boundary of the DWSMA is shown in **Figure 1, Appendix B**. Portions of the DWSMA extend into the Cities of Shorewood and Tonka Bay. Water supply wells covered by this delineation and this Part 2 Plan are listed on **page iv** and in Chapter 1.

The *vulnerability assessment* for the aquifers within the DWSMA was performed using available information and indicates that the vulnerability of the aquifers used by the system is low and moderate. The results of the aquifer vulnerability assessment determine *what types of potential contamination sources* must be managed within the DWSMA as determined by the MDH:

- Low vulnerability areas – wells
- Moderate vulnerability areas – wells and tanks

This document includes the following information:

- A review of data elements identified by the MDH as applicable to the DWSMA.
- Results of an inventory of potential contaminant sources within the DWSMA.
- Review of changes, issues, problems, and opportunities related to the public water supply and the identified potential contaminant sources.
- A discussion of potential contaminant source management strategies and the goals, objectives, and action plans associated with these management strategies.
- A review of the wellhead and source water protection evaluation program and the City of Excelsior's alternative water supply contingency strategy.

The goals and objectives of this Plan focus on: managing potential contaminant sources within the DWSMA; reducing the potential contaminant pathways to the source water aquifer that may be provided by private wells; educating property owners and water supply users; and working with the Cities of Shorewood and Tonka Bay to ensure proper management of the portion of the DWSMA in their respective community.

The City of Excelsior WHP team has identified the following goals for implementation of this Plan:

Goal 1: The City will work to maintain or improve the current level of water quality so that the municipal water supply will continue to meet or exceed all applicable state and federal water quality standards.

Goal 2: The City will work to continue to supply sufficient water quantity for system users and emergency needs.

Goal 3: The City will provide and promote activities that protect the source water aquifer which provides water to the municipal system. This will include increased public education of the Wellhead and Source Water Protection Program and groundwater-related issues as well as management of the identified potential contaminant sources and conveyance mechanisms within the DWSMA.

Goal 4: The City will continue to collect data to support future wellhead and source water protection efforts.

Implementation of these goals will be achieved through direct management efforts to the following areas to prevent future contamination of the aquifer and increase awareness of groundwater protection:

- A. Well Management
- B. Public Education
- C. Storage Tank Management
- D. Stormwater Management
- E. Data Collection
- F. Water Conservation
- G. Land Use Planning and Zoning
- H. Implementation
- I. Evaluation

The effectiveness of the WHP Plan must be evaluated to determine whether the implementation activities are consistent with the Plan's intent. Monitoring will be ongoing and a written evaluation of the Plan and associated activities will be conducted every two and one-half years that the Plan is in effect.

CHAPTER ONE

DATA ELEMENTS AND ASSESSMENT (4720.5200)

The City of Excelsior currently uses the following wells to provide the City's drinking water:

- Well 1 – unique number 205674
- Well 2 – unique number 205675
- Well 3 – unique number 232336

The Drinking Water Supply Management Area (DWSMA) delineated in the Wellhead Protection Plan (WHP Plan) area delineation study extends into the Cities of Shorewood and Tonka Bay (**Figure 1, Appendix A**). The DWSMA is found in Township 117N, Range 23W, Sections 27 and 34.

I. REQUIRED DATA ELEMENTS AND ASSESSMENT

In accordance with Minnesota Rules Chapter 4720.5200, the data elements and their assessments required to be included in the WHP Plan are presented in this section. Required by the Minnesota Department of Health (MDH) Second Scoping Decision letter, the following are required data elements: physical environment; land use; water quantity; and water quality.

A. WELLHEAD PROTECTION AREA DELINEATION CRITERIA

See the Part 1 Plan (**Appendix C**) for documentation regarding how the following delineation criteria were applied to determine the boundary of the Wellhead Protection Area (WHPA):

1. **Time of Travel** – 10 years
2. **Aquifer Transmissivity** –specific capacity test for Well 2, TGuess Method
3. **Daily Volume of Water Pumped** – historical volumes
4. **Hydrologic Boundaries** - surface water features, geological boundaries, high capacity wells, and overland drainage.
5. **Groundwater Flow Field** – MODFLOW

B. PHYSICAL ENVIRONMENT DATA ELEMENTS

Within the physical environment category, the MDH Second Scoping Decision letter required geology to be analyzed.

1. GEOLOGY

The geology in the vicinity of the City consists of Quaternary-Aged glacial and younger lake and organic sediments that are underlain by Paleozoic-Aged bedrock. The glacial deposits consist of Des Moines Lobe till, ice margin, and lacustrine deposits. These are underlain by older clay-rich tills with fluvial sand layers. The local tills are considered an effective hydraulic barrier. Bedrock geology is presented in plan view on **Figure 2, Appendix B**.

Groundwater flow in the uppermost bedrock aquifers is generally to the south-southeast in the vicinity of the City's well field, as identified in Part 1 (**Appendix C**), which is consistent with previously published data.

C. LAND USE DATA ELEMENTS

Required areas of the land use category includes land use and public utilities based on the MDH Second Scoping Decision letter.

1. LAND USES

It is important to understand land use to determine key areas for concern in managing a WHPA. For example, knowledge about the location of future development or areas of redevelopment within the DWSMA may reveal a need to closely manage the activity within more sensitive areas. Additionally, any existing land uses that currently pose a potential threat to the City's water supply would need to be highlighted to increase awareness of any concerns. **Figure 3, Appendix B** illustrates existing land uses within the DWSMA.

Figures 4a- 4c, Appendix B contain the DWSMA superimposed over the proposed future land use maps for those communities within the DWSMA from their Comprehensive Plans. Land uses planned within the DWSMA include low density residential, high density residential, commercial, parks, and public/semipublic land. Information for this section was taken from the City of Excelsior's Comprehensive Plan (2008), the City of Tonka Bay's Comprehensive Plan (2009), the City of Shorewood's Comprehensive Plan (2009).

As required by the MDH, a potential contaminant source inventory (PCSI) was completed within the DWSMA boundary. Data was extracted from existing databases including the Minnesota Pollution Control Agency's (MPCA) What's in my Neighborhood (WIMN) database and the County Well Index (CWI) and were then verified.

Data points collected from the MPCA WIMN database were first properly located through site investigation, aerial photography, and additional research. The list of sites was reduced by assigning the vulnerability of the DWSMA to each data point and removing those sites that did not fit the criteria for the vulnerability setting. Next, material and facility codes were added to the sites and a table and map (**Tables 1-3, Appendix A and Figures 5 and 6, Appendix B**) were produced to display the locations and types of potential contaminants throughout the DWSMA.

Data points were also collected from the CWI and through field survey. These wells were included in all vulnerability types and were coded with the appropriate material and facility codes. Facility codes were established based on the existing land use type for the parcel containing the well. **Figures 6 and 7, Appendix B** contains the location of the water distribution system and wells. Tables for both the wells and remaining unlocated wells are also included in **Appendix A** as **Tables 2 and 3**.

In addition, the MDH completed and provided survey results for the Inner Wellhead Management Zone (IWMZ) that surrounds each municipal well at a 200 ft radius. Results of this survey remain as submitted by the MDH and are included in **Appendix D**.

Provided below is a summary of PCSI results:

- Public and Private Wells. There are three public wells, one domestic well, and one commercial well within the DWSMA according to the CWI and the PCSI field survey.
- Leak Sites. There are seventeen areas classified by the MPCA WIMN database as leak sites within the moderate vulnerability section. Of these sites, two are active spill sites (SPL) and one is an active leaking underground storage (LUST) site. The remaining sites are inactive.
- Storage Tanks. Eight storage tanks were classified within the DWSMA using the MDH requirements based on vulnerability. One aboveground storage tank (AST) was identified, which is active. Seven USTs were identified within the DWSMA: three are classified as active while four are classified as inactive.
- Other. Also identified within the DWSMA were three Voluntary Investigation and Cleanup (VIC) sites (one active) and five petroleum brownfield sites (four active).
- IWMZ Results. Located within 200 ft of the municipal wells are buried sanitary sewer pipes, a sewage lift station, road salt storage, and operating wells.

Management strategies have been identified and included within Chapter 5 to address the PCSI results.

2. PUBLIC UTILITIES

Public utilities located within the DWSMA include water, sanitary sewer and stormwater systems, as shown in **Figures 7, 8, and 9** in **Appendix B**. **Figure 10, Appendix B** provides existing transportation routes and **Figure 11, Appendix B** displays the location of a gas pipeline in the DWSMA. Additional information about the City of Excelsior's utility system in general is presented in various City plans and can be available upon request.

D. WATER QUANTITY DATA ELEMENTS

The City of Excelsior currently operates three active water supply wells, as shown on **Table 2, Appendix A**. As outlined in the Part 1 of the WHP Plan (**Appendix C**) and depicted on the Minnesota Department of Natural Resources (DNR) State Water Use Database System, **Table 2** below illustrates the annual withdrawal from 2006 to 2010.

Table 2: Annual Water Withdrawal (million gallons/year)

Unique Number	Well Name	2006	2007	2008	2009	2010
205674	1	14.8	6.3	31.0	19.3	11.6
205675	2	14.8	6.3	31.0	19.3	11.6
232336	3	81.7	90.8	41.5	58.7	69.2
	Totals	111.3	103.4	103.5	97.3	92.4

Source: DNR State Water Use Database Permit No. 1975-6164; adapted from Part 1 of the WHP Plan (**Appendix C**)

In addition, the 2011, 2012, and 2013 annual water withdrawals were 95.3, 103.3, and 102.0 million gallons respectively. Since 2006 to present an increase in water use was not observed. In addition, the City does not anticipate a substantial increase in water use as a future projection. Currently, the City is unaware of well interference problems and water use conflicts, but for further detail on other high capacity wells within the DWSMA please review the WHP Plan Part 1 found in **Appendix C**.

Additional information about the City of Excelsior water supply system in general is presented in various City reports and may be requested for further information. In addition, well construction details, well logs, and past and projected pumping rates are included in the WHP Plan Part 1 located in **Appendix C**.

E. WATER QUALITY DATA ELEMENTS

The City of Excelsior produces an annual report on the quality of its drinking water called the Consumer Confidence Report (CCR) which can be found in **Appendix D**. **Appendix D** contains the 2013 CCR, which outlines the results of quality monitoring done on the City's drinking water. The attached CCR shows that the City is in compliance with maximum contaminant levels set by the state and federal Safe Drinking Water Rules for the contaminants analyzed. Water supplied by the City meets all Maximum Contaminant Level (MCL) National Primary Drinking Water Regulations. However, water from the wells contains concentrations of iron and manganese that exceed the Secondary Maximum Contaminant Levels (SMCLs) of 0.3 milligrams per liter (mg/L) and 0.05 mg/L respectively. Although concentrations exceeding the SMCLs are not impactful to human health, they do pose aesthetic concerns and require treatment to reduce levels to below SMCLs. To reduce the concentration of both iron and manganese the City has a water treatment plant. After treatment, iron and manganese levels are reduced to below the SMCL.

According to Part 1 of the Plan (**Appendix C**), the vulnerability of the City's DWSMA is low to moderate. This assessment was determined through the analysis of geology, well construction, pumping rate, and water quality. The thick confining units of glacial clay between the surface and the aquifer aid in protection of the City's groundwater supply by reducing the time in which it takes to allow water moving vertically from the surface to the aquifer. Water samples have been regularly obtained from the City wells and tested for regulated contaminants. Per the WHP Plan Part 1, none of the human-caused contaminants regulated under the Federal Safe Drinking Water Act have been detected at levels to cause concern. However, test results for tritium contained concentrations greater than the detection limit, giving the wells the vulnerable status (**Appendix D**). Tritium is not a health hazard, but is an indicator of vertical migration travel time, aquifer vulnerability, and relative water age.

Currently, the City is unaware of any groundwater tracer studies that have occurred. However, groundwater monitoring wells were utilized to study the area surrounding an abandoned landfill. Groundwater quality was found to meet MDH requirements and the monitoring wells were properly sealed as described by the well sealing records located in **Appendix D**.

Non-municipal owned wells, particularly those that are completed in or penetrate the aquifers used for the municipal water supply, are a source of concern for potential contamination within the City's DWSMA. Unmaintained, damaged, poorly constructed, or unused/abandoned wells could provide a direct route for contaminants to enter the aquifers utilized by the City as their drinking water supply.

Management strategies are discussed in Chapter Five, which focus on activities that have the most potential to impact the aquifer system the City is using for its drinking water supply.

CHAPTER TWO

IMPACT OF CHANGES ON PUBLIC WATER SUPPLY WELLS (4720.5220)

In accordance with Minnesota Rules 4720.5220 and the MDH Second Scoping Decision letter, a WHP Plan must identify and describe expected changes that may occur during the next ten years to:

1. The physical environment
2. Land use
3. Groundwater

I. POTENTIAL CHANGES IDENTIFIED

A. PHYSICAL ENVIRONMENT

Currently, significant or large-scale changes in the physical environment are not anticipated. The City of Excelsior is not expected to grow in population over the next ten years or the life of this Plan.

B. LAND USE

Many of the properties within the DWSMA are developed. A land use map for the year 2008 and a future land use map for the year 2030 are shown on **Figures 3, Appendix B** and **Figure 4a-c, Appendix B**, respectively. Projected land uses are also consistent with the Cities of Shorewood and Tonka Bay. Comparison of the year 2008 and the future land use for the year 2030 indicates that, in general, most properties within the DWSMA will remain consistent in terms of use and density.

Future land use proposed for the year 2030 includes residential (low, medium, and high), commercial, business warehousing, institutional (churches and schools), parks and open spaces and undeveloped. All of these future land uses are currently present within the DWSMA. No new land uses not currently present within the DWSMA are anticipated during the next ten years or the life of this Plan.

C. GROUNDWATER

No significant changes in groundwater pumping are expected by the City of Excelsior in the next ten years. Please see Part 1 in **Appendix C** for further details on projected pumping. Changes to groundwater quality are also not anticipated.

II. IMPACT OF CHANGES

A. WATER USE

The Metropolitan Council estimates very little population growth for the City of Excelsior by the year 2030. The population at the 2010 census was 2,190 and the estimated population by 2030 is 2,540.

B. INFLUENCE OF EXISTING WATER AND LAND GOVERNMENT PROGRAMS AND REGULATIONS

There are a number of existing rules and regulations at the Federal, State, County, and local levels requiring regulations related to managing wells, storage tanks, and other land use issues within the City's DWSMA.

1. FEDERAL AND STATE REGULATIONS

All tank operators and owners must comply with both federal and state regulations for USTs. At the federal level, tank operators and owners for USTs must comply with 40 CFR Part 280-282. At the state level, operators and owners must comply with Minnesota Rules, Chapter 7150. Enforcement of state and federal regulations is the responsibility of the MPCA. The existing federal and state regulations provide adequate controls to manage USTs within the DWSMA.

ASTs which store liquid substances that may pollute the waters of the state are regulated by Minnesota Rules, Chapter 7151, if the site capacity is less than one million gallons. AST regulations are also enforced by the MPCA. Existing regulations provide adequate controls to manage storage tanks within the DWSMA. In addition to the MPCA, the state and local fire marshal also regulate tanks.

2. CITY OF EXCELSIOR REGULATIONS

The City of Excelsior controls water and land use within the municipal boundaries through the enforcement of their Zoning Ordinances and other provisions of the City Code.

The majority of the DWSMA is located within the City of Excelsior which is zoned as shown in **Figure 12a, Appendix B**. As mentioned previously, there is minimal change proposed for future land uses planned in the City of Excelsior and uses will remain residential (low, medium, and high), commercial, business warehousing, institutional (churches and schools), parks and open spaces. According to the City of Excelsior Comprehensive Plan (2008), single-family residential made up 32.2 percent of the area resulting in the most predominant land use in the City. Current densities for residential in the City range from a low of 3.7 to a high of 19.8, with an overall average of 6.5 dwelling units per acre. Currently, the City is almost fully developed with only 0.2 percent of the land classified as undeveloped at the time of the inventory. There is little difference between the existing and future land use maps.

The City of Excelsior comprehensive plan focuses on preservation of the existing land use pattern, but with some areas of improvement or intensification. With only 0.2 acres of vacant land available for development, anticipated changes come in the area of redevelopment and most of it is expected for existing commercial and highway business land uses. Between 2008 and 2030, residential land use is projected to change, with a decrease of low density residential land use by 5.2 acres and an increase in medium and high (combined) 3.1 acres. Commercial is anticipated to increase by 5.4 acres, with a decrease in business/warehouse land use of 3.3.

Other official controls available to the City of Excelsior for regulating land use within the DWSMA include performance standards such as shoreland management regulations and wetland standards, and health and sanitation codes. Stormwater standards are also implemented throughout the City and within the DWSMA.

3. CITY OF SHOREWOOD REGULATIONS

The DWSMA extending into Shorewood is low density residential and commercial which is also planned to remain the same. As with other cities in the area, Shorewood regulates land use and development via its zoning code (**Figure 12b**), shoreland management standards and stormwater management.

4. CITY OF TONKA BAY REGULATIONS

The areas of the DWSMA that extend into Tonka Bay are low density residential and park land. This is planned to remain in this land use classification in the 2030 future land use designation. The City of Tonka Bay controls water and land use within the City through the enforcement of their Zoning Ordinances (**Figure 12c**) and other provisions of the City Code including shoreland zoning and stormwater management.

5. MINNEHAHA WATERSHED DISTRICT

The entire DWSMA falls within the Minnehaha Creek Watershed District (MCWD). Established in 1967, the MCWD was created as part of the Minnesota Watershed District Act which was passed in 1955 sought to integrate water management among different political jurisdictions. The MCWD uses scientific research, monitoring, education, permitting, and programing to maintain and improve the MCWD.

C. ADMINISTRATIVE, TECHNICAL, AND FINANCIAL CONSIDERATIONS

The City of Excelsior will have adequate resources available to regulate the public water supply's source water. Funds to support ongoing wellhead and source water protection efforts will come from the City's water utility fund. In addition, the City will utilize MDH grant opportunities when available. Wellhead and source water protection activities will be evaluated, and any changes in the focus of the tasks will also be evaluated to determine if additional funding will be necessary to accommodate the changes.

The City of Excelsior does not anticipate a significant increase in population during the life of this plan. City staff continues to evaluate the water distribution system and evaluate

whether additional municipal wells, storage reservoirs, water treatment facilities are needed.

It is also important for the City of Excelsior to continue to work with the adjacent communities to manage the portions of the DWSMA that extend into their jurisdictions. In addition, the City of Excelsior intends to work in conjunction with Hennepin County and neighboring communities to protect the source water resources when it is beneficial and logistically feasible.

CHAPTER THREE

ISSUES, PROBLEMS, AND OPPORTUNITIES (4720.5230)

I. LAND USE ISSUES, PROBLEMS, AND OPPORTUNITIES

A. SOURCE WATER AQUIFER

Part 1 of the WHP Plan determined that the WHPA and corresponding DWSMA for the source aquifer range from low to moderate vulnerability. Land use and zoning regulations can discourage types of construction or activity that may increase the potential for contamination. The City of Excelsior and other communities in the DWSMA have land use and zoning ordinances in place that could be revised in the future if needed to address potential contaminant sites. Additionally, the City of Excelsior has a Comprehensive Plan in place that includes policies for managing growth of the City, the allowable land uses, water supplies, and wells. Policies identified in the Comprehensive Plan will help protect the City's source water aquifer. Portions of the DWSMA are located in other communities and outside of the City of Excelsior's control, therefore *cooperative participation in the management of the local aquifers to help assure sustainable water supplies for all users is a challenge and an opportunity.*

The City of Excelsior is not expected to experience significant growth within the DWSMA and therefore it is unlikely that additional high capacity wells will be constructed before 2030. *The ongoing collection of data has been identified as an opportunity to support future wellhead protection efforts.*

B. GROUNDWATER QUALITY

Groundwater pumped from the Jordan and Prairie du Chien aquifers by the City of Excelsior municipal wells currently meet MDH water quality requirements. In addition, the City of Excelsior's public water supply currently meets or exceeds state and federal water quality requirements. For aesthetic purposes, the City treats the water at a local water treatment plant, to reduce the concentration of iron and manganese. The presence of tritium in some of the wells as discussed previously, is not a health risk, but an indication of the vulnerability of the aquifer and relative water age.

Well water quality sampling will need to continue so that possible contamination can be identified. There are few private wells within the DWSMA and they will need to continue to be regulated. *Coordination with other local government units (LGUs) in the DWSMA in addition to the MDH and DNR to share and maintain information on wells and potential contaminants will be a challenge and an opportunity.*

*Education of landowners, especially those with private wells that are located in the unlocated wells found in **Table 3, Appendix A** or other potential contaminant sources such as storage tanks, will be important in wellhead protection and is identified as both a problem and an opportunity.*

C. DRINKING WATER SUPPLY MANAGEMENT AREAS

Land uses found within the DWSMA include residential, commercial, business warehousing, institutional, parks and open spaces along with road and highway right of ways.

Some opportunities identified include:

- Working with other municipalities in the DWSMA and government entities to share information, and create policies that prevent contamination of aquifers.
- Tracking the potential contaminant sources and updating the list of potential contaminant sources as new information becomes available.
- Landowner education and proper well management.
- Routinely monitoring for land use and potential contaminant source changes within the IWMZ, 200ft radius around well, in consideration of State Well Code requirements.

II. ISSUES, PROBLEMS, AND OPPORTUNITIES DISCLOSED AT PUBLIC MEETINGS AND IN WRITTEN COMMENTS

At the beginning of the wellhead protection planning process, the City of Excelsior sent a notification to other LGUs of its intention to develop their wellhead and source water protection efforts. After approval by the MDH, the City of Excelsior sent copies of the Part 1 report to the LGUs. The City was not informed of any issues, problems, or opportunities by the LGUs during that time.

In addition, the City submitted the draft report of Part 2 to the LGUs for a 60 day review. The City was not informed of any issues, problems, or opportunities by the LGUs during that time. A Public Hearing was also held and no issues, problems, or opportunities were voiced.

III. ISSUES, PROBLEMS, AND OPPORTUNITIES RELATED TO THE DATA ELEMENTS

Part 1 and Part 2 of the City of Excelsior's WHP Plan have utilized current local and regional information available for compiling and assessing data elements. At a minimum, this Plan will be revised or updated every ten years as required by the Wellhead Protection Rules and the most recent and accurate data will be utilized at that time. To support on-going wellhead protection efforts, the City will collect data on wells, water quality and land use within its DWSMA. Due to limited resources to independently collect the full range of data and recreate the necessary databases, the City will continue to mainly rely on databases maintained by the State and County agencies to obtain data and verify data, as needed.

IV. ISSUES, PROBLEMS, AND OPPORTUNITIES RELATED TO STATUS AND ADEQUACY OF OFFICIAL CONTROLS, PLANS, AND OTHER LOCAL, STATE, AND FEDERAL PROGRAMS

Numerous controls, plans and programs exist that may be used to achieve the wellhead protection goals identified in this Plan. State and LGUs currently enforce land use ordinances, zoning laws, sewer ordinances, well permits, and groundwater use appropriation permits. The City will continue to work with neighboring communities to ensure proper management of the

portion of the DWSMA that extends into their respective municipality. It is anticipated that most local issues may be adequately addressed through these existing processes and adopting of best management practices.

The wellhead protection team does not recommend any additional regulations be imposed at this time. However, the team does recommend that overall regional coordination of wellhead protection efforts be initiated.

CHAPTER FOUR

WELLHEAD PROTECTION GOALS (4720.5240)

In accordance with Minnesota Rules 4720.5240 this section must address goals for present and future water use and land use to provide a framework for determining plan objectives and related actions.

Goals outlined in this part were selected based on the information gathered and compiled from the data elements, delineations of the WHPA and DWSMA, results of the vulnerability assessments, results of the PCSI, expected changes in land and water uses, identified issues, problems, and opportunities, and evaluation of this information.

The public water supply is considered to be of low and moderate vulnerability. In addition, portions of the DWSMA extend into neighboring communities, including the Cities of Shorewood and Tonka Bay. Therefore, the goals and objectives of this Plan will focus on managing potential contaminant sources within the DWSMA, reducing the potential contaminant pathways to the source water aquifer that may be provided by private wells, educating property owners and water supply users, and working with the neighboring communities to ensure proper management of the portion of the DWSMA in their respective community.

The City of Excelsior's WHP team has identified the following goals for implementation of this Plan:

Goal 1: The City will work to maintain or improve the current level of water quality so that the municipal water supply will continue to meet or exceed all applicable state and federal water quality standards.

Goal 2: The City will work to continue to supply sufficient water quantity for system users and emergency needs.

Goal 3: The City will provide and promote activities that protect the source water aquifer that provides water to the municipal system. This will include increased public awareness of the Wellhead and Source Water Protection Program and groundwater-related issues, and management of the identified potential contaminant sources and conveyance mechanisms within the DWSMA.

Goal 4: The City will continue to collect data to support future wellhead and source water protection efforts.

CHAPTER FIVE

OBJECTIVES AND PLANS OF ACTION (4720.5250)

I. OBJECTIVES

Given the issues, problems, and opportunities discussed in Chapter Three and the goals stated in Chapter Four, the WHP Plan delegates direct management efforts to the following areas to prevent future contamination of the aquifer and increase awareness of groundwater protection:

- A. Well Management
- B. Public Education
- C. Storage Tank Management
- D. Stormwater Management
- E. Data Collection
- F. Water Conservation
- G. Land Use Planning and Zoning
- H. Implementation
- I. Evaluation

Each activity shall only be implemented in the sections of the DWSMA that are of the vulnerability level that is applicable to that specific action item per MDH requirements. In general, action items shall follow the basic rule for activities relating to the following areas:

- Low vulnerability areas – wells
- Moderate vulnerability areas – wells and tanks

II. PLANS OF ACTION

A. WELL MANAGEMENT

Objective A1: Educate the public about proper well management.

Action A1: Provide links to MDH and Hennepin County well management websites on the City's website, include information in the City's newsletter or other direct mailings.

Who:	City of Excelsior Staff and/or consultant
Cooperators:	MDH, Hennepin County
Time Frame:	Within two years following adoption of this Plan or when MDH grant is available.
Estimated Cost:	\$500
How:	Use the City's website, newsletters, or direct mailings.

Objective A2: Incorporate Wellhead Protection Initiatives into City Plans.

Action A2: The City will use this Wellhead Protection Plan as a resource when updating its Comprehensive Plan, Local Water Management Plan, Water Supply Plan, and other relevant plans.

Who:	City of Excelsior Staff and/or consultant
Cooperators:	None
Time Frame:	As plans are updated or when MDH grant is available.
Estimated Cost:	\$500
How:	Wellhead Protection initiatives will be addressed and incorporated into the City's various plan updates. The City of Excelsior will cooperate with neighboring and overlapping jurisdictions to address land use management issues for the portions of the DWSMA outside the City.

Objective A3: Identify New High-Capacity Wells within the DWSMA.

Action A3: The City will identify new high-capacity wells that are proposed for construction in or near the City's DWSMA, and/or major changes to groundwater appropriations for existing high-capacity wells.

Who:	City of Excelsior Staff and/or consultant
Cooperators:	DNR
Time Frame:	Annually starting with 2015
Estimated Cost:	\$250
How:	Staff will annually request information from the Regional DNR office on any newly proposed/constructed high capacity wells within or near the DWSMA or any changes to existing appropriations permits for high capacity wells.

Objective A4: Take measures to promote proper sealing of abandoned, unused, unmaintained, or damaged wells.

Action A4: Make property owners aware of potential technical and financial resources that are available to assist them in securing grant funding for properly sealing wells. Prioritize unused wells for sealing based on their construction, condition, distance, depth, and threat to the aquifer and public water supply wells.

Who:	City of Excelsior Staff and/or consultant
Cooperators:	County, MDH, Consultant
Time Frame:	On-going
Estimated Cost:	\$1,000 each mailing or grant, sealing costs will vary
How:	Use the City's website, newsletters, or direct mailings to make well owners aware of well sealing cost-share programs. Seek grant funding to locate, prioritize, and seal priority wells.

Objective A5: Management of the Inner Wellhead Management Zone (IWMZ).

Action A5: Review and update IWMZ survey form for all wells in cooperation with MDH.

Who:	City Staff
Cooperators:	MDH
Time Frame:	ongoing
Estimated Cost:	no additional cost
How:	Obtain data from MDH and seek funding to implement the measures identified on the IWMZ forms.

Objective A6: Management of the Inner Wellhead Management Zone (IWMZ).

Action A6: Monitor land uses, both proposed and existing, in the IWMZ.

Who:	City public works department
Cooperators:	Planning consultant
Time Frame:	ongoing
Estimated Cost:	no additional cost
How:	When new projects are proposed, or building permits are applied for in the IWMZ, review proposed land use for potential new wells and work with owners to connect to city services, especially in areas of the IWMZ.

B. PUBLIC EDUCATION**Objective B1: Develop a public support and understanding for the wellhead protection plan through the use of websites, newsletters, and handouts.**

Action B1.1: Include information about wellhead protection and groundwater protection in the City newsletter.

Who:	City staff and/or consultant
Cooperators:	MDH
Time Frame:	Within one year
Estimated Cost:	\$500
How:	Identify and obtain existing educational materials available from MDH and other sources. Write newsletter articles describing wellhead protection and include contact information and website addresses for existing educational resources.

Action B1.2: Provide information about the Wellhead Protection Plan and links to other wellhead protection related resources on the City's website.

Who:	City staff and/or consultant
Cooperators:	MDH, DNR, Hennepin County
Time Frame:	Two years
Estimated Cost:	\$500
How:	Provide a summary of wellhead protection goals and implementation and list of wellhead protection implementation activities on the city

	website. Provide links to wellhead protection related websites including MDH, DNR, and Hennepin County
--	--

Action B1.3: Provide information about the Wellhead Protection Plan and DWSMA to property owners.

Who:	City staff and/or consultant
Cooperators:	None
Time Frame:	Three to five years
Estimated Cost:	\$500
How:	Send mailings or a newsletter out to property owners notifying them about the DWSMA delineation and the importance of spill prevention. Provide contact numbers for appropriate government agencies.

C. STORAGE TANK MANAGEMENT

Objective C1: Notify owners of storage tanks located within the DWSMA that the tank is in a source water protection area, and educate the owners of properties containing the storage tanks of the importance of spill prevention.

Action C1: Update list of storage tank owners and contact each property owner and make them aware of their placement within the City's WHPA.

Who:	City staff and/or consultant
Cooperators:	MPCA
Time Frame:	Three to five years
Estimated Cost:	\$500
How:	Send mailings out to property owners notifying them about the DWSMA delineation and the importance of spill prevention. Provide contact numbers for appropriate government agencies to each property owner.

D. STORMWATER MANAGEMENT

Objective D1: Educate the public on proper stormwater management, turf management, proper lawn care practices and water conservation.

Action D1: Provide information to the community with respect to the everyday issues regarding stormwater and lawn care.

Who:	City staff and/or consultant
Cooperators:	DNR
Time Frame:	Three to five years
Estimated Cost:	\$500
How:	Include information on the City's website, in the City's newsletter, distribute direct mailers, or include water billing inserts to educate the community on best management practices that may be implemented.

Objective D2: Cooperate with other agencies and programs to manage stormwater quality.

Action D2: Work in cooperation with the NPDES permit program implemented in areas overlapping the DWSMA.

Who:	City staff and/or consultant
Cooperators:	MPCA, Hennepin County, Minnehaha Creek Watershed District
Time Frame:	When required
Estimated Cost:	Staff and/or consultant time
How:	Update the City Stormwater Pollution Prevention Plan (SWPPP) to meet NPDES stormwater permit requirements. Additional measures will be reviewed to comply with current MPCA permit requirements.

E. DATA COLLECTION

Objective E1: Continue to collect and maintain local geologic and hydrogeologic data in order to improve and augment current information and to provide additional data for future revisions to this Plan.

Action E1.1: Monitor static and pumping levels in municipal wells.

Who:	City staff and/or consultant
Cooperators:	None
Time Frame:	Ongoing
Estimated Cost:	\$1,000 each analysis
How:	Conduct routine collection of groundwater levels in the municipal wells, which will provide data for the evaluation of groundwater elevation trends over time.

Action E1.2: Cooperate and support future data collection efforts by other agencies.

Who:	City staff and/or consultant
Cooperators:	MDH and Hennepin County
Time Frame:	As requested
Estimated Cost:	\$500
How:	Provide assistance to agencies as requested if feasible and appropriate.

Objective E2: Maintain up to date information about wells and potential contaminant sources within the DWSMA.

Action E2: In cooperation with existing state or local agencies and programs, create and maintain a database of wells, storage tanks, and shallow disposal wells within the DWSMA.

Who:	City staff and/or consultant
Cooperators:	MDH and Hennepin County
Time Frame:	Annually
Estimated Cost:	\$1,000
How:	An inventory of wells and potential contaminant sources was performed as part of the development of this Plan. The database will be reviewed periodically and updated as information becomes available.

F. WATER CONSERVATION

Objective F1: Implement a community-wide water conservation program.

Action F1: Implement or promote drinking water conservation measures.

Who:	City staff and/or consultant
Cooperators:	None
Time Frame:	Three to five years
Estimated Cost:	\$2,500 to \$5,000
How:	Educate the public to encourage users to incorporate water saving habits and tools into their lifestyles, improve the exiting water system's operation and maintenance procedures, or incorporate costs associated with water conservation programs.

G. LAND USE PLANNING AND ZONING

Objective G1: Eliminate or reduce the potential pollution risks to the source water aquifer and minimize the risk of altering the WHPA and DWSMA.

Action G1.1: Include a review of this Plan as part of the normal zoning and planning review process.

Who:	City staff and/or consultant
Cooperators:	None
Time Frame:	Within first 12 months of Plan implementation
Estimated Cost:	\$500
How:	Copies of this Plan will be distributed to the City Planner, Planning Department, and Planning Commission and they will review this Plan and incorporate it as part of their project planning review process.

Action G1.2: Participate with other jurisdictions within the DWSMA to identify land use changes outside the city limits.

Who:	City staff and/or consultant
Cooperators:	City of Shorewood and City of Tonka Bay
Time Frame:	Within one year and ongoing
Estimated Cost:	\$500
How:	Copies of this Plan will be distributed to other jurisdictions within the DWSMA and when applicable will participate in discussions regarding land use planning concerns.

H. IMPLEMENTATION

Objective H1: Track and report Wellhead Protection activities to aid in implementing Wellhead Protection Objectives.

Action H1: Complete an internal annual report on completed WHP activities to the WHP team.

Who:	City staff and/or consultant
Cooperators:	None
Time Frame:	Annually
Estimated Cost:	\$500
How:	Report will be prepared and reviewed by WHP team and filed for potential MDH review.

I. EVALUATION

Objective I1: Evaluate Plan.

Action I1: Complete an evaluation report/binder every two and one-half years.

Who:	City staff and/or consultant
Cooperators:	None
Time Frame:	Every two and one-half years
Estimated Cost:	\$500
How:	Prepare a written report using the MDH Wellhead Protection Program Evaluation form or a format selected by the City. Provide report to the MDH Source Water Protection Unit.

CHAPTER SIX

EVALUATION PROGRAM (4720.5270)

The success of the WHP Plan must be evaluated in order to determine whether the implementation activities are accomplishing the intent of the Plan. Monitoring will be ongoing and a written evaluation of the WHP Plan and associated activities will be conducted every two and one-half years that the Plan is in effect. The evaluation activities will include the following items:

- Track the implementation of the goals, objectives, activities, and tasks discussed in Chapter Five of this Plan;
- Determine the effectiveness of specific management strategies regarding the protection of Excelsior 's municipal water supply;
- Identify possible changes to these strategies which may improve their effectiveness; and
- Determine the adequacy of financial resources and staff availability to carry out the management strategies planned for each year.

The City of Excelsior will continue to coordinate with the MDH in the annual monitoring of the City's municipal water supply. It will then be determined if the management strategies presented in this Plan are having a positive impact on water quality, to identify what water quality problems may still be occurring and how they need to be addressed.

At the end of each evaluation period (every two and one-half years) City Staff will make a written report regarding progress in implementing the WHP Plan, as well as an evaluation of the costs and benefits of the Plan activities. This report may be completed using the MDH Wellhead Protection Program Evaluation form. A copy of the report will be sent to the MDH Source Water Protection Unit in St. Paul. The City will also keep a copy of the report in its records. The intent of the annual reports is to compile a complete and comprehensive study of the implementation of the source water management strategies for use when the City updates or revises this Plan. As required by the Wellhead Protection Rules, this Plan will be updated every ten years at a minimum.

CHAPTER SEVEN

ALTERNATIVE WATER SUPPLY CONTINGENCY STRATEGY (4720.5280)

A contingency plan is put into effect to establish, provide, and keep updated certain emergency response procedures and information for the public water supply, which may become vital in the event of a partial or total loss of public water supply services as a result of a natural disaster, chemical contamination, civil disorder, or human-caused disruption.

In September of 2008, the City of Excelsior completed its Water Supply Plan. As required, the plan was submitted to the DNR Waters-Water Permit Programs and the Metropolitan Council for review and approval. The plan has been adopted by the City. Copies of the Plan are available at City Hall.

Appendix A- Tables

Table 1: PCSI - Sites

FIGURE ID	MPCA ID	NAME	ADDRESS	ACTIVITY	STATUS	MATERIAL CODE	FACILITY CODE	VULNERABILITY	PARCEL ID NUMBER
0	18715	Mason Bill Chrysler Plymouth	440 Water St	Leak Site	Active	SPL	2110-01	Moderate	3411723130090
1	559	Excelsior Ez Stop	300 Water St	Leak Site	Active	LUST	2116	Moderate	3411723110087
2	VP28530	Barrett Retail Development	348, 368, & 374 George St	Voluntary Investigation & Cleanup (VIC)	Active	PCS-VIC	2000	Moderate	3411723130090
3	16177	Hance Building 200	204 206 Water St	Leak Site	Inactive	SPL	2100	Moderate	3411723110061
4	18151	Knapp Residence	128 3rd St	Leak Site	Active	SPL	1100-01	Moderate	3411723120106
5	1934	Excelsior Elementary School	441 Oak St	Tank Site	Active	UST-F000	6000	Moderate	3411723140032
6	11596	Excelsior Community Center	443 Oak St	Leak Site	Inactive	LUST	5000	Moderate	3411723140032
7	13871	Former Ez Stop Bulk Site	SW Of 3rd St & East Dr	Leak Site	Inactive	LUST	2110	Moderate	3411723140013
8	15746	Adams Residence	165 Lakeview Ave	Leak Site	Inactive	SPL	1100-01	Moderate	2711723240055
9	13215	Gary's 1st Class Car Care	301 Water St	Leak Site	Inactive	LUST	2110-01	Moderate	3411723140013
10	13962	Former Pure Oil Company	352 3rd St	Leak Site	Inactive	SPL	3000	Moderate	3411723120003
11	4375	City Of Excelsior-utility Project	N of Water St	Leak Site	Inactive	SPL	1100	Moderate	3411723110065
12	15028	Excelsior Amoco	481 2nd St	Leak Site	Inactive	LUST	2116	Moderate	3411723110144
13	4304	Tonka Building	355 2nd St	Leak Site	Inactive	LUST	2000	Moderate	3411723110053
14	3009	Excelsior Ez Stop	300 Water St	Tank Site	Active	UST-F000	2116	Moderate	3411723110087
15	4164	Barrett Retail Development	348, 368, & 374 George St	Petroleum Brownfield	Active	PCS-BMS	2116	Moderate	3411723130090
16	5903	Gary's 1st Class Car Care	301 Water St	Leak Site	Inactive	LUST	2110-01	Moderate	3411723140013
17	13254	Gary's 1st Class Car Care	301 Water St	Tank Site	Inactive	UST-F000	2110-01	Moderate	3411723140013
18	13254	Gary's 1st Class Car Care	301 Water St	Tank Site	Active	AST-F000	2110-01	Moderate	3411723140013
19	4131	Former Pure Oil Company	352 3rd St	Petroleum Brownfield	Active	PCS-BMS	3000	Moderate	3411723120003
20	2930	Excelsior Amoco	481 2nd St	Tank Site	Active	UST-F000	2110-02,2116	Moderate	3411723110144
21	1880	Excelsior Community Center	443 Oak St	Tank Site	Inactive	UST-F000	5000	Moderate	3411723140032
22	2317	Nodak Connection Inc	320 Morse Ave	Leak Site	Inactive	SPL	3000	Moderate	3411723140055
23	VP18000	Tonka Printing	287 Water St	Voluntary Investigation & Cleanup (VIC)	Inactive	PCS-VIC	3000	Moderate	3411723110034
24	4177	Excelsior Interceptor 7017	337 Water St	Petroleum Brownfield	Active	PCS-BMS	6000	Moderate	3411723140072
25	15049	East Lake Enterprise	421 3rd St Ste A	Leak Site	Inactive	SPL	2100	Moderate	3411723110027
26	9463	Nicollet Street Bridge	Between Nicollet St & Grove St	Leak Site	Inactive	SPL	4000	Moderate	2711723440020
27	3465	Tonka Printing	287 Water St	Petroleum Brownfield	Inactive	PCS-BMS	3000	Moderate	3411723110034
28	6204	Lyman Lumber Co	337 Water St	Leak Site	Inactive	LUST	2126	Moderate	3411723140072
29	VP26380	Lyman Lumber Co	337 Water St	Voluntary Investigation & Cleanup (VIC)	Inactive	PCS-VIC	2126	Moderate	3411723140072
30	4342	Lyman Lumber Co	337 Water St	Petroleum Brownfield	Active	PCS-BMS	2126	Moderate	3411723140072
31	13875	Lyman Lumber Co	337 Water St	Tank Site	Inactive	UST-F000	2126	Moderate	3411723140072
32	13633	Tonka Building	355 2nd St	Tank Site	Inactive	UST-F000	2000	Moderate	3411723110053

Table 2: PCSI - Wells

FIGURE ID	UNIQUE NUMBER	WELL NAME	DEPTH	STATUS CODE	USE CODE	PARCEL ID NUMBER	MATERIAL CODE	FACILITY CODE
0	00205674	EXCELSIOR 1	465	A	PC	3411723120122	WEL	6000
1	00232336	EXCELSIOR 3	460	A	PC	3411723120024	WEL	6000
2	00205675	EXCELSIOR 2	448	A	PC	3411723120122	WEL	6000
3	00205672	MINNEAPOLIS & ST. LOUIS	393	A	CO	3411723110001	WEL	2000
4	00178198	HASKINS, STEVE	256	A	DO	3411723220020	WEL	1000

Table 3: PCSI - Unlocated Wells

UNIQUE NUMBER	WELL NAME	STATUS CODE	USE CODE	DEPTH	VULNERABILITY
00510604		A	DO	250.00	Moderate
00739145	HOMES BY KODIAK	A	DO	264.00	Moderate
00739144	HOMES BY KODIAK	A	DO	264.00	Moderate
00739146	HOMES BY KODIAK	A	DO	266.00	Moderate
00660576	SAUER, DAVE	A	DO	272.00	Moderate
00548540		A	DO	273.00	Moderate
00561397		A	DO	275.00	Moderate
00457085	THOLE, LOWELL	A	DO	280.00	Moderate
00272392	G. A. HEINRICK	A		282.00	Moderate
00272601	SOLOMONSON, RONALD	A		287.00	Moderate
00596695	HOFIUS, PETER	A	DO	290.00	Moderate
00508087	HARZLIK, WILLIAM	A	DO	300.00	Moderate
00696494		A	DO	300.00	Moderate
00696455	ANDERSON, JERRY	A	DO	300.00	Moderate
00447122	DELAITRE, CARTER	A	DO	305.00	Moderate
00508057	ENGSTROM, CURT	A	DO	305.00	Moderate
00743409	FETZER, JEFFREY & KAREN	A	DO	305.00	Moderate
00508063	BJORLIN, MARVIN	A	DO	313.00	Moderate
00457112		A	DO	315.00	Moderate
00554087		A	DO	320.00	Moderate
00272886	ROBINSON, RALPH	A	UN	350.00	Moderate
00510610	BAUMANN, VERNON	A	DO	366.00	Moderate

Appendix B- Figures

City of Excelsior Wellhead Protection Plan

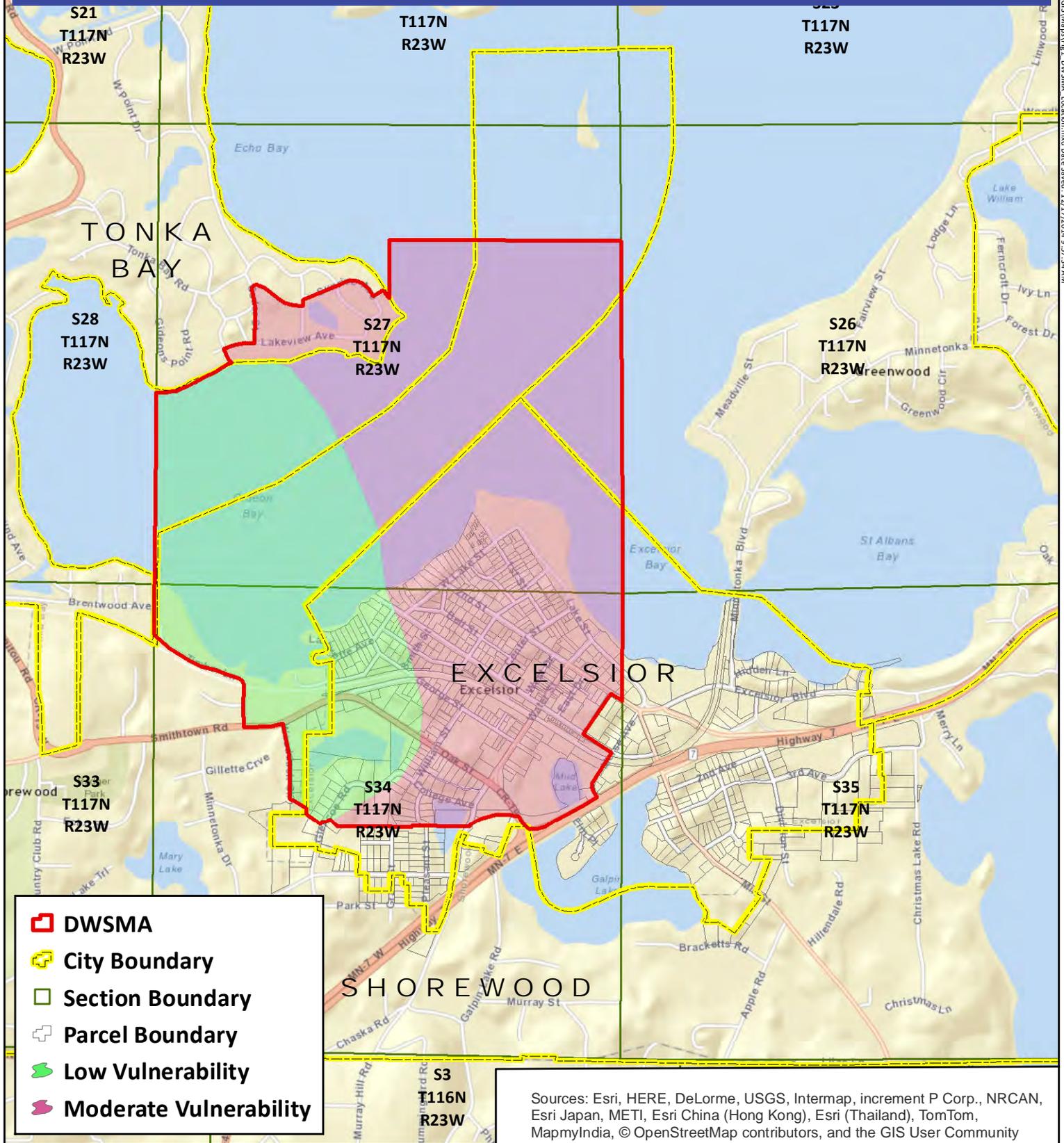


Figure 1
Excelsior, MN

Drinking Water Supply Management
Area (DWSMA) Location

0 1,500 3,000 Feet



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City of Excelsior Wellhead Protection Plan

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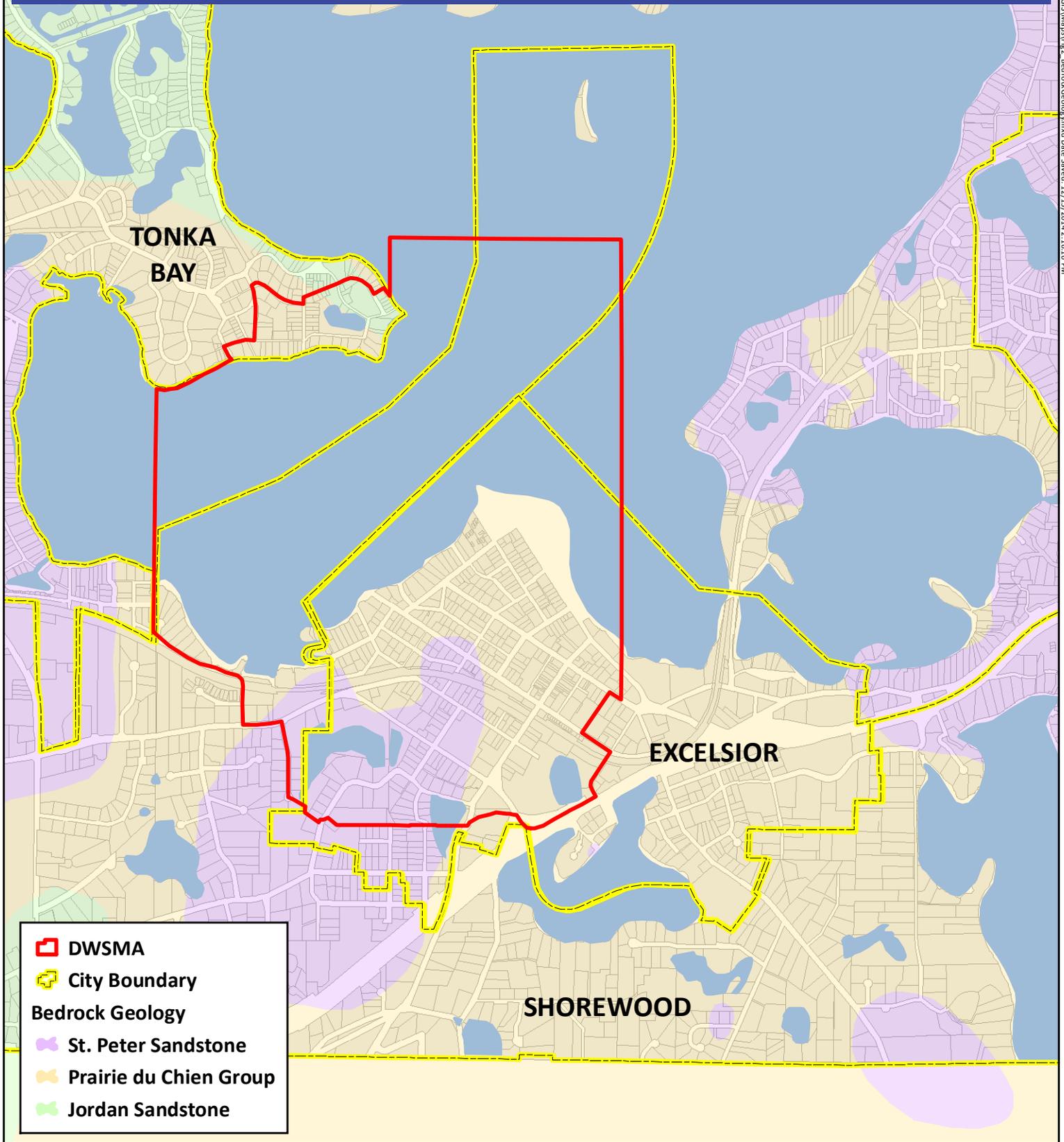


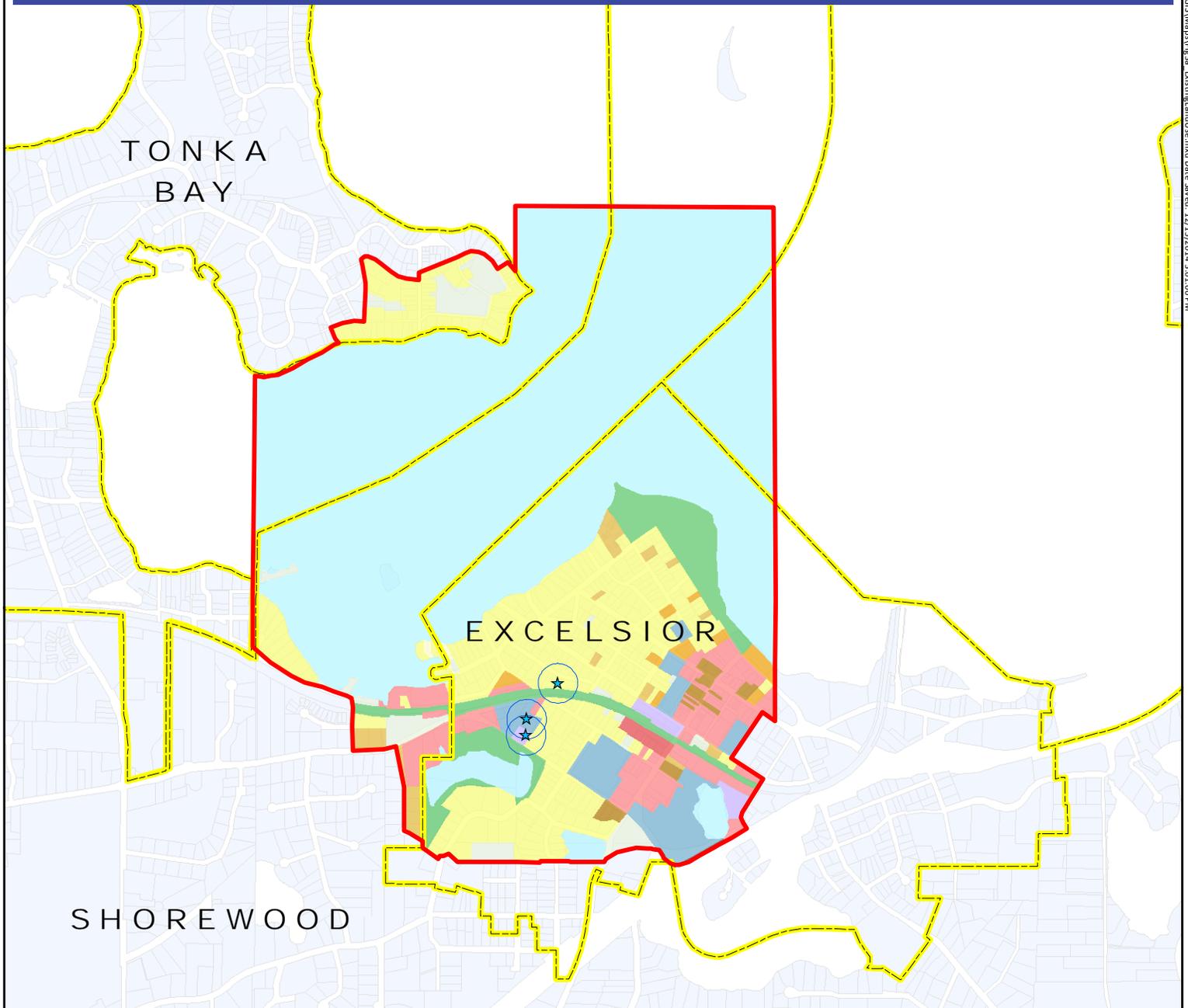
Figure 2
Excelsior, MN

Bedrock Geology
Map



City of Excelsior Wellhead Protection Plan

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★ Excelsior Wells	Generalized Land Use 2010	Open Water
📍 City Boundary	Industrial and Utility	Park, Recreational, or Preserve
📐 DWSMA	Institutional	Retail and Other Commercial
🕒 IWMZ	Major Highway	Seasonal/Vacation
	Mixed Use Commercial	Single Family Attached
	Mixed Use Residential	Single Family Detached
	Multifamily	Undeveloped



Figure 3
Excelsior, MN

Existing Land Use



City of Excelsior Wellhead Protection Plan

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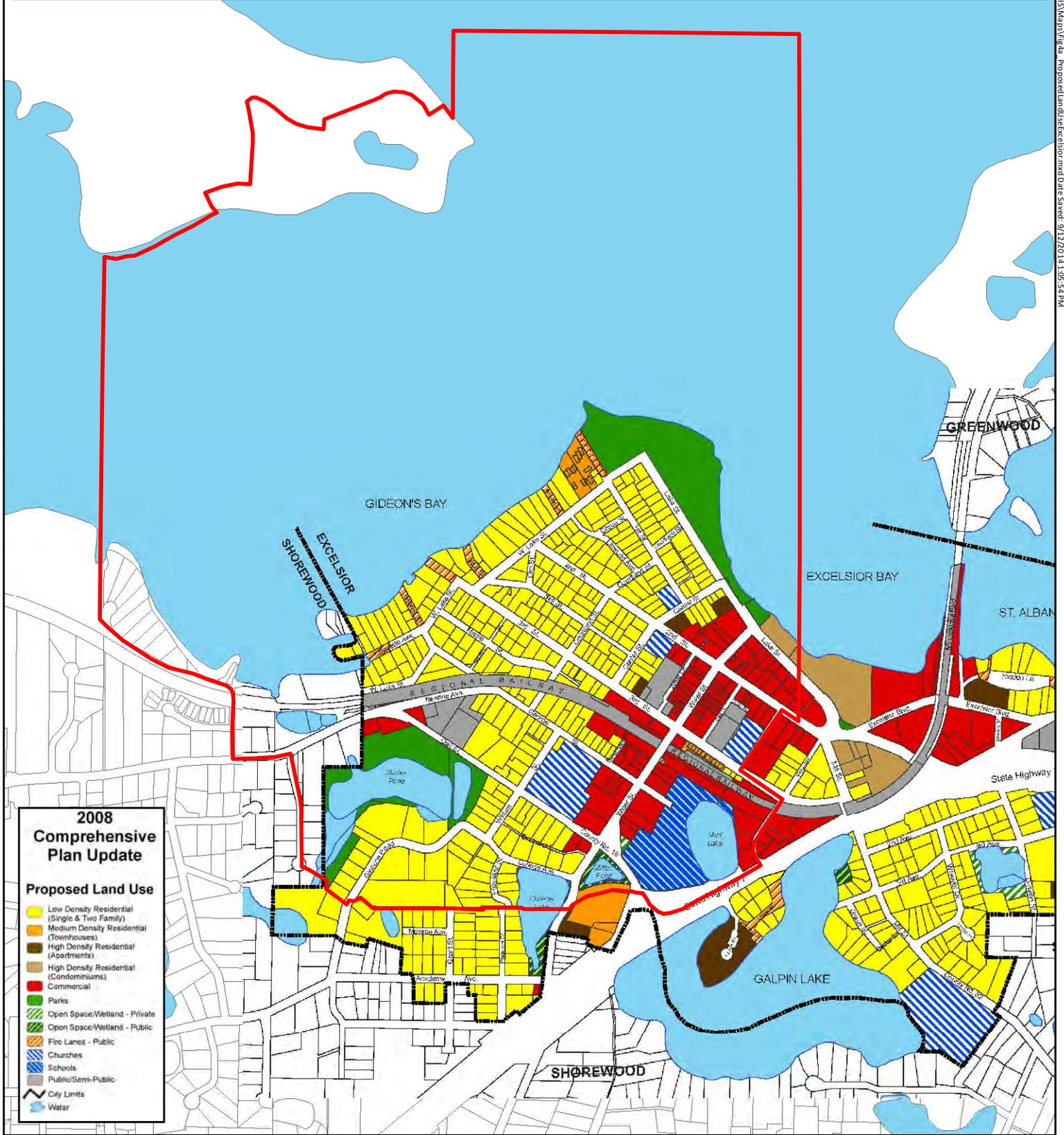


Figure 4a
Excelsior, MN

Proposed Land Use
City of Excelsior



City of Excelsior Wellhead Protection Plan

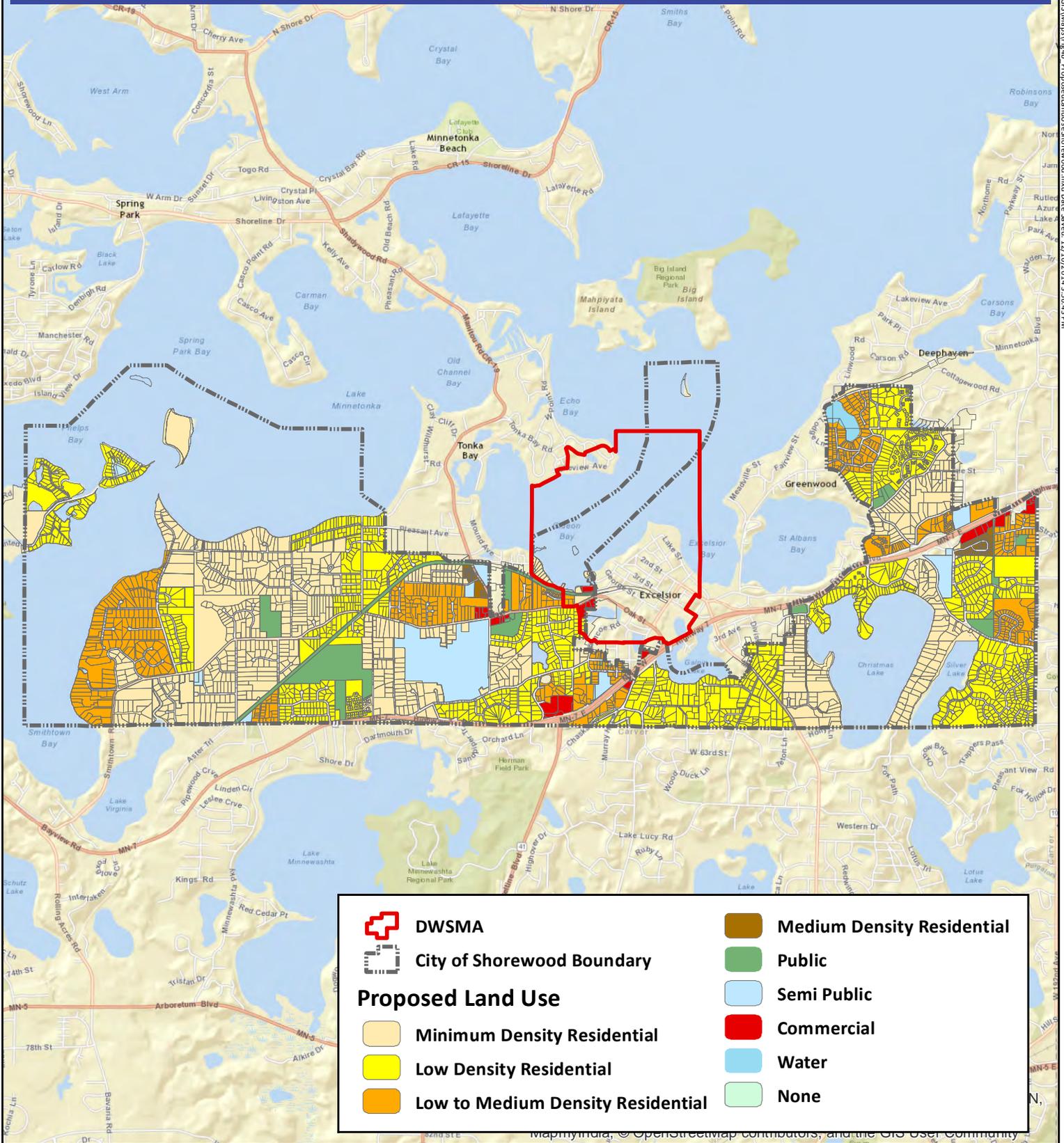


Figure 4b
Excelsior, MN

Proposed Land Use
City of Shorewood

0 2,500 5,000 Feet



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City of Excelsior Wellhead Protection Plan

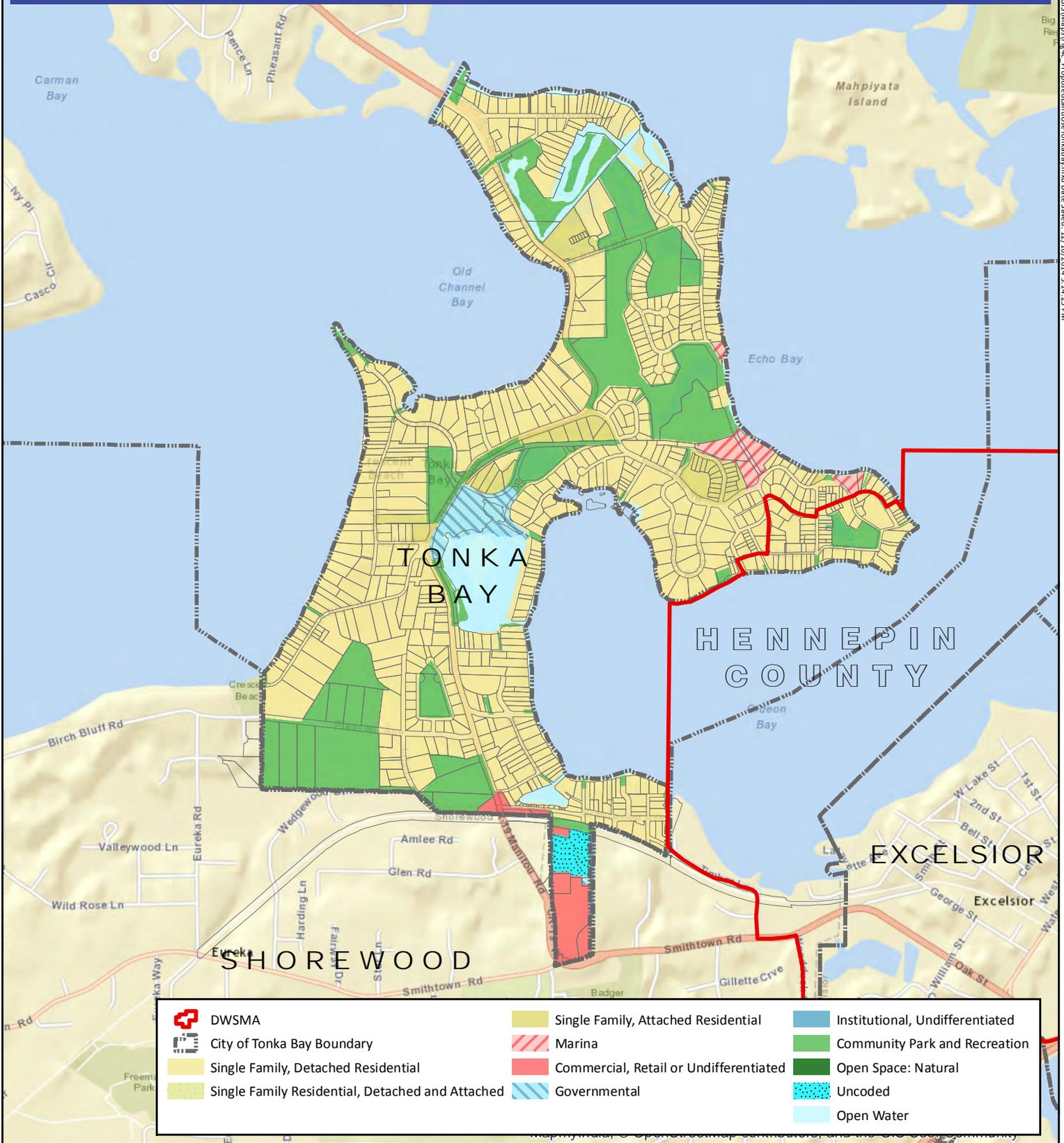


Figure 4c
Excelsior, MN

Proposed Land Use
Tonka Bay

0 1,500 3,000 Feet



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City of Excelsior Wellhead Protection Plan

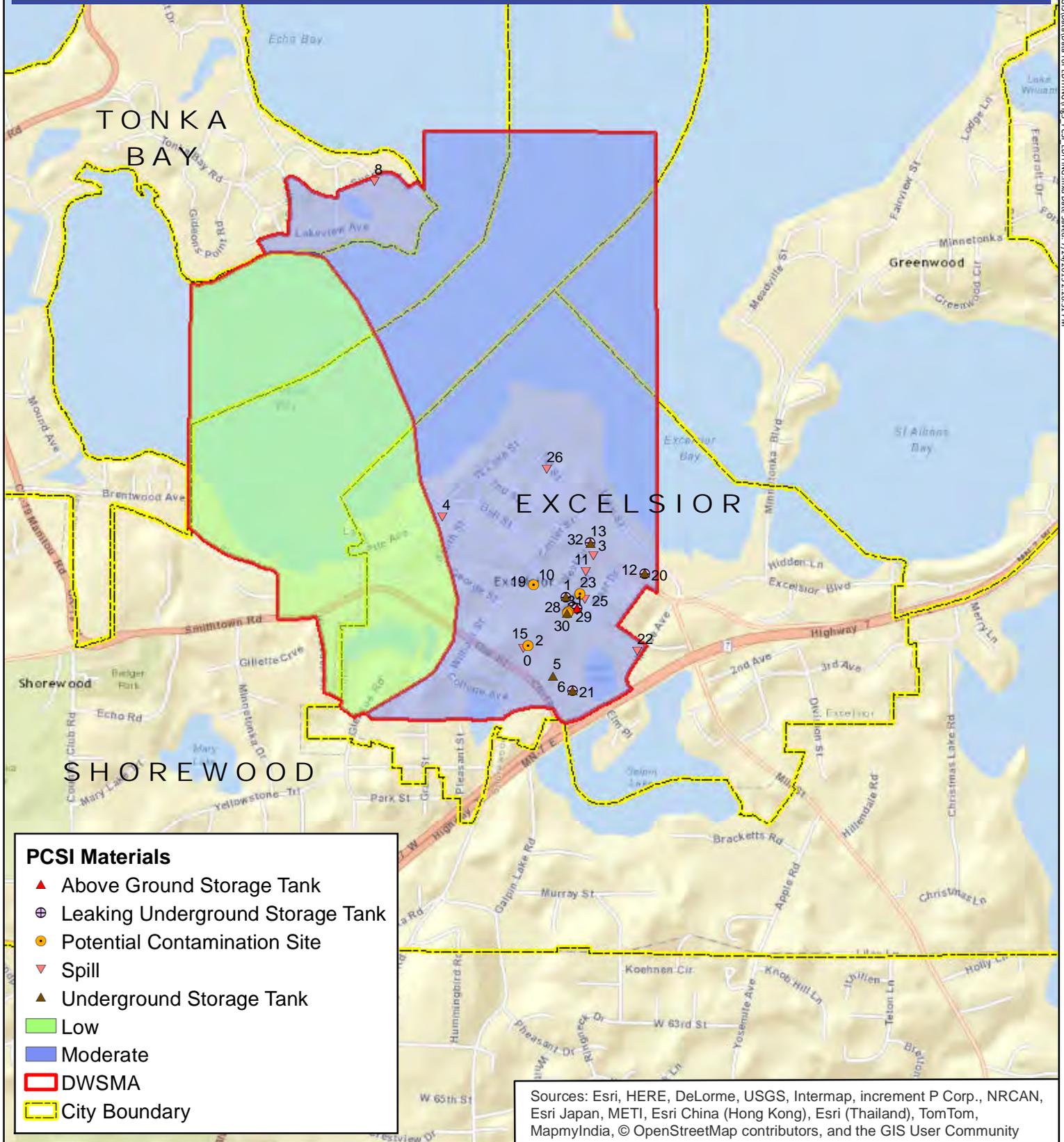


Figure 5
Excelsior, MN

PCSI - Sites

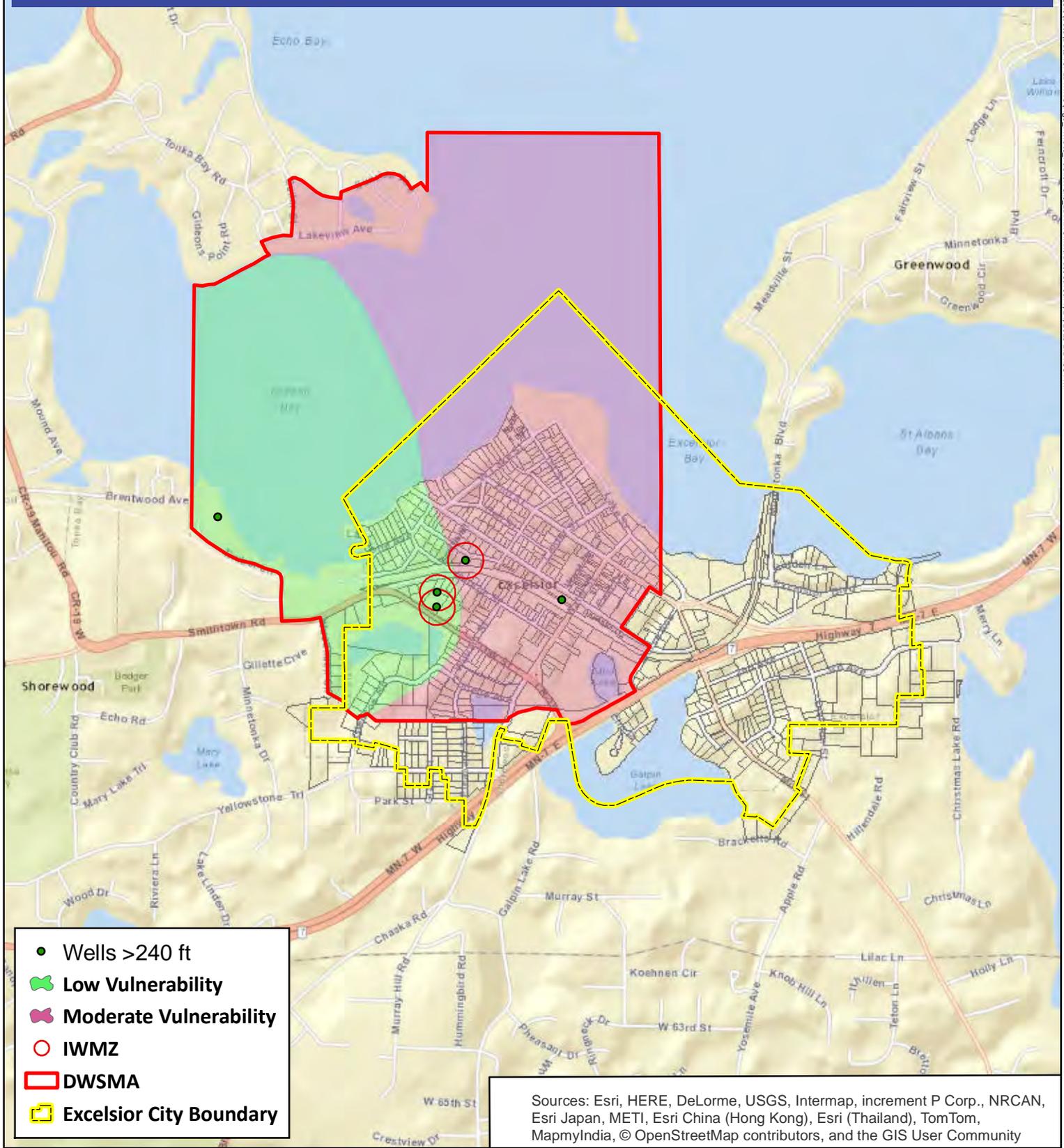
0 1,500 3,000 Feet



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City of Excelsior Wellhead Protection Plan

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- Wells >240 ft
- Low Vulnerability
- Moderate Vulnerability
- IWMZ
- ▭ DWSMA
- ▭ Excelsior City Boundary

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Figure 6
Excelsior, MN

PCSI - Wells



City of Excelsior Wellhead Protection Plan

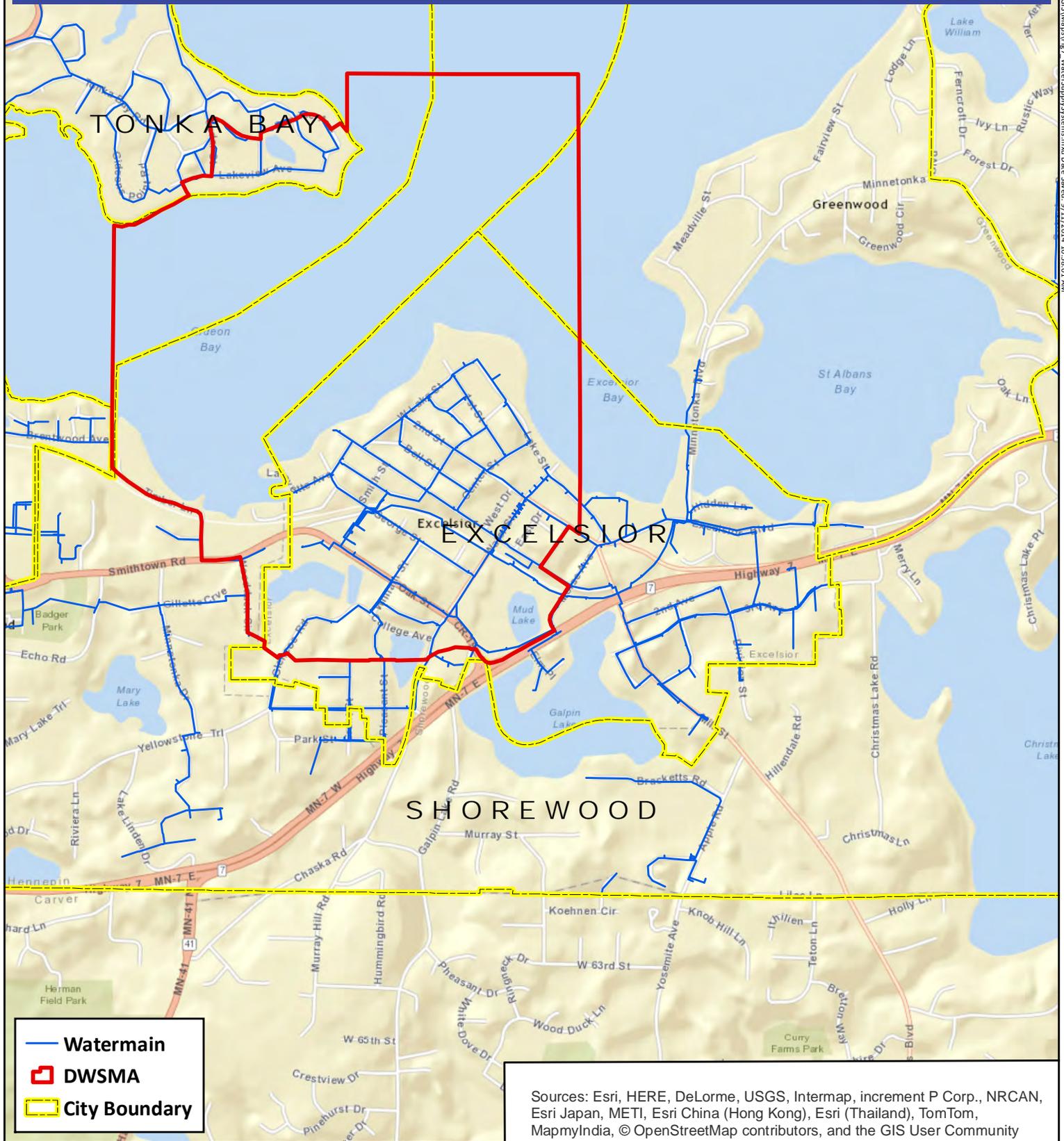


Figure 7
Excelsior, MN

Water Supply Systems

0 1,500 3,000 Feet



City of Excelsior Wellhead Protection Plan

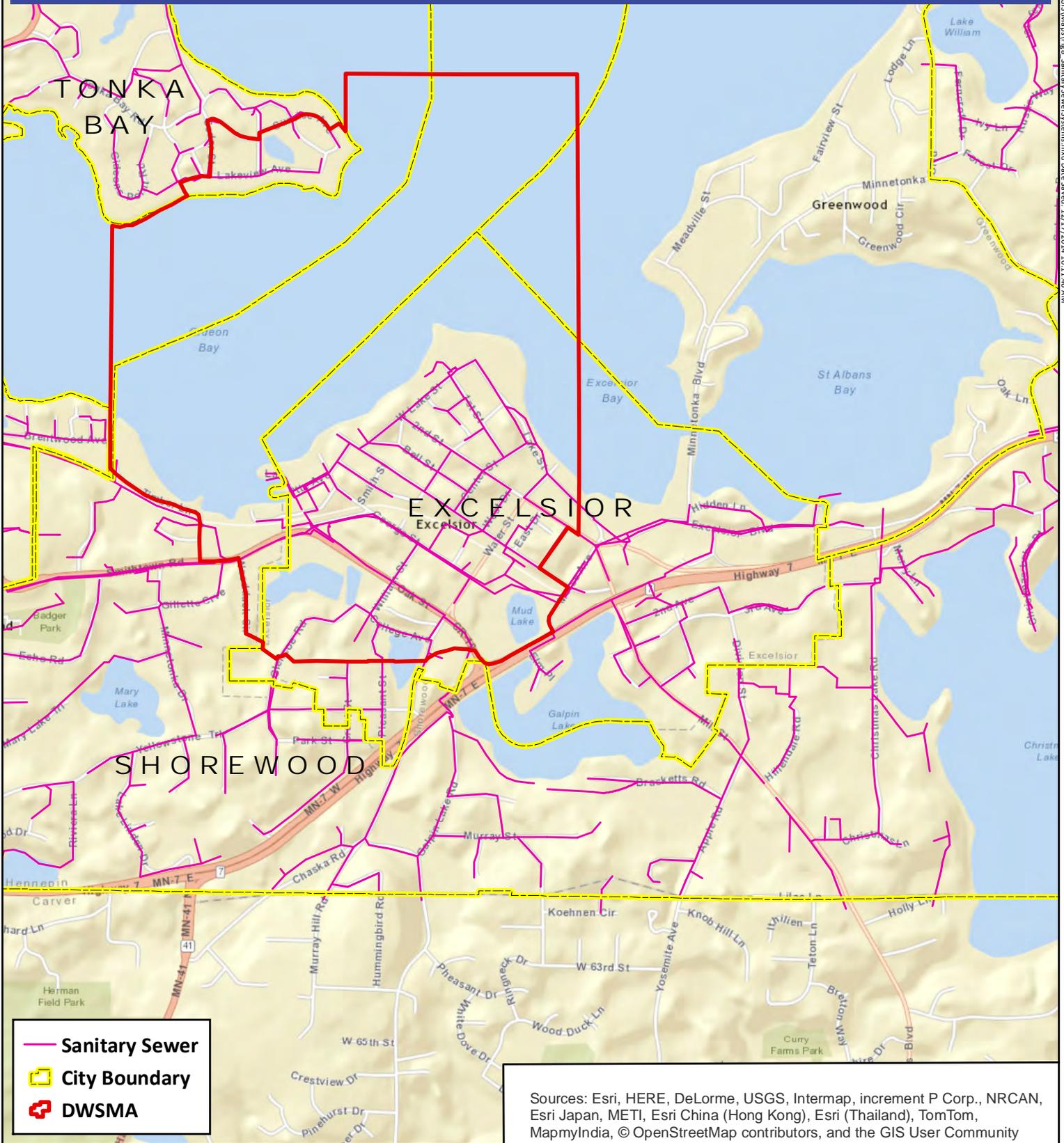


Figure 8
Excelsior, MN

Sanitary Sewer Systems

0 1,500 3,000 Feet



City of Excelsior Wellhead Protection Plan

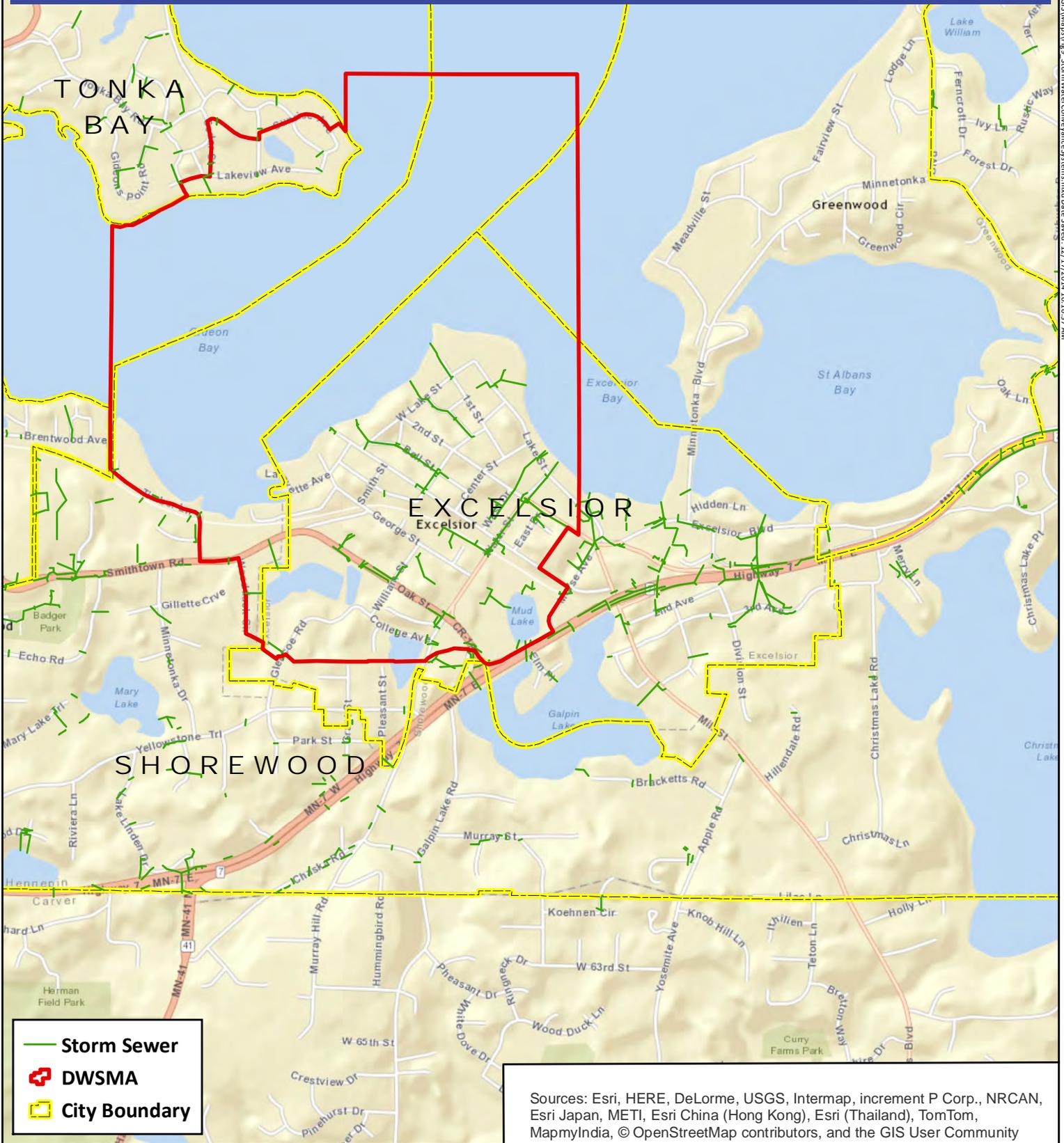


Figure 9
Excelsior, MN

Stormwater Conveyance Systems

0 1,500 3,000 Feet



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City of Excelsior Wellhead Protection Plan

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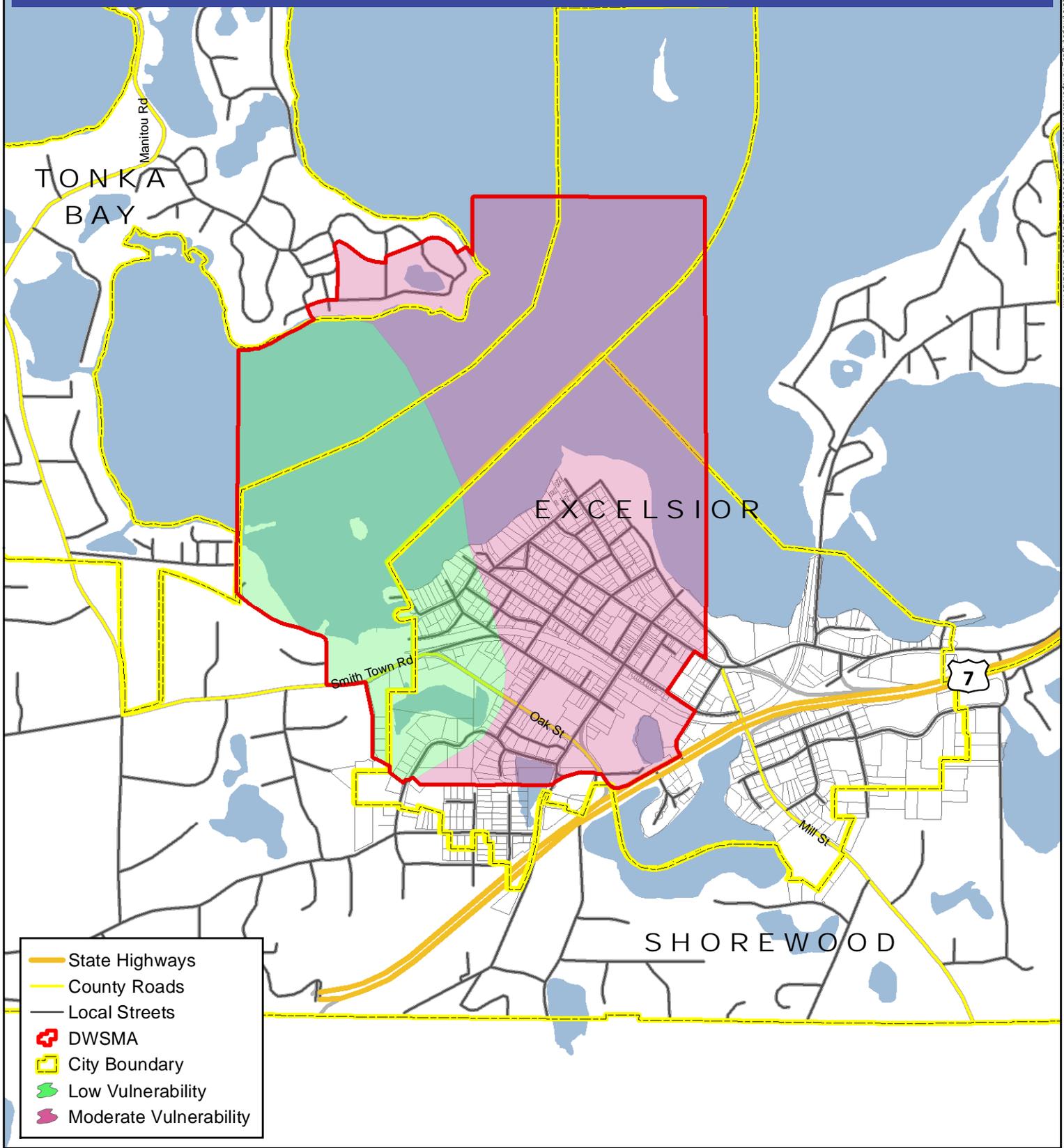


Figure 10
Excelsior, MN

Transportation Routes



City of Excelsior Wellhead Protection Plan

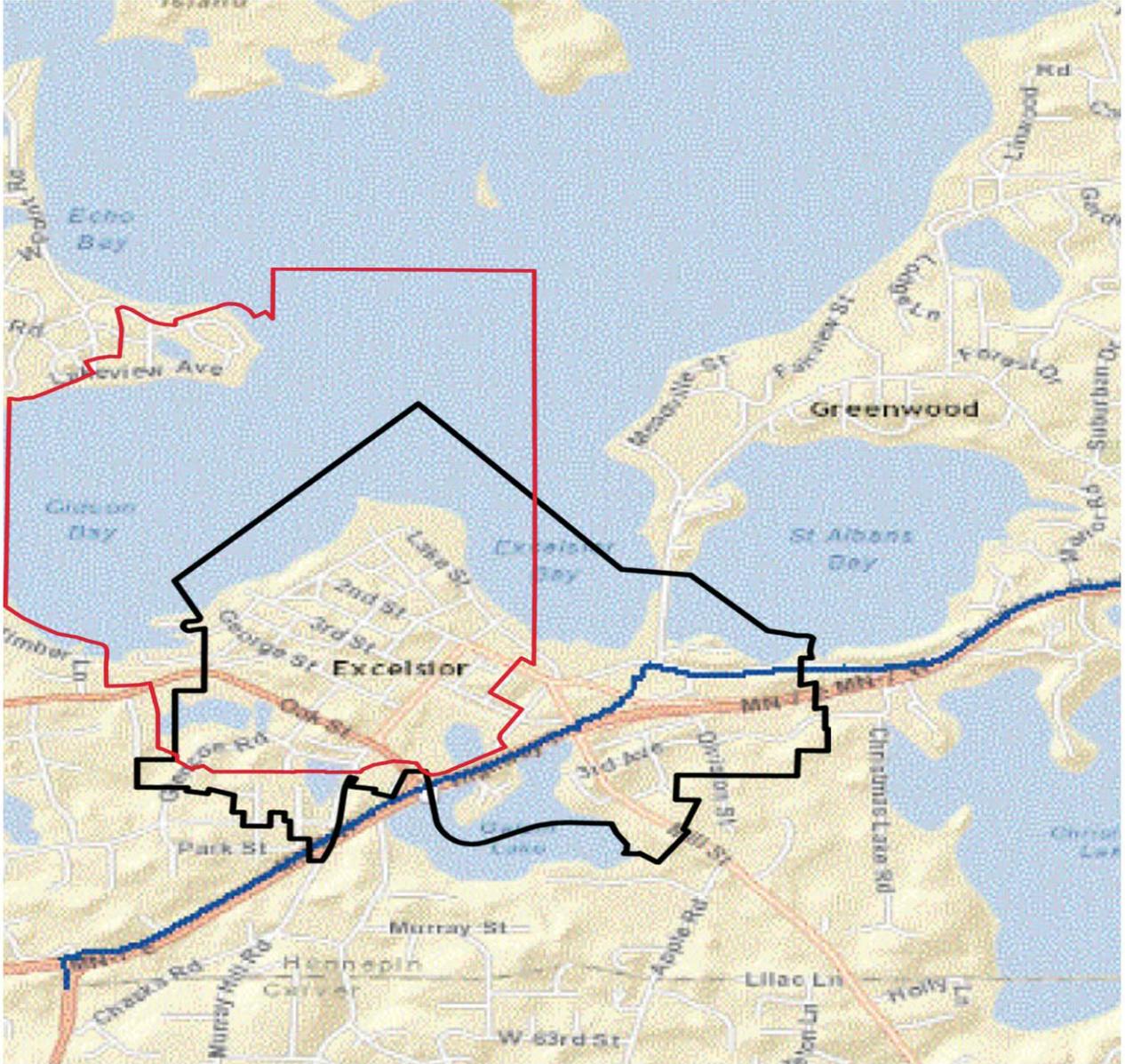


Figure 11
Excelsior, MN

Gas Pipeline Map

0 1,500 3,000 Feet



City of Excelsior Wellhead Protection Plan

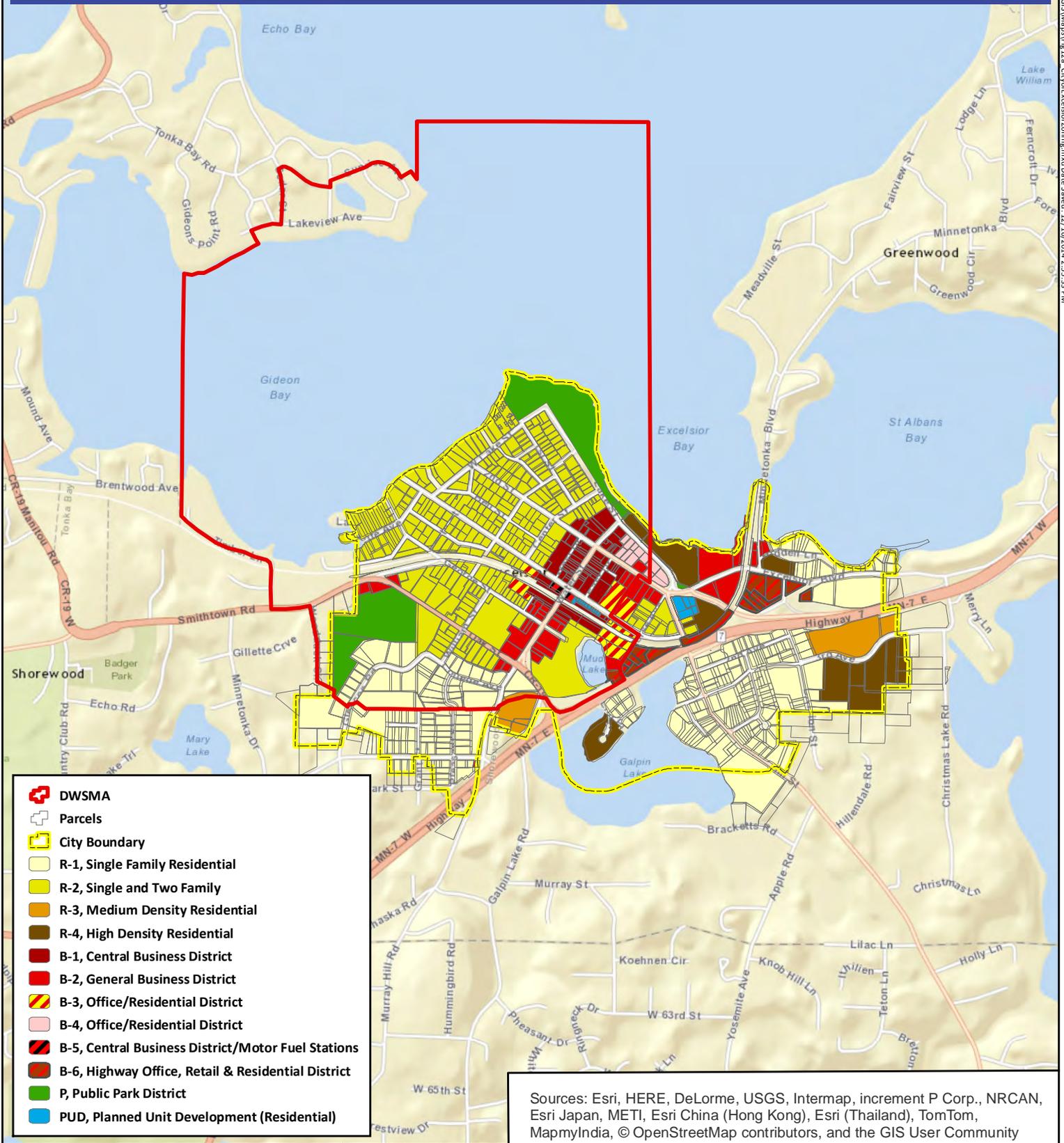


Figure 12a
Excelsior, MN

City of Excelsior Zoning

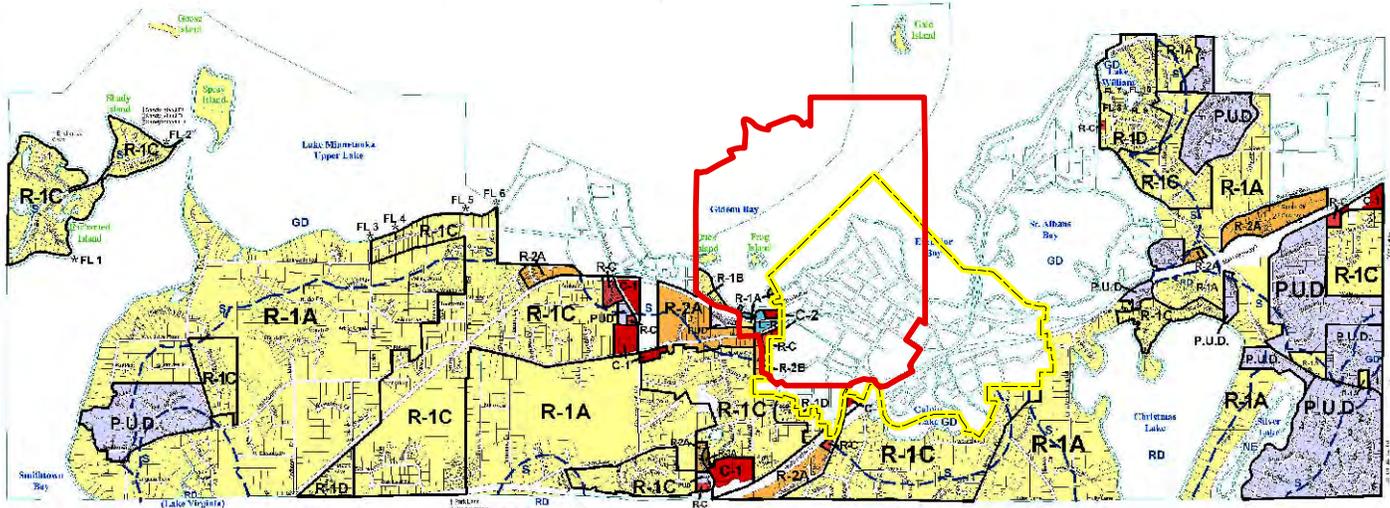
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City of Excelsior Wellhead Protection Plan

CITY OF SHOREWOOD



RESIDENTIAL DISTRICTS

- R-1A Single-Family (40,000 sq. ft.)
- R-1B Single-Family (30,000 sq. ft.)
- R-1C Single-Family (20,000 sq. ft.)
- R-1D Single-Family (10,000 sq. ft.)
- R-2A Single/Two-Family (20,000/30,000 sq. ft.)
- R-2B Single/Two-Family (15,000/20,000 sq. ft.)
- R-2C Single/Two-Family (10,000/15,000 sq. ft.)
- R-3A Two-Family/Multiple (20,000/30,000 sq. ft.)
- R-3B Two-Family/Multiple (15,000/20,000 sq. ft.)
- R-C Residential/Commercial

COMMERCIAL DISTRICTS

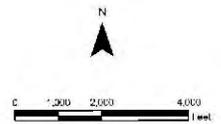
- C-1 General Commercial
- C-2 Service Commercial

SPECIAL DISTRICTS

- L-R Lakeshore-Recreational
- PUD Planned Unit Development
- S** Shoreland
 - GD General Development
 - RD Recreational Development
 - NE Natural Environment
- FL Fire Lane

Zoning Districts

Shorewood Planning Department
01/14



- DWSMA
- City Boundary

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Figure 12b
Excelsior, MN

City of Shorewood Zoning



City of Excelsior Wellhead Protection Plan

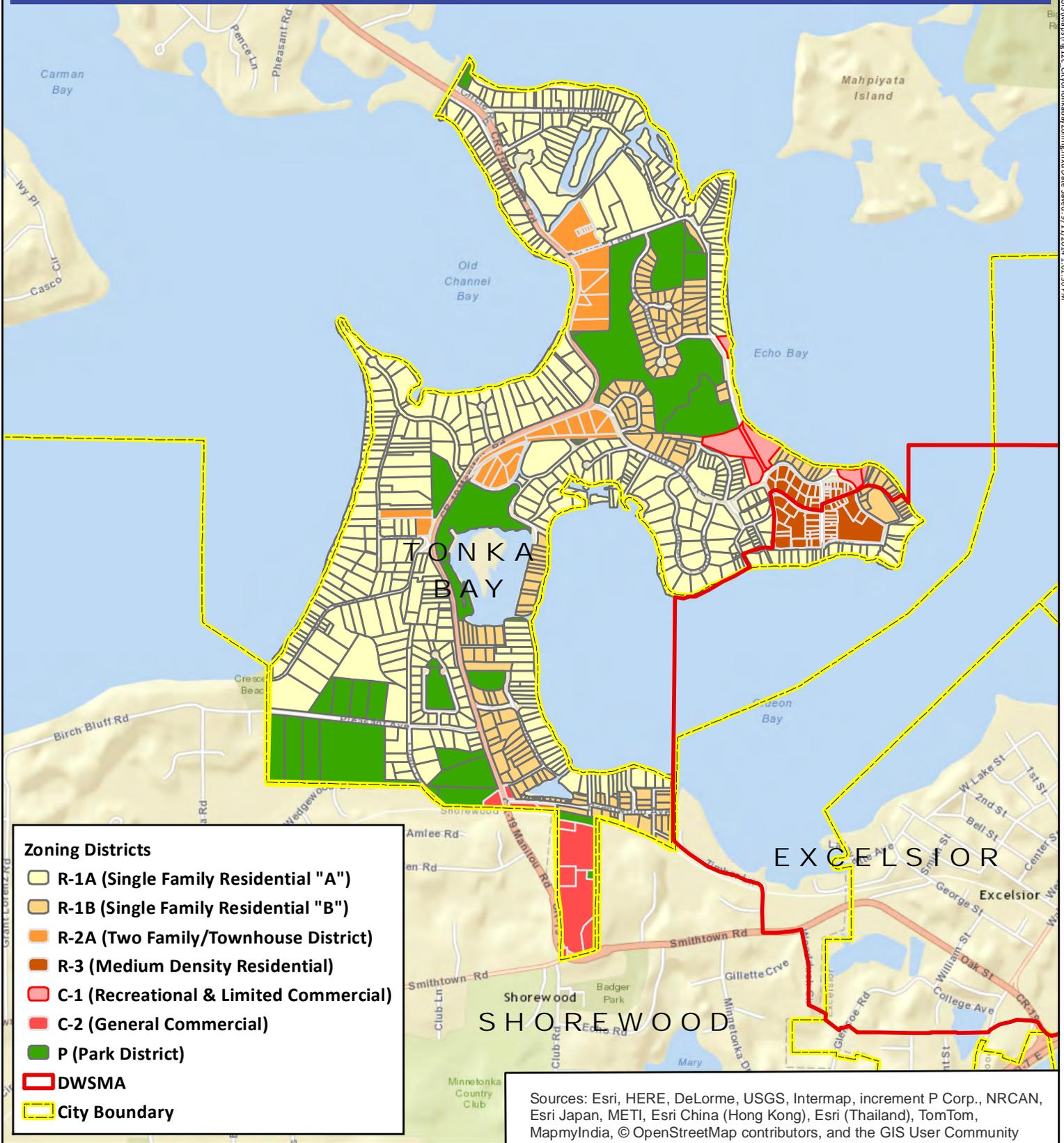


Figure 12c
Excelsior, MN

City of Tonka Bay Zoning

0 1,500 3,000 Feet



8/10/2023 2:10:03 PM GIS/Map/Fig 12c - City of Tonka Bay Zoning.mxd Date Saved: 9/11/2024 1:01:30 PM

Appendix C- Wellhead Protection Plan Part 1

Wellhead Protection Plan

Part I

**Delineation of Wellhead Protection Area
Drinking Water Supply Management Area Delineation
Well and Drinking Water Supply Management Area Vulnerability Assessments**

Prepared for

The City of Excelsior

December 2011



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Minnesota Department of Health

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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, part 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

CWI - County Well Index

DNR - Minnesota Department of Natural Resources

EPA - United States Environmental Protection Agency

FSA - Farm Security Administration

MDA - Minnesota Department of Agriculture

MDH - Minnesota Department of Health

MGS - Minnesota Geological Survey

MnDOT - Minnesota Department of Transportation

MnGEO - Minnesota Geospatial Information Office

MPCA - Minnesota Pollution Control Agency

NRCS - Natural Resource Conservation Service

SWCD - Soil and Water Conservation District

UMN - University of Minnesota

USDA - United States Department of Agriculture

USGS - United States Geological Survey

1. Introduction

The Minnesota Department of Health (MDH) developed Part I of the wellhead protection (WHP) plan at the request of the city of Excelsior (public water supply identification number 1270012). The work was performed in accordance with the Minnesota Wellhead Protection Rule, parts 4720.5100 to 4720.5590.

This report presents delineations of the wellhead protection area (WHPA) and drinking water supply management area (DWSMA), and the vulnerability assessments for the public water supply wells and DWSMA. Figure 1 shows the boundaries for the WHPA and DWSMA. The WHPA is defined by a 10-year time of travel. Figure 1 also shows the emergency response area (ERA), which is defined by a 1-year time of travel. Definitions of rule-specific terms that are used are provided in the “Glossary of Terms.”

This report also documents the technical information that was required to prepare this portion of the WHP plan in accordance with the Minnesota Wellhead Protection Rule. Additional technical information is available from MDH.

The wells included in the WHP plan are listed in Table 1.

Table 1
Public Water Supply Well Information

Local Well Name	Unique Number	Use/Status	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed/Reconstructed	Well Vulnerability	Aquifer (Bedrock)
Well 1	205674	Primary	12	303	465	1957	Not Vulnerable	Prairie du Chien/Jordan
Well 2	205675	Primary	12	290	448	1957	Not Vulnerable	Prairie du Chien/Jordan
Well 3	232336	Seasonal	24x20	310	460	1973	Not Vulnerable	Prairie du Chien/Jordan

2. Assessment of the Data Elements

MDH staff met with representatives of the public water supplier on June 13, 2011, for a scoping meeting that identified the data elements required to prepare Part I of the WHP plan. Table 2 presents the assessment of these data elements relative to the present and future implications of planning items that are specified in Minnesota Rules, part 4720.5210.

Table 2 - Assessment of Data Elements

Data Element	Present and Future Implications				Data Source
	Use of the Wells	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Precipitation					
Geology					
Maps and geologic descriptions	M	H	H	H	MGS
Subsurface data	M	H	H	H	MGS, MDH, CWI
Borehole geophysics	M	H	H	H	MGS
Surface geophysics	L	L	L	L	Not Available
Maps and soil descriptions					
Eroding lands					
Water Resources					
Watershed units					
List of public waters					
Shoreland classifications					
Wetlands map					
Floodplain map					
Land Use					
Parcel boundaries map	L	H	L	L	Metropolitan Council
Political boundaries map	L	L	L	L	
PLS map	L	H	L	L	MDH
Land use map and inventory	M	H	M	M	
Comprehensive land use map	L	L	L	L	
Zoning map	L	L	L	L	
Public Utility Services					
Transportation routes and corridors					
Storm/sanitary sewers and PWS system map					
Oil and gas pipelines map					
Public drainage systems map/list					
Records of well construction, maintenance, and use	H	H	H	H	Public Water Supplier, CWI, MDH files
Surface Water Quantity					
Stream flow data					
Ordinary high water mark data					
Permitted withdrawals					
Protected levels/flows					
Water use conflicts					
Groundwater Quantity					
Permitted withdrawals	H	H	H	H	DNR
Groundwater use conflicts	L	L	L	L	DNR
Water levels	H	H	H	H	CWI, MDH

Data Element	Present and Future Implications				Data Source
	Use of the Wells	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Surface Water Quality					
Stream and lake water quality management classification					
Monitoring data summary					
Groundwater Quality					
Monitoring data	H	H	H	H	MDH
Isotopic data	H	H	H	H	MDH
Tracer studies	H	H	H	H	Not Available
Contamination site data	M	M	M	M	Not Available
Property audit data from contamination sites					
MPCA and MDA spills/release reports					

Definitions Used for Assessing Data Elements:

- High (H)** - the data element has a direct impact
- Moderate (M)** - the data element has an indirect or marginal impact
- Low (L)** - the data element has little if any impact
- Shaded** - the data element was not required by MDH for preparing the WHP plan

Acronyms used in this report are listed on page ii, after the “Glossary of Terms.”

3. General Descriptions

3.1 Description of the Water Supply System

The city of Excelsior obtains its drinking water supply from two primary wells and one seasonal well. Table 1 summarizes information regarding them.

3.2 Description of the Hydrogeologic Setting

The description of the hydrologic setting for the aquifer used to supply drinking water is presented in Table 3.

Figures 3, 4a, and 4b show the distribution of the aquifer and its stratigraphic relationships with adjacent geologic materials. They were prepared using well record data that is contained in the County Well Index (CWI) database. The geological maps and studies that were used to further define local hydrogeologic conditions are provided in the “Selected References” section of this report.

Table 3 - Description of the Hydrogeologic Setting at Excelsior Well 1 (205674), Well 2 (205675), and Well 3 (232336)

Aquifer	Attribute	Descriptor	Data Source
Prairie du Chien-Jordan Sandstone (OPCJ)	Aquifer Material	Dolomite and Sandstone	Well logs
	Primary Porosity	0.05 (Dolomite) 0.20 (Sandstone)	Estimated and porosity values used in the Metro Model.
	Aquifer Thickness	152 feet (56 feet of OPDC and 96 feet of CJDN)	Well 2 well log (205675)
	Stratigraphic Top Elevation	651 feet MSL	Well 2 well log (205675)
	Stratigraphic Bottom Elevation	499 feet MSL	Well 2 well log (205675)
	Hydraulic Confinement	Confined	Well 2 well log (205675)
	Transmissivity (T)	Reference Value (OPCJ): 6,701 ft ² /day Reference Value (OPDC): 1,805 ft ² /day Reference Value (CJDN): 4,896 ft ² /day	The aquifer test plan was approved on August 19, 2011, and T was determined from a specific capacity test conducted at Excelsior Well 2 (205675). The reference values for the transmissivity of the Prairie du Chien and Jordan were calculated from the hydraulic conductivity values and the formation thicknesses at Excelsior Well 2 (205675).
	Hydraulic Conductivity (K)	Reference Value (OPDC): 32 ft/day Reference Value (CJDN): 51 ft/day	The reference value for the hydraulic conductivity of the Jordan Aquifer was back-calculated from the transmissivities and formation thicknesses at Shorewood Wells 1 (232331) and 6 (122298). This value is also in agreement with that used in the Metro Model (Metropolitan Council, 2009). The reference values for the hydraulic conductivity of the Prairie du Chien were back-calculated from the transmissivities and formation thicknesses at Well 2 (205675).
	Groundwater Flow Field	Flow to the southeast. Hydraulic Gradient: 1.6×10^{-3} feet/ft	Hennepin County Atlas (Kanivetsky, 1989)

4. Delineation of the Wellhead Protection Area

4.1 Delineation Criteria

The boundaries of the WHPA for the city of Excelsior are shown in Figure 5. Table 4 describes how the delineation criteria that are specified under Minnesota Rules, part 4720.5510, were addressed.

Table 4 - Description of WHPA Delineation Criteria

Criterion	Descriptor	How the Criterion was Addressed
Flow Boundary	Mississippi, Minnesota, and Crow Rivers	The rivers provided boundary conditions to the model that extended to these natural boundaries. They were included in the model and set the regional groundwater flow.
Flow Boundary	Other High-Capacity Wells (Table 6)	The pumping amounts were determined based on the averaged 2000-2009 pumped volumes. The pumping amounts of these wells were included in the methods used for the delineation.
Daily Volume of Water Pumped	See Table 5	Pumping information was obtained from DNR Appropriations Permit 1975-6164. The annual pumped volumes were converted to a daily volume pumped by a well.
Groundwater Flow Field	See Figure 2	The model calibration process addressed the relationship between the calculated versus observed groundwater flow field.
Aquifer Hydraulic Transmissivity	Reference Value (OPCJ): 6,701 ft ² /day	The aquifer test plan was approved on August 19, 2011, and T was determined from a specific capacity test conducted at Excelsior Well 2 (205675).
Time of Travel	10 years	The public water supplier selected a 10 year time of travel.

Information provided by the city of Excelsior was used to identify the maximum volume of water pumped annually by each well over the previous five-year period, as shown in Table 5. No changes in pumping volume are expected in the next five years. Previous pumping values have been reported to the DNR, as required by Groundwater Appropriation Permit 1975-6164. The maximum daily volume of discharge used as an input parameter in the model was calculated by dividing the greatest annual pumping volume by 365 days.

In addition to the wells used by the public water supplier, Table 6 shows other high-capacity wells that were included in the delineation to account for their pumping impacts on the capture areas for the public water supply wells. Pumping data was obtained from the DNR State Water Use Database System.

Table 5 - Annual Volume of Water Discharged from Water Supply Wells

Well Name	Unique Number	Total Annual Withdrawal (gal/yr)			Permit Number: 1975-6164	
		2006	2007	2008	2009	2010 ¹
1	205674	14,754,000	6,262,000	31,005,000	19,323,000	11,648,000
2	205675	14,754,000	6,262,000	31,005,000	19,323,000	11,648,000
3	232336	81,690,000	90,812,000	41,531,000	58,671,000	69,246,000
Totals		96,444,000	97,074,000	72,541,000	77,994,000	80,894,000

Source: The DNR State Water Use Database System Permit Number 1975-6164.

¹ Source: City of Excelsior. Bolding indicates greatest annual pumping volume.

Table 6 - Other Permitted High-Capacity Wells Within Two Miles

Unique Number	Well Name	Permittee	DNR Permit Number	Aquifer	Use	Average Withdrawal 2000 - 2009 (gal/yr)
214487	1	MINNETONKA COUNTRY CLUB ASSOC	1966-0030	Quaternary Buried Artesian	Golf course, commercial and Institutional	26,240,000
161414	3	SHOREWOOD, CITY OF	1974-5226	Prairie du Chien/Jordan	Municipal	3,730,000
416160	7	SHOREWOOD, CITY OF	1974-5226	Prairie du Chien/Jordan	Municipal	17,670,000
529487	2	SHOREWOOD VILLAGE CENTER	1975-6064	Quaternary Buried Artesian	Commercial and institutional	380,000
223349	1	TONKA BAY, CITY OF	1979-6313	Prairie du Chien/Jordan	Municipal	180,000
205657	2	TONKA BAY, CITY OF	1979-6313	St. Peter/ Prairie du Chien/Jordan	Municipal	17,670,000
541545	7	CHANHASSEN, CITY OF	1981-6089	Prairie du Chien/Jordan	Municipal	97,270,000
578953	8	CHANHASSEN, CITY OF	1981-6089	Prairie du Chien/Jordan	Municipal	82,840,000
200810	WEST	CHANHASSEN, CITY OF	1981-6089	Prairie du Chien/Jordan	Municipal	140,000
625301	2	MILES, HENRY & VICTORIA	1998-6104	Quaternary Buried Artesian	Basin (lake) level	810,000

4.2 Method Used to Delineate the Wellhead Protection Area

The WHPAs for Excelsior Well 1 (205674), Well 2 (205675), and Well 3 (232336) were determined using:

- the existing regional MODFLOW Model that simulates porous media groundwater flow within the Prairie du Chien Group and Jordan Sandstone, and
- a calculated fixed radius procedure to address flow within the secondary porosity features of the Prairie du Chien Group.

The delineation methods are described in more detail in the following sections.

4.2.1. Porous Media Delineations

The porous media capture zones for the city of Excelsior Well 1 (205674), Well 2 (205675), and Well 3 (232336) were determined using an existing regional MODFLOW Model that was developed by Barr Engineering Company for the Metropolitan Council (Metro Council, 2009). MODFLOW is a 3D, cell-centered, finite difference, saturated flow model developed by the U.S. Geological Survey (McDonald and Harbaugh, 1988; Harbaugh et al., 2000).

The regional Metro Model consists of nine layers that represent the major aquifers and aquitards within the seven-county metropolitan area. These layers represent, from top to bottom, the following units: (1) surficial aquifer of glacial deposits; (2) St. Peter Sandstone or Quaternary Buried Artesian Aquifer; (3) Prairie du Chien Group; (4) Jordan Sandstone; (5) St. Lawrence Formation (aquitard); (6) Franconia Formation; (7) Iron-ton-Galesville Aquifer, (8) Eau Claire Formation (aquitard); and (9) Mt. Simon Sandstone. The regional groundwater model was calibrated to steady-state water levels and river base flows.

A regional model limited to Hennepin and Carver Counties was extracted from the regional seven-county model. This extracted model extends to the natural hydraulic boundaries, the Mississippi River to the north and east, the Minnesota River to the south, and the Crow River to the northwest. These river boundaries, along with wells, lakes, and infiltration, provided the model boundary conditions.

The regional Hennepin-Carver Counties model provided the boundary conditions for a telescopic, refined sub-model that was used to delineate the wellhead protection areas. The sub-model had head-specified boundary conditions prescribed along the northern, eastern, and western sides of the model domain. River boundary conditions (i.e., representing the Minnesota River) were prescribed along the southern side of the model domain. The model grid was refined around the Excelsior wells. Variable grid spacing was used, ranging from one meter near the wells to 250 meters at the edge of the grid. This refinement was required for an accurate computation of the particle flow paths and, therefore, the WHPA delineation.

Prior to its use in the delineations, the following modifications were incorporated in the refined model:

- Local areas of the modified top and bottom of the aquifer and modified horizontal conductivity were included in the model to reflect the local aquifer geometry and the reference values for the hydraulic conductivities described in Table 3.
- The pumping rates from Table 5 were assigned to the city of Excelsior wells.
- The pumping rates from Table 6 were assigned to the permitted high-capacity wells located within two miles of the city of Excelsior wells.

The delineation was performed by backtracking particles from each well to a 10-year time of travel using the particle tracking MODPATH Code. A series of 50 particles were launched at each pumping well. Porosities of 5.6 and 20 percent were used for the Prairie du Chien Dolomite and the Jordan Sandstone, respectively.

4.2.1.1 Calibration and Sensitivity

Model quality is commonly evaluated by three different measures: calibration, sensitivity, and uncertainty analyses. Model calibration is a procedure that compares the results of a model based on estimated input values to measured or “known” values. This procedure is used to define model validity over a range of input values. The result of calibration is an assessment of the general quality of the model and the confidence that may be placed in the model results. As a matter of practice, groundwater flow models usually are calibrated using groundwater elevation and flow (if available). Sensitivity analysis quantifies the differences in model results produced by the natural variability of a particular parameter. Uncertainty analysis addresses the effects of poor data quality (lack of local detailed information or deficiencies in the data) on the model results. Together, sensitivity and uncertainty analyses are commonly used to evaluate the effects that natural variability and uncertainties in the hydrogeologic data have on the size and shape of the capture zones. In regards to the WHPA delineation, these analyses are used to document that the delineation is optimal, conservative, and protective of public health based on existing information.

4.2.1.1.1 Calibration

The regional Metro Model was calibrated to the CWI database water level targets and stream flow targets by the Metropolitan Council (2009). The calibration of the regional model was performed by applying an automated calibration procedure using PEST, a parameter estimation code that automatically adjusts the recharge rates and hydraulic conductivity values and compares modeled piezometric heads against measured values at observation well locations until a satisfactory fit is obtained.

The regional Hennepin-Carver Counties model derived from the calibrated regional Metro Model provided the boundary conditions at the head-specified cells at the boundaries of the telescopic refined model. After construction, the telescopic MODFLOW Model calibration was verified by comparing modeled head results to the static water elevations in wells that were selected from the CWI database. The selected wells were completed in the aquifers used by the city of Excelsior (i.e., Prairie du Chien-Jordan Aquifer).

4.2.1.1.2 Sensitivity Analysis

Sensitivity is the amount of change in model results caused by the variation of a particular input parameter. Because of the relative simplicity of the Metro Model, the direction and extent of the modeled capture zone may be very sensitive to any of the input parameters:

The **pumping rate** directly affects the volume of the aquifer that contributes water to the well. An increase in pumping rate leads to an equivalent increase in the volume of aquifer and an expanded capture zone, proportional to the porosity of the aquifer materials.

Results - The pumping rate defined by WHP rule requirements is the highest rate that can be expected under normal water demand. Therefore, with respect to the delineation of the WHPA, the sensitivity of the capture zone to variations in the pumping rate is minimized.

The **direction of groundwater flow** determines the orientation of the capture zone. Variations in the direction of groundwater flow will not affect the size of the capture zone but are important for defining the areas that are contributing water to the well.

Results - The ambient groundwater flow field that is defined in Figure 2 provides the basis for determining the extent to which each model run reflects the conceptual understanding of the orientation of the capture area for a well. The regional model has been calibrated to hydraulic heads, and the local refined model calibration was verified. The sensitivity of the WHPA to the direction of groundwater flow should not be significant, given the current knowledge of hydraulic head distribution in the aquifer.

The **hydraulic gradient** (along with aquifer transmissivity) determines the rate at which water moves through the aquifer materials.

Results - The regional model has been calibrated to hydraulic heads. The local refined model calibration was verified. The sensitivity of the WHPA to the direction of groundwater flow should not be significant, given the current knowledge of hydraulic head distribution in the aquifer.

The **horizontal hydraulic conductivity** influences the size and shape of the capture zone. In the base-case scenario, the hydraulic conductivity was estimated from a specific capacity test conducted at Excelsior Well 2 (205675). This value was used in the local model to delineate the 10-year time of travel capture zones. Because no pumping test was conducted on the Excelsior wells, the uncertainty of the hydraulic conductivity can be great.

Results - The impact, however, of this uncertainty on the WHPA delineation is minimal in the case of Excelsior, because the delineation of the WHPA is mostly driven by the fracture flow delineation, which was found to be much larger than the porous media delineation.

The aquifer **thickness** and **porosity** influence the size and shape of the capture zone.

Results - Decreasing either thickness or porosity causes a linear, proportional increase in the areal extent of the capture zone.

4.2.2. Fractured Rock Delineation

In addition to the porous media delineation, fracture flow capture zones were delineated using a calculated fixed radius procedure for the Prairie du Chien Group. Groundwater may move at much greater velocity in aquifers influenced by secondary porosity than in porous media aquifers. Flow directions are considerably more variable in unconfined aquifer settings influenced by fractures or conduit flow because of focused recharge. Therefore, numerical or analytical methods traditionally

used to designate capture zones for wells completed in porous media aquifers may not apply to fractured and solution-weathered bedrock aquifers. To include the increased variability in flow velocities and directions for these settings, MDH has developed the document entitled, “Guidance for Delineating Wellhead Protection Areas in Fractured and Solution-Weathered Bedrock in Minnesota” (MDH, 2005).

A fracture flow analysis is required where flow through fractures or solution-weathered features exists. Specific to the setting in Excelsior, Delineation Technique 3 of the guidance (MDH, 2005) addresses wells such as Excelsior wells that are open to both a porous media aquifer and a fractured or solution-weathered aquifer. The delineation involved using 1) a groundwater model for the porous media Jordan Aquifer, and 2) a calculated fixed-radius capture zone for the Prairie du Chien Aquifer, which exhibits secondary porosity.

All calculated fixed radii were modified for 1) upgradient flow, and 2) uncertainty in the flow direction using the MDH ArcFlow routine.

4.2.3. Composite Delineations

The WHPA for the city of Excelsior Well 1 (205674), Well 2 (205675), and Well 3 (232336) in Figure 5 consists of a composite of the porous media aquifer delineation and the fractured rock delineation. The input files for all models are available upon request at MDH.

4.2.4. Addressing Model Uncertainty

Using computer models to simulate groundwater flow necessarily involves representing a complicated natural system in a simplified manner. Local geologic conditions may vary within the capture area of the Excelsior wells, but existing information is not sufficiently detailed to define this degree of variability. In addition, the available groundwater flow modeling techniques may not represent the natural flow system exactly, but the results are valid within a range defined by the reasonable variation of input parameters.

Traditional numerical groundwater models were used to delineate the capture zone for the porous media aquifer that contributes water to the public water supply wells. The secondary porosity in the Prairie du Chien Group provided the greatest uncertainty because there is little detailed information to understand the orientation of the joints and the degree to which the void spaces are interconnected.

A porous media flow model was developed for comparison. In most cases, the fracture flow delineation technique ultimately resulted in a much larger contribution area in comparison to the capture zone calculated from a porous media flow model. Thus, there was no need to perform a sensitivity analysis for the porous media capture zone delineations.

Specific to the hydrogeological conditions in Excelsior, there is insufficient information available to address location and orientation of fractures in the bedrock. Therefore, the influence that these fractures have on groundwater flow directions and velocities within the Prairie du Chien Aquifer is undefined. Another large uncertainty is the source of recharge to the aquifer. The most likely source is focused recharge through coarse alluvial sediments in the stream valleys. Other potential sources also may be unsealed or improperly constructed wells that cross-connect aquifer layers.

The uncertainty associated with the fracture flow delineation results from the lack of local detailed information mentioned above and the fact that the fractured rock procedure cannot be calibrated. The measures employed for this delineation to address the uncertainty of the wells' capture areas are listed below:

- Pumping Rate - For each well, a maximum historical (five-year) pumping rate or an engineering estimate of future pumping, whichever is greater (Minnesota Rules, part 4720.5510, subpart 4).
- Ambient Flow Field - Uncertainty in the groundwater flow field was accounted for by creating a composite of capture zones from angles of flow that were 10 degrees greater and 10 degrees lesser than the representative angle of ambient flow (Minnesota Rules, part 4720.5510, subpart 5 B2).
- Aquifer Thickness - The smaller open-hole interval of the wells was used rather than a representative thickness of the aquifer. Using this value rather than the aquifer thickness results in a more conservative well capture zone.
- Porosity - A reasonably low value for porosity, listed in Table 3, was used to address variability in aquifer composition, resulting in a more conservative well capture zone.
- All calculated fixed radii were modified for 1) upgradient flow, and 2) uncertainty in the flow direction. The WHPA for Excelsior Well 1 (205674), Well 2 (205675), and Well 3 (232336) consists of a composite of the porous media aquifer delineation and the fractured rock delineation (Figure 5).

This provides a conservative approach to addressing model uncertainty and produces a WHPA that will likely be most protective of public health.

5. Delineation of the Drinking Water Supply Management Area

The boundaries of the DWSMAs were defined by the public water supplier using the following features (Figure 1):

- Center-lines of highways, streets, roads, or railroad rights-of-ways;
- Public Land Survey coordinates;
- Property or fence lines; and
- Political boundaries.

6. Vulnerability Assessments

The Part I wellhead protection plan includes the vulnerability assessments for the public water supply wells and DWSMA. These vulnerability assessments are used to help define potential contamination sources within the DWSMA and to select appropriate measures for reducing the risk that they present to the public water supply.

6.1 Assessment of Well Vulnerability

The wells are nonvulnerable; this assessment is based upon the following conditions:

- 1) Well construction and, more specifically, grouting information is not known at the city of Excelsior wells, and the wells may not be up to code. However, based on water quality results, the borehole integrity does not appear to be compromised in any of the wells.
- 2) The geologic conditions at the well sites include a cover of clay-rich geologic materials over the aquifers, that is sufficient to retard or prevent the vertical movement of contaminants.
- 3) None of the human-caused contaminants regulated under the federal Safe Drinking Water Act have been detected at levels indicating that any well serves to draw contaminants into the aquifers as a result of pumping.
- 4) Water samples were collected from Excelsior Well 1 (205674), and Excelsior Well 3 (232336) on October 4, 2011, and are being analyzed for tritium to confirm the nonvulnerable status. The results are not yet available.

6.2 Assessment of the Drinking Water Supply Management Area Vulnerability

The vulnerability of the DWSMA is low to moderate and is based upon the following information:

- 1) Water chemistry data from wells located within the DWSMA indicate that the aquifers contain water that has no detectable levels of human-caused contamination.
- 2) Review of the geologic logs contained in the CWI database and geological maps and reports indicate that the aquifers exhibit a low to moderate geologic sensitivity throughout the DWSMA. The L-scores from wells in the area vary from 0 to 12, indicating that 0 to 120 feet of clayey material overlies the Prairie du Chien/Jordan Aquifer (Figure 6). In addition, the static water levels in those wells are more than 50 feet lower than Lake Minnetonka's average water level, further corroborating that the deep aquifers are not in direct connection with the lake. The Prairie du Chien/Jordan Aquifer used by Excelsior is, therefore, isolated from the direct vertical recharge of surface water.

7. Selected References

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Figures

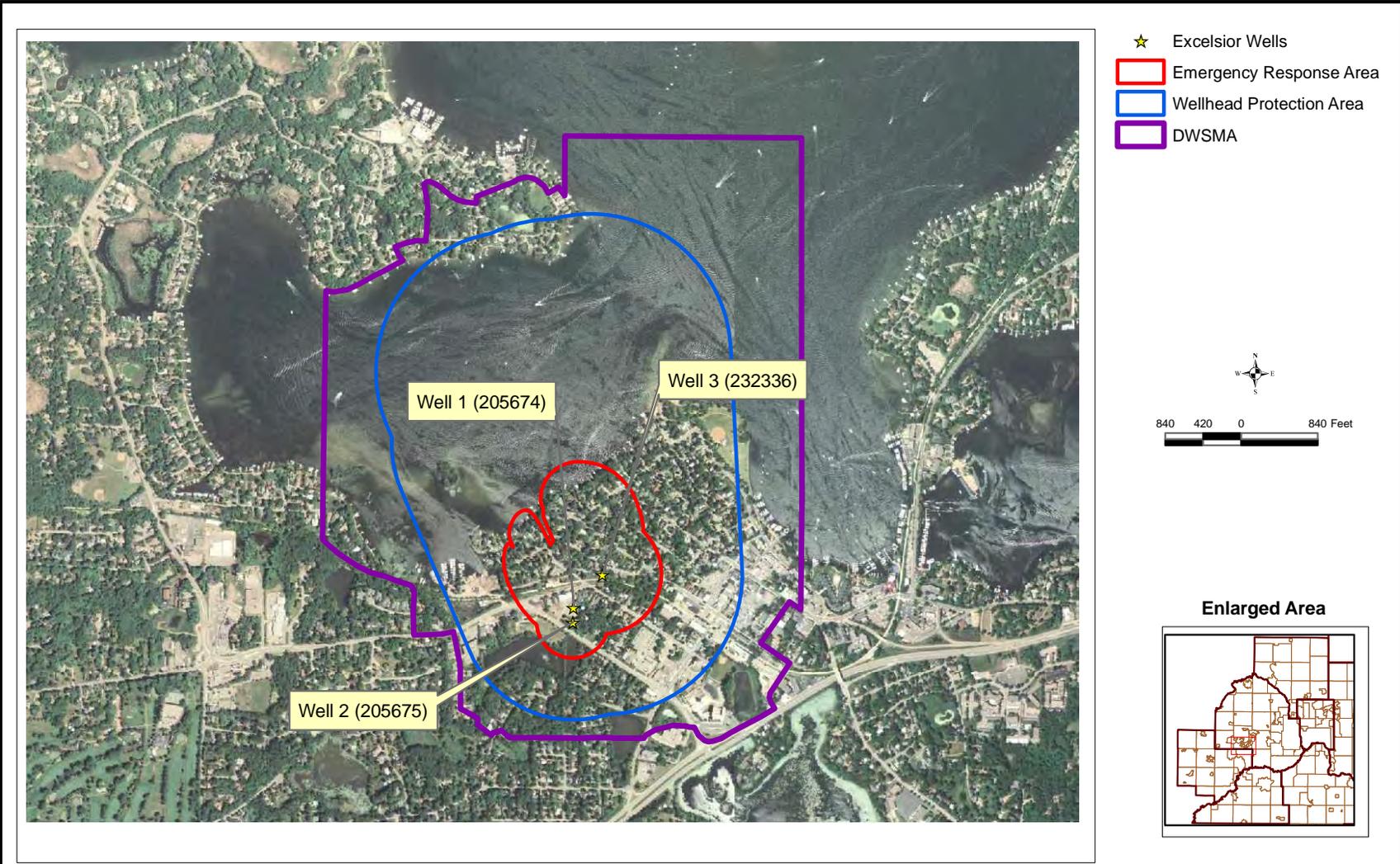


Figure 1
 Drinking Water Supply Management Area
 (Excelsior, MN)

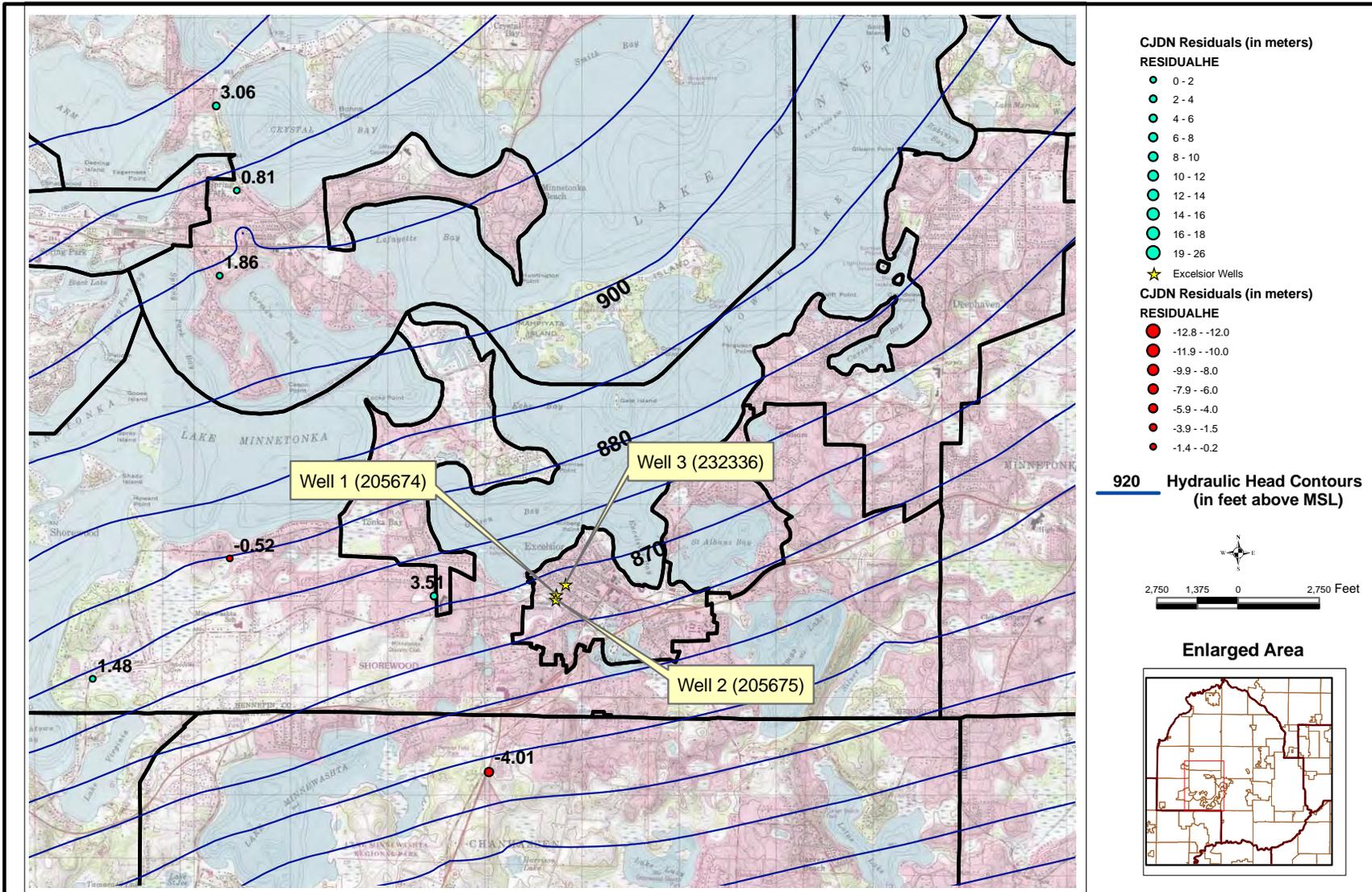
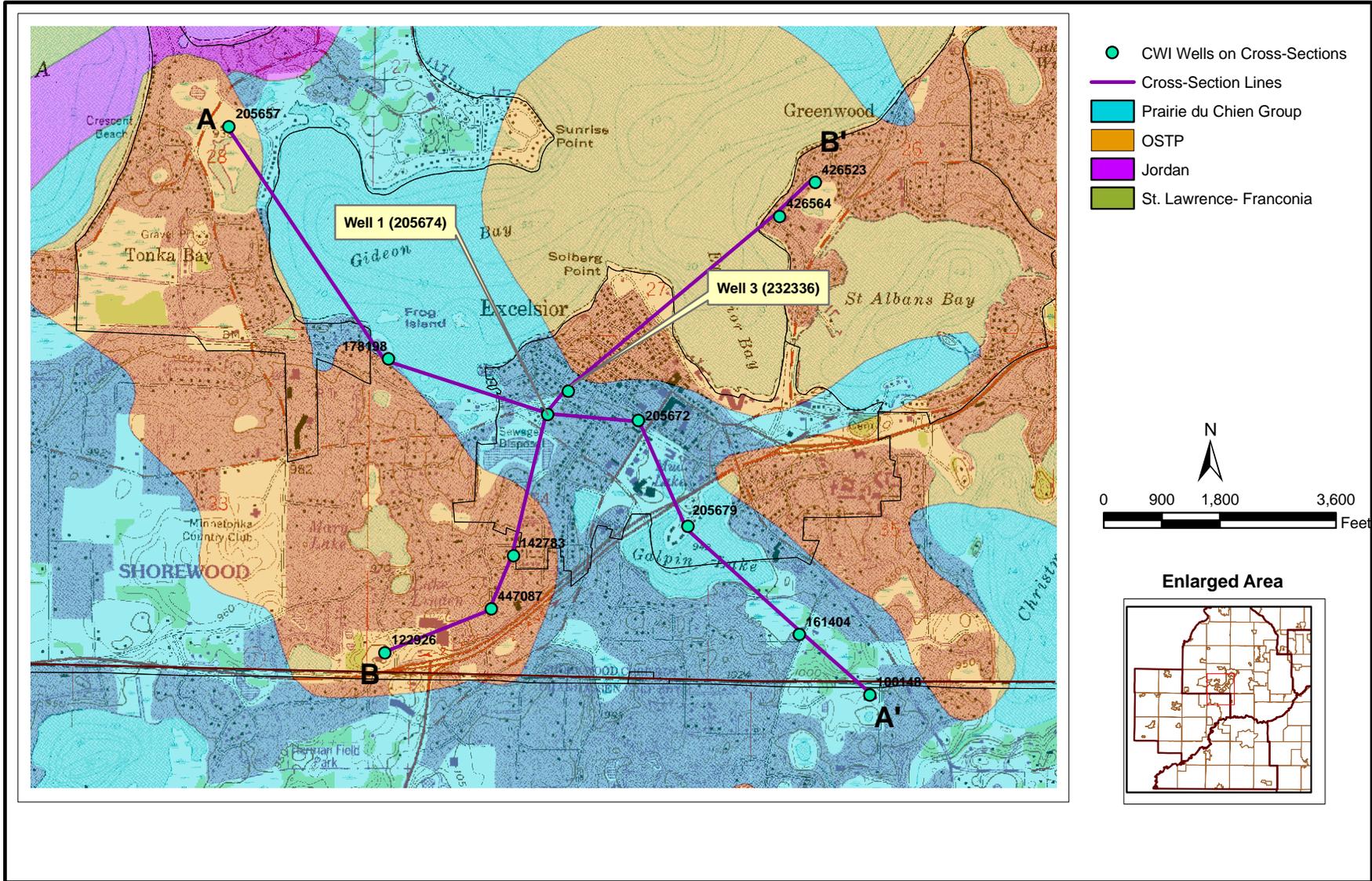


Figure 2
Modeled Groundwater Flow Field and Spatial Distribution of Modeling Errors
Jordan Sandstone Aquifer
(Excelsior, MN)



- CWI Wells on Cross-Sections
- Cross-Section Lines
- Prairie du Chien Group
- OSTP
- Jordan
- St. Lawrence- Franconia

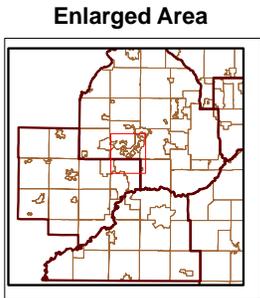
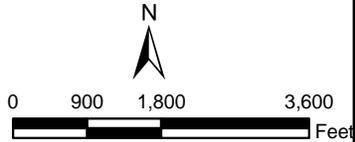
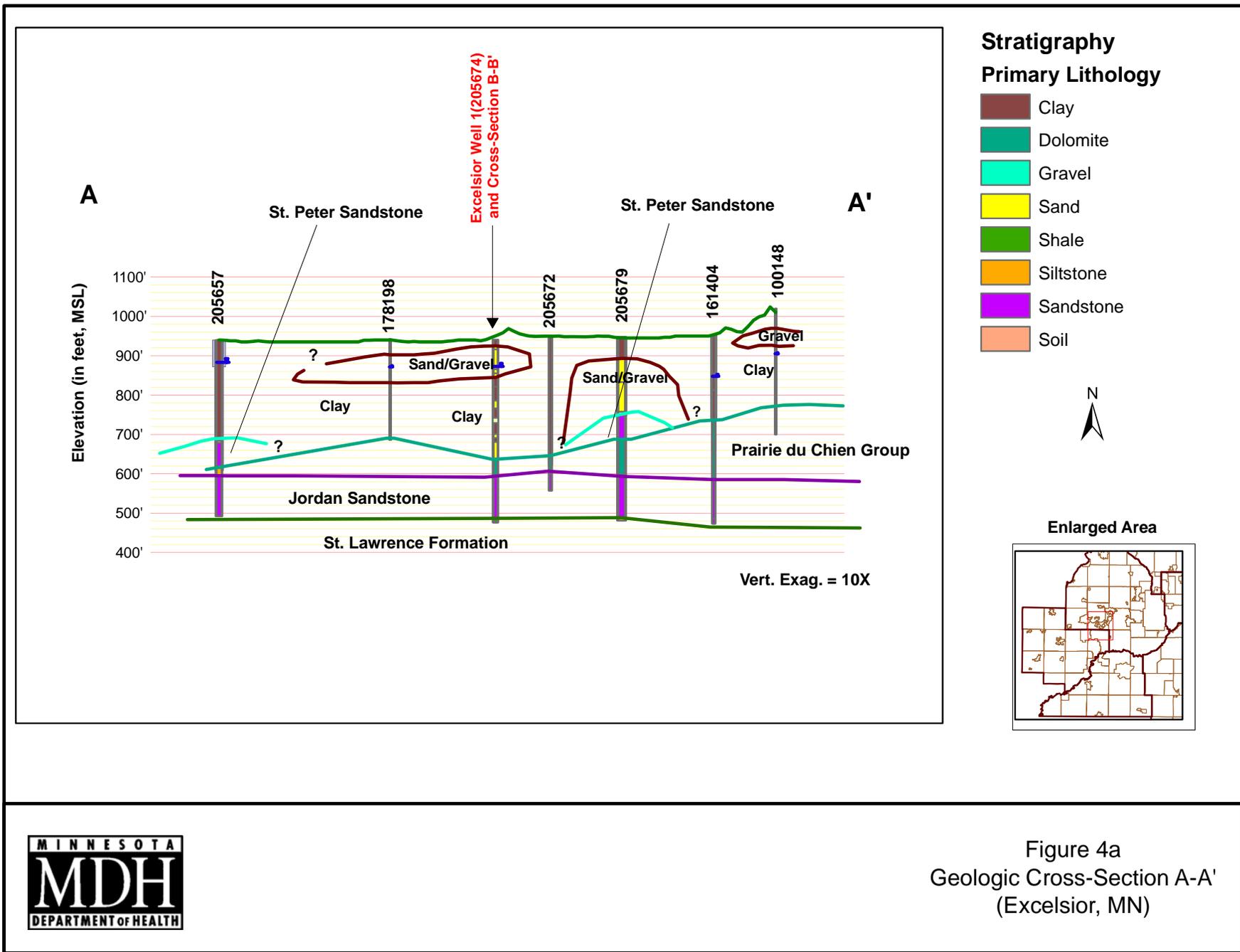


Figure 3
Geologic Cross-Section Locations
(Excelsior, MN)



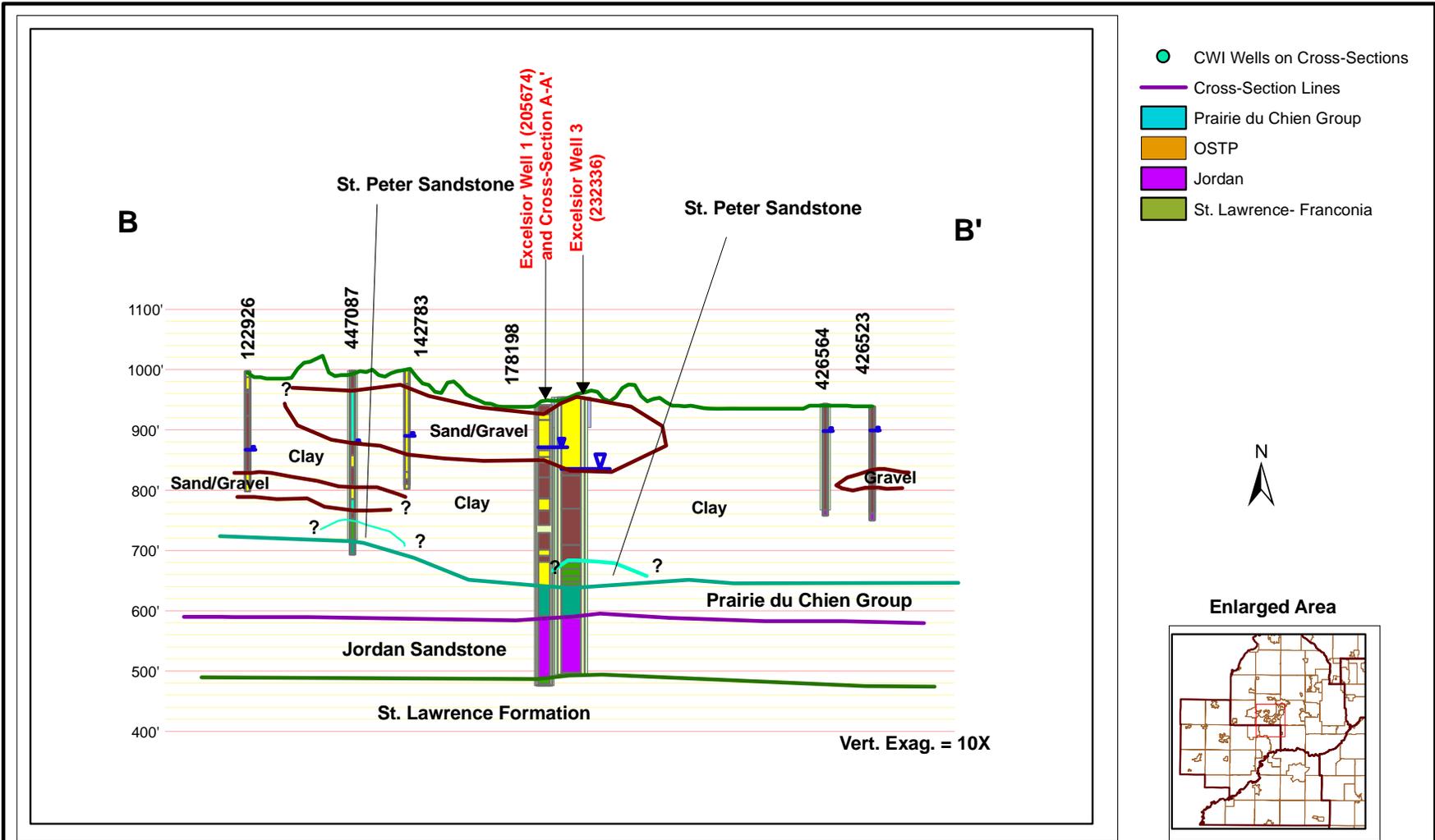
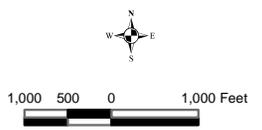
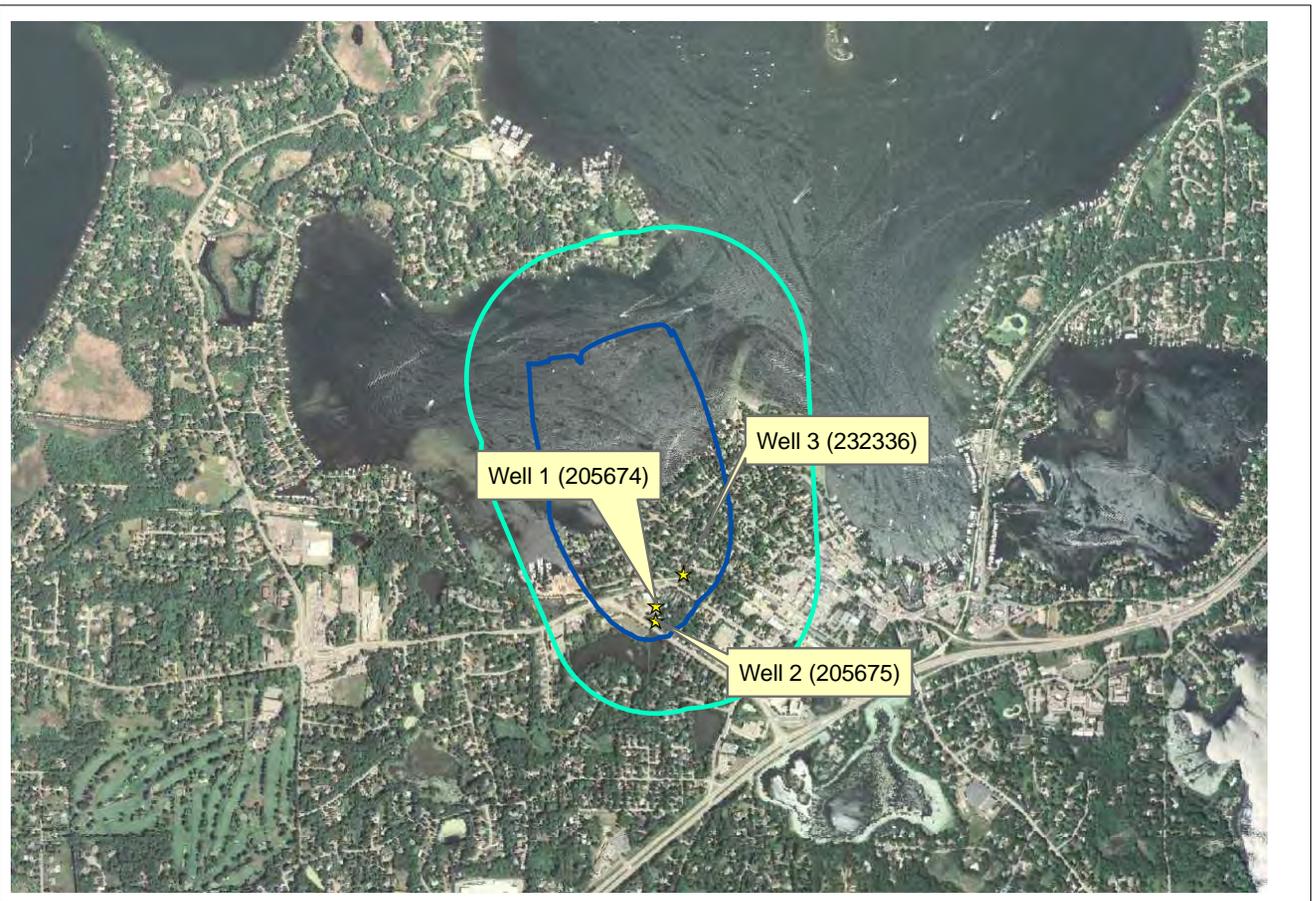
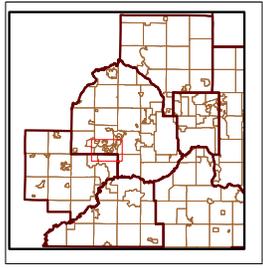


Figure 4b
Geologic Cross-Section B-B'
(Excelsior, MN)



Enlarged Area



- ★ Excelsior Wells
- ▭ 10-yr Capture Zone - Porous Media Delineation
- ▭ 10-yr Capture Zone - Fracture Flow Delineation



Figure 5
10-Yr Capture Zone Delineation
(Excelsior, MN)



Geologic Sensitivity

- H
- L (1-3)
- L (4-7)
- M
- VL (8-11)
- VL (>12)
- ★ Excelsior Wells

DWSMA Vulnerability

- L: Low
- M: Moderate

883: Water Elevation in the Prairie du Chien/Jordan Aquifer



1,100 550 0 1,100 Feet

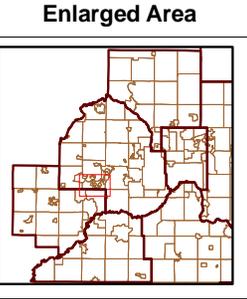


Figure 6
 Drinking Water Supply Management Area Vulnerability
 (Excelsior, MN)

Appendix D- Supporting Documents

CONSUMER CONFIDENCE REPORT

PWSID: 1270012

City of Excelsior 2013 Drinking Water Report

The City of Excelsior is issuing the results of monitoring done on its drinking water for the period from January 1 to December 31, 2013. The purpose of this report is to advance consumers' understanding of drinking water and heighten awareness of the need to protect precious water resources.

Source of Water

The City of Excelsior provides drinking water to its residents from a groundwater source: three wells ranging from 448 to 465 feet deep, that draw water from the Prairie Du Chien-Jordan aquifer.

The water provided to customers may meet drinking water standards, but the Minnesota Department of Health has also made a determination as to how vulnerable the source of water may be to future contamination incidents. If you wish to obtain the entire source water assessment regarding your drinking water, please call 651-201-4700 or 1-800-818-9318 (and press 5) during normal business hours. Also, you can view it on line at www.health.state.mn.us/divs/eh/water/swp/swa.

Call Dave Wisdorf, Public Works Superintendent at 952-653-3676 if you have questions about the City of Excelsior drinking water or would like information about opportunities for public participation in decisions that may affect the quality of the water.

Results of Monitoring

No contaminants were detected at levels that violated federal drinking water standards. However, some contaminants were detected in trace amounts that were below legal limits. The table that follows shows the contaminants that were detected in trace amounts last year. (Some contaminants are sampled less frequently than once a year; as a result, not all contaminants were sampled for in 2013. If any of these contaminants were detected the last time they were sampled for, they are included in the table along with the date that the detection occurred.)

Key to abbreviations:

MCLG—Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

MCL—Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

MRDL—Maximum Residual Disinfectant Level.

MRDLG—Maximum Residual Disinfectant Level Goal.

AL—Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirement which a water system must follow.

90th Percentile Level—This is the value obtained after disregarding 10 percent of the samples taken that had the highest levels. (For example, in a situation in which 10 samples were taken, the 90th percentile level is determined by disregarding the highest result, which represents 10 percent of the samples.) Note: In situations in which only 5 samples are taken, the average of the two with the highest levels is taken to

CONSUMER CONFIDENCE REPORT

PWSID: 1270012

determine the 90th percentile level.

ppm—Parts per million, which can also be expressed as milligrams per liter (mg/l).

ppb—Parts per billion, which can also be expressed as micrograms per liter (µg/l).

N/A—Not Applicable (does not apply).

Contaminant (units)	MCLG	MCL	Level Found		Typical Source of Contaminant
			Range (2013)	Average /Result*	
Fluoride (ppm)	4	4	.91-1.4	1.23	State of Minnesota requires all municipal water systems to add fluoride to the drinking water to promote strong teeth; Erosion of natural deposits; Discharge from fertilizer and aluminum factories.
Haloacetic Acids (HAA5) (ppb)	0	60	5-5.5	5.5	By-product of drinking water disinfection.
TTHM (Total trihalomethanes) (ppb)	0	80	12.1-17.7	17.7	By-product of drinking water disinfection.
Xylenes (ppm)	10	10	N/A	.0003	Discharge from petroleum factories; Discharge from chemical factories.

*This is the value used to determine compliance with federal standards. It sometimes is the highest value detected and sometimes is an average of all the detected values. If it is an average, it may contain sampling results from the previous year.

Contaminant (units)	MRDLG	MRDL	****	*****	Typical Source of Contaminant
Chlorine (ppm)	4	4	.2-.6	.55	Water additive used to control microbes.

****Highest and Lowest Monthly Average.

*****Highest Quarterly Average.

Contaminant (units)	MCLG	AL	90% Level	# sites over AL	Typical Source of Contaminant
Copper (ppm)	1.3	1.3	.1	0 out of 10	Corrosion of household plumbing systems; Erosion of natural deposits.
Lead (ppb)	0	15	2.5	0 out of 10	Corrosion of household plumbing systems; Erosion of natural deposits.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. City of Excelsior is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>.

CONSUMER CONFIDENCE REPORT

PWSID: 1270012

Monitoring may have been done for additional contaminants that do not have MCLs established for them and are not required to be monitored under the Safe Drinking Water Act. Results may be available by calling 651-201-4700 or 1-800-818-9318 during normal business hours.

Compliance with National Primary Drinking Water Regulations

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the U. S. Environmental Protection Agency (EPA) prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at 1-800-426-4791.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline at 1-800-426-4791.



**MINNESOTA DEPARTMENT OF HEALTH
SECTION OF DRINKING WATER PROTECTION
SWP Vulnerability Rating**



625 Robert St. N. St. Paul MN 55155
P.O. Box 64975 St. Paul MN 55164 - 0975

PWSID: 1270012
SYSTEM NAME: Excelsior
WELL NAME: Well #1

TIER: 2
WHP RANK:
UNIQUE WELL #: 00205674

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 23 W SECTION: 34 QUARTERS: BADD

<u>CRITERIA</u>	<u>DESCRIPTION</u>	<u>POINTS</u>
Aquifer Name(s)	: Prairie Du Chien-Jordan	
DNR Geologic Sensitivity Rating	: Very low	10
L Score	: 8	
Geologic Data From	: Well Record	
Year Constructed	: 1957	
Construction Method	: Cable Tool/Bored	0
Casing Depth	: 303	5
Well Depth	: 465	
Casing grouted into borehole?	Unknown	0
Cement grout between casings?	Not applicable	0
All casings extend to land surface?	Yes	0
Gravel - packed casings?	Unknown	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	No	0
Isolation distance violations?		0
Pumping Rate	: 400	5
Pathogen Detected?		0
Surface Water Characteristics?		0
Maximum nitrate detected	: <.05 08/26/2014	0
Maximum tritium detected	: 5.4 10/04/2011	VULNERABLE
Non-THMS VOCs detected?		0
Pesticides detected?		0
Carbon 14 age	: Unknown	0
Wellhead Protection Score	:	20
Wellhead Protection Vulnerability Rating	:	VULNERABLE
Vulnerability Overridden	:	

COMMENTS



**MINNESOTA DEPARTMENT OF HEALTH
SECTION OF DRINKING WATER PROTECTION
SWP Vulnerability Rating**



625 Robert St. N. St. Paul MN 55155
P.O. Box 64975 St. Paul MN 55164 - 0975

PWSID: 1270012
SYSTEM NAME: Excelsior
WELL NAME: Well #2

TIER: 2
WHP RANK:
UNIQUE WELL #: 00205675

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 23 W SECTION: 34 QUARTERS: BADD

<u>CRITERIA</u>	<u>DESCRIPTION</u>	<u>POINTS</u>
Aquifer Name(s)	: Prairie Du Chien-Jordan	
DNR Geologic Sensitivity Rating	: Very low	15
L Score	: 7	
Geologic Data From	: Well Record	
Year Constructed	: 1957	
Construction Method	: Cable Tool/Bored	0
Casing Depth	: 290	5
Well Depth	: 448	
Casing grouted into borehole?	Unknown	0
Cement grout between casings?	Not applicable	0
All casings extend to land surface?	Yes	0
Gravel - packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	No	0
Isolation distance violations?		0
Pumping Rate	: 400	5
Pathogen Detected?		0
Surface Water Characteristics?		0
Maximum nitrate detected	: <1 01/01/1969	0
Maximum tritium detected	: Unknown	0
Non-THMS VOCs detected?		0
Pesticides detected?		0
Carbon 14 age	: Unknown	0
Wellhead Protection Score	:	25
Wellhead Protection Vulnerability Rating	:	NOT VULNERABLE
Vulnerability Overridden	:	

COMMENTS



**MINNESOTA DEPARTMENT OF HEALTH
SECTION OF DRINKING WATER PROTECTION
SWP Vulnerability Rating**



625 Robert St. N. St. Paul MN 55155
P.O. Box 64975 St. Paul MN 55164 - 0975

PWSID: 1270012
SYSTEM NAME: Excelsior
WELL NAME: Well #3

TIER: 2
WHP RANK:
UNIQUE WELL #: 00232336

COUNTY: Hennepin TOWNSHIP NUMBER: 117 RANGE: 23 W SECTION: 34 QUARTERS: ABCB

<u>CRITERIA</u>	<u>DESCRIPTION</u>	<u>POINTS</u>
Aquifer Name(s)	: Prairie Du Chien-Jordan	
DNR Geologic Sensitivity Rating	: Medium	25
L Score	: 0	
Geologic Data From	: Well Record	
Year Constructed	: 1973	
Construction Method	: Cable Tool/Bored	0
Casing Depth	: 310	5
Well Depth	: 460	
Casing grouted into borehole?	Unknown	0
Cement grout between casings?	Unknown	5
All casings extend to land surface?	Yes	0
Gravel - packed casings?	No	0
Wood or masonry casing?	No	0
Holes or cracks in casing?	No	0
Isolation distance violations?		0
Pumping Rate	: 800	10
Pathogen Detected?		0
Surface Water Characteristics?		0
Maximum nitrate detected	: .1 01/01/1977	0
Maximum tritium detected	: 12.3 10/04/2011	VULNERABLE
Non-THMS VOCs detected?		0
Pesticides detected?		0
Carbon 14 age	: Unknown	0
Wellhead Protection Score	:	45
Wellhead Protection Vulnerability Rating	:	VULNERABLE
Vulnerability Overridden	:	

COMMENTS

Medium sensitivity rating does not include basal St. Peter.

Dave Wisdorf

From: Eric C. Lund [ELund@barr.com]
Sent: Thursday, December 20, 2012 9:36 AM
To: Dave Wisdorf
Cc: Kevin Eisen
Subject: RE: Monitoring Well Abandonment Timing
Attachments: MW-103 complete.JPG

Good morning, Dave. The operation ran smoothly. We were able to pull out the well materials (including casings and posts) without doing any digging so there is very little disturbed area.

For restoration, we added Earthgro-brand topsoil to each location. The topsoil added in the garden area is 2-3 feet deep. Note that it was only added inside the borehole to match the existing grade.

We'll prepare a brief summary letter that includes a photo log. Attached is a photo following abandonment well within the garden plots.

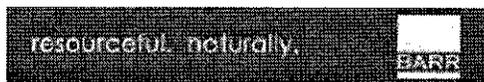
If you have any other questions, let us know.

Thanks,

Eric

Eric C. Lund, PE

Environmental Engineer
Minneapolis office: 952.832.2974
cell: 612.207.7187
elund@barr.com
www.barr.com



From: Dave Wisdorf [mailto:dwisdorf@ci.excelsior.mn.us]
Sent: Wednesday, December 19, 2012 1:41 PM
To: Eric C. Lund
Subject: RE: Monitoring Well Abandonment Timing

Eric,

How did the operation turn out? What depth is the soil around the well abandoned inside the gardens?

From: Eric C. Lund [mailto:ELund@barr.com]
Sent: Wednesday, December 12, 2012 2:47 PM
To: Dave Wisdorf
Subject: RE: Monitoring Well Abandonment Timing

Dave,

12/21/2012

Fowler
pl/co

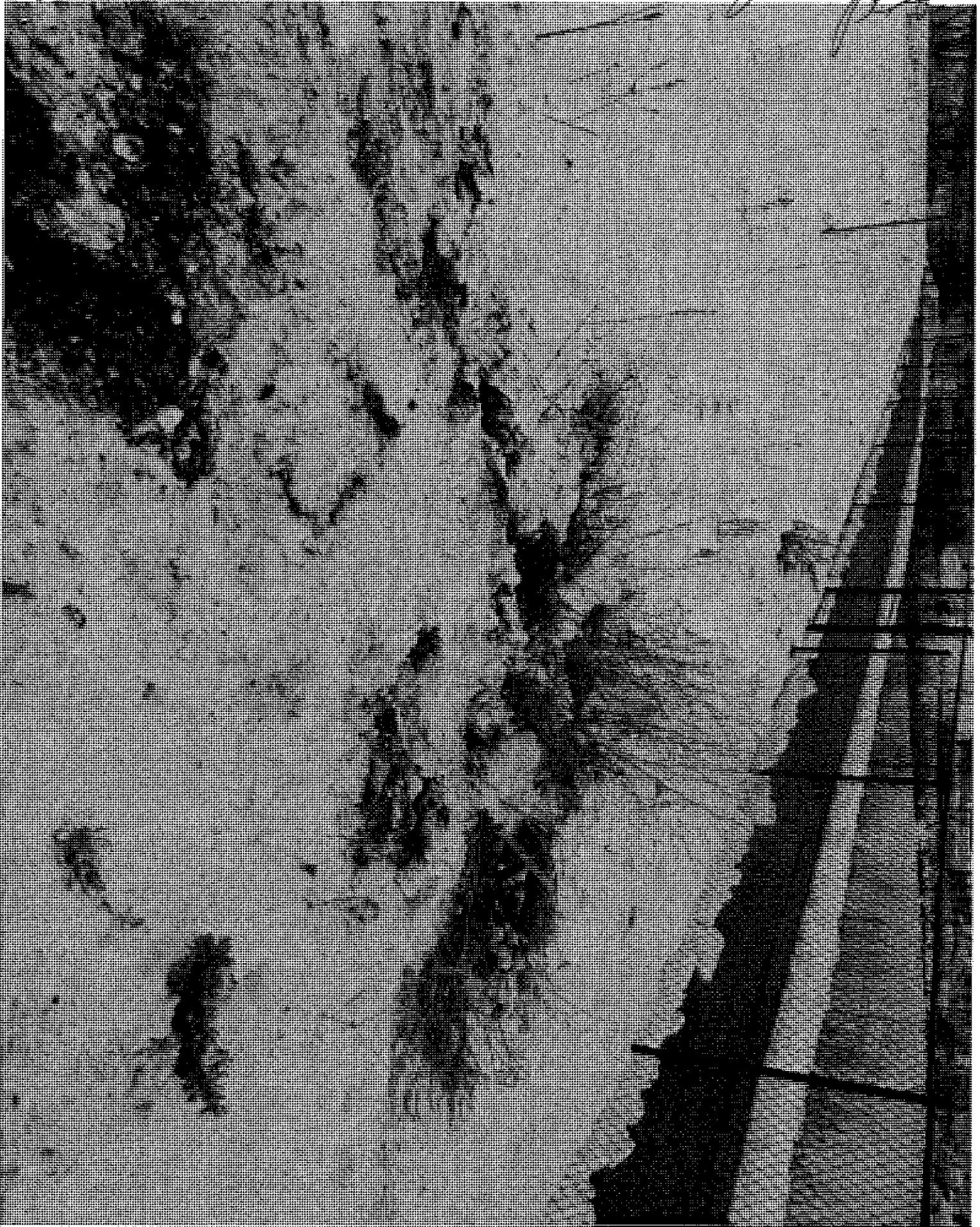
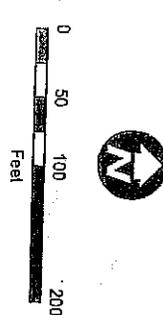




Figure 3
PROPOSED MONITORING
WELL LOCATIONS
Excelsior, Minnesota

- ⊙ Proposed Monitoring Well Location
- ▬ Approximate Property Boundary
- ▬ Approximate Parcel Boundary
- ⊠ Approximate Dump Extent Boundary
- ⊠ Area Unaccessible During Site Visit
- ⊠ Approximate Athletic Field/Footley Risk Boundary
- ▬ Approximate City Boundary
- Property Features
- Hydrant

Note: Proposed monitoring well locations are approximate based on utility locations and field conditions.



1 inch = 100 feet



Figure 3

**PROPOSED MONITORING
WELL LOCATIONS
Excelsior, Minnesota**

- Proposed Monitoring Well Location
- ▬ Approximate Property Boundary
- ▬ Approximate Parcel Boundary
- ▬ Approximate Dump Extent Boundary
- ⊗ Area Unaccessible During Site Visit
- Approximate Athletic Field/Hockey Rink Boundary
- Approximate City Boundary
- Property Features
- Hydrant

Note: Proposed monitoring well locations are approximate based on utility locations and field conditions.



1 inch = 100 feet



BARR



**PROPOSED MONITORING WELL LOCATIONS
Excelsior, Minnesota**

Figure 3

- ⊙ Proposed Monitoring Well Location
- ▬ Approximate Property Boundary
- ▬ Approximate Parcel Boundary
- ⊗ Approximate Dump Extent Boundary
- ⊗ Area Unaccessible During Site Visit
- ⊗ Approximate Athletic Field/Hockey Risk Boundary
- Approximate City Boundary
- Property Features
- Hydrant

Note: Proposed monitoring well locations are approximate based on utility locations and field conditions.



1 Inch = 100 feet



WELL OR BORING LOCATION
 County Name
Hennepin

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING SEALING RECORD
 Minnesota Statutes, Chapter 103I

Minnesota Well and Boring Sealing No.
 Minnesota Unique Well No. or W-series No.
 (Leave blank if not known)

H 308821
762584

Township Name Excelsior	Township No. 117N	Range No. 23W	Section No. 34	Fraction (sm. → lg.) NE SW NW	Date Sealed Dec. 17, 2012	Date Well or Boring Constructed Feb. 17, 2009
-----------------------------------	-----------------------------	-------------------------	--------------------------	---	-------------------------------------	---

GPS LOCATION: Latitude _____ degrees _____ minutes _____ seconds
 Longitude _____ degrees _____ minutes _____ seconds

Depth Before Sealing **15** ft. Original Depth **15** ft.

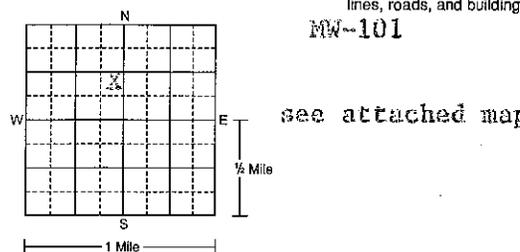
AQUIFER(S)
 Single Aquifer Multi-aquifer

WELL/BORING
 Water-Supply Well Monit. Well
 Env. Bore Hole Other _____

Numerical Street Address or Fire Number and City of Well or Boring Location
160 Oak St, Excelsior

STATIC WATER LEVEL
 Measured Estimated Date Measured **12/17/12**

Show exact location of well or boring in section grid with "X". Sketch map of well or boring location, showing property lines, roads, and buildings.



CASING TYPE(S)
 Steel Plastic Tile Other _____

WELLHEAD COMPLETION

Outside: Well House At Grade Pileless Adapter/Unit Well Pit Other **cover pipe**

Inside: Basement Offset Well Pit Buried Other _____

PROPERTY OWNER'S NAME/COMPANY NAME
City of Excelsior

CASING(S)
 Diameter _____ in. from **0** to **5** ft. Set in oversized hole? Yes No Annular space initially grouted? Yes No Unknown

Property owner's mailing address if different than well location address indicated above
339 Third St

Excelsior, MN 55331

_____ in. from _____ to _____ ft. Yes No Yes No Unknown

_____ in. from _____ to _____ ft. Yes No Yes No Unknown

WELL OWNER'S NAME/COMPANY NAME
Hennepin County Environmental Svc.

SCREEN/OPEN HOLE
 Screen from **5** to **15** ft. Open Hole from _____ to _____ ft.

Well owner's mailing address if different than property owner's address indicated above
417 N 5th St

Minneapolis, MN 55401

OBSTRUCTIONS
 Rods/Drop Pipe Check Valve(s) Debris Fill No Obstruction

Type of Obstructions (Describe) _____

Obstructions removed? Yes No Describe _____

PUMP
 Type _____
 Removed Not Present Other _____

METHOD USED TO SEAL ANNULAR SPACE BETWEEN 2 CASINGS, OR CASING AND BORE HOLE:

No Annular Space Exists Annular Space Grouted with Tremie Pipe Casing Perforation/Removal

_____ in. from _____ to _____ ft. Perforated Removed

_____ in. from _____ to _____ ft. Perforated Removed

Type of Perforator _____

Other _____

GROUTING MATERIAL(S) (One bag of cement = 94 lbs., one bag of bentonite = 50 lbs.)

Grouting Material **neat cement** from **0** to **15** ft. _____ yards **1/2** bags

_____ from _____ to _____ ft. _____ yards _____ bags

_____ from _____ to _____ ft. _____ yards _____ bags

OTHER WELLS AND BORINGS
 Other unsealed and unused well or boring on property? Yes No How many? _____

LICENSED OR REGISTERED CONTRACTOR CERTIFICATION
 This well or boring was sealed in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

Stevens Drilling & Env. Svc., Inc. **2255**

Licensee Business Name License or Registration No.

[Signature] **556** **12/18/12**

Certified Representative Signature Certified Rep. No. Date

Tim Stevens

Name of Person Sealing Well or Boring

LOCAL COPY **H 308821**

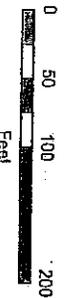
Figure 3

**PROPOSED MONITORING
WELL LOCATIONS
Excelsior, Minnesota**



- ⊙ Proposed Monitoring Well Location
- ▬ Approximate Property Boundary
- ▬ Approximate Parcel Boundary
- ⊠ Area Unaccessible During Site Visit
- ⊠ Approximate Athletic Field/Hockey Rink Boundary
- ⊠ Approximate City Boundary
- Property Features
- ⊠ Hydrant

Note: Proposed monitoring well locations are approximate based on utility locations and field conditions.



BARR

1 inch = 100 feet

Figure 3

**PROPOSED MONITORING
WELL LOCATIONS
Excelsior, Minnesota**

- Proposed Monitoring Well Location
- ▬ Approximate Property Boundary
- ▬ Approximate Parcel Boundary
- ▬ Approximate Dump Extent Boundary
- ⊗ Area Unaccessible During Site Visit
- Approximate Athletic Field/hockey Rink Boundary
- Approximate City Boundary
- Property Features
- Hydrant

Note: Proposed monitoring well locations are approximate based on utility locations and field conditions.



1 inch = 100 feet



Barr

WELL OR BORING LOCATION

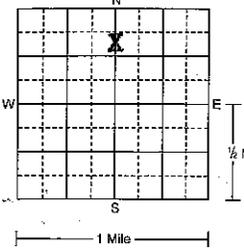
County Name
Hennepin

Township Name **Excelsior** Township No. **117N** Range No. **23W** Section No. **34** Fraction **SE NE NW 1/4**

GPS LOCATION: Latitude _____ degrees _____ minutes _____ seconds _____
Longitude _____ degrees _____ minutes _____ seconds _____

House Number, Street Name, City, and Zip Code of Well Location
located on trail approx 300' E of Oak St & 100' N of Beehrie, Excelsior

Show exact location of well/boring in section grid with "X." Sketch map of well/boring location. Showing property lines, roads, buildings, and direction.



MW-104

see attached map

PROPERTY OWNER'S NAME/COMPANY NAME
Hennepin County Regional Railroad Authority

Property owner's mailing address if different than well location address indicated above.
**417 N 5th St
Minneapolis, MN 55401**

WELL OWNER'S NAME/COMPANY NAME
Hennepin County Environmental Services

Well/boring owner's mailing address if different than property owner's address indicated above.
**417 N 5th St
Minneapolis, MN 55401**

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
top soil	black		0	2
silty sand	tan		2	16

REMARKS, ELEVATION, SOURCE OF DATA, etc.

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
Minnesota Statutes, Chapter 1031

MINNESOTA UNIQUE WELL AND BORING NO.

762581

WELL/BORING DEPTH (completed) **16** ft. DATE WORK COMPLETED **Feb. 17, 2009**

DRILLING METHOD
 Cable Tool Driven Dug
 Auger Rotary Jetted

DRILLING FLUID _____ WELL HYDROFRACTURED? Yes No
From _____ ft. To _____ ft.

USE
 Domestic Monitoring Heating/Cooling
 Noncommunity PWS Environ. Bore Hole Industry/Commercial
 Community PWS Irrigation Remedial
 Elevator Dewatering _____

CASING MATERIAL Drive Shoe? Yes No
 Steel Threaded Welded
 Plastic _____

CASING Diameter _____ Weight _____ Specifications _____
2 in. to **6** ft. _____ lbs./ft. _____
8 1/2 in. to **16** ft. _____ lbs./ft. _____

SCREEN Make **Johnson** OPEN HOLE From _____ ft. To _____ ft.
Type **PVC** Diam. **2"**
Slot/Gauze **10** Length **10'**
Set between **6** ft. and **16** ft. FITTINGS **thread**

STATIC WATER LEVEL Measured from **grade**
12 ft. Below Above land surface Date measured **2/17/09**

PUMPING LEVEL (below land surface) _____ ft. after _____ hrs. pumping **1/4** g.p.m.

WELLHEAD COMPLETION
 Pileless/adaptor manufacture _____ Model _____
 Casing Protection **6" x 6'** **24"** above grade
 At-grade (Environmental Well and Boring ONLY)

GROUTING INFORMATION
Well grouted Yes No
Grout materials Neat cement Bentonite Concrete Other _____
From **0** To **4** ft. **1 1/2** Yds. Bags
From _____ To _____ ft. _____ Yds. Bags
From _____ To _____ ft. _____ Yds. Bags

NEAREST KNOWN SOURCE OF CONTAMINATION _____ feet _____ direction _____ type

Well disinfected upon completion? Yes No

PUMP
 Not installed Date installed _____
Manufacturer's name _____
Model Number _____ HP _____ Volts _____
Length of drop pipe _____ ft. Capacity _____ g.p.m.
Type: Submersible L.S. Turbine Reciprocating Jet _____

ABANDONED WELLS
Does property have any not in use and not sealed well(s)? Yes No

VARIANCE
Was a variance granted from the MDH for this well? Yes No TN# _____

WELL CONTRACTOR CERTIFICATION
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

Stevens Drilling & Env. Svc. Inc. 2255
Licensee Business Name Lic. or Reg. No.
 556 2/23/09
Certified Representative Signature Certified Rep. No. Date
Randy Johnson
Name of Driller

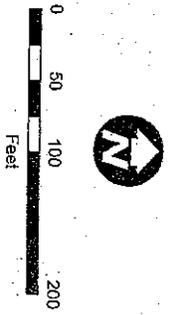
LOCAL COPY 762581



Figure 3
PROPOSED MONITORING WELL LOCATIONS
 Excelsior, Minnesota

- ⊙ Proposed Monitoring Well Location
- ▬ Approximate Property Boundary
- ▬ Approximate Parcel Boundary
- ▬ Approximate Dump Extent Boundary
- ⊗ Area Unaccessible During Site Visit
- ⊔ Approximate Athletic Field/Hockey Rink Boundary
- Approximate City Boundary
- Property Features
- Hydrant

Note: Proposed monitoring well locations are approximate based on utility locations and field conditions.

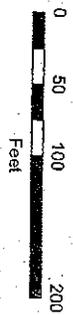


**PROPOSED MONITORING WELL LOCATIONS
Excelsior, Minnesota**

Figure 3

- Proposed Monitoring Well Location
- ▬ Approximate Property Boundary
- ▬ Approximate Parcel Boundary
- ▬ Approximate Dump Extent Boundary
- ▬ Area Unaccessible During Site Visit
- ▬ Approximate Athletic Field/Hockey Rink Boundary
- ▬ Approximate City Boundary
- Property Features
- Hydrant

Note: Proposed monitoring well locations are approximate based on utility locations and field conditions.



PROPOSED MONITORING WELL LOCATIONS Excelsior, Minnesota

Figure 3

- ⊙ Proposed Monitoring Well Location
- ▬ Approximate Property Boundary
- ▬ Approximate Parcel Boundary
- ⊗ Area Unaccessible During Site Visit
- ⊠ Approximate Athletic Field/Hockey Rink Boundary
- Approximate City Boundary
- Hydrant

Note: Proposed monitoring well locations are approximate based on utility locations and field conditions.



1 inch = 100 feet



BARR

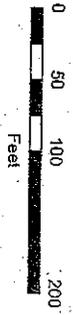




Figure 3
PROPOSED MONITORING WELL LOCATIONS
Excelsior, Minnesota

- ⊙ Proposed Monitoring Well Location
- ▬ Approximate Property Boundary
- ▬ Approximate Parcel Boundary
- ▬ Approximate Dump Exant Boundary
- ⊗ Area Unaccessible During Site Veil
- ⊠ Approximate Athletic Field/Hockey Rink Boundary
- Approximate City Boundary
- Property Features
- ⊕ Hydrant

Note: Proposed monitoring well locations are approximate based on utility locations and field conditions.



**MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD**
Minnesota Statutes, Chapter 103I

MINNESOTA UNIQUE WELL
AND BORING NO.

762585

WELL OR BORING LOCATION
County Name
Hennepin

Township Name **Excelsior** Township No. **117N** Range No. **23W** Section No. **34** Fraction **NE SE NW₄**

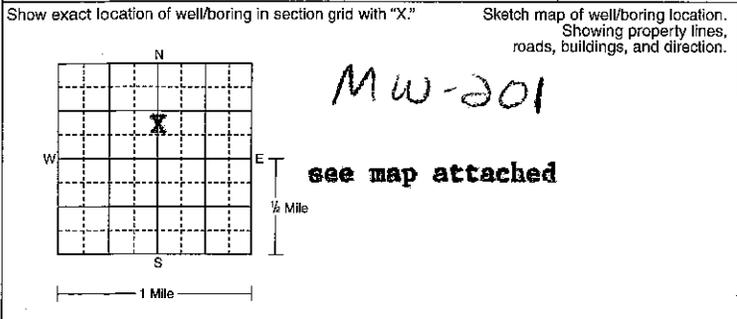
WELL/BORING DEPTH (completed) **50** ft. DATE WORK COMPLETED **Feb. 17, 2009**

GPS LOCATION: Latitude _____ degrees _____ minutes _____ seconds _____
Longitude _____ degrees _____ minutes _____ seconds _____

DRILLING METHOD
 Cable Tool Driven Dug
 Auger Rotary Jetted

House Number, Street Name, City, and Zip Code of Well Location
160 Oak St, Excelsior

DRILLING FLUID _____ WELL HYDROFRACTURED? Yes No



USE Domestic Monitoring Heating/Cooling
 Noncommunity PWS Environ. Bore Hole Industry/Commercial
 Community PWS Irrigation Remedial
 Elevator Dewatering _____

PROPERTY OWNER'S NAME/COMPANY NAME
City of Excelsior

CASING MATERIAL Steel Plastic Drive Shoe? Yes No
 Threaded Welded HOLE DIAM. **8 1/2** in. to **50** ft.

Property owner's mailing address if different than well location address indicated above.
**339 Third St
Excelsior, MN 55331**

SCREEN Make **Johnson** Type **PVC** Slot/Gauze **10** Set between **45** ft. and **50** ft. FITTINGS **thread**

WELL OWNER'S NAME/COMPANY NAME
Hennepin County Environmental Services

STATIC WATER LEVEL **20** ft. Below Above land surface Measured from **grade** Date measured **2/17/09**

Well/boring owner's mailing address if different than property owner's address indicated above.
**417 N 5th St
Minneapolis, MN 55401**

PUMPING LEVEL (below land surface) _____ ft. after _____ hrs. pumping **XXX 1/4** g.p.m.

WELLHEAD COMPLETION Pitless/adaptor manufacturer _____ Model _____
 Casing Protection **6" x 6"** Above grade **24"**
 At-grade (Environmental Well and Boring ONLY)

GEOLOGICAL MATERIALS	COLOR	HARDNESS OF MATERIAL	FROM	TO
top soil	black		0	4
fill, garbage	mixed		4	10
silty sand	tan		10	20
clay	gray		20	46
silty sand	gray		46	50

GROUTING INFORMATION
Well grouted Yes No
Grout materials Neat cement Bentonite Concrete Other _____
From **0** To **42** ft. **11** Yds. Bags

NEAREST KNOWN SOURCE OF CONTAMINATION _____ feet _____ direction _____ type

Well disinfected upon completion? Yes No

PUMP Not installed Date installed _____
Manufacturer's name _____
Model Number _____ HP _____ Volts _____
Length of drop pipe _____ ft. Capacity _____ g.p.m.
Type: Submersible L.S. Turbine Reciprocating Jet _____

ABANDONED WELLS
Does property have any not in use and not sealed well(s)? Yes No

VARIANCE
Was a variance granted from the MDH for this well? Yes No TN# _____

WELL CONTRACTOR CERTIFICATION
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

REMARKS, ELEVATION, SOURCE OF DATA, etc.

Use a second sheet, if needed.

Stevens Drilling & Env. Svc. Inc. 2255
Licensee Business Name _____ Lic. or Reg. No. _____

556 2/23/09
Certified Representative Signature _____ Certified Rep. No. _____ Date _____
Randy Johnson

LOCAL COPY **762585**

Name of Driller _____

Figure 3

**PROPOSED MONITORING
WELL LOCATIONS
Excelsior, Minnesota**

- ⊙ Proposed Monitoring Well Location
- ▬ Approximate Property Boundary
- ▬ Approximate Parcel Boundary
- ▬ Approximate Dump Extent Boundary
- ⊠ Area Unaccessible During Site Visit
- Approximate Athletic Field/Hockey Rink Boundary
- Approximate City Boundary
- Property Features
- Hydrant

Note: Proposed monitoring well locations are approximate based on utility locations and field conditions.



1 Inch = 100 feet



INNER WELLHEAD MANAGEMENT ZONE (IWMZ) -
 POTENTIAL CONTAMINANT SOURCE INVENTORY (PCSI) REPORT

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1270012	COMMUNITY
NAME	Excelsior	
ADDRESS	Excelsior Water Superintendent, City Hall, 339 Third Street, Excelsior, MN 55331	

FACILITY (WELL) INFORMATION

NAME	Well #1	IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE? <input type="checkbox"/> YES (Please attach a copy) <input type="checkbox"/> NO <input type="checkbox"/> UNDETERMINED
FACILITY ID	S01	
UNIQUE WELL NO.	205674	
COUNTY	Hennepin	

PWS ID / FACILITY ID	1270012 S01	UNIQUE WELL NO.	205674
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PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)			LOCATION		
		Minimum Distances		Sensitive Well ¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				

Agricultural Related

*AC1	Agricultural chemical buried piping	50	50		N		
*AC2	Agricultural chemical multiple tanks or containers for residential retail sale or use, no single tank or container exceeding, but aggregate volume exceeding 56 gal. or 100 lbs. dry weight	50	50		N		
ACP	Agricultural chemical tank or container with 25 gal. or more or 100 lbs. or more dry weight, or equipment filling or cleaning area without safeguards	150	150		N		
ACS	Agricultural chemical storage or equipment filling or cleaning area with safeguards	100	100		N		
ACR	Agricultural chemical storage or equipment filling or cleaning area with safeguards and roofed	50	50		N		
ADW	Agricultural drainage well ² (Class V well - illegal ³)	50	50		N		
AAT	Anhydrous ammonia tank (stationary tank)	50	50		N		
AB1	Animal building, feedlot, confinement area, or kennel, 0.1 to 1.0 animal unit (stockyard)	50	20	100/40	N		
AB2	Animal building or poultry building, including a horse riding area, more than 1.0 animal unit	50	50	100	N		
ABS	Animal burial area, more than 1.0 animal unit	50	50		N		
FWP	Animal feeding or watering area within a pasture, more than 1.0 animal unit	50	50	100	N		
AF1	Animal feedlot, unroofed, 300 or more animal units (stockyard)	100	100	200	N		
AF2	Animal feedlot, more than 1.0, but less than 300 animal units (stockyard)	50	50	100	N		
AMA	Animal manure application	use discretion	use discretion		N		
REN	Animal rendering plant	50	50		N		
MS1	Manure (liquid) storage basin or lagoon, unpermitted or noncertified	300	300	600	N		
MS2	Manure (liquid) storage basin or lagoon, approved earthen liner	150	150	300	N		
MS3	Manure (liquid) storage basin or lagoon, approved concrete or composite liner	100	100	200	N		
MS4	Manure (solid) storage area, not covered with a roof	100	100	200	N		
OSC	Open storage for crops	use discretion	use discretion		N		

SSTS Related

AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	N		
AA2	Absorption area of a soil dispersal system serving a facility handling infectious or pathological wastes, average flow 10,000 gal./day or less	150	150	300	N		
AA3	Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	50	50	100	N		
AA4	Absorption area of a soil dispersal system serving multiple family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well) ²	50/300/150 ⁴	50/300/150 ⁴	100/600/300 ⁴	N		
CSP	Cesspool	75	75	150	N		
AGG	Dry well, leaching pit, seepage pit	75	75	150	N		
*FD1	Floor drain, grate, or trough connected to a buried sewer	50	50		N		
*FD2	Floor drain, grate, or trough if buried sewer is air-tested, approved materials, serving one building, or two or less single-family residences	50	20		N		
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal) ²	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal) ²	illegal	illegal		N		

PWS ID / FACILITY ID	1270012 S01	UNIQUE WELL NO.	205674
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PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well ¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well ² (Class V well - illegal ³)	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		Y	164	
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		
IWD	Industrial waste disposal well (Class V well) ²	illegal ³	illegal ³		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		

PWS ID / FACILITY ID

1270012 S01

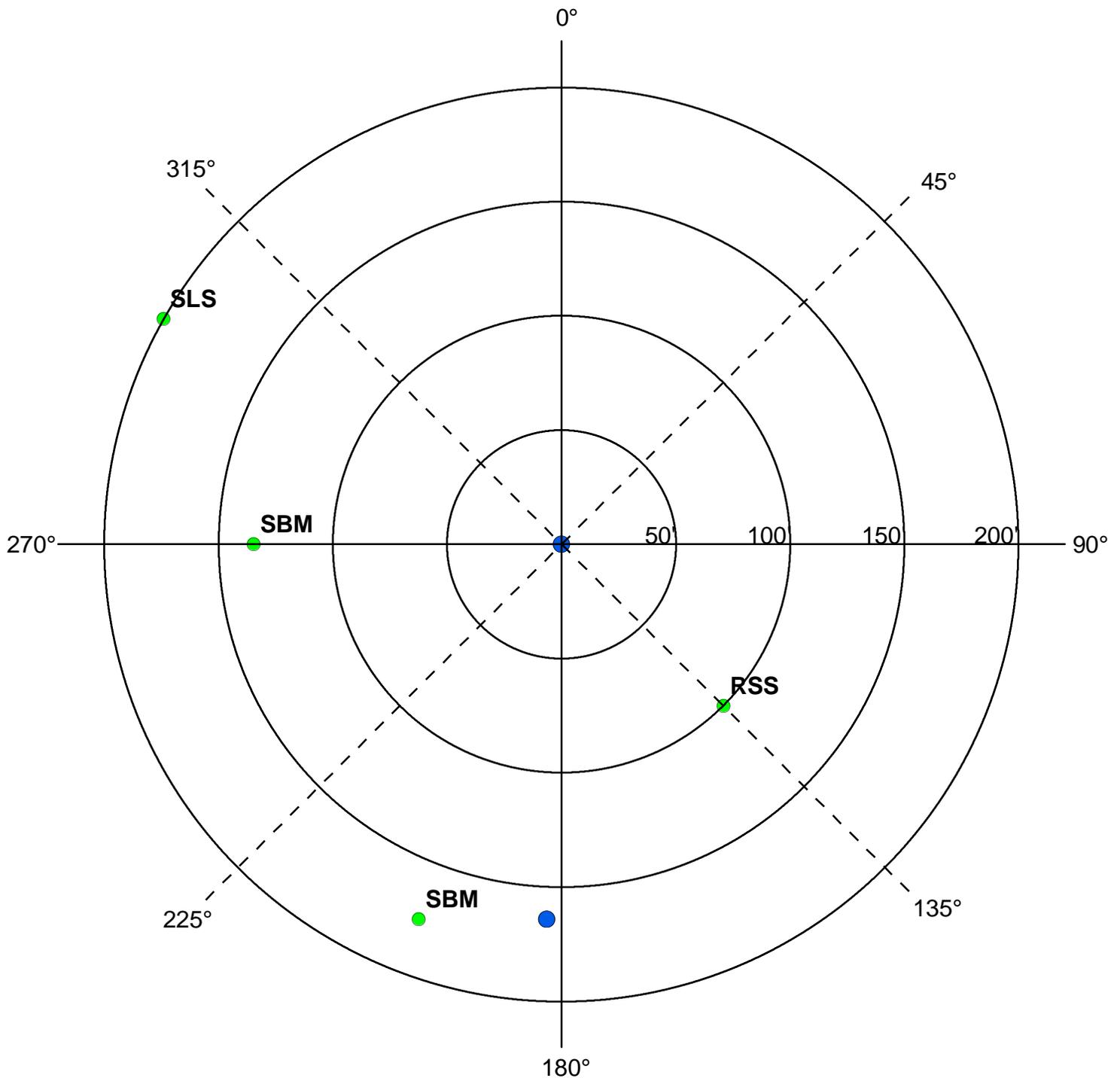
UNIQUE WELL NO.

205674

SETBACK DISTANCES

All potential contaminant sources must be noted on sketch.

Record the distance and approximate compass bearing of each potential contaminant source from the well, and identify the source using the "Source Code". Unlabeled points on the map are unsealed wells.



	Y	N	N/A
Were the isolation distances maintained for the new sources of contamination?			X
Is the system monitoring existing nonconforming sources of contamination?			X

Reminder Question: Were the wellhead protection measure(s) implemented?

INSPECTOR

Freitag, John

DATE

1 - 10 - 2012

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED

COMMENTS

For further information, please contact:

**Minnesota Department of Health
 Drinking Water Protection Section
 Source Water Protection Unit
 P.O. Box 64975
 St. Paul, Minnesota 55164-0975**

**Section Receptionist: 651-201-4700
 Division TDD: 651-201-5797 or MN Relay Service @ 1-800-627-3529 and ask for 651-201-5000**

INNER WELLHEAD MANAGEMENT ZONE (IWMZ) -
 POTENTIAL CONTAMINANT SOURCE INVENTORY (PCSI) REPORT

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1270012	COMMUNITY
NAME	Excelsior	
ADDRESS	Excelsior Water Superintendent, City Hall, 339 Third Street, Excelsior, MN 55331	

FACILITY (WELL) INFORMATION

NAME	Well #2	IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE? <input type="checkbox"/> YES (Please attach a copy) <input type="checkbox"/> NO <input type="checkbox"/> UNDETERMINED
FACILITY ID	S02	
UNIQUE WELL NO.	205675	
COUNTY	Hennepin	

PWS ID / FACILITY ID	1270012 S02	UNIQUE WELL NO.	205675
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PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)			LOCATION		
		Minimum Distances		Sensitive Well ¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				

Agricultural Related

*AC1	Agricultural chemical buried piping	50	50		N		
*AC2	Agricultural chemical multiple tanks or containers for residential retail sale or use, no single tank or container exceeding, but aggregate volume exceeding 56 gal. or 100 lbs. dry weight	50	50		N		
ACP	Agricultural chemical tank or container with 25 gal. or more or 100 lbs. or more dry weight, or equipment filling or cleaning area without safeguards	150	150		N		
ACS	Agricultural chemical storage or equipment filling or cleaning area with safeguards	100	100		N		
ACR	Agricultural chemical storage or equipment filling or cleaning area with safeguards and roofed	50	50		N		
ADW	Agricultural drainage well ² (Class V well - illegal ³)	50	50		N		
AAT	Anhydrous ammonia tank (stationary tank)	50	50		N		
AB1	Animal building, feedlot, confinement area, or kennel, 0.1 to 1.0 animal unit (stockyard)	50	20	100/40	N		
AB2	Animal building or poultry building, including a horse riding area, more than 1.0 animal unit	50	50	100	N		
ABS	Animal burial area, more than 1.0 animal unit	50	50		N		
FWP	Animal feeding or watering area within a pasture, more than 1.0 animal unit	50	50	100	N		
AF1	Animal feedlot, unroofed, 300 or more animal units (stockyard)	100	100	200	N		
AF2	Animal feedlot, more than 1.0, but less than 300 animal units (stockyard)	50	50	100	N		
AMA	Animal manure application	use discretion	use discretion		N		
REN	Animal rendering plant	50	50		N		
MS1	Manure (liquid) storage basin or lagoon, unpermitted or noncertified	300	300	600	N		
MS2	Manure (liquid) storage basin or lagoon, approved earthen liner	150	150	300	N		
MS3	Manure (liquid) storage basin or lagoon, approved concrete or composite liner	100	100	200	N		
MS4	Manure (solid) storage area, not covered with a roof	100	100	200	N		
OSC	Open storage for crops	use discretion	use discretion		N		

SSTS Related

AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	N		
AA2	Absorption area of a soil dispersal system serving a facility handling infectious or pathological wastes, average flow 10,000 gal./day or less	150	150	300	N		
AA3	Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	50	50	100	N		
AA4	Absorption area of a soil dispersal system serving multiple family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well) ²	50/300/150 ⁴	50/300/150 ⁴	100/600/300 ⁴	N		
CSP	Cesspool	75	75	150	N		
AGG	Dry well, leaching pit, seepage pit	75	75	150	N		
*FD1	Floor drain, grate, or trough connected to a buried sewer	50	50		N		
*FD2	Floor drain, grate, or trough if buried sewer is air-tested, approved materials, serving one building, or two or less single-family residences	50	20		N		
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal) ²	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal) ²	illegal	illegal		N		

PWS ID / FACILITY ID	1270012 S02	UNIQUE WELL NO.	205675
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PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well ¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well ² (Class V well - illegal ³)	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		Y	164	
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		
IWD	Industrial waste disposal well (Class V well) ²	illegal ³	illegal ³		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		

PWS ID / FACILITY ID

1270012 S02

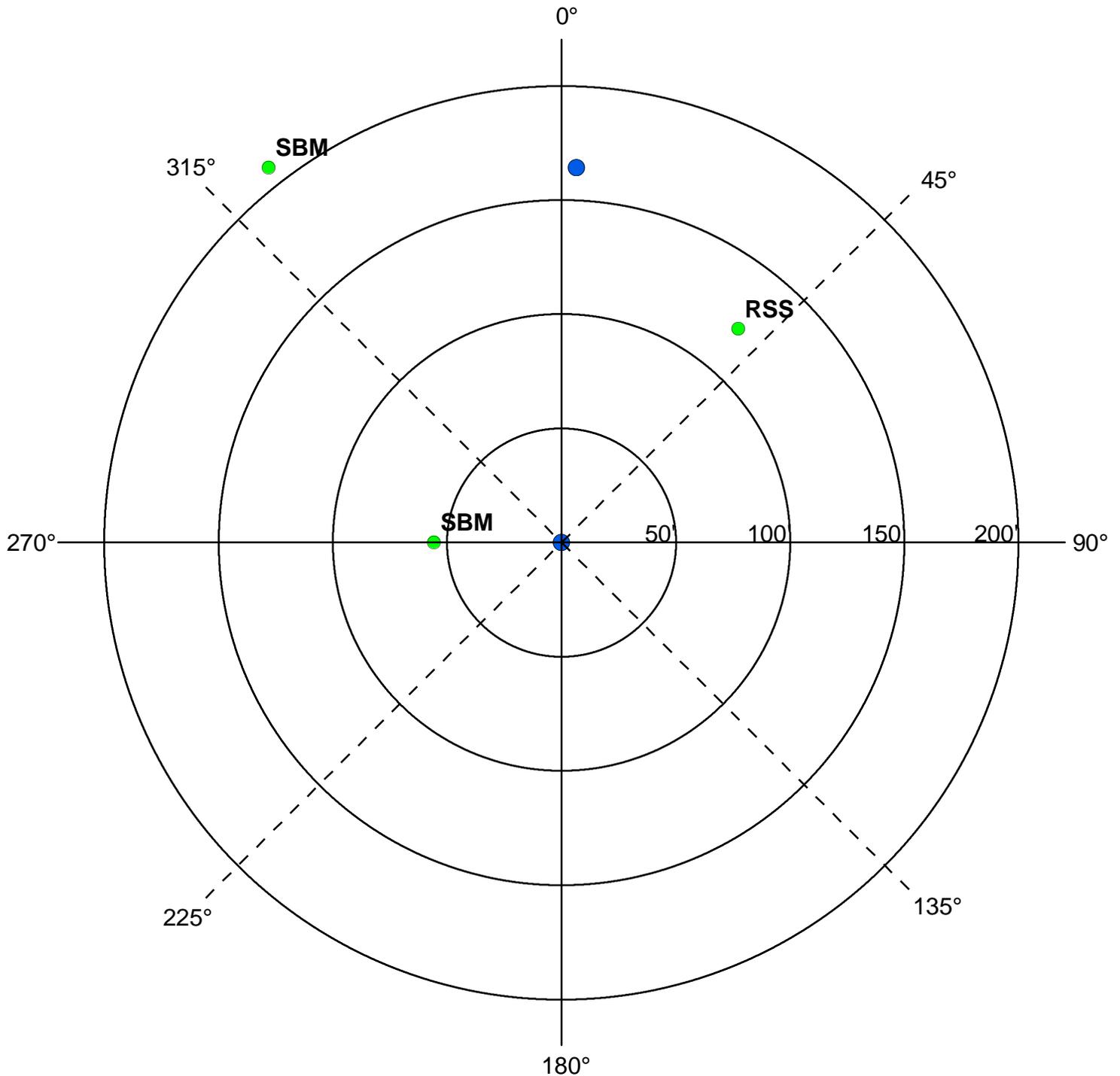
UNIQUE WELL NO.

205675

SETBACK DISTANCES

All potential contaminant sources must be noted on sketch.

Record the distance and approximate compass bearing of each potential contaminant source from the well, and identify the source using the "Source Code". Unlabeled points on the map are unsealed wells.



	Y	N	N/A
Were the isolation distances maintained for the new sources of contamination?			X
Is the system monitoring existing nonconforming sources of contamination?			X

Reminder Question: Were the wellhead protection measure(s) implemented?

INSPECTOR

Freitag, John

DATE

1 - 10 - 2012

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED

COMMENTS

For further information, please contact:

**Minnesota Department of Health
 Drinking Water Protection Section
 Source Water Protection Unit
 P.O. Box 64975
 St. Paul, Minnesota 55164-0975**

**Section Receptionist: 651-201-4700
 Division TDD: 651-201-5797 or MN Relay Service @ 1-800-627-3529 and ask for 651-201-5000**

INNER WELLHEAD MANAGEMENT ZONE (IWMZ) -
 POTENTIAL CONTAMINANT SOURCE INVENTORY (PCSI) REPORT

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1270012	COMMUNITY
NAME	Excelsior	
ADDRESS	Excelsior Water Superintendent, City Hall, 339 Third Street, Excelsior, MN 55331	

FACILITY (WELL) INFORMATION

NAME	Well #3	IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE? <input type="checkbox"/> YES (Please attach a copy) <input type="checkbox"/> NO <input type="checkbox"/> UNDETERMINED
FACILITY ID	S03	
UNIQUE WELL NO.	232336	
COUNTY	Hennepin	

PWS ID / FACILITY ID	1270012 S03	UNIQUE WELL NO.	232336
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PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)			LOCATION		
		Minimum Distances		Sensitive Well ¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				

Agricultural Related

*AC1	Agricultural chemical buried piping	50	50		N		
*AC2	Agricultural chemical multiple tanks or containers for residential retail sale or use, no single tank or container exceeding, but aggregate volume exceeding 56 gal. or 100 lbs. dry weight	50	50		N		
ACP	Agricultural chemical tank or container with 25 gal. or more or 100 lbs. or more dry weight, or equipment filling or cleaning area without safeguards	150	150		N		
ACS	Agricultural chemical storage or equipment filling or cleaning area with safeguards	100	100		N		
ACR	Agricultural chemical storage or equipment filling or cleaning area with safeguards and roofed	50	50		N		
ADW	Agricultural drainage well ² (Class V well - illegal ³)	50	50		N		
AAT	Anhydrous ammonia tank (stationary tank)	50	50		N		
AB1	Animal building, feedlot, confinement area, or kennel, 0.1 to 1.0 animal unit (stockyard)	50	20	100/40	N		
AB2	Animal building or poultry building, including a horse riding area, more than 1.0 animal unit	50	50	100	N		
ABS	Animal burial area, more than 1.0 animal unit	50	50		N		
FWP	Animal feeding or watering area within a pasture, more than 1.0 animal unit	50	50	100	N		
AF1	Animal feedlot, unroofed, 300 or more animal units (stockyard)	100	100	200	N		
AF2	Animal feedlot, more than 1.0, but less than 300 animal units (stockyard)	50	50	100	N		
AMA	Animal manure application	use discretion	use discretion		N		
REN	Animal rendering plant	50	50		N		
MS1	Manure (liquid) storage basin or lagoon, unpermitted or noncertified	300	300	600	N		
MS2	Manure (liquid) storage basin or lagoon, approved earthen liner	150	150	300	N		
MS3	Manure (liquid) storage basin or lagoon, approved concrete or composite liner	100	100	200	N		
MS4	Manure (solid) storage area, not covered with a roof	100	100	200	N		
OSC	Open storage for crops	use discretion	use discretion		N		

SSTS Related

AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	N		
AA2	Absorption area of a soil dispersal system serving a facility handling infectious or pathological wastes, average flow 10,000 gal./day or less	150	150	300	N		
AA3	Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	50	50	100	N		
AA4	Absorption area of a soil dispersal system serving multiple family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well) ²	50/300/150 ⁴	50/300/150 ⁴	100/600/300 ⁴	N		
CSP	Cesspool	75	75	150	N		
AGG	Dry well, leaching pit, seepage pit	75	75	150	N		
*FD1	Floor drain, grate, or trough connected to a buried sewer	50	50		N		
*FD2	Floor drain, grate, or trough if buried sewer is air-tested, approved materials, serving one building, or two or less single-family residences	50	20		N		
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal) ²	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal) ²	illegal	illegal		N		

PWS ID / FACILITY ID	1270012 S03	UNIQUE WELL NO.	232336
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SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well ² (Class V well - illegal ³)	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
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MON	Monitoring well	record dist.	record dist.		N		
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DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
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HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
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IWD	Industrial waste disposal well (Class V well) ²	illegal ³	illegal ³		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		

PWS ID / FACILITY ID

1270012 S03

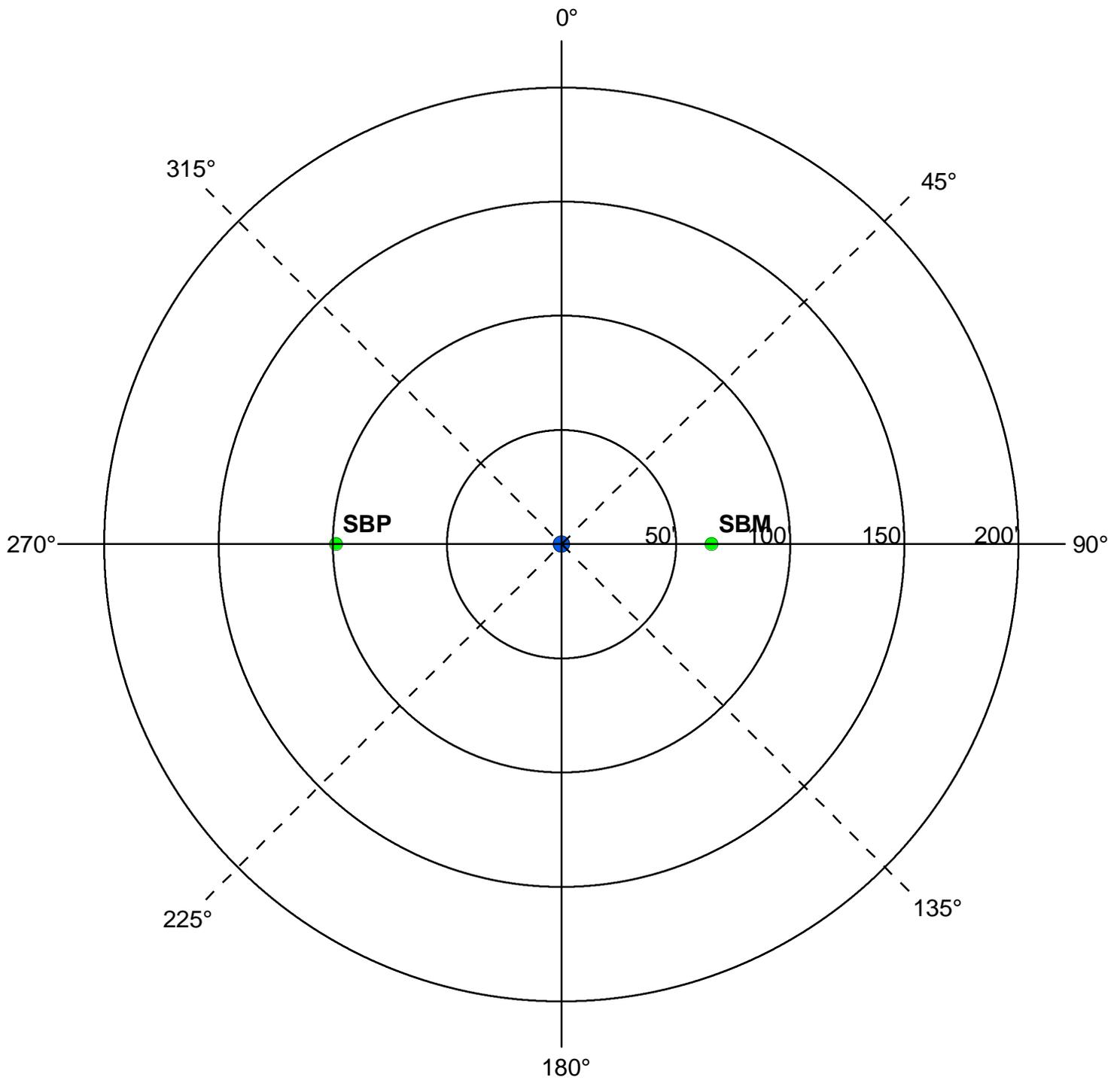
UNIQUE WELL NO.

232336

SETBACK DISTANCES

All potential contaminant sources must be noted on sketch.

Record the distance and approximate compass bearing of each potential contaminant source from the well, and identify the source using the "Source Code". Unlabeled points on the map are unsealed wells.



	Y	N	N/A
Were the isolation distances maintained for the new sources of contamination?			X
Is the system monitoring existing nonconforming sources of contamination?			X

Reminder Question: Were the wellhead protection measure(s) implemented?

INSPECTOR

Freitag, John

DATE

1 - 10 - 2012

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED

COMMENTS

For further information, please contact:

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 Source Water Protection Unit
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**Section Receptionist: 651-201-4700
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