City of Shorewood
5755 Country Club Road • Shorewood, MN 55331

2015 WELLHEAD PROTECTION PLAN

Part 2

WSB Project No. 1459-89

WSB & Associates, Inc.
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416
Tel: (763) 541-4800 · Fax: (763) 541-1700
wsbeng.com

Wellhead Protection Plan

Part 2

City of Shorewood, Minnesota

Table of Contents

Appendix A – Tables

Appendix B – Figures

Appendix C – Wellhead Protection Plan Part 1

Appendix D –Inner Wellhead Management Zone Surveys

PUBLIC WATER SUPPLY PROFILE

PUBLIC WATER SUPPLY

City of Shorewood
5755 Country Club Road
Shorewood, Minnesota 55331
Phone: (952) 960-7900
Fax: (952) 474-0128

WELLHEAD PROTECTION MANAGER

Larry Brown, PE
Director of Public Works
City of Shorewood
7555 Country Club Road
Shorewood, Minnesota 55331
Phone: (952) 960-7913
Fax: (952) 474-0128
E-Mail: lbrown@shorewoodpw.com

CONSULTANT/TECHNICAL ASSISTANCE

Leslee Storlie, EIT
WSB & Associates, Inc.
477 Temperance St.
St. Paul, Minnesota 55101
Phone: (763) 231-4874
E-Mail: lstorlie@wsbeng.com

Molly Patterson-Lundgren, Planner
WSB & Associates, Inc.
701 Xenia Ave. S, Suite 300
Minneapolis, Minnesota 55416
Phone: (763) 541-4800
E-Mail: mollypl@wsbeng.com

GENERAL INFORMATION

Unique Well Number(s): 232331, 161414, 171020, 171023, 122298, 416160
Size of Population Served by Public Water Supply: Approximately 3,300
County: Hennepin

PUBLIC WATER SUPPLY WELLS

Local Well Name	Unique Number	Aquifer	Casing Depth (ft)	Well Depth (ft)	Date Constructed
Well Amesbury 1	232331	St. Peter-Jordan	244	528	1973
Well Badger 3	161414	Prairie du Chien-Jordan	332	372	1981
Well Boulder Br. 4	171020	Franconia-Ironton-Galesville	398	640	1981
Well Boulder Br. 5	171023	Franconia-Ironton-Galesville	399	640	1981
Well Amesbury 6	122298	Prairie du Chien	276	326	1982
Well Waterford 7	416160	Prairie du Chien - Jordan	223	415	1986

DOCUMENTATION LIST

Step	Date Performed
Part I Approval Notice Received from MDH	August 8, 2012
Scoping 2 Meeting Held (4720.5349, subp. 1)	February 21, 2013
Scoping Decision Notice Received (4720.5340, subp. 2)	April 9, 2013
Remaining Portion of Plan Submitted to Local Units of Government (LGUs) (4720.5350, subp. 1 & 2)	June 25, 2015
Review Considered (4720.5350, subp. 3)	July – August, 2015
Public Hearing Conducted (4720.5350, subp. 4)	August 24, 2015
Remaining Portion WHP Plan Submitted (4720.5360, subp. 1)	September 1, 2015
Approved Review Notice Received	TBD

EXECUTIVE SUMMARY

The Wellhead Protection (WHP) Plan for the City of Shorewood (City) addresses the six municipal water supply wells used by the City (Wells No. 1, 3, 4, 5, 6, and 7) and the associated source water aquifers (the St. Peter Jordan, Prairie du Chien-Jordan, and Franconia- Ironton-and Galesville; the aquifers from which the municipal wells pump water).

Part 1 of the Plan was completed in October of 2011 and approved by the Minnesota Department of Health (MDH). The WHP Plan Part 1 presented the delineation of the Wellhead Protection Areas (WHPA), the drinking water supply management areas (DWSMAs), and the vulnerability assessments for the system's wells and aquifers within the DWSMAs. The boundaries of the DWSMAs are shown in **Figures 1** and **2, Appendix B**. Portions of the DWSMAs extend into the City of Tonka Bay, the City of Greenwood, and the City of Excelsior. Water supply wells covered by this delineation and this Part 2 Plan are listed on **page 4** and in **Chapter 1**.

The vulnerability assessment for the aquifers within the DWSMAs was performed using available information and indicates that the vulnerability varies from low to moderate. The results of the vulnerability assessment determine *what types of potential contamination sources* must be managed within the DWSMAs 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 Shorewood'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, educating property owners and water supply users, and working with the City of Tonka Bay, the City of Greenwood, and the City of Excelsior to ensure proper management of the portion of the DWSMA in their respective community.

The City'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 Protection Program, 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.

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. Data Collection
E. Planning and Zoning
F. Implementation
G. Evaluation

The success of the WHP Plan must be evaluated in order to determine whether or not the Plan is accomplishing what the City intended to do. Monitoring and evaluation of the WHP 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 currently uses the following wells to provide the City's drinking water:

- Well 1 – unique number 232331
- Well 3 – unique number 161414
- Well 4 – unique number 171020
- Well 5 – unique number 171023
- Well 6 – unique number 122298
- Well 7 – unique number 416160

The Drinking Water Supply Management Areas (DWSMAs) delineated in the Wellhead Protection (WHP) Plan area delineation study extends into the Cities of Tonka Bay, Greenwood, Deephaven, and Excelsior. The DWSMAs are found in Township 117, Range 23, Sections 23, 25, 26, 27, 28, 31, 33, 34, 35, and 36 as shown in **Figure 1, Appendix B**.

Wells No. 4, 5, and Well 6 are non-vulnerable based on water quality results, borehole integrity, and geologic conditions. Wells No. 1, 3, and 7 are vulnerable due to tritium detection at more than one Tritium Unit (TU) in all samples.

Overall, the DWSMAs vulnerability classification varies from low to moderate vulnerability and is shown in **Figure 2, Appendix B**.

I. REQUIRED DATA ELEMENTS

In accordance with Minnesota Rules Chapter 4720.5200, and the Scoping 2 Decision letter received by the City on April 9, 2013 the following data elements and their assessments are required to be submitted in the City's WHP Plan. Depending on the vulnerability, Minnesota Department of Health (MDH) dictates which data elements are required to be submitted and which are to be analyzed and kept on file at the City.

1) Precipitation
2) Geology
3) Soils
4) Water resources
5) Land use
6) Public utility services
7) Surface water quantity
8) Groundwater quantity
9) Surface water quality
10) Groundwater quality

A. PHYSICAL ENVIRONMENT DATA ELEMENTS

1. PRECIPITATION

Due to the majority of the DWSMAs being classified as moderately vulnerable to contamination, precipitation must be evaluated and submitted. As shown on **Table 1, Appendix A**, there are two National Weather Service gauging stations located near Shorewood, in Spring Lake and Chanhassen. However, these stations have not collected complete precipitation data. There is also a backyard monitoring station in Shorewood. At this station, precipitation averaged 29.4 inches per year over the last 5 years on record.

As outlined in Part 1, Wells No. 1, 3, and 7 contained tritium at levels above 1 TU. While tritium is not a health concern, its presence indicates a potential surface connection. Precipitation in the form of overland flow can act as a contaminant transport mechanism through runoff and infiltration. Contaminants may be displaced through the soil matrix in the direction of the source water aquifer, through the municipal storm sewer system, or across impermeable surface features during rain events. Therefore, precipitation is an important component to consider in relation to management of land use in the DWSMAs.

2. GEOLOGY

The geology in the vicinity of the City's DWSMA is discussed in detail in the WHP Plan Part 1 (**Appendix C**). Geological maps and additional well logs are on file with the City.

3. SOIL CONDITIONS

Surficial soil types within the DWSMAs are shown on **Figure 3, Appendix B**. Soil makeup affects how water and potential contaminants move from the surface into the ground potentially affecting the City's water supply. The surficial soil types in the City's DWSMA are primarily fine loam, with some coarse loam and small areas of fine and sandy over loamy soils.

Figure 4, Appendix B shows the level of permeability of the soil cover in the DWSMAs. The DWSMAs show a wide range of permeability: between 0.5 inches per hour in some areas and greater than 6 inches per hour in other areas.

There are highly and potentially highly erodible lands in City's DWSMA, as shown in **Figure 5, Appendix B.** Erosion has the potential of changing the infiltration rate of the soil and can result in contaminant transport.

Potential contaminant sources should be monitored closely in areas susceptible to rapid erosion.

4. WATER RESOURCES

Since portions of the City's DWSMA are classified as moderately vulnerable, surface water resources must be evaluated but not submitted as required by MDH. However, as mandated by MDH, the water resources data items are not to be submitted, but are on file at the City and are available upon request.

B. LAND USE DATA ELEMENTS

Current and historic land use in the vicinity of the DWSMA is discussed in this section. Parcel information for the Cities of Shorewood, Tonka Bay, Excelsior, Deephaven, and Greenwood were used to delineate the DWSMA (WHP Plan Part 1, **Appendix A**).

1. LAND USES

a. Current Land Use

It is important to understand land use in order to determine key areas for concern in managing a wellhead protection area (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 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 6, Appendix B shows existing land uses within the DWSMA, as indicated in each City's Comprehensive Plan. **Figure 7, Appendix B**, shows existing zoning within the DWSMAs. Land uses found within the DWSMA include large portions of single family residential with scattered seasonal vacation homes. There are also multi-family residential, as well as smaller areas of commercial, industrial, institutional, parks/recreational, and a large golf course that is proposed for redevelopment as single family low density residential. There are some areas of undeveloped land, much of it covering public waters and wetlands.

A potential contaminant source inventory (PCSI) was completed within the DWSMA boundaries. Data was extracted from existing databases including the Minnesota Pollution Control Agency's (MPCA) What's in my Neighborhood (WIMN) and the County Well Index (CWI) and then verified. In addition, the EPA database was reviewed and it was determined that currently, no known Class V injection wells are located within the DWSMAs.

Data points collected from the MPCA WIMN database were first properly located through aerial photography and additional research. Special investigation was considered for those points located through zip code centroid measures as classified by the MPCA WIMN database. 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 (**Table 2, Appendix A** and **Figure 8, 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 MDH Well databases. Wells retrieved 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. **Figure 9, Appendix B** contains private wells within the City. **Figure 10, Appendix B** contains the location

of the water distribution system and municipal water supply wells. Tables for both of these public and private wells are also included in **Appendix A** as **Tables 3-6.**

A list of remaining unlocated wells that were not identified during the development of this Plan is included in **Table 4, Appendix A**. A list of sealed wells that are located within the DWSMA boundaries is included in **Table 5, Appendix A**.

In addition the MDH completed and provided survey results for the Inner Wellhead Management Zone (IWMZ) that surrounds each municipal well at a 200-foot-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 93 known private and eight public wells currently active in the DWSMA according to the CWI.
- Leak and Spill Sites. There are 10 leaking underground storage tank (LUST) sites, five of which are active. In addition, there are seven active and eight inactive spill sites.
- Large Storage Tanks. There are nine underground storage tanks (UST) with volumes greater than 1,100 gallons in the DWSMA. Five are inactive, four are active, and each contains fuels, gases, or oils.
- Other. There are four active and one inactive voluntary investigation and cleanup sites. There are also two petroleum brownfields, one of which is active.
- IWMZ Results. Located within 200-feet of the municipal wells are buried sanitary sewer pipes, operating wells, in-ground swimming pools, stormwater drain pipes, gravel pockets for clear water drainage, and water treatment chemical waste discharge.

The DWSMA does extend into multiple municipalities, so cooperation between Shorewood and neighboring Cities is essential.

2. PUBLIC UTILITIES

Public utilities were evaluated to determine their potential influence and impact on the City's drinking water supply. This section describes gas and oil pipelines as well as public drainage systems in the DWSMA. Other public utilities, such as public sewer, public water, and transportation routes were also considered and are on file at the City.

a. Gas and Oil Pipelines
Gas and oil pipe lines are located within the DWSMA. For security reasons, the map has not been submitted as part of this document; however, a map that indicates the locations of major oil and gas lines within the DWSMA is on file with the City.

b. Public Drainage Systems
Figure 12, Appendix B shows public drainages and ditches within the City's DWSMA. There is one unnamed ditch in the DWSMA that leads to a perennial drainage that flows from Silver Lake to Purgatory Creek.

C. WATER QUANTITY DATA ELEMENTS

Water levels in lakes and streams can impact an aquifer, particularly if the two systems are closely connected hydraulically. The following section discusses some of the water quantity elements essential to DWSMA management.

1. SURFACE WATER QUANTITY

The City of Shorewood is on Lake Minnetonka and is surrounded by bodies of water. Lake Minnetonka levels dropped slightly from 2010 to 2013 but recovered in 2014 according to the Minnesota Department of Natural Resources (MnDNR). There are no known water use conflicts within the DWSMA, to the City's knowledge.

2. GROUNDWATER QUANTITY

Groundwater quantity was analyzed as part of the WHP Plan Part 1 (Appendix C). In addition, the WHP Part 1 also lists all of the appropriation permits for the City of Shorewood. Between 2010 and 2014, the City pumped an average of approximately 159 MG/year of groundwater, which is less than the average over the course of the last 20 years of 165 MG/year. Water use has remained relatively stable over the last 20 years. No substantial increase in water use have occurred.

D. WATER QUALITY DATA ELEMENTS

Water quantity in lakes and streams can impact an aquifer, particularly if the two systems are closely connected hydraulically. The following section discusses some of the water quality elements essential to DWSMA management.

1. SURFACE WATER QUALITY

Due to the moderate vulnerability of the source aquifer, the quality of surface water was reviewed; however, it was not required to be submitted by the MDH. A summary of surface water quality parameters within the DWSMA is on file at the City.

2. GROUNDWATER QUALITY

The City produces an annual report on the quality of its drinking water called the Consumer Confidence Report (CCR). The 2013 CCR, which outlines the results of quality monitoring done on the City's drinking water, is available on the City's website. The 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. The water supplied by the City meets all Maximum Contaminant Level (MCL) National Primary Drinking Water Regulations. There are no known areas of groundwater contamination located in the DWSMA.

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.

II. ASSESSMENT OF DATA ELEMENTS

A. USE OF MUNICIPAL WELLS

The City currently operates six active water supply wells (Wells No. 1, 3, 4, 5, 6 and 7), as shown in **Figure10, Appendix B**. Additional information about the City's water supply system in general is presented in the City's Comprehensive Plan – Water Supply and Distribution Plan. Well construction details, well logs, and past and projected pumping rates are included in the WHP Plan Part 1 (**Appendix C**) document.

B. WELLHEAD PROTECTION AREA DELINEATION CRITERIA

The Part 1 Plan (**Appendix C**) includes documentation regarding how the following delineation criteria were applied to determining the boundaries of the WHPA:

1. **Time of Travel –** 10 years.
2. **Aquifer Transmissivity –** geologic information, Minnesota Pollution Control Agency (MPCA) Metro Model, Metropolitan Council's (MetCouncil) Metromodel 2.0, specific capacity tests at Wells No. 3,4, and 7.
3. **Daily Volume of Water Pumped –** Pumping information from MnDNR appropriations permits. The annual pumped volumes were converted to a daily volume pumped for each well.
4. **Hydrologic/Flow Boundaries -** Surface water features, geological boundaries, and high capacity wells.
5. **Groundwater Flow Field –** MODFLOW.

C. LAND AND GROUNDWATER USES IN THE DWSMAS

The DWSMA associated with the City's municipal wells has been determined to range from low to moderate vulnerability. Land uses within the DWSMA could affect source water protection efforts or the management of the DWSMA. A summary of potential contaminant sources identified in the DWSMA was provided in **Tables 2-5, Appendix A**. Proactive management of existing wells are of concern within the DWSMA.

Specific non-point source land use acreage was not determined for this report, but the land use and zoning maps (**Figures 6 and 7, Appendix B**) provide a tool for understanding the scope of land uses in the DWSMA. Furthermore, the inventory was made as complete as practicable at the time of the development of this Plan.

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. Non-point sources of contamination are of less immediate concern than are larger potential point sources, particularly those in moderately vulnerable areas.

Privately owned wells will continue to be considered when developing the management strategies for the City's DWSMA. Unmaintained, damaged, poorly constructed, or unused/abandoned wells could provide a direct route for contaminants to enter the aquifers.

CHAPTER TWO

IMPACT OF CHANGES ON PUBLIC WATER SUPPLY WELLS (4720.5220)

In accordance with Minnesota Rules 4720.5220 a wellhead protection plan must identify and describe expected changes that may occur during the next ten years to:

1. The physical environment
2. Land use
3. Surface water
4. Groundwater

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 (wells)
- Moderate vulnerability (wells and tanks)

I. POTENTIAL CHANGES IDENTIFIED

A. PHYSICAL ENVIRONMENT

The existing golf course located within the City is being proposed for redevelopment into single family low density residential use. Other significant or large-scale changes in the physical environment, the municipal wells or corresponding DWSMAs are not anticipated in the next 10 years or the life of this Plan. The City's 2009 comprehensive plan projected a steady growth of population; however, the actual 2010 census indicated a decrease in numbers. Current projections from the Metropolitan Council project no change in population over the next 20 years. The Land Use/City Comprehensive Plan updated in 2009 indicates that there is a potential for infill and intensification of development.

B. LAND USE

While many of the properties within the DWSMA are developed, the 2009 Comprehensive Plan indicates that "vacant land alone is capable of producing between 65 and 70 additional residential housing units". Additionally, underdeveloped land, if redeveloped, could provide 155-170 more housing units. A land use map for the year 2008 and a future land use map for the year 2030 are shown on **Figures 6** and **Figure11, Appendix B**, respectively. 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, though densities for certain housing areas could be increased. One exception is the existing golf course within the City that is proposed for redevelopment into single family low density residential use.

Future land use proposed for the year 2030 includes minimum, low, medium low, and medium residential, commercial, public and semi-public uses. All of these future land uses are currently present within the DWSMA, thus no new land uses not currently present within the DWSMA are anticipated during the next 10 years.

C. SURFACE WATER

The City has six lakes within its boundaries and is on the southern shore of Lake Minnetonka. Therefore, surface water management is a critical issue within the City. As the tritium levels in the drinking water indicate, it is likely that there are connections between the groundwater and the surface water. The primary source of pollution to the surface water in Shorewood is stormwater drainage. As is outlined in the City's Surface Water Management Plan, the City will continue to address stormwater pollution. The City is not anticipating significant changes in groundwater pumping volume. It is unlikely that well-related activity will greatly affect the surface water as there are no known water use conflicts that have been observed by the City. Changes to surface water are not anticipated.

D. GROUNDWATER

No significant changes in groundwater pumping are expected by the City in the next 10 years. Significant changes in groundwater pumping have not occurred over the last five years and limited developments are proposed for the next 10 years.

II. IMPACT OF CHANGES

A. WATER USE

The Metropolitan Council estimates no population growth for the City of Shorewood by the year 2030. The population at the 2010 census was 7,400 and the estimated population by 2030 is 7,400. While the City comprehensive plan projected growth, there was a slight decline in population between 2000 and 2010. Recently, the existing golf course has been proposed to be redeveloped into a single family development within the DWSMA boundaries in Shorewood. It is not anticipated that water use will increase substantially over the next ten years. Water use will be further analyzed once more information is available about the proposed development.

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 related to managing wells, storage tanks, and other land use issues within the system's DWSMA.

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.

Aboveground storage tanks (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.

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 and 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.

RILEY PURGATORY BLUFF CREEK WATERSHED DISTRICT

The eastern most DWSMA falls within the Riley Purgatory Bluff Creek Watershed District (RPBCWD). The RPBCWD functions to protect and manage the water resources within and around Riley Creek, Purgatory Creek, and Bluff Creek. Communities involved with the RPBCWD include Bloomington, Chanhassen, Deephaven, Eden Prairie, Minnetonka, and Shorewood.

C. ADMINISTRATIVE, TECHNICAL, AND FINANCIAL CONSIDERATIONS

The City 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. Wellhead and source water protection activities will be evaluated on an annual basis, 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.

For this Plan to be effective, the City will need to collaborate with other surrounding and overlapping jurisdictions and agencies to raise public awareness of the issues affecting its public water supply through public education programs. Therefore, a number of the wellhead and source water protection actions in this Plan will include public education.

While it is not anticipated that the City will experience increasing water demand, City staff will continue to evaluate the water distribution system and evaluate whether additional municipal wells, storage reservoirs, or water treatment facilities are needed.

It is important for the City to continue to work with the adjacent communities in which the City of Shorewood's DWSMA lies. In addition, the City will work with MCWD to protect the source water resources as much as possible 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 and therefore some locations within the moderate vulnerability area are more likely to be affected by land use activities. Land use and zoning regulations can protect the quality of the aquifers by discouraging types of construction or activity that may cause contamination. The industrial areas within the moderately vulnerable DWSMA are identified as a potential issue that can cause problems with groundwater quality if not properly maintained. There is an opportunity to better regulate through education and other means this land use type. There is also an opportunity for the cities in this region to work collaboratively to implement WHP activities. Shorewood 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 also 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 extend into adjacent communities. However, the DWSMAs of these neighboring communities also extend into Shorewood, which creates a strong opportunity for cooperative participation in the management of the local aquifers, thereby helping to assure sustainable water supplies for all users in the Lake Minnetonka region.

B. GROUNDWATER QUALITY

Both public and private well water quality sampling will need to continue so that possible contamination can be identified. Coordination with other local government units (LGUs) in the DWSMA along with MDH and MnDNR 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, or other contaminant sources such as storage tanks, will be important in the control of contamination affecting the groundwater quality.

C. DRINKING WATER SUPPLY MANAGEMENT AREAS

As previously mentioned, both a challenge and an opportunity for the City is their DWSMA that extends into neighboring communities in which the City does not have regulatory control. In addition, the cities do not have authority over water appropriations within their DWSMAs and rely on the DNR to address issues related to pumping of the aquifer.

Some opportunities identified include:

- Working with other municipalities and government entities in the DWSMA to share information and create policies that prevent contamination of aquifers for the entire area.
- Tracking and then sharing 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.

II. Issues, Problems, and Opportunities Disclosed at Public Meetings and in Written Comments

At the beginning of the wellhead protection amendment process, the City sent a notification to other LGUs of its intention to amend their wellhead and source water protection efforts. After approval by the MDH, the City 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.

III. Issue, Problems, and Opportunities Related to the Data Elements

Part 1 and Part 2 of the City'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 10 years as required by the Minnesota 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 & 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 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 addresses goals for present and future water use and land use to provide a framework for determining plan objectives and related actions.

Goals outlined were selected based on the information gathered and compiled from the data elements, delineations of the WHPAs and DWSMAs, 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 mixed vulnerability; ranging from low to moderate. In addition, portions of the amended DWSMA extend into neighboring communities, including the cities of Tonka Bay, Excelsior, Deephaven, and Greenwood. 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'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 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.

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 Wellhead Protection 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. Data Collection
E. Planning and Zoning
F. Implementation
G. 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: Take measures to promote proper sealing of abandoned, unused, unmaintained, or damaged wells.

Action A1.1: Make property owners aware of potential technical and financial resources that are available to assist them in securing grant funding for properly sealing wells.

Who:	City Staff
Cooperators:	Hennepin County
Time Frame:	On-going
Estimated Cost:	$1,000 each year of mailing/postings
How:	Use the City's website, newsletters, or direct mailings to make well owners aware of well sealing cost-share programs. Provide information to realtors to pass along to property owners preparing to sell.

Action A1.2: Seek funding when available and feasible to seal wells located on City property.

Who:	City Staff
Cooperators:	Hennepin County, MDH
Time Frame:	On-going, when grant funding is available
Estimated Cost:	$2,000 (grant application); additional cost for sealing TBD.
How:	If wells are discovered on City owned property, grant funding shall be sought after to properly seal the well.

Objective A2: Take measures to identify remaining unlocated wells within the City's DWSMA.

Action A2: Using the list prepared in this WHP Plan, work to verify the location and/or status of those unlocated wells that could not be located during the development of this plan.

Who:	City Staff or consultant
Cooperators:	Hennepin County, MDH
Time Frame:	On-going, when grant funding is available
Estimated Cost:	Varies by well, potentially $1,000 per well depending on information available
How:	When feasible, apply for grant funding to investigate the status and location of each well through mapping, field investigation, and historical records. Records shall be kept of the efforts made to locate or verify each well even if the well remains to be unlocated. Data shall be provided to MDH.

Objective A3: Educate the public about proper well management.

Action A3: Provide links to MDH and County well management websites on the City's website, include information in the City's newsletter or other direct mailings.

Who:	City Staff or consultant
Cooperators:	MDH
Time Frame:	Every quarter
Estimated Cost:	$500 each year of mailing/posting
How:	Use the City's website, newsletters, or direct mailings. Use local newspaper, public access or social media sites.

Objective A4: Identify New High-Capacity Wells within the DWSMA.

Action A4: 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 Staff
Cooperators:	MnDNR, MDH
Time Frame:	Every quarter
Estimated Cost:	$500
How:	The City will request to be notified by the MnDNR of changes to appropriation permits within or near the City's DWSMA and by the MDH of changes to well status within or near the City's DWSMA.

Objective A5: Continue to monitor the water quality from City's wells (existing and new) to ensure water quality standards are met.

Action A5: Examine and review the annual water quality reports to ensure maximum levels of contaminants are not changing.

Who:	City Staff
Cooperators:	MDH
Time Frame:	Annually
Estimated Cost:	No additional cost – staff time
How:	Staff will review annual water quality reports and provide summaries about changes over time. This can include distributing the Consumer Confidence Report through water bill inserts or placing on the City's website.

Objective A6: Update the IWMZ surveys.

Action A6: Work in collaboration with the MDH to review and update the IWMZ surveys.

Who:	City Staff
Cooperators:	MDH
Time Frame:	As required by MDH
Estimated Cost:	No additional cost – staff time
How:	Staff will in collaboration with MDH to review and update the IWMZ surveys as required by the MDH.

Objective A7: Monitor and work to minimize impacts within the IWMZ area.

Action A7: Monitor setbacks for all new potential sources of contamination, monitor and revise status of existing potential contaminants, and work to abate existing potential contaminants within the IWMZ.

Who:	City Staff or Consultants
Cooperators:	MDH
Time Frame:	Annually
Estimated Cost:	$500 annually
How:	The IWMZ surveys shall be reviewed annually for any changes to existing contaminants. Proposed potential contaminant sources shall be reviewed for compliance within the IWMZ area. Work shall be done when feasible to abate or otherwise minimize the impact of existing potential contaminant sources within the IWMZ areas.

B. PUBLIC EDUCATION

Objective B1: Develop a public support and understanding for the wellhead protection planning through the use of websites, newsletters, and handouts.

Action B1.1: Include information about wellhead protection and groundwater protection in the City newsletter, perhaps in conjunction with the City's MS4 permitting requirements.

Who:	City Staff
Cooperators:	Consultant, MRWA
Time Frame:	Ongoing
Estimated Cost:	$500 each year of mailing/posting
How:	Identify and obtain existing educational materials available from MRWA 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 WHP Plan and links to other wellhead protection related resources on the City's website.

Who:	City Staff
Cooperators:	Consultant, MRWA
Time Frame:	Ongoing
Estimated Cost:	$1,000 each year of mailing/posting
How:	Provide a summary of wellhead protection goals and implementation. Provide links to wellhead protection related websites including MDH, Hennepin County, and EPA.

Action B1.3: Send a mailer to properties in the vulnerable areas of the DWSMA informing thusly and providing resources and best management practices for protecting the aquifer on their property.

Who:	City Staff
Cooperators:	MDH, MRWA, Consultant
Time Frame:	Every 2 years
Estimated Cost:	$1,500 each year of mailing/posting
How:	Provide educational brochures from the MRWA on specific types of potential contaminant sources that are located within the moderate vulnerability portion of the DWSMA. When feasible, target specific properties with the specific brochure based on the PCSI results.

Objective B2: Develop an understanding for the location of the gas and oil pipelines with in the DWSMAs.

Action B2: Provide the fire departments and utility companies within the DWSMAs with a map showing the location of the DWSMAs and gas and oil pipelines.

Who:	City Staff
Cooperators:	Utility companies, Fire Departments, consultant
Time Frame:	Within the first year
Estimated Cost:	$1,000
How:	Provide a map of the location of the DWSMA in comparison to the location of the gas and oil pipelines to all fire departments that have jurisdiction in the areas covered by the DWSMAs and to the owners of the utilities. The letter shall describe the importance of the DWSMA boundary, especially in respect to the gas and oil pipelines.

C. STORAGE TANK MANAGEMENT

Objective C1: Notify owners of all UST and aboveground storage tanks greater than 1,100 gallons in capacity located within the moderate vulnerability area of the DWSMA that the tank is in a source water protection area. 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, proper management of storage tanks, and what to do if there is a spill.

Who:	City Staff
Cooperators:	MDH, MPCA, MRWA, Consultant
Time Frame:	3 years
Estimated Cost:	$3,000
How:	Send mailings out to property owners notifying them about the DWSMA delineation and the importance of spill prevention and reporting requirements. Provide contact numbers for appropriate government agencies to each property owner. When feasible, differentiate between brochures for each property based on the PCSI results.

D. DATA COLLECTION

Objective D1: 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 D1.1: Monitor static and pumping levels in municipal wells.

Who:	City Staff
Cooperators:	MnDNR
Time Frame:	On-going
Estimated Cost:	No additional cost – staff time
How:	Conduct routine collection of groundwater levels in the municipal wells, which will provide data for the evaluation of groundwater elevation trends over time. This data can also be used to verify the groundwater flow field in the source water aquifer. If needed, apply for grant funding to assist in the purchase of monitoring equipment to aid in the collection of hydrogeologic data.

Action D1.2: Cooperate and support future data collection efforts by other agencies.

Who:	City Staff
Cooperators:	MPCA, DNR, MDH, USGS, Consultant
Time Frame:	On-going, when requested
Estimated Cost:	Varies depending on request
How:	Provide assistance to agencies as requested.

Objective D2: Evaluate the water quality monitoring strategy and results to ensure that they are consistent with federal and state requirements yet also take into account local conditions.

Action D2: Maintain water quality sampling requirements mandated by MDH and analyze trends in water chemistry, looking for any possible degradation of quality or changes in aquifer hydraulics.

Who:	City Staff
Cooperators:	MDH
Time Frame:	Ongoing
Estimated Cost:	No additional cost
How	Assist in data collection requests by the MDH to test the water quality in each well and to update tritium testing when required by MDH.

Objective D3: Maintain up to date information about wells and potential contaminant sources within the DWSMA.

Action D3: In cooperation with existing state or local agencies and programs, maintain the database of wells, ISTS, storage tanks, and shallow disposal wells within the DWSMA that was developed through this WHP Plan.

Who:	City Staff
Cooperators:	Property owners, MDH, MPCA, Consultant
Time Frame:	5 years
Estimated Cost:	$2,500
How:	An inventory of wells and potential contaminant sources was performed as part of the development of this Plan. Database will be reviewed periodically and updated half way through the life of this plan as information becomes available.

E. LAND USE PLANNING AND ZONING

Objective E1: Consider the location of the DWSMA during land use planning and zoning activities.

Action E1.1: Include a review of this Plan as part of the normal zoning and planning review process.

Who:	City Staff, Consultant
Cooperators:	Cities of Tonka Bay, Greenwood, Deephaven, and Excelsior
Time Frame:	On-going
Estimated Cost:	$500 staff time
How:	Copies of this Plan will be distributed to City staff and they will review this Plan and incorporate it as part of their project planning review process. When feasible make an effort to coordinate with neighboring cities that are located within the City's DWSMA.

Action E1.2: The City will use this WHP Plan as a resource when updating its Comprehensive Plan, Local Water Management Plan, Water Supply Plan, and other relevant plans.

Who:	City Staff, Consultant
Cooperators:	
Time Frame:	When plans are required to be updated
Estimated Cost:	Will vary by plan, approximately $500 for each update
How:	Wellhead Protection initiatives will be addressed and incorporated into the City's various plan updates.

F. IMPLEMENTATION

Objective F1: Track and report Wellhead Protection activities to aid in implementing Wellhead Protection Objectives.

Action F1: Complete and submit an internal annual report on completed WHP activities.

Who:	City Staff
Cooperators:	Consultant
Time Frame:	Annually
Estimated Cost:	$500 to $1,000
How:	Organize the WHP binder with the completed WHP implementation activities. Determine which activities are to be completed over the next year.

G. EVALUATION

Objective G1: Evaluate Plan

Action G1: Complete an evaluation report every two and one-half years.

Who:	City Staff
Cooperators:	Retained consultant
Time Frame:	Every two and one-half years
Estimated Cost:	$2,000
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 or not the Plan is accomplishing what the City intended to do. Monitoring and 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 the City'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 will continue to coordinate with the MDH in the annual monitoring of the City's municipal water supply to determine if the management strategies presented in this Plan are having a positive impact on water quality and 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. The City will also keep a copy of the report in its records. The intent of the evaluation reports is to compile a complete and comprehensive study of the implementation of the source water management strategies for use when the City is required to amend this Plan. As required by the Minnesota Rules, this Plan will be amended every 10 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.

The City of Shorewood completed its Water Emergency and Conservation Plan. As required, the plan was submitted to the DNR Waters-Water Permit Programs and the Metropolitan Council for review and approval. This plan has been adopted by the City and incorporated in the City's 2030 Comprehensive Plan. Copies of the Water Emergency and Conservation Plan and the 2030 Comprehensive Plan are available from the City.

Appendix A - Tables

Table 1: Precipitation

Backyard Monitoring Station **Location: Shorewood MN**								
	2010	**2011**	**2012**	**2013**	**2014**	**5 yr avg**	**Yearly**	
Jan	0.68	1.30		0.65		0.88	**2010**	27.86
Feb	0.78	1.25		0.85		0.96	**2011**	19.66
Mar	1.16	1.85		1.21		1.41	**201**	16.94
Apr	1.40	2.13	1.74	4.54		2.45	**2013**	30.12
May	2.39	3.32	9.30	5.47		5.12	**2014**	0
Jun	3.17	2.20	5.40	6.05		4.21	**Average**	29.40833
Jul	3.93	4.03		5.10		4.35		
Aug	5.14	2.28		1.11		2.84		
Sep	3.93	0.13	0.50	1.25		1.45		
Oct	0.70	0.85		3.89		1.81		
Nov	1.63	0.32				0.98		
Dec	2.95					2.95		
total	27.86	19.66	16.94	30.12	0	29.40833		

sp

National Weather Service **Location: Spring Park**								
	2010	**2011**	**2012**	**2013**	**2014**	**5 yr avg**	**Yearly**	
Jan				0.65		0.65	**2010**	1.63
Feb				0.85		0.85	**2011**	0.32
Mar				1.21		1.21	**201**	0
Apr							**2013**	2.71
May							**2014**	0
Jun							**Average**	3.685
Jul								
Aug								
Sep								
Oct								
Nov	1.63	0.32				0.975		
Dec								
total	1.63	0.32	0	2.71	0	3.685		

Table 1: Precipitation

National Weather Service
Location: Chanhassen

	2010	2011	2012	2013	2014	5 yr avg
Jan					1.32	1.32
Feb						
Mar						
Apr						
May						
Jun						
Jul						
Aug						
Sep						
Oct						
Nov				0.51		0.51
Dec		0.67		1.26		0.965
total	0	0.67	0	1.77	1.32	2.795

Yearly	
2010	0
2011	0.67
201	0
2013	1.77
2014	1.32
Average	2.795

Table 2: PCSI - Sites

FIGURE ID	MPCA ID	NAME	ADDRESS	CITY	ACTIVITY	MATERIAL CODE	FACILITY CODE	PARCEL ID NUMBER	VULNERABILITY	STATUS
0	14142	Shorewood Village Center	Highway 7 and County Road 41	Shorewood	Leak Site	SPL	2100	3411723330048	Moderate	Inactive
1	17031	Ico	5680 Manitou Rd	Shorewood	Leak Site	LUST	2116	3311723130005	Moderate	Active
2	17005	First Student Inc 11397	5531 Manitou Rd	Tonka Bay	Leak Site	LUST	2110-01,2116	3311723110075	Moderate	Active
3	4839	Steven Pahl Residence	24860 Smithtown Rd	Shorewood	Leak Site	SPL	1100-01	3311723240006	Moderate	Inactive
4	4166	Ico	5680 Smithtown Road	Shorewood	Leak Site	LUST	2116	3311723110076	Moderate	Inactive
5	9251	Larson Residence	20435 Radisson Inn Rd	Shorewood	Leak Site	SPL	1100-01	3611723210031	Moderate	Inactive
6	12528	Crabapple Ln Site	135 Crabapple Ln	Tonka Bay	Leak Site	SPL	1100-01	2811723420004	Moderate	Inactive
7	18529	Former Edward Arundel Residence	90 Wildhurst Rd	Tonka Bay	Leak Site	SPL	1100-01	2811723240038	Moderate	Active
8	18655	Tonka Village Shopping Center	5609 Manitou Rd	Tonka Bay	Leak Site	SPL	2100	3311723110076	Moderate	Active
9	5389	Linda & Bill Norman (residence)	105 Mound Ave	Tonka Bay	Leak Site	LUST	1100-01	2811723430074	Moderate	Inactive
10	16482	Manning Property	4750 Manitou Rd	Excelsior	Leak Site	SPL	1100-01	2811723120019	Moderate	Active
11	643	Lucky's Station 7	24365 Smithtown Rd	Excelsior	Leak Site	SPL	2110-01	3311723140041	Moderate	Active
12	16198	Tonka Village Shopping Center	5655 Manitou Rd	Tonka Bay	Leak Site	SPL	2100	3311723110076	Moderate	Inactive
13	4318	Western Relocation Management	5590 Shore Road	Shorewood	Leak Site	SPL	2000	3611723210009	Moderate	Inactive
14	4680	City Of Shorewood	5755 Country Club Rd	Shorewood	Leak Site	LUST	6000	3311723140048	Moderate	Inactive
15	18665	Roslyn Henderson	150 Wildhurst Rd	Tonka Bay	Tank Site	UST-F000	1100-01	2811723240018	Moderate	Inactive
16	14141	Excelsior Covenant Church	19955 Excelsior Blvd	Shorewood	Leak Site	SPL	6000	2511723430069	Moderate	Active
17	16858	Bruce Gniffke Property	5995 Ridge Rd	Excelsior	Leak Site	SPL	1100-01	3611723310013	Moderate	Active
18	18896	Holiday Stationstore #12	19955 Highway 7	Shorewood	Tank Site	UST-F000	2116	2511723430064	Moderate	Active
19	2868	Tonka Bay	4901 Manitou Rd	Tonka Bay	Leak SIte	LUST	6000	2811723130008	Moderate	Active
20	18800	Culp Residence	10 Old Orchard Ln	Tonka Bay	Leak Site	SPL	1100-01	2811723240008	Moderate	Active
21	10580	Mullen Residence	4948 Rustic Way	Shorewood	Leak Site	SPL	1100-01	2611723140033	Moderate	Inactive
22	3942	City Of Tonka Bay Municipal Liquor	5681 Manitou Rd	Tonka Bay	Leak Site	LUST	2100	3311723140053	Moderate	Inactive
23	7589	Former Tom Thumb	5660 County Road 19	Shorewood	Leak Site	SPL	2100	3311723130007	Moderate	Inactive
24	1774	Ico	5680 Manitou Rd	Shorewood	Tank Site	UST-F000	2116	3311723130005	Moderate	Active
25	1187	First Student Inc 11397	5531 Manitou Rd	Tonka Bay	Leak Site	LUST	2110-01,2116	3311723110075	Moderate	Active
26	18076	First Student Inc 11397	5531 Manitou Rd	Tonka Bay	Leak Site	LUST	2110-01,2116	3311723110075	Moderate	Active
27	124125	Tonka Village Shopping Center	5609 Manitou Rd	Tonka Bay	Tank Site	UST-F000	2100	3311723110076	Moderate	Active
28	17542	Linda & Bill Norman (residence)	105 Mound Ave	Tonka Bay	Tank Site	UST-F000	1100-01	2811723430074	Moderate	Inactive
29	14208	Lucky's Station 7	24365 Smithtown Rd	Excelsior	Tank Site	UST-F000	2110-01	3311723140041	Moderate	Active
30	4239	City Of Shorewood	5755 Country Club Rd	Shorewood	Leak Site	LUST	6000	3311723140048	Moderate	Inactive
31	2473	City Of Shorewood	5755 Country Club Rd	Shorewood	Tank Site	UST-F000	6000	3311723140048	Moderate	Inactive
32	15133	City Of Tonka Bay Municipal Liquor	5681 Manitou Rd	Tonka Bay	Tank Site	UST-F000	2100	3311723140035	Moderate	Inactive
33	2476	Tonka Bay	4901 Manitou Rd	Tonka Bay	Tank Site	UST-F000	6000	2811723130008	Moderate	Active
34	VP17600	Shorewood Village Shopping Center	23660-23750 State Highway 7	Shorewood	Voluntary Investigation & Cleanup	PCS-VIC	2100	3411723330048	Moderate	Inactive
35	3412	Minnetonka State Bank/Cub Foods Site	23780 Highway 7	Shorewood	Petroleum Brownfield	PCS-BMS	2100	3411723330047	Moderate	Inactive
36	3493	Carmichiel Autoparts	20755 Manor Rd	Excelsior	Petroleum Brownfield	PCS-BMS	2110-01	2511723330071	Moderate	Active
37	VP21390	Anderson Property Management	5609-63 Manitou Rd	Tonka Bay	Voluntary Investigation & Cleanup	PCS-VIC	2110-01	3311723110076	Moderate	Active
38	VP13470	Fina #0161	24365 Smithtown Road	Shorewood	Voluntary Investigation & Cleanup	PCS-VIC	2116	3311723140041	Moderate	Active
39	VP13471	Fina #0161	24365 Smithtown Rd	Shorewood	Voluntary Investigation & Cleanup	PCS-VIC	2116	3311723140041	Moderate	Active
40	VP18640	Carmichael Auto Parts	20755 Manor Rd	Excelsior	Voluntary Investigation & Cleanup	PCS-VIC	2110-01	2511723330071	Moderate	Active

Table 3:PCSI - Located Wells

FIGURE ID	UNIQUE NUMBER	WELL NAME	ADDRESS	PCS MATERIAL	FACILITY CODE	USE CODE	PARCEL ID NUMBER	VULNERABILITY
0	00127497	RUDDA	5865 MINNETONKA DR	WEL	1100-01	DO	3411723320023	Moderate
1	00159009	ED HEIMERL	5775 MINNETONKA DR	WEL	1100-01	DO	3411723230033	Moderate
2	00205666	JIM DUTCHER	5515 SHOREWOOD LA	WEL	1100-01	DO	3311723110051	Moderate
3	00194929		20705 LINWOOD RD	WEL	1100-01	DO	2311723440023	Moderate
4	00400793	THIEDE, DAVE	20185 EXCELSIOR BLVD	WEL	1100-01	DO	2511723340002	Moderate
5	00100195	WILLIAM KASTER	5040 SUBURBAN DR	WEL	1100-01	DO	2611723410012	Moderate
6	00426540	JACKSON, DAVE		WEL	1100-01	DO	2311723440035	Moderate
7	00138710	DWIGHT CHURCHHILL	23930 SMITHTOWN RD	WEL	1100-01	DO	3411723220008	Moderate
8	00138714	GEORGE HARRISON	24740 AMLEE RD	WEL	1100-01	DO	3311723120017	Moderate
9	00142768	RALPH CONNOR	5810 MINNETONKA DR	WEL	1100-01	DO	3411723320011	Moderate
10	00127462	HENKE	20390 EXCELSIOR BLVD	WEL	1100-01	DO	2511723340020	Moderate
11	00130755	ROBERT LUBBER	5045 ST ALBANS BAY RD	WEL	1100-01	DO	2611723410025	Moderate
12	00438145	BART WYLIE	5970 CHARLESTON CIR	WEL	1100-01	DO	3411723330034	Moderate
13	00205667	BACKDAHL-OLSON	24285 SMITHTOWN RD	WEL	2110-01	DO	3311723140005	Moderate
14	00205669	HUBERT PULVERMACHER	24880 AMLEE RD	WEL	1100-01	DO	3311723210012	Moderate
15	00140149	TERRY DUDYCKA	24695 GLEN RD	WEL	1100-01	DO	3311723120025	Moderate
16	00163897	RICH BAKER	28075 WOODSIDE RD	WEL	1100-01	DO	3111723240011	Moderate
17	00122221	DAN OLANDER	5715 KATHLEEN CT	WEL	1100-01	DO	3111723130020	Moderate
18	00100147	BITUMINOUS ROADWAYS	24830 AMLEE RD	WEL	1100-01	DO	3311723210010	Moderate
19	00724573	BURLESON, HARRY	20370 EXCELSIOR BLVD	WEL	1100-01	DO	2511723340006	Moderate
20	00138705	MARILYN LINDQUIST	5690 ECHO RD	WEL	1100-01	DO	3311723140012	Moderate
21	00206917	KARL ANDERSON		WEL	1100-01	DO	2311723440015	Moderate
22	00138742		5405 WEDGEWOOD DR	WEL	1100-01	DO	3311723210032	Moderate
23	00168742	BOULDER BRIDGE FARM TEST	28125 BOULDER BRIDGE DR	WEL	5000	TW	3111723420023	Moderate
24	00205642	PETER WALSTAD		WEL	1100-01	DO	2311723440004	Moderate
25	00205670	T. A. BEAVER	5765 ECHO RD	WEL	1100-01	DO	3311723410002	Moderate
26	00100140	BART BAKER	20155 VINE ST	WEL	1100-01	DO	2511723310018	Moderate
27	00100141	BOYER	19765 EXCELSIOR BLVD	WEL	1000	DO	2511723420004	Low
28	W0000065	PETERSON, JOHN	4989 WOODEND PL	WEL	1100-01	DO	2611723140101	Moderate
29	00138735		26 ADDRESS UNASSIGNED	WEL	1000	DO	3311723240044	Low
30	00426597	PORTER, RICK & DEBBIE	25520 ORCHARD CIR	WEL	1000	DO	2811723330033	Low
31	00158436	KEITH WENDT	23735 GILLETTE CUR	WEL	1100-01	DO	3411723230014	Moderate
32	00122948	GODFREY BRINK	20025 VINE ST	WEL	1100-01	DO	2511723310027	Moderate
33	00251803	LAKE MARY	24035 MARY LAKE TR	WEL	1100-01	LA	3311723410044	Moderate
34	00155064		23660 GILLETTE CUR	WEL	1100-01	DO	3411723230008	Moderate
35	00137393	EASTER, JAMES	4925 FERNCROFT DR	WEL	1100-01	DO	2611723140087	Moderate
36	00165949	STAN THIES	21055 FOREST DR	WEL	1100-01	DO	2611723140041	Moderate
37	00197575	HARRISON, J.W.	5915 MINNETONKA DR	WEL	1100-01	DO	3411723320010	Moderate
38	00138715		24770 AMLEE RD	WEL	1100-01	DO	3311723120018	Moderate
39	00100145	JOHN C. KURIMCHAK	24395 WOOD DR	WEL	1100-01	DO	3311723430002	Moderate
40	W0000063	ALLEN THOMAS HOMES		WEL	1100-01	CO	2811723340010	Moderate
41	00426598	LANG	5490 WEDGEWOOD DR	WEL	1000	DO	3311723220027	Low
42	00122847	STACKEN, ROMAN	5050 SUBURBAN DR	WEL	1100-01	DO	2611723410013	Moderate
43	00122846	JENSEN, WILLIAM	4880 RUSTIC WAY	WEL	1100-01	DO	2611723140021	Moderate

Table 3:PCSI - Located Wells

44	00600220	TONDRYK, DALE	4990 SUBURBAN DR	WEL	1100-01	DO	2611723140098	Moderate
45	00205677	NORMAN, CHET	5910 MINNETONKA DR	WEL	1100-01	DO	3411723320030	Moderate
46	00151474	KEITH MADONNA	23885 CLOVER LA	WEL	1100-01	DO	3411723230027	Moderate
47	00413391	JOHNSON, JIM		WEL	1100-01	DO	2611723120003	Moderate
48	00138716		24710 AMLEE RD	WEL	1100-01	DO	3311723120016	Moderate
49	00438118	JEFF JOHNSON	5810 CLUB LA	WEL	1000	DO	3311723240033	Low
50	00426549	ROSHAR, JANET	5490 WEDGEWOOD DR	WEL	1000	DO	3311723220027	Low
51	00122926	JOHN MILLET	6140 LAKE LINDEN DR	WEL	2100	DO	3411723330035	Moderate
52	00130780	THOMAS MCKAY	24575 SMITHTOWN RD	WEL	1100-01	DO	3311723420004	Low
53	00122923	L.H. MAY, JR.	5765 ECHO RD	WEL	1100-01	DO	3311723410002	Moderate
54	00111005		5350 ST ALBANS BAY RD	WEL	1100-01	DO	2511723330006	Moderate
55	00171091	HILL, RICHARD	20655 MANOR RD	WEL	1100-01	DO	2511723320030	Moderate
56	00214487	MINNETONKA COUNTRY CLUB	24575 SMITHTOWN RD	WEL	5000	IR	3311723420004	Moderate
57	00205684	BANKER, GEORGE	19205 WATERFORD PL	WEL	1000	DO	3611723110022	Low
58	00426536	EASTLING, DAVE		WEL	1100-01	DO	2311723440037	Moderate
59	00168996	DAILY, RON	23965 SMITHTOWN RD	WEL	1100-01	DO	3411723230020	Moderate
60	00205658	SIMONIZE		WEL	1100-01	DO	2811723240035	Moderate
61	00112246	PETER WALSTAD		WEL	1100-01	DO	2311723410002	Moderate
62	00164866	MCKENNEY, MILDRED	4931 RUSTIC WAY	WEL	1100-01	DO	2611723140010	Moderate
63	00435353	MILLER, DOUG	25525 ORCHARD CIR	WEL	1000	DO	2811723330029	Low
64	00434015	OLLY ENGEL	20030 EXCELSIOR BLVD	WEL	1100-01	DO	2511723310029	Moderate
65	00433414	PAUL PROCEVIAT		WEL	1100-01	DO	2511723310019	Moderate
66	00184771	ROGER NESTANDE	6085 LAKE LINDEN DR	WEL	1100-01	DO	3411723330009	Moderate
67	00130781	SHELDON MANTHER	23890 ELDER TURN	WEL	1100-01	DO	3411723230036	Moderate
68	00205668	JOE DRESSEL	5570 WEDGEWOOD DR	WEL	1000	DO	3311723220004	Low
69	00413365	HERB GAGER	23640 YELLOWSTONE TR	WEL	1100-01	DO	3411723320009	Moderate
70	00100146	DAVE HEELMERS	26 ADDRESS UNASSIGNED	WEL	1100-01	DO	3311723240044	Moderate
71	00677856	DINSMORE, JEFF	5805 MINNETONKA DR	WEL	1100-01	DO	3411723320005	Moderate
72	00434257	BRUCE JOHNSON	23645 YELLOWSTONE TR	WEL	1100-01	DO	3411723320027	Moderate
73	00420492	SMART, JENNIFER	20540 MANOR RD	WEL	1100-01	DO	2511723320027	Moderate
74	00189576	LINDSTROM, GORDON	23680 MCLAIN RD	WEL	1100-01	DO	3411723230053	Moderate
75	00194922			WEL	5000	DO	2311723440003	Moderate
76	00178198	HASKINS, STEVE	5465 TIMBER LA	WEL	1100-01	DO	3411723220020	Moderate
77	00137441	FRANK KERBER	28100 WOODSIDE RD	WEL	1100-01	DO	3111723240017	Moderate
78	00168746	PAETZEL, HENRY		WEL	1100-01	DO	2511723420006	Low
79	00138712		5460 TEAL CIR	WEL	1100-01	DO	3311723220023	Moderate
80	00118836	WALTER OHLAND	4865 FERNCROFT DR	WEL	1200	DO	2611723140031	Moderate
81	00164893	STEVE JOHNSON	23575 SMITHTOWN RD	WEL	1100-01	DO	3411723240045	Moderate
82	00138707	SMITH, JAMES	25580 NELSINE DR	WEL	1000	DO	3311723220006	Low
83	00242110	MINNETONKA COUNTRY CLUB	24575 SMITHTOWN RD	WEL	5000	IR	3311723420004	Moderate
84	00180942	SHOREWOOD PROFFESIONAL B	24000 STATE HWY NO 7	WEL	2100	CO	3411723330024	Moderate
85	00138713	RAYMOND ANDERSON	5715 ECHO RD	WEL	1100-01	DO	3311723140017	Moderate
86	00205655	JACK RABY	4695 FATIMA PL	WEL	1100-01	DO	2611723110055	Moderate
87	00420515	STROUTHMAN, JACK		WEL	1100-01	DO	2611723120020	Moderate
88	00205676	PHIL HART	23645 YELLOWSTONE TR	WEL	1100-01	DO	3411723320027	Moderate

Table 3:PCSI - Located Wells

89	00138743	JIM DUTCHER	5405 WEDGEWOOD DR	WEL	1000	DO	3311723210032	Low
90	00403769	WAKEFIELD, RICHARD	5325 LEE CIR	WEL	1000	DO	2811723330018	Low
91	00405064	DENNIS NELSON	23950 ELDER TURN	WEL	1100-01	DO	3411723230037	Moderate
92	00790874	TIFT, MATTHEW	5695 STAR LA	WEL	1100-01	DO	3311723240025	Moderate

Table 4: PCSI - Public Wells

FIGURE ID	UNIQUE NUMBER	WELL NAME	STATUS CODE	USE CODE	FACILITY CODE	MATERIAL CODE	PARCEL ID NUMBER
1	00122298	SHOREWOOD 6	A	PC	4000	WEL	2511723230077
3	00205657	TONKA BAY 2	A	PC	4000	WEL	2811723130008
15	00161414	SHOREWOOD 3	A	PC	4000	WEL	3311723140046
47	00171020	SHOREWOOD 4	A	PC	4000	WEL	3111723420023
62	00416160	SHOREWOOD 7	A	PC	4000	WEL	3611723130015
64	00223349	TONKA BAY 1	U	PC	4000	WEL	2811723130008
89	00171023	SHOREWOOD 5	A	PC	4000	WEL	3111723420023
95	00232331	SHOREWOOD 1	A	PC	4000	WEL	2511723230077

Table 5: Sealed Wells

UNIQUE NO	NAME	ADDRESS	CITY	STATE	PARCEL ID NO	DATE SEALED	DEPTH SEALED	STATUS CODE	VULNERABILITY
0000493125	Western Relocation Management	5590 Shore Rd	Shorewood	MN		10/31/1991	15	A	Moderate
0000493126	Western Relocation Management	5590 Shore Rd	Shorewood	MN		10/31/1991	6	A	Moderate
0000493127	Western Relocation Management	5590 Shore Rd	Shorewood	MN		10/31/1991	6	A	Moderate
0000493128	Western Relocation Management	5590 Shore Rd	Shorewood	MN		10/31/1991	14	A	Moderate
0000493129	Western Relocation Management	5590 Shore Rd	Shorewood	MN		10/31/1991	15	A	Moderate
0000573599	Smith, David	5025 Suburban Dr	Shorewood	MN		9/27/2005	213	A	Moderate
0000615250	Johnson & Johnson Building Company	20245 Manor Rd	Shorewood	MN		5/8/2000	214	A	Moderate
H000005373	Laboda, Don	5120 Suburban Dr	Shorewood	MN		10/24/1990	100	A	Moderate
H000005405	Johnson, Jerry	5105 Weeks Rd	Shorewood	MN		3/2/1990	70	A	Moderate
H000005411	Garrett, Jerry	20585 Manor Rd	Shorewood	MN		10/26/1990	110	A	Moderate
H000005416	Vanderhyde, Melva	5065 St. Albans Bay Rd	Shorewood	MN		10/9/1989	110	A	Moderate
H000005417	Paulson, Dan	4780 Fatima Pl	Shorewood	MN		10/9/1989	85	A	Moderate
H000005423	Buckett, Jim	20085 Vine St	Shorewood	MN		8/1/1989	115	A	Moderate
H000005424	Buckett, Jim	20085 Vine St	Shorewood	MN		8/1/1989	115	A	Moderate
H000005428	Clark, Edward	5075 Suburban Dr		MN		1/25/1989	85	A	Moderate
H000005429	Keefer, Jim	20925 Forest Dr		MN		12/8/1988	100	A	Moderate
H000002101	Sliterman, Mark	4580 Linwood Ci	Deephaven	MN		6/5/1990	71	A	Moderate
H000005395	Morrow, Scott	5200 St. Albans Bay Rd	Shorewood	MN		6/12/1990	135	A	Moderate
H000005398	Meyer, Mary	4890 Ferncroft		MN		5/10/1990	50	A	Moderate
H000011034	Thiede, David	20145 Excelsior Bl		MN		5/1/1991	136	A	Moderate
H000007750	Devore, Willard	4931 Rustic Wa	Shorewood	MN	2611723140010	12/12/1990	86	A	Moderate
H000007751	Frost, Lowell	20485 Manor Rd	Shorewood	MN		6/13/1990	125	A	Moderate
H000014742	Moe, Don	20920 Forest Dr		MN		5/7/1991	130	A	Moderate
H000014630	Saliterman, Mark	4560 Linwood La	Deephaven	MN		5/21/1991	25	A	Moderate
H000014687	Thiede, David	20145 Excelsior Bl		MN		5/1/1991	136	A	Moderate
H000011540	Perl, Norman	20670 Linwood Rd	Deephaven	MN		6/25/1991	92	A	Moderate
H000022644	Dick Construction Service	20905 Oak La	Greenwood	MN		7/24/1992	105	A	Moderate
H000017889	Consentino, Lou/judi	20640 Linwood Rd	Deephaven	MN		2/26/1992	120	A	Moderate
H000018014	Bartholaw, Richard	4700 Fatima Pl	Shorewood	MN		2/27/1992	78	A	Moderate
H000018868	Larsen, Phil	5015 St. Albans Bay Rd	Shorewood	MN		4/1/1992	135	A	Moderate
H000028747	Rosenberger, Kirk	20960 Ivy La	Shorewood	MN		4/2/1993	88	A	Moderate
H000025639	Excelsior Covenant Church	19955 Excelsior Bl	Shorewood	MN		10/5/1992	128	A	Moderate
H000027535	Gardener, Dave	4720 West La	Excelsior	MN	2511723220064	4/14/1993	75	A	Moderate
H000026161	Bauer, W. L.	4710 Lakeway Te	Shorewood	MN	2611723110025	10/28/1992	70	A	Moderate
H000038737	Pete Boyer Construction	20095 St. Albans Bay Rd	Excelsior	MN		10/22/1993	286	A	Low
H000042477	Gram, Tore	20185 Vine St	Shorewood	MN		9/20/1993	90	A	Moderate
H000043085	Korzendorfer, Violet	4840 Ferncroft Dr	Excelsior	MN		12/21/1994	80	A	Moderate
H000043052	Peterson, Marlow	4985 St. Albans Bay Rd	Shorewood	MN		8/20/1994	102	A	Moderate
H000037849	Cermack, Laurie	4945 Suburban Dr	Shorewood	MN		6/6/1994	90	A	Moderate
H000044839	Mamsten, Pat	5350 Shady Hills Ci	Shorewood	MN		11/11/1993	105	A	Low
H000046787	Frank Griswald, Estate Of	21520 Fairview St	Greenwood	MN		3/8/1994	200	A	Moderate
H000057399	Mccurdy, Warren	5360 Vine Hill Rd	Shorewood	MN		9/7/1994	65	A	Low
H000057407	Pahl, Doug	4985 Suburban Dr	Shorewood	MN		9/12/1994	124	A	Moderate
H000057408	Pahl, Doug	4985 Suburban Dr	Shorewood	MN		9/12/1994	80	A	Moderate
H000062650	Zins, B. & N.	19580 Shady Hills Rd	Shorewood	MN		5/26/1995	135	A	Low
H000061632	Two-s Properties	19545 Hwy 7	Shorewood	MN		12/28/1994	172	A	Low
H000061637	Cruikshank, Archie	4960 Suburban Dr	Shorewood	MN		12/15/1994	100	A	Moderate
H000061649	Chanin, Lorne/irene	5310 Shady Hills Ci	Shorewood	MN		12/28/1994	78	A	Low
H000061653			Shorewood	MN		2/15/1995	81	A	Low
H000071093	Blackowiak, Chet	4860 Ferncroft Dr	Excelsior	MN		9/6/1995	70	A	Moderate
H000062694	Harris, Jim	5040 Suburban Dr	Shorewood	MN		3/16/1995	140	A	Moderate
H000062695	Harris, Jim	5040 Suburban Dr	Shorewood	MN		3/16/1995	90	A	Moderate
H000075448	Foss, Kathy	20955 Ivy La	Shorewood	MN		10/6/1995	110	A	Moderate
H000071462	Olson, S/j	20760 Radisson Rd	Shorewood	MN		7/7/1995	150	A	Moderate
H000092033	Kirby, J.t. & Sons	4600 Linwood Ci	Deephaven	MN		1/27/1987	150	A	Moderate
H000092063	Kirby, J.t. & Sons	4600 Linwood Ci	Deephaven	MN		1/27/1987	35	A	Moderate
H000090903	Zahn, Rogeer	5815 Ridge Rd	Shorewood	MN		11/11/1988	85	A	Moderate
H000090908	Lindren Bros. Const	19445 Elbert Pt	Shorewood	MN		5/23/1989	123	A	Moderate
H000090909	Ward, Bill	19355 Shady Hills Rd	Shorewood	MN		4/11/1989	100	A	Low
H000090910	Herbert, Peter	19385 Shady Hills Rd	Shorewood	MN		1/14/1989	75	A	Low
H000090916	Krebe, Jerry	20555 Radisson Rd	Shorewood	MN		3/5/1987	135	A	Moderate
H000090917	Born, Ron	4865 Ferncroft	Shorewood	MN		4/30/1986	70	A	Moderate
H000093282	Olson, Kenneth P.	4735 Lakeway Tr	Shorewood	MN		3/24/1988	65	A	Moderate
H000093284	Streeter, Don	4740 Lakeway Te	Shorewood	MN		8/28/1988	70	A	Moderate
H000093290	Engel, Olly	5100 Anthony Te	Shorewood	MN		11/5/1987	192	A	Moderate
H000093293	Olson, Kenneth P.	4735 Lakeway Te	Shorewood	MN		3/24/1988	65	A	Moderate
H000093295	Strothman, Jack	4636 Linwood Ci	Shorewood	MN		6/24/1987	100	A	Moderate
H000081797	Badcock, Charles	20465 Manor Rd	Excelsior	MN		10/8/1992	132	A	Moderate
H000090921	Hankinson, Mark	20815 Idlewild Pa	Shorewood	MN		10/4/1988	250	A	Moderate
H000090922	Molland, J.	20685 Garden Rd	Shorewood	MN		8/26/1988	100	A	Moderate
H000090923	Vosnick, Stan	20615 Manor Rd	Shorewood	MN		9/18/1987	95	A	Moderate
H000090927	Bayer, Robert	5020 Suburban Dr	Shorewood	MN		10/30/1986	0	A	Moderate
H000090928	Peterson, John	20995 Forest Dr	Shorewood	MN		4/15/1988	105	A	Moderate
H000090929	Kluge, William	20720 Idlewild Pa	Shorewood	MN		10/31/1988	135	A	Moderate
H000090930	Coad, June	21095 Forest Dr	Shorewood	MN		10/31/1988	130	A	Moderate
H000090931	Higashi, Robert	20220 Manor Rd	Shorewood	MN		11/16/1988	85	A	Moderate
H000095806	Cochran, Dave	4640 Linwood Ci	Greenwood	MN		1/19/1989	90	A	Moderate
H000095810	West, Howard	21500 Fairview St	Greenwood	MN		11/10/1988	54	A	Moderate
H000095813	Johanson, Jim	4680 Linwood Ci	Greenwood	MN		10/8/1985	82	A	Moderate
H000108196	Makepeace, Ann	4965 Suburban Dr	Shorewood	MN		10/9/1996	90	A	Moderate
H000105148	Valvoline Instant Oil Change	19965 Hwy 7	Shorewood	MN		5/6/1997	22	A	Moderate
H000110164	Peterson, Ernest	4635 Lakeway Te	Shorewood	MN		8/30/1996	67	A	Moderate
H000110103	Collins, Mike	5215 St. Albans Bay Rd	Shorewood	MN		3/17/1997	147	A	Moderate

Table 5: Sealed Wells

H000113043	Prosser, David	21510 Fairview St	Greenwood	MN		11/21/1996	25	A	Moderate
H000104922	Smith, David	5025 Suburban Dr	Shorewood	MN	2511723320012	5/16/1996	105	A	Moderate
H000110721	Wallin, Bob	20025 Vine St	Excelsior	MN		5/1/1997	121	A	Moderate
H000110731	Helmeke, Jim	5075 St. Albans Bay Rd	Excelsior	MN		5/7/1998	75	A	Moderate
H000114011	Bergdorf, Cyd	21115 Minnetonka Bl	Shorewood	MN		12/19/1996	60	A	Moderate
H000122366	Heller, Ellen	20980 Ivy La	Shorewood	MN		11/22/1995	80	A	Moderate
H000122005	Jyland Development, Inc.	21560 Fairview St	Excelsior	MN		5/16/1996	380	A	Moderate
H000117104	Johnson, Ken	20515 Manor Rd	Excelsior	MN		5/1/1997	105	A	Moderate
H000128729	Lee, Bill	21065 Forest Dr	Shoreview	MN		5/2/1989	94	A	Moderate
H000127481	Mcnally, Terry	20390 Excelsior Bl	Shorewood	MN		9/5/1997	100	A	Moderate
H000127483	Mcnally, Terry	20390 Excelsior Bl	Shorewood	MN		9/5/1997	150	A	Moderate
H000124551	Haug, C.	4725 Lakeway Te	Shorewood	MN		6/30/1997	80	A	Moderate
H000124634	Christianson, Don	4905 Suburban Dr	Shorewood	MN		8/15/1997	125	A	Moderate
H000126512	Bloom, Mary	5340 Shady Hills Ci	Shorewood	MN		8/15/1997	110	A	Low
H000126400	Gosen, Dave	20050 Excelsior Bl	Shorewood	MN		6/11/1998	144	A	Moderate
H000131512	Kuempel Chime Clock	21195 Minnetonka Bl	Shorewood	MN		1/19/1998	100	A	Moderate
H000131516	Kuempel Chime Clock	21195 Minnetonka Bl	Shorewood	MN		1/19/1998	80	A	Moderate
H000126561	Malooly, Tim	4780 Lakeway Te	Shorewood	MN		1/28/1999	60	A	Moderate
H000133013	Green Institute, The	5640 Covington Rd	Shorewood	MN		4/16/1998	155	A	Moderate
H000139718	Noble, Ed	20585 Minnetonka Bl	Shorewood	MN		1/28/1999	156	A	Moderate
H000132963	Wuensch Construction	4990 Suburban Dr	Shorewood	MN		12/16/1997	127	A	Moderate
H000137129	Wilcock, Keith	21165 Forest Dr	Shorewood	MN		2/10/1999	83	A	Moderate
H000149941	Hibbs, Bob	5385 St. Albans Bay Rd	Shorewood	MN		6/23/1999	135	A	Moderate
H000148376	Erotas Building Corporation	20630 Linwood Rd	Deephaven	MN		11/22/1998	187	A	Moderate
H000151574	Vandenbrandon, Robert	19585 Shady Hills Rd	Shorewood	MN	2511723440044	8/12/1999	135	A	Low
H000155028	Lund, Earl	20965 Forest Dr	Shorewood	MN	2611723140004	6/22/1999	98	A	Moderate
H000155042	Thomson, Richard	5920 Ridge Rd	Shorewood	MN		6/29/1999	170	A	Moderate
H000155128	Utz, Bill	5890 Ridge Rd	Shorewood	MN		10/19/1999	180	A	Moderate
H000155141	Eaton, Dave	20690 Linwood Rd	Deephaven	MN		4/5/2001	116	A	Moderate
H000160636	Chase, Steve	5225 St. Albans Bay Rd	Shorewood	MN		2/21/2000	135	A	Moderate
H000159819	Widt, Kristina	4815 Suburban Dr	Shorewood	MN	2511723230073	11/1/1999	88	A	Moderate
H000165665	Oknick, Tj/cindy	20425 Manor Rd	Shorewood	MN		4/13/2000	106	A	Moderate
H000161862	Schmidt, Stephanie	4940 Suburban Dr	Shorewood	MN		11/15/1999	84	A	Moderate
H000168014	Marso, Joe	20615 Manor Rd	Shorewood	MN		5/9/2000	129	A	Moderate
H000170185	Watz, Nick	20525 Radisson Rd	Shorewood	MN		10/27/2000	125	A	Moderate
H000170536	Nelson, Leslie	20820 Radisson Inn Rd	Shorewood	MN		7/30/2001	121	A	Moderate
H000170833	Harder, Jim	4510 Linwood La	Deephaven	MN		8/8/2000	89	A	Moderate
H000180899	Collins, Pat	4675 Fatima Pl	Excelsior	MN	2611723110011	6/27/2001	50	A	Moderate
H000177708	Tersi, Carl/tara	4775 Lakeway Te	Shorewood	MN		1/15/2001	100	A	Moderate
H000184676	Jan Ette Miller, Estate Of	19225 Shady Hills Rd	Excelsior	MN		7/25/2001	120	A	Low
H000175301	Bren Schell Homes	4812 Ferncroft Rd	Shorewood	MN		11/10/2000	62	A	Moderate
H000184673	Keith Waters & Associates	5840 Ridge Rd	Shorewood	MN		9/13/2001	187	A	Moderate
H000178819	Falline, Brian/julie	4820 Suburban Dr	Shorewood	MN		3/20/2001	181	A	Moderate
H000190963	Phillippi, Matt	21155 Minnetonka Bl	Shorewood	MN		12/3/2001	68	A	Moderate
H000190983	Walker, David	20485 Radisson Inn Rd	Shorewood	MN		3/6/2002	68	A	Moderate
H000188469	Holtan, Christina	21135 Minnetonka Bl	Shorewood	MN		5/30/2002	94	A	Moderate
H000189924	Ditch, Leon	21020 Ivy La	Shorewood	MN		6/10/2002	80	A	Moderate
H000196779	M.a. Peterson Design	5950 Ridge Rd	Shorewood	MN		8/2/2002	170	A	Moderate
H000202995	Johnson, Fred	5695 Christmas Lake Pt	Shorewood	MN		11/10/2003	228	A	Moderate
H000200103	O'dell, Kathy	5230 Shady Hills Ci	Shorewood	MN		10/4/2002	96	A	Low
H000205733	Arenz, John/deb	4975 St. Albans Bay Rd	Shorewood	MN		8/28/2003	154	A	Moderate
H000200109	Logan, Steve	20525 Manor Rd	Shorewood	MN		10/15/2002	170	A	Moderate
H000206586	Landschute Group, Inc.	4610 Linwood Ci	Deephaven	MN		5/14/2003	80	A	Moderate
H000206515	Landschute Group Inc.	4610 Linwood Ci	Deephaven	MN		5/14/2003	125	A	Moderate
H000194934	Wilson, Mike	20634 Linwood Rd	Deephaven	MN		10/1/2002	97	A	Moderate
H000203356	Landschute Group	4600 Linwood Ci	Deephaven	MN		11/19/2002	138	A	Moderate
H000203367	Raby, Jack	4695 Fatima Pl	Shorewood	MN		12/18/2002	78	A	Moderate
H000203917	Ferry, Steve	5090 Suburban Dr	Shorewood	MN		1/5/2003	107	A	Moderate
H000220580	Landschute Group, Inc.	4520 Linwood La	Deephaven	MN	2311723440013	1/5/2005	96	A	Moderate
H000215882	Thies, Stanley	21055 Forest Dr	Shorewood	MN	2611723140041	10/5/2003	109	A	Moderate
H000215919	Anderson, Less	5385 Shady Hills Ci	Excelsior	MN		3/16/2004	142	A	Low
H000220332	Carmichael Auto Parts	20755 Manor Rd	Shorewood	MN		8/12/2004	72	A	Moderate
H000218279	Mn Dot Environmental Services	Broms (& Covington Rd) Bl	Shorewood	MN		1/9/2004	110	A	Moderate
H000229604	Weirson, Wallace	19765 Excelsior Bl	Excelsior	MN		11/16/2004	124	A	Moderate
H000232934	Erickson, Craig/sandra	4715 Lakeway Te	Shorewood	MN		7/8/2005	78	A	Moderate
H000227906	Smith, Phil	5125 Suburban Dr	Shorewood	MN		9/10/2004	90	A	Moderate
H000227907	Smith, Phil	5125 Suburban Dr	Shorewood	MN		9/10/2004	140	A	Moderate
H000227923	Anderson, Sharon	21490 Fairview St	Greenwood	MN		12/8/2004	223	A	Moderate
H000227926	Sebald, Christopher	20625 Garden Rd	Shorewood	MN		11/20/2004	210	A	Moderate
H000232279	Hardacre, Andrew	20540 Manor Rd	Shorewood	MN		6/22/2005	90	A	Moderate
H000232289	Cranbrook, John	20520 Excelsior Bl	Shorewood	MN		8/30/2005	63	A	Moderate
H000243175	Charels Cudd Co.	20270 Excelsior Bl	Shorewood	MN		11/15/2005	168	A	Moderate
H000233809	Phillipi, Matthew	4900 Farcroft	Shorewood	MN		7/26/2005	102	A	Moderate
H000233814	Dodson, John	19265 Shady Hills Rd	Shorewood	MN		8/15/2005	78	A	Low
H000235241	Kapolka, Joe	4680 Fatima Pl	Shorewood	MN		2/16/2006	152	A	Moderate
H000238026	Doboszenski And Sons	5045 Suburban Dr	Shorewood	MN		9/27/2005	140	A	Moderate
H000238027	Doboszenski And Sons	5055 Suburban	Shorewood	MN	2511723320010	9/27/2005	188	A	Moderate
H000238028	Doboszenski And Sons	5075 Suburban	Shorewood	MN		9/27/2005	160	A	Moderate
0000572725	Mark Warren Homes	5260 St. Alban's Bay Rd	Shorewood	MN		9/7/2006	143	A	Moderate
H000252255	Leland, Tony	5250 St. Albans Bay Rd	Shorewood	MN		9/7/2006	146	A	Moderate
0000159046	Bridgeland Development	5045 Suburban Dr	Shorewood	MN		8/15/2006	270	A	Moderate
H000244539	Wilims, Cheryl	4790 Lakeway Te	Shorewood	MN		10/27/2006	78	A	Moderate
H000248507	Burleson, Harry	20370 Excelsior Bl	Shorewood	MN		7/5/2006	180	A	Moderate
H000245819	10 Spring, Inc.	20520 Excelsior	Shorewood	MN		6/17/2006	130	A	Moderate
H000244540	Bean, Robert	5285 St. Albans Bay Rd	Shorewood	MN		10/27/2006	181	A	Moderate

Table 5: Sealed Wells

H000254301	Kerber, Cy	4800 Rustic Wa	Shorewood	MN	2511723220066	4/19/2007	110	A	Moderate
H000245675	Ulvestad, Nancy	5730 Ridge Rd	Shorewood	MN		10/10/2006	175	A	Moderate
H000266441	Kruger, Ivan	5135 St. Albans Bay Rd	Shorewood	MN		11/30/2007	90	A	Moderate
H000264301	Stahl Construction Co.	19955 Excelsior Bl	Shorewood	MN		8/31/2007	342	A	Moderate
H000261684	Robert Craig Homes	20660 Linwood Rd	Deephaven	MN		11/3/2007	116	A	Moderate
H000261662	Bushnell, Bob	20940 Ivy La	Shorewood	MN		11/1/2007	94	A	Moderate
H000254100	Shorewood, City Of	St. Albans Bay Rd	Shorewood	MN		8/6/2008	112	A	Moderate
H000270272	Dammen, Keenen	20435 Radisson Rd	Shorewood	MN		9/3/2008	294	A	Moderate
H000257843	Petron, Jon	4865 Suburban Dr	Shorewood	MN		5/13/2009	90	A	Moderate
H000274442	Meusey, Jack E.	20445 Manor Rd	Shorewood	MN		10/29/2008	102	A	Moderate
H000279243	Eggers, William	4720 Lakeway Te	Shorewood	MN		5/27/2009	70	A	Moderate
0000526435	Mark Warren Homes, Inc.	5262 St. Albans Bay Rd	Shorewood	MN		5/1/2009	135	A	Moderate
H000279212	Eggers, William	4720 Lakeway Te	Shorewood	MN		5/27/2009	145	A	Moderate
H000286995	French, Pamela G.	4650 Lakeway Te	Shorewood	MN		4/2/2010	95	A	Moderate
H000287004	Wellens, Martin R.	4755 Lakeway Te	Shorewood	MN		4/19/2010	130	A	Moderate
H000263730	Moore, Michael	20620 Garden Rd	Shorewood	MN		9/14/1996	0	A	Moderate
H000263731	Moore, Michael	20620 Garden Rd	Shorewood	MN		9/14/1996	0	A	Moderate
0000151458	American Legion	24450 Smithtown Rd	Excelsior	MN		2/27/2003	177	A	Moderate
0000406077	Lan-de-con	25600 Hwy 7	Excelsior	MN		7/20/1999	203	A	Moderate
0000461037	Yes Partnership	24365 Smithtown Rd	Shorewood	MN		7/17/1996	27	A	Moderate
0000461038	Yes Partnership	24365 Smithtown Rd	Shorewood	MN		7/17/1996	26	A	Moderate
0000486408	Tonka Bay, City Of	4901 Manitou Rd	Tonka Bay	MN		9/26/1997	13	A	Moderate
0000500976	Tonka Bay, City Of	4901 Manitou Rd	Tonka Bay	MN		9/26/1997	29	A	Moderate
0000500977	Tonka Bay, City Of	4901 Manitou Rd	Tonka Bay	MN		9/26/1997	30	A	Moderate
0000500978	Tonka Bay, City Of	4901 Manitou Rd	Tonka Bay	MN		9/26/1997	25	A	Moderate
0000530051	Tonka Bay, City Of	4901 Manitou Rd	Tonka Bay	MN		6/16/1998	22	A	Moderate
0000536173	Koehnen, Terry	6095 Lake Linden Dr	Shorewood	MN		2/20/2003	152	A	Moderate
0000538742	Youngstedt Service Centers	5755 Country Club Rd	Shorewood	MN		6/21/2000	14	A	Moderate
0000538743	Youngstedt Service Centers	5755 Country Club Rd	Shorewood	MN		6/21/2000	18	A	Moderate
0000545419	Youngstedt Service Centers	24365 Smithtown Rd	Shorewood	MN		6/21/2000	15	A	Moderate
0000556042	Youngstedt Service Centers	24365 Smithtown Rd	Shorewood	MN		6/21/2000	88	A	Moderate
0000556043	Youngstedt Service Centers	24365 Smithtown Rd	Shorewood	MN		6/21/2000	53	A	Moderate
0000552483	Youngstedt Service Centers	24365 Smithtown Rd	Shorewood	MN		6/21/2000	13	A	Moderate
0000540690	Youngstedt Service Centers	24365 Smithtown Rd	Shorewood	MN		6/21/2000	49	A	Moderate
0000540691	Youngstedt Service Centers	24365 Smithtown Rd	Shorewood	MN		6/21/2000	23	A	Moderate
0000540692	Youngstedt Service Centers	24365 Smithtown Rd	Shorewood	MN		6/21/2000	23	A	Moderate
0000540693	Youngstedt Service Centers	24365 Smithtown Rd	Shorewood	MN		6/21/2000	20	A	Moderate
H000005349	Brown, Max & Murial	30 Old Orchard La	Tonka Bay	MN		10/17/1990	265	A	Moderate
H000005350	Bruhn, Mary	5330 Manitou Rd		MN		9/19/1990	145	A	Moderate
H000005352	Edgar, Milton	80 Birch Bluff Rd	Tonka Bay	MN		7/19/1990	130	A	Moderate
H000005354	Well Owner, Brian	15 Pleasant Av	Tonka Bay	MN		6/28/1990	170	A	Moderate
H000005358	Ross, Brian	30 Wildhurst Rd	Tonka Bay	MN		3/26/1990	168	A	Moderate
H000005359	Spencer, Tom	20 Pearl St	Tonka Bay	MN	2811723140013	10/4/1989	130	A	Moderate
H000005377	Mara, Frank X	25165 Glen Rd		MN		10/1/1990	100	A	Moderate
H000005378	American Legion Post 259	24450 Smithtown Rd		MN		8/18/1990	110	A	Moderate
H000005379	Swanson, Steve	5755 Echo Rd	Shorewood	MN		9/29/1990	140	A	Moderate
H000005381	Peterson, Baird	23620 Mclain Rd		MN		7/12/1990	120	A	Moderate
H000005414	Johnson, Melvin	23775 Yellowstone		MN		10/10/1989	108	A	Moderate
H000005415	Haskins, Steve	5455 Timber Av	Shorewood	MN		10/10/1989	105	A	Moderate
0000643924	Atofina Petrochemicals, Inc.	24365 Smithtown Rd	Shorewood	MN		11/22/2003	13	A	Moderate
H000001160	Froberg, Glen	35 Old Orchard La	Tonka Bay	MN		9/12/1990	320	A	Moderate
H000005388	Olson, Warren	23820 Yellowstone Tr	Shorewood	MN		7/11/1990	165	A	Moderate
H000005389	Bt Ventures	Wood Duck (5640-5642) Ci	Shorewood	MN		7/3/1990	300	A	Moderate
H000005396	Pahlen, Wm	5510 Manitou La	Shorewood	MN		5/29/1990	100	A	Moderate
H000005401	Martinson, Kathey	6105 Tee Tr	Shorewood	MN		4/1/1990	125	A	Moderate
H000002337	Hebson, D	692 Glencoe Rd	Excelsior	MN		11/14/1989	210	A	Moderate
H000008189	Bevernick, Virginia	50 Florence Dr	Tonka Bay	MN		9/4/1990	18	A	Moderate
H000009610	Kenny, Timothy	5830 Minnetonka Dr	Excelsior	MN		4/4/1991	112	A	Moderate
H000008325	Hybrid Construction	120 Birch Bluff Rd		MN		12/13/1990	105	A	Moderate
H000009087	Olson, Max	5805 Echo Rd	Shorewood	MN		2/13/1991	100	A	Moderate
H000010017	Trick, Robert	23735 Gillette Cv	Shorewood	MN		4/12/1991	85	A	Moderate
H000009812	Danberry Company	60 Wildhurst Tr		MN		3/16/1991	310	A	Moderate
H000009849	Tolle, Jeff	10 Woodlawn Av	Tonka Bay	MN		4/15/1991	88	A	Moderate
H000009811	Sohl, Don	5880 Minnetonka Dr		MN		4/4/1991	170	A	Moderate
H000010159	Quast, Jim	24800 Smithtown Rd		MN		4/26/1991	142	A	Moderate
H000015118	Ranier, Dennis	15 Pleasant La E	Tonka Bay	MN		9/20/1991	340	A	Moderate
H000015120	Hiller, Ken	100 Brentwood	Tonka Bay	MN		8/16/1991	146	A	Moderate
H000015121	Gerdes, Gene	40 Lilah La	Tonka Bay	MN		4/23/1991	74	A	Moderate
H000014237	Mcmahon, Joan	15 Northrup Av	Tonka Bay	MN		9/27/1991	85	A	Moderate
H000014238	Fisk, Shirley	145 Woodpecker Ridge Rd	Tonka Bay	MN		9/18/1991	130	A	Moderate
H000014239	Fisk, Shirley	145 Woodpecker Ridge Rd	Tonka Bay	MN		9/18/1991	300	A	Moderate
H000014566	Siejman, Alan	5775 Echo Rd	Shorewood	MN		5/28/1991	95	A	Moderate
H000015264	Englund, Erick	24050 Smithtown Rd	Shorewood	MN		10/24/1991	186	A	Moderate
H000015472	Schutz	35 Wildhurst	Tonka Bay	MN		10/4/1991	270	A	Moderate
H000011977	Ahlstrom, Arlen	65 Mound Av		MN		6/14/1991	150	A	Moderate
H000016990	Mccutchen, Al	5740 Minnetonka Dr	Shorewood	MN		10/29/1991	129	A	Moderate
H000012444	Lyonski, Joe	24710 Glen Rd	Shorewood	MN		7/26/1991	98	A	Moderate
H000022091	Lundquist, Teckla	5730 Echo Rd	Shorewood	MN	3311723140022	7/13/1992	151	A	Moderate
H000022605	Larson, Connie	135 Wildhurst Rd	Excelsior	MN		5/8/1992	190	A	Moderate
H000019175	Spilseth, Daniel	155 Wildhurst Rd	Tonka Bay	MN		3/25/1992	85	A	Moderate
H000019630	Schultz, Jim	5465 Timber La	Shorewood	MN		5/14/1992	78	A	Moderate
H000024320	Norman, Bill	105 Mound Av	Tonka Bay	MN		7/3/1992	65	A	Moderate
H000029332	May, L. H.	5765 Echo Rd	Shorewood	MN		5/17/1993	100	A	Moderate
H000026364	Fagon, Joanne	65 Wildhurst	Tonka Bay	MN		11/9/1992	240	A	Moderate
H000027549	Cullen, Ralph	25370 Birch Bluff Rd	Excelsior	MN		5/25/1993	242	A	Low

Table 5: Sealed Wells

H000027554	Engelke, Wally	5495 Wedgewood Dr	Shorewood	MN		6/14/1993	160	A	Low
H000027559	Hullsiek, George	55 Mound Av	Tonka Bay	MN		6/18/1993	25	A	Moderate
H000028531	Ryan Construction	Hwy 7 (& 41 Hy)	Shorewood	MN	3411723330027	6/10/1993	173	A	Moderate
H000028715	Smith, Jim	25580 Nelsine Dr	Excelsior	MN		3/31/1993	114	A	Low
H000029380	Ogin, Harry	145 Mound Av	Tonka Bay	MN		6/28/1993	160	A	Moderate
H000029413	Stodola, George	697 Glencoe Rd	Excelsior	MN		7/8/1993	89	A	Moderate
H000034137	Becker, Scott	5050 Manitou Rd	Excelsior	MN		3/26/1993	110	A	Moderate
H000034138	Becker, Scott	5050 Manitou Rd	Excelsior	MN		3/26/1993	105	A	Moderate
H000034139	Becker, Scott	5050 Manitou Rd	Excelsior	MN		3/26/1993	272	A	Moderate
H000034662	Barthel, Gerald	10 Bay St	Tonka Bay	MN		3/24/1993	22	A	Moderate
H000034663	Barthel, Gerald	10 Bay St	Tonka Bay	MN		3/24/1993	22	A	Moderate
H000034664	Juhl, Ida/chris	15 Bay St	Tonka Bay	MN		3/24/1993	24	A	Moderate
H000036147	Swanson, Paul	24460 Yellowstone Tr	Excelsior	MN		7/2/1993	180	A	Moderate
H000040224	Boyer Corporation	23720 Lawtonka Dr	Shorewood	MN		1/4/1994	290	A	Moderate
H000042504	Mattson, Diane	15 Woodlane St	Tonka Bay	MN		10/11/1993	120	A	Moderate
H000042532	Anderson, Linda	195 Mound Av	Tonka Bay	MN		10/28/1993	175	A	Moderate
H000042981	Zieman, Dave	5790 Echo Rd	Shorewood	MN		10/20/1993	62	A	Moderate
H000043067	Torkelson, Barb	23690 Gillette Cv	Shorewood	MN	3411723230010	10/6/1994	85	A	Moderate
H000043087	Miller, Kevin	15 Northrup	Excelsior	MN		1/10/1995	0	A	Moderate
H000043088	Leak, Roger	5870 Minnetonka Dr	Excelsior	MN		1/10/1995	135	A	Moderate
H000043092	Mueller, Ed	80 Wildhurst Rd	Excelsior	MN		10/13/1995	218	A	Moderate
H000037059	Bossert, Bob	100 Mound Av	Tonka Bay	MN		5/24/1994	178	A	Moderate
H000037047	Anderson, Dave/cheryl	6055 Lake Linden Dr	Shorewood	MN		4/12/1994	173	A	Moderate
H000041998	Aldritt, John	60 Florence Dr	Tonka Bay	MN	2811723440004	9/22/1993	73	A	Moderate
H000043638	Lisell, Lorna	45 Northrup Av	Tonka Bay	MN		1/12/1994	133	A	Moderate
H000037342	Henderson, Roslyn	150 Wildhurst Rd	Tonka Bay	MN		8/4/1993	142	A	Moderate
H000037361	Werp, Cindy	170 Brentwood Av	Tonka Bay	MN		8/26/1993	84	A	Moderate
H000037834	Redman, Michele	20 Old Orchard La	Tonka Bay	MN		5/17/1994	170	A	Moderate
H000043642	Swenson, Roy	24745 Amlee Rd	Excelsior	MN	3311723120012	3/16/1994	103	A	Moderate
H000043941	Wakefield, Richard	5325 Lee Ci	Shorewood	MN		4/22/1994	187	A	Low
H000049154	Simons, Lois	35 Pleasant La E	Excelsior	MN		10/18/1994	310	A	Moderate
H000039820	Foster, Renee	5595 Eureka Rd	Shorewood	MN		8/25/1993	130	A	Low
H000053559	Barber, Steve	24395 Wood Dr	Shorewood	MN		6/22/1994	142	A	Moderate
H000062659	Anderson, Fern	6065 Tee Tr	Shorewood	MN		12/22/1994	112	A	Moderate
H000045821	Minnetonka Country Club	24575 Smithtown Rd	Shorewood	MN		11/17/1993	160	A	Moderate
H000053005	Inter City Oil	5680 Smithtown Rd	Shorewood	MN		5/19/1994	0	A	Moderate
H000051026	Saveroid, Steve	20 Birch Bluff Rd	Tonka Bay	MN		5/4/1994	391	A	Moderate
H000058060	Realty House Real Estate	70 Birch Bluff Rd	Tonka Bay	MN		8/11/1994	87	A	Moderate
H000058061	Bursh, Priscilla	50 Crabapple La	Tonka Bay	MN		8/15/1994	174	A	Moderate
H000049056	Koehnen, Terry	6095 Lake Linden Dr	Shorewood	MN		2/22/1994	147	A	Moderate
H000049097	Howell, Rick/betsy	5865 Minnetonka Dr	Shorewood	MN		3/18/1994	110	A	Moderate
H000060962	Plathe, Craig	20 Bay St	Tonka Bay	MN		11/11/1994	96	A	Moderate
H000060981	Faser, Frank	10 Pearl St	Tonka Bay	MN		11/30/1994	100	A	Moderate
H000061643	Evans, David	20 Florence Dr	Tonka Bay	MN		12/29/1994	178	A	Moderate
H000061595	Zuppan, Therese	35 Pleasant Av	Tonka Bay	MN		6/5/1995	162	A	Moderate
H000060934	Pulvermicher, Robin	25 Pleasant Av	Tonka Bay	MN		10/25/1994	205	A	Moderate
H000062686	Dahl, Gene	5845 Country Club Rd	Shorewood	MN		2/28/1995	145	A	Moderate
H000062687	Dahl, Gene	5845 Country Club Rd	Shorewood	MN		2/28/1995	120	A	Moderate
H000073604	Hanus Properties	5531 Manitou Rd	Tonka Bay	MN		8/9/1995	290	A	Moderate
H000080908	Stabech, Candi	15 Old Orchard	Tonka Bay	MN		12/10/1992	130	A	Moderate
H000074770	Koester, Ken	24825 Amlee Rd	Excelsior	MN		6/25/1996	132	A	Moderate
H000074796	Klomps, Terry	23950 Clover La	Shorewood	MN		8/25/1998	212	A	Moderate
H000073322	Wagner, Alvin	25720 Hwy 7	Shorewood	MN		9/20/1995	140	A	Moderate
H000079756	Carlson, Dick	6140 Lake Linden Rd	Shorewood	MN		1/18/1993	185	A	Moderate
H000079773	Andersen, Carl	45 Mound Av	Tonka Bay	MN		1/7/1993	120	A	Moderate
H000081042	Nelson, Kirk/linda	185 Woodpecker Ridge Rd	Tonka Bay	MN		11/12/1992	210	A	Moderate
H000075718	Duncan, Ken	6105 Tee Tr	Shorewood	MN		11/17/1995	204	A	Moderate
H000090900	Roy's Bait	360 Hwy 7	Excelsior	MN		4/30/1984	232	A	Moderate
H000090915	Turner Excavating	24365 Smithtown Rd	Shorewood	MN		7/29/1988	145	A	Moderate
H000093279	Salber, Gene	6110 Tee Tr	Shorewood	MN		11/16/1987	110	A	Moderate
H000093285	White, Mrs. William	5865 Glencoe Rd	Shorewood	MN		11/17/1986	120	A	Moderate
H000093289	Condon, Ceril	5795 Club La	Shorewood	MN		4/10/1988	157	A	Moderate
H000093292	Lubke, Roger	5915 Minnetonka Dr	Shorewood	MN		4/27/1988	220	A	Moderate
H000090918	Martinson, Ken	23970 Smithtown Rd	Shorewood	MN		1/28/1988	115	A	Moderate
H000090932	Carroll, Joan	5815 Echo Rd	Shorewood	MN		11/3/1988	115	A	Moderate
H000090924		5725 Echo Rd	Shorewood	MN		9/9/1987	115	A	Moderate
H000106655	Heilicher, Amos	35 Northrup Av	Tonka Bay	MN		7/17/1996	120	A	Moderate
H000106656	Johnson, Phillip	40 Northrup Av	Tonka Bay	MN		7/17/1996	86	A	Moderate
H000108151	Korpi, Bruce	70 Pleasant La W	Tonka Bay	MN	2811723340024	10/23/1996	314	A	Moderate
H000102868	Nelson, Dennis	135 Mound Av	Tonka Bay	MN		8/25/1996	140	A	Moderate
H000102886	Luke, Dan	25040 Smithtown Rd	Shorewood	MN		10/4/1996	164	A	Low
H000102502	Gleason, Judy	205 Mound Av	Tonka Bay	MN		5/13/1996	94	A	Moderate
H000105395	Zalkowsky, Steve	4754 Manitou Rd	Tonka Bay	MN		6/10/1996	90	A	Moderate
H000110222	Carmichael, Stan	24775 Amlee Rd	Shorewood	MN		10/8/1996	96	A	Moderate
H000106847	Mactaggart, Bette J.	40 Wildhurst Rd	Tonka Bay	MN		7/13/1996	205	A	Moderate
H000110061	Johnson, Steve	245 Birch Bluff Rd	Tonka Bay	MN		11/1/1996	142	A	Low
H000110962	Zamor, Jean	110 Birch Bluff Rd	Tonka Bay	MN		10/2/1996	170	A	Moderate
H000108954	Vinge, Ruby E	80 Mound Av	Tonka Bay	MN		10/10/1996	181	A	Moderate
H000107197	Schmid, Conrad	5760 Minnetonka Dr	Shorewood	MN		7/26/1996	147	A	Moderate
H000109046	Sauer, William L.	165 Mound Av	Tonka Bay	MN		9/27/1996	170	A	Moderate
H000107130	Matthews, Darren	40 Wildhurst Rd	Tonka Bay	MN		8/30/1996	315	A	Moderate
H000107140	Jones, Mitchell	5715 Echo Rd	Shorewood	MN	3311723140017	8/15/1996	125	A	Moderate
H000114583	Tony Eiden Company	5300 Eureka Rd	Shorewood	MN		2/26/1997	94	A	Low
H000114584	Tony Eiden Company	5330 Eureka Rd	Shorewood	MN		2/26/1997	84	A	Low
H000114585	Tony Eiden Company	5370 Eureka Rd	Shorewood	MN		2/26/1997	124	A	Low

Table 5: Sealed Wells

H000114594	Tony Eiden Company	5370 Eureka Rd	Shorewood	MN		2/27/1997	80	A	Low
H000104957	Clyborne, Robert/paula	95 Birch Bluff Rd	Tonka Bay	MN		6/10/1996	140	A	Moderate
H000104962	Pieterick, Elizabeth	55 Tonka Bay Rd	Excelsior	MN		6/4/1996	127	A	Moderate
H000110719	Hillstrom, Joe	24450 Glen Rd	Shorewood	MN		5/1/1997	105	A	Moderate
H000119940	Little, Janet	25140 Glen Rd	Shorewood	MN		6/10/1997	140	A	Moderate
H000112958	Seierstad, Glen	119 Pleasant La	Tonka Bay	MN		10/28/1996	175	A	Moderate
H000114026	Katherine Taylor's Homes	100 Birch Bluff Rd	Tonka Bay	MN		1/14/1997	96	A	Moderate
H000117117	Clogue, Hale	30 Woodpecker Ridge Rd	Tonka Bay	MN		7/24/1997	340	A	Moderate
H000128024	Nelson, Dennis	135 Mound Av	Tonka Bay	MN		9/3/1996	10	A	Moderate
H000119347	Schmidt, Rosella	23975 Yellowstone Tr	Shorewood	MN		7/29/1997	110	A	Moderate
H000121702	Ohland, George	65 Tonka Bay Rd	Tonka Bay	MN		11/15/1995	117	A	Moderate
H000124801	Simmer, Chris/katie	5735 Echo Rd	Shorewood	MN		6/23/1997	150	A	Moderate
H000121764	Kronholm, Irene	23630 Mclain Rd	Shorewood	MN		4/2/1996	137	A	Moderate
H000127997	Uglem, Dean/jean	23875 Elder Turn	Shorewood	MN		10/2/1997	124	A	Moderate
H000135031	Anderson, Roger	5910 Minnetonka Dr	Shorewood	MN		11/24/1998	110	A	Moderate
H000128481	Taylor, Shirley	55 Crabapple La	Tonka Bay	MN	2811723420047	9/21/1988	120	A	Moderate
H000134965	Waple, Andy	5685 Echo Rd	Shorewood	MN		4/1/1998	74	A	Moderate
H000133057	Wyman, John	24060 Yellowstone Tr	Shorewood	MN	3311723410043	12/3/1997	22	A	Moderate
H000133058	Wyman, Jim	24020 Yellowstone Tr	Shorewood	MN	3311723410043	12/3/1997	22	A	Moderate
H000133059	Wyman, Jim	24020 Yellowstone Tr	Shorewood	MN	3311723410043	12/3/1997	22	A	Moderate
H000133060	Wyman, Jim	24020 Yellowstone Tr	Shorewood	MN	3311723410043	12/3/1997	22	A	Moderate
H000133061	Wyman, Jim	24020 Yellowstone Tr	Shorewood	MN	3311723410043	12/3/1997	20	A	Moderate
H000149241	Steneman, Bob	200 Wildhurst Rd	Tonka Bay	MN		10/4/2000	207	A	Moderate
H000139752	Hentges, Gloria	24675 Amlee Rd	Shorewood	MN	3311723120014	6/24/1998	114	A	Moderate
H000137125	Al-atraqchi, Waleed	100 Florence Dr	Tonka Bay	MN		1/20/1999	180	A	Moderate
H000146083	Steiner & Koppleman Inc.	4740 Manitou Rd	Tonka Bay	MN		11/12/1998	364	A	Moderate
H000146086	Weider, Dave	23820 Yellowstone Tr	Shorewood	MN		12/8/1998	112	A	Moderate
H000139446	Wyman, Jim			MN		9/23/1998	350	A	Moderate
H000149213	O'keefe, Gary	4780 Manitou Rd	Tonka Bay	MN		4/19/2000	89	A	Moderate
H000144408	Harrington, Pheobe	23870 Elder Turn	Excelsior	MN		10/28/1998	155	A	Moderate
H000154373	Hocking, Ron	5835 Minnetonka Dr	Shorewood	MN		7/13/1999	124	A	Moderate
H000148917	Miles, Henry	24035 Mary Lake Tr	Shorewood	MN		1/21/1999	295	A	Moderate
H000154437	Opheim, Steve	20 Woodlane St	Tonka Bay	MN		6/15/1999	82	A	Moderate
H000154396	Menth, Carol	6180 Riviera La	Shorewood	MN		6/13/1999	180	A	Moderate
H000144058	Potter, Larry	24925 Amlee Rd	Shorewood	MN	3311723210008	10/12/1998	86	A	Moderate
H000144059	Zoellmer, Evelyn	24885 Amlee Rd	Shorewood	MN		10/12/1998	86	A	Moderate
H000149832	Marty, John	190 Birch Bluff Rd	Tonka Bay	MN		3/4/1999	200	A	Moderate
H000148418	Hunter, Bob	24675 Amlee Rd	Shorewood	MN	3311723120014	1/29/1999	94	A	Moderate
H000148420	Corrective Building Service Inc.	135 Crabapple La	Tonka Bay	MN		12/14/1998	181	A	Moderate
H000145438	Gager, Herb	23640 Yellowstone Tr	Shorewood	MN		10/13/1998	115	A	Moderate
H000150907	Becker, Beth	5330 Manitou Rd	Tonka Bay	MN			-1	A	Moderate
H000154067	Union 76	366 Hwy 7	Excelsior	MN		5/18/2000	62	A	Moderate
H000161825	Youngquist, Charles	30 Woodlane St	Tonka Bay	MN		10/28/1999	216	A	Moderate
H000153640	Emfield, Gary	23930 Smithtown Rd	Shorewood	MN	3411723220008	6/2/1999	110	A	Moderate
H000156282	Osha, Bob	25840 Hwy 7	Shorewood	MN		4/28/2000	183	A	Moderate
H000165636	Femrite, Roger	24530 Smithtown Rd	Shorewood	MN		6/9/2000	150	A	Moderate
H000158020	Dobosenski & Sons	25720 Hwy 7	Shorewood	MN		9/5/1999	265	A	Moderate
H000161890	Strand, Tom	24845 Smithtown Rd	Shorewood	MN	3311723240032	12/1/1999	146	A	Moderate
H000162789	Montei, Scott	23980 Clover La	Excelsior	MN		1/7/2000	182	A	Moderate
H000165901	Foltz, Nancy	90 Birch Bluff Rd	Tonka Bay	MN		3/10/2000	117	A	Moderate
H000170100	Zumbach, Clark/debbie	24880 Glen Rd	Shorewood	MN		12/5/2000	107	A	Moderate
H000170119	Radzom, Scott	23950 Elder Turn	Shorewood	MN	3411723230037	9/12/2000	106	A	Moderate
H000170153	Babcock, Howard	60 Pleasant Av	Tonka Bay	MN		9/29/2000	152	A	Moderate
H000170531	Storlie, Duncan	5375 Eureka Rd	Shorewood	MN		6/8/2001	97	A	Low
H000180827	Leek, Linda	23675 Smithtown Rd	Shorewood	MN		5/10/2001	190	A	Moderate
H000168953	Fina Serve, Inc.	24365 Smithtown Rd	Shorewood	MN		6/21/2000	13	A	Moderate
H000168954	Fina Serve, Inc.	24365 Smithtown Rd	Shorewood	MN		6/21/2000	18	A	Moderate
H000168955	Fina Serve, Inc.	5755 Country Club Rd	Shorewood	MN		6/21/2000	16	A	Moderate
H000168956	Fina Serve, Inc.	5755 Country Club Rd	Shorewood	MN		6/21/2000	16	A	Moderate
H000168957	Fina Serve, Inc.	5755 Country Club Rd	Shorewood	MN		6/21/2000	17	A	Moderate
H000177875	Fischbach, Roger	24885 Glen Rd	Shorewood	MN		1/26/2001	127	A	Moderate
H000173784	Kendrick, Dudley	5800 Echo Rd	Shorewood	MN		10/31/2000	90	A	Moderate
H000184617	Fowler, Mike	30 Northrup Av	Tonka Bay	MN		7/3/2001	154	A	Moderate
H000191332	Petersen, Mike	155 Woodpecker Ridge Rd	Tonka Bay	MN		12/10/2001	58	A	Moderate
H000185251	Pahl, Steve	24860 Smithtown Rd	Shorewood	MN		7/18/2001	147	A	Moderate
H000188033	Brooks, Marjorie	23610 Gillette Cv	Shorewood	MN		6/18/2002	165	A	Moderate
H000188040	Gundeson, Julion	6115 Club Valley Rd	Excelsior	MN		5/20/2002	92	A	Moderate
H000188046	Midwest Asphalt Corporation	24470 Smithtown Rd	Shorewood	MN		11/16/2001	161	A	Moderate
H000185330	Robinson, Roy	125 Mound Av		MN		7/15/1988	168	A	Moderate
H000190966	Grotting, Steve	23605 Gillette Cv	Shorewood	MN		12/14/2001	138	A	Moderate
H000192125	Hanson, Scott	185 Brentwood Av	Tonka Bay	MN		2/26/2002	216	A	Moderate
H000196067	Boynton, Todd/karen	6155 Riviera La	Shorewood	MN		8/16/2002	0	A	Moderate
H000197705	Johnson, Bruce	23645 Yellowstone Tr	Shorewood	MN		7/22/2002	128	A	Moderate
H000197711	Johnson, Bruce	23645 Yellowstone Tr	Shorewood	MN		7/22/2002	108	A	Moderate
H000202095	Tillery, David	23890 Elder Turn	Shorewood	MN		10/25/2002	102	A	Moderate
H000202478	Doboszenski & Sons Inc.	24140 Smithtown Rd	Shorewood	MN		11/8/2002	177	A	Moderate
H000194662	Jensen, Thomas	5413 Manitou Rd	Tonka Bay	MN	3311723120033	7/11/2002	112	A	Moderate
H000200731	Conrad, Edna	5765 Club La	Shorewood	MN		10/14/2002	116	A	Moderate
H000206565	Grothe, Dixie	5040 Manitou Rd	Tonka Bay	MN		5/6/2003	256	A	Moderate
H000194935	Dinsmore, Jeff	5805 Minnetonka Dr	Shorewood	MN		7/1/2002	90	A	Moderate
H000200809	Klosinski, Andrew	5795 Echo Rd	Shorewood	MN		7/30/2002	143	A	Moderate
H000200838	Harland, Lu	5300 Eureka Rd	Shorewood	MN		12/12/2002	124	A	Low
H000203947	Jensen, Jim/pam	5810 Echo Rd	Shorewood	MN		3/17/2003	122	A	Moderate
H000208096	Helene Pree Estate	70 Wildhurst Rd	Tonka Bay	MN		7/31/2003	77	A	Moderate
H000210031	Seifert, Mike	23775 Yellowstone Tr	Shorewood	MN		7/10/2003	184	A	Moderate

Table 5: Sealed Wells

H000210032	Seifert, Mike	23665 Yellowstone Tr	Shorewood	MN		7/10/2003	190	A	Moderate
H000210033	Legler, John	5955 Country Club Rd	Shorewood	MN		6/4/2003	108	A	Moderate
H000210092	Gagne, Robert	24850 Amlee Rd	Shorewood	MN		6/26/2003	112	A	Moderate
H000220529	Brackett, Judd	135 Woodpecker Ridge Rd	Tonka Bay	MN		5/5/2004	297	A	Moderate
H000220588	Soukup, Linda	140 Wildhurst Rd	Tonka Bay	MN	2811723240014	5/6/2004	170	A	Moderate
H000215460	Lake Fellowship Unitarium Universalis	24575 Glen Rd	Shorewood	MN		9/26/2003	95	A	Moderate
H000212096	Engelhardt, Rachel	24780 Glen Rd	Shorewood	MN		9/17/2003	98	A	Moderate
H000213811	Waldo, Andrew	5679 Harding La	Shorewood	MN	3311723230056	12/22/2003	138	A	Moderate
H000217973	Carmichiel, Todd	5935 Country Club Rd	Shorewood	MN		3/4/2004	101	A	Moderate
H000222666	Quast, Marie	125 Brentwood Av	Tonka Bay	MN	3311723110082	6/9/2004	74	A	Moderate
H000218198	Final Grade Inc.	60 Crabapple La	Tonka Bay	MN		2/23/2004	32	A	Moderate
H000215080	Edina Realty	195 Woodpecker Ridge Rd	Tonka Bay	MN	2811723420017	12/11/2003	299	A	Moderate
H000225117	Muchow, Robert	10 Florence Dr	Tonka Bay	MN		7/21/2004	240	A	Moderate
H000232906	Connors, Jim	5810 Minnetonka Dr	Shorewood	MN		3/30/2005	116	A	Moderate
H000226491	Rehman, Tom	130 Birch Bluff Rd	Tonka Bay	MN		10/26/2004	108	A	Moderate
H000227927	Roys Live Bait, Inc.	360 Hwy 7	Excelsior	MN		11/8/2004	226	A	Moderate
H000227928	Roys Live Bait, Inc.	360 Hwy 7	Excelsior	MN		11/8/2004	221	A	Moderate
H000246042	Larson, Paul	15 Mound Av	Tonka Bay	MN	2811723440014	4/24/2006	125	A	Moderate
H000243159	Cottage Creek Design Build	5810 Minnetonka Dr	Shorewood	MN		11/2/2005	173	A	Moderate
H000243239	Fenler Patterson Construction	6120 Lake Linden Dr	Shorewood	MN		12/12/2005	186	A	Moderate
H000243266	7901 Brooklyn Boulevard Associates, Llp	5609 Manitou Rd	Shorewood	MN		12/16/2005	42	A	Moderate
H000228790	Veit And Co.	5830 Minnetonka Dr	Shorewood	MN		12/21/2004	210	A	Moderate
H000233836	Williams, Jeff	24287 Smithtown Rd	Shorewood	MN		12/8/2005	142	A	Moderate
H000237129	Eureka Construction	5660 County Road 19	Shorewood	MN		8/1/2005	260	A	Low
H000244401	Gysling, Walter/helen	24385 Wood Dr	Shorewood	MN		2/14/2006	150	A	Moderate
H000240728	Luke, Gayle	165 Woodpecker Ridges Rd	Tonka Bay	MN		8/25/2005	210	A	Moderate
H000251790	Stonewood Design Build	24990 Birch Bluff Rd	Shorewood	MN		9/14/2006	107	A	Low
H000240786	Haskins, Steve	5455 Timber La	Shorewood	MN		12/2/2005	241	A	Moderate
H000249902	Goetz, Ron	5790 Echo Rd	Shorewood	MN		8/2/2006	120	A	Moderate
0000513107	Paul Sorenson Construction	6175 Riviera La	Shorewood	MN		6/30/2007	184	A	Moderate
H000264300	Depauw, Robert	24945 Smithtown Rd	Shorewood	MN		9/12/2007	150	A	Moderate
H000266831	American Legion	5680 Montou Rd	Shorewood	MN		12/18/2007	24	A	Moderate
H000261344	Mcgeady, John	24020 Yellowstone Tr	Shorewood	MN	3311723410043	7/13/2007	116	A	Moderate
H000265736	First Student Transportation	5531 Manitou Rd	Tonka Bay	MN		10/26/2007	28	A	Moderate
0000426588	Nestande, Scott	6067 Lake Linden Dr	Shorewood	MN		11/12/2007	152	A	Moderate
H000254338	Kutzke Construction	175 Mound Av	Excelsior	MN		11/15/2007	185	A	Moderate
H000274066	First Student Transportation	5531 Manitou Rd	Tonka Bay	MN		9/9/2008	16	A	Moderate
H000267678	First Student Transportation	5531 Manitou Rd	Tonka Bay	MN		6/6/2008	20	A	Moderate
0000439545	Eidsness, Paul	6025 Riviera La	Shorewood	MN		4/16/2009	155	A	Moderate
H000281799	Liberty Contractors	20 Woodpecker Ridge Rd	Tonka Bay	MN		7/22/2009	329	A	Moderate
H000090454	Tonka Bay, City Of	4901 Manitou Rd	Tonka Bay	MN		5/15/1989	160	A	Moderate
0000529487	Ryan Construction	Hwy 7 & Hwy.41	Shorewood	MN		8/4/2009	178	A	Moderate
H000090453		50 Brentwood Av	Tonka Bay	MN		5/8/1989	85	A	Moderate
H000278670	American Legion	5660 Manitou Rd	Shorewood	MN		5/4/2009	40	A	Moderate
H000278671	American Legion	24450 Smithtown Rd	Shorewood	MN		5/4/2009	32	A	Moderate
H000090457	Allen Thomas Homes	70 Pleasnat Av	Tonka Bay	MN		6/7/1988	200	A	Moderate
H000090460	Mcclure, Caroline	220 Birch Bluff Rd	Tonka Bay	MN	2811723320012	11/1/1988	250	A	Moderate
H000090455	Tonka Bay, City Of	5410 Manitou Rd	Tonka Bay	MN		5/15/1989	160	A	Moderate
H000090464		200 Birch Bluff Rd	Tonka Bay	MN	2811723320010	6/2/1988	45	A	Moderate
H000090465		200 Birch Bluff Rd	Tonka Bay	MN	2811723320010	6/2/1988	136	A	Moderate
H000286076	American Legion	5680 Manitou Rd	Shorewood	MN		1/25/2010	50	A	Moderate
H000282861	Viger, Jason	45 Pleasant Av	Tonka Bay	MN		10/29/2009	159	A	Moderate
H000279112	American Legion	24450 Smithtown Rd	Shorewood	MN		5/28/2009	26	A	Moderate
H000279111	American Legion	5680 Manitou Rd	Shorewood	MN		5/28/2009	32	A	Moderate
H000272947	Johnson, Scott	24955 Glen Rd	Shorewood	MN		8/24/2009	112	A	Moderate
H000275542	Bollig And Sons	120 Wildhurst Rd	Tonka Bay	MN		3/4/2009	119	A	Moderate
H000287560	Allee, Leonard	5325 Manitou Rd	Tonka Bay	MN	2811723430008	4/29/2010	84	A	Moderate
H000114229	Boone Builders	28010 Woodside Rd	Shorewood	MN		6/18/1997	0	A	Moderate
H000146020	Ron Clark Construction	28200 Woodside Rd	Shorewood	MN		10/8/1998	119	A	Moderate
H000146021	Ron Clark Construction	28210 Woodside Rd	Shorewood	MN		10/8/1998	115	A	Moderate
H000156450	Loheit, Steve	27915 Woodside Rd	Shorewood	MN		8/27/1999	125	A	Moderate
H000156376	Joy, Wanda	28190 Woodside Rd	Shorewood	MN		8/25/1999	110	A	Moderate
H000207073	Kyle Hunt And Partners	28050 Woodside La	Shorewood	MN		12/24/2003	122	A	Moderate
H000227340	Kyle Hunt And Partners	28220 Woodside Rd	Excelsior	MN		2/21/2005	131	A	Moderate
H000233801	Connor, Mike	28170 Woodside Rd	Shorewood	MN	3111723310002	5/15/2005	98	A	Moderate
H000237972	Skramstad, Tom	28020 Woodside Rd	Shorewood	MN		8/23/2005	94	A	Moderate
H000256105	Stonewood Design Build, Llc	28070 Woodside Dr	Shorewood	MN		2/20/2007	128	A	Moderate
H000258458	Zubert, Brian	28040 Woodside Rd	Shorewood	MN		4/30/2007	133	A	Moderate
H000266408	Robinson, Ralph	28194 Woodside Rd	Shorewood	MN		11/6/2007	150	A	Moderate

Table 6: Unlocated Wells

UNIQUE NUMBER	WELL NAME	STATUS CODE	USE CODE	ADDRESS	STREET NAME	CITY	VULNERABILITY
00724558	SCHWORZ, KURT	A	DO	24315	YELLOWSTONE TR	SHOREWOOD	Moderate
00572709	SCHMID, CONRAD	A	DO	5705	WOOD DUCK CIR	SHOREWOOD	Moderate
00138736	HELMERS	A	DO	5795	CLUB LA	SHOREWOOD	Low
00484597	BADCOCK, CHARLES	A	DO	20525	MANOR RD	SHOREWOOD	Moderate
00513107		A	DO	6125	RAMPART CT	SHOREWOOD	Moderate
00551844	OLSON, J.	A	DO	5550	SHORE RD	SHOREWOOD	Moderate
00130754	NIEME, CARL	A	DO	5860	GLENCOE RD	SHOREWOOD	Moderate
00111002	ZUBERT, BRIAN	A	DO	28028	WOODSIDE RD	SHOREWOOD	Moderate
00127531	SALBER, FRANK E.	A	DO	6145	CLUB VALLEY RD	SHOREWOOD	Moderate
00127522	HEPP, SANDY	A	DO	5455	MALLARD LA	SHOREWOOD	Moderate
00127517	BARNUM, JACK	A	DO	5845	COUNTRY CLUB RD	SHOREWOOD	Moderate
00184816	LAGLESKI, ERNIE	A	DO	5795	CLUB LA	SHOREWOOD	Low
00111023	LUCE, JOHN	A	DO				Moderate
00256126	MILES, HENRY	A	DO	24100	YELLOWSTONE TR	SHOREWOOD	Moderate
00435375			DO				Moderate
00435374	ANDERSON, DAVE	A	DO	6140	LAKE LINDEN DR	SHOREWOOD	Moderate
00435368		A	DO	5505	CO RD NO 19	SHOREWOOD	Moderate
00435366		A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00435363	COLLINS, ROBERT	A	DO	5065	ANTHONY TER	SHOREWOOD	Moderate
00466478	MOORE, RICHARD	A	DO	5655	STAR CIR	SHOREWOOD	Moderate
00466499		A	DO	24575	SMITHTOWN RD	SHOREWOOD	Moderate
00447115	CARROLL, J.P.	A	DO	5795	CLUB LA	SHOREWOOD	Low
00441111	ADAMS, KENT	A	DO	5795	CLUB LA	SHOREWOOD	Low
00441108	BROKKE, RON	A	DO	19685	STATE HWY NO 7	SHOREWOOD	Low
00441098	HILLSTROM, JOE	A	DO	25505	NELSINE DR	SHOREWOOD	Low
00439523		A	DO	5950	RIDGE RD	SHOREWOOD	Moderate
00438338	JACOBS, CONRAD	A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00441060	DUTCHER, JIM	A	DO	5640	HARDING AVE	SHOREWOOD	Moderate
00441056	BAKER, BART	A	DO	5065	ANTHONY TER	SHOREWOOD	Moderate
00438279		A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00434001		A	DO				Moderate
00435445	BURTON, RICHARD	A	DO				Moderate
00111010	GARCIA, FERANDO	A	DO	5555	COVINGTON RD	SHOREWOOD	Moderate
00464521	MEYER, MARY	A	DO	21095	FOREST DR	SHOREWOOD	Moderate
00441077	CALLAHAN, ED	A	DO	24315	YELLOWSTONE TR	SHOREWOOD	Moderate
00438280		A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00438275		A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00469526		A	DO	24575	SMITHTOWN RD	SHOREWOOD	Moderate
00142846	WOODRIDGE, RICHARD	S	AB	5640	HARDING AVE	SHOREWOOD	Moderate
00458111		A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00184871	PATCH, EUGENE	A	DO	24575	SMITHTOWN RD	SHOREWOOD	Moderate
00457116	SWANSON, JON	A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00471320		A	DO	5935	LAKE LINDEN CT	SHOREWOOD	Moderate
00178996	HAFSTROM, ROBERT	A	DO	5725	KATHLEEN CT	SHOREWOOD	Moderate
00453779	FRITZ, ROSEMARY	A	DO	4961	RUSTIC WAY	SHOREWOOD	Moderate
00457101		A	DO	5795	CLUB LA	SHOREWOOD	Low
00164576	GROSSMAN	A	DO				Moderate
00439548	GOECKE, JOE	A	DO	5795	CLUB LA	SHOREWOOD	Low
00435410	MORAVEK, BENNIE	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00435403	DUTCHER, JIM	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00435394		A	DO	5985	LAKE LINDEN CT	SHOREWOOD	Moderate
00435386	L. CRAMER CO	A	DO				Moderate
00464916	BROWNFIELD, CARL	A	DO	5795	CLUB LA	SHOREWOOD	Low
00466458	SHELL, DAVE	A	DO	5640	HARDING AVE	SHOREWOOD	Moderate
00481863	CHRYSSOMALIS, GEORGE	A	DO	5250	ST ALBANS BAY RD	SHOREWOOD	Moderate
00441116		A	DO	5250	ST ALBANS BAY RD	SHOREWOOD	Moderate
00439545	GRECKO, JOE	A	DO	24315	YELLOWSTONE TR	SHOREWOOD	Moderate
00467113	QUAST, JIM	A	DO	24575	SMITHTOWN RD	SHOREWOOD	Moderate
00467109	SOHL, DON	A	DO	23930	YELLOWSTONE TR	SHOREWOOD	Moderate
00467080	MELLY, JIM	A	DO	5655	FAIRWAY DR	SHOREWOOD	Moderate
00467130		A	DO	5655	FAIRWAY DR	SHOREWOOD	Moderate
00453940	MAGHAN, BRIAN	A	DO	5620	CO RD NO 19	SHOREWOOD	Moderate
00170276	STUNDAHL, BARB	A	DO	5795	CLUB LA	SHOREWOOD	Low
00467060		A	DO	5655	FAIRWAY DR	SHOREWOOD	Moderate
00467052	PETERSON, BAIRD	A	DO	23715	SMITHTOWN RD	SHOREWOOD	Moderate
00464510		A	DO	5655	FAIRWAY DR	SHOREWOOD	Moderate
00180206	WILSON, JAMES	A	DO	24100	YELLOWSTONE TR	SHOREWOOD	Moderate
00180205	GUENTHER, HANK	A	DO	5550	SHORE RD	SHOREWOOD	Moderate
00481900	O'HLAND, BRIAN	A	DO	5655	FAIRWAY DR	SHOREWOOD	Moderate
00193626	BUSINESS INC.	A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00193623	BUSINESS INC.	A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate

Table 6: Unlocated Wells

00173689	OLIN, JOHN	A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00168955	JORGENSEN, DENNIS	A	DO	4961	RUSTIC WAY	SHOREWOOD	Moderate
00169000	KNAPIK, TIM	A	DO	24905	SMITHTOWN RD	SHOREWOOD	Moderate
00485087	KRAFT, AUSTIN	A	DO	24315	YELLOWSTONE TR	SHOREWOOD	Moderate
00406057	KAESLER, KAY	A	DO	24695	GLEN RD	SHOREWOOD	Moderate
00406080	BUTLER, JOHN	A	DO	28124	BOULDER BRIDGE DR	SHOREWOOD	Moderate
00458095	AUBRECHT, PAUL	A	DO	5470	CARRIE LA	SHOREWOOD	Moderate
00464732	FOSTER, MIKE	A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00189570	JOHNSON	A	DO	20525	MANOR RD	SHOREWOOD	Moderate
00458921		A	DO	5640	HARDING AVE	SHOREWOOD	Moderate
00458082		A	DO	5555	COVINGTON RD	SHOREWOOD	Moderate
00453741	KAUFFMANN, JEFF	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00453758		A	DO	4820	SUBURBAN DR	SHOREWOOD	Moderate
00453757		A	DO	24695	GLEN RD	SHOREWOOD	Moderate
00420526		A	DO				Moderate
00434288	EISENREICH, BERNIE	A	DO				Low
00479362	LUNDQUIST, TECKLA	A	DO	6055	RIVIERA LA	SHOREWOOD	Moderate
00428225		A	DO	5985	LAKE LINDEN CT	SHOREWOOD	Moderate
00428204		A	DO	6055	RIVIERA LA	SHOREWOOD	Moderate
00453772		A	DO	5500	CARRIE LA	SHOREWOOD	Moderate
00420534		A	DO	5640	HARDING AVE	SHOREWOOD	Moderate
00420531	OKSNESS, JOHN	A	DO	19685	EXCELSIOR BLVD	SHOREWOOD	Low
00481249	CHINANDER, CHRIS	A	DO	6055	RIVIERA LA	SHOREWOOD	Moderate
00400839		A	DO	5795	CLUB LA	SHOREWOOD	Low
00687295		A	DO	5935	LAKE LINDEN CT	SHOREWOOD	Moderate
00417581	OBEREIN, BILL	A	DO	6055	RIVIERA LA	SHOREWOOD	Moderate
00413399		A	DO	5730	RIDGE RD	SHOREWOOD	Moderate
00413394		A	DO	5730	RIDGE RD	SHOREWOOD	Moderate
00413379		A	DO	5640	HARDING AVE	SHOREWOOD	Moderate
00255854	FINCH, J. CONNER	A	DO	5810	MINNETONKA DR	SHOREWOOD	Moderate
00449438	LATTERNER, DOC MRS	A	DO				Low
00416715		A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00410399	POHLEN, BILL	A	DO				Moderate
00428743		A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00414043	PIKE, ELLIS	A	DO	24575	SMITHTOWN RD	SHOREWOOD	Moderate
00410380	GEORGE, LEN	A	DO	24575	SMITHTOWN RD	SHOREWOOD	Moderate
00428244	LANDBERG, DENNIS	A	DO	5620	CO RD NO 19	SHOREWOOD	Moderate
00428240	DUDDA, JACK	A	DO	4860	RUSTIC WAY	SHOREWOOD	Moderate
00420503		A	DO				Moderate
00420498		A	DO	24315	YELLOWSTONE TR	SHOREWOOD	Moderate
00253037	MILES, HENRY	S	DO	24100	YELLOWSTONE TR	SHOREWOOD	Moderate
00400773	SEDESKY, JIM	A	DO	21095	FOREST DR	SHOREWOOD	Moderate
00415489	KREBS, JERRY	A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00415488	SMITH, GARY	A	DO	5795	CLUB LA	SHOREWOOD	Low
00415487	OFSTEHAGE, AL & GAIL	A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00449446	GERMAIN, BILL	A	DO				Low
00449445	KRONHOLM, MORRIE	A	DO	5705	WOOD DUCK CIR	SHOREWOOD	Moderate
00449440	CONDON, CERIL	A	DO	24575	SMITHTOWN RD	SHOREWOOD	Moderate
00424330		A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00415481	THISS, TOM	A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00508055	NELSON, CURT	A	DO	5795	CLUB LA	SHOREWOOD	Low
00505040	PAULSON, DON	A	DO	4865	FERNCROFT DR	SHOREWOOD	Moderate
00405067	KNUTSON, TERRY	A	DO	5795	CLUB LA	SHOREWOOD	Low
00433428		A	DO	5640	HARDING AVE	SHOREWOOD	Moderate
00424028	LINDELL, JIM	A	DO	145	BRENTWOOD AVE	TONKA BAY	Moderate
00405998	NELSON, LOREN	A	DO	5275	ST ALBANS BAY RD	SHOREWOOD	Moderate
00505083		A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00433409	DOUGLASS-WHITE, TOM	A	DO				Low
00433407	NYGREN, KATHRYN	A	DO	5675	CHRISTOPHER RD	SHOREWOOD	Moderate
00505026		A	DO	5250	ST ALBANS BAY RD	SHOREWOOD	Moderate
00505019	BURNHART, VINCE	A	DO	24695	GLEN RD	SHOREWOOD	Moderate
00505018	SCHEURICH, JOHN	A	DO	4660	LAKEWAY TER	SHOREWOOD	Moderate
00505925	KOERTING, KURT	A	DO	5405	ST ALBANS BAY RD	SHOREWOOD	Moderate
00415464	CUTTER, WM.	A	DO	5795	CLUB LA	SHOREWOOD	Low
00451405	BARDINE, PAUL	A	DO	5795	CLUB LA	SHOREWOOD	Low
00505034	AMESBERRY HOMEOWNERS ASSOC.	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00505051	SANDBERG, ERICK	A	DO	5640	HARDING AVE	SHOREWOOD	Moderate
00505050		A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00508085	VANDERLINDE, ALLEN	A	DO	5795	CLUB LA	SHOREWOOD	Low
00426591	MINNETONKA COUNTRY CLUB	A	DO	24905	SMITHTOWN RD	SHOREWOOD	Moderate
00426589		A	DO	5655	FAIRWAY DR	SHOREWOOD	Moderate
00426588		A	DO	6140	LAKE LINDEN DR	SHOREWOOD	Moderate

Table 6: Unlocated Wells

00426587		A	DO	6140	LAKE LINDEN DR	SHOREWOOD	Moderate
00426581	PFIFFNER, FRANK	A	DO	20675	PARKVIEW LA	SHOREWOOD	Moderate
00426580	TULLY, JOHN	A	DO				Moderate
00426575	GAGNE, BOB	A	DO	5455	MALLARD LA	SHOREWOOD	Moderate
00426573		A	DO				Moderate
00508074	SWANSON, STEVE	A	DO	5795	CLUB LA	SHOREWOOD	Low
00508060	WREDE, JOHN	A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00508059	MCCARTHY, MIKE	A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00426568	ROUTT, MOLLY	A	DO				Moderate
00426566	MOORE, DICK	A	DO	5620	CO RD NO 19	SHOREWOOD	Moderate
00536184	LANGLEY, WALTER	A	DO	5795	CLUB LA	SHOREWOOD	Low
00536178		A	DO	5795	CLUB LA	SHOREWOOD	Low
00551811	PAHL, DOUGLAS	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00538743	MW-2	S	AB	5795	CLUB LA	SHOREWOOD	Low
00576134	SHERIDAN, EDWARD	A	DO	5795	CLUB LA	SHOREWOOD	Low
00536153		A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00546837		A	DO	24235	MARY LAKE TR	SHOREWOOD	Moderate
00536168		A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00554050	LEAK, ROGER	A	DO	23930	YELLOWSTONE TR	SHOREWOOD	Moderate
00554041	KORZENDORFER, TERRY	A	DO	4795	FERNCROFT DR	SHOREWOOD	Moderate
00551833	DAHL, GENE	A	DO	24235	MARY LAKE TR	SHOREWOOD	Moderate
00551830	ANDERSON, FERN	A	DO	24575	SMITHTOWN RD	SHOREWOOD	Moderate
00572716	PETERSON, ERNEST	A	DO				Moderate
00591537	KUEMPEL CHIME CLOCK	A	DO	4865	FERNCROFT DR	SHOREWOOD	Moderate
00591520	MCNALLY, TERRY	A	DO	20522	EXCELSIOR BLVD	SHOREWOOD	Moderate
00591502	BERGDORF, CYD	A	DO	4865	FERNCROFT DR	SHOREWOOD	Moderate
00591511	SIMMER, CHRIS & KATIE	A	DO	5755	COUNTRY CLUB RD	SHOREWOOD	Moderate
00532598	LARSON, AL	A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00561377	DUNCAN, KEN	A	DO	5795	CLUB LA	SHOREWOOD	Low
00573563		A	DO	5795	CLUB LA	SHOREWOOD	Low
00551836	YUNGERBERG, S & V	A	DO				Moderate
00548529	LEIPOLD, ED	A	DO	5795	CLUB LA	SHOREWOOD	Low
00539803		A	DO	6055	RIVIERA LA	SHOREWOOD	Moderate
00532170		A	DO	5620	CO RD NO 19	SHOREWOOD	Moderate
00600250	MARSO, JOE	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00572699		A	DO	21095	FOREST DR	SHOREWOOD	Moderate
00626969	ADVANT PETROLEUM INC.	S	AB	5775	RIDGE RD	SHOREWOOD	Moderate
00626966	AVANTI PETROLEUM INC.	S	AB	5775	RIDGE RD	SHOREWOOD	Moderate
00528611	VOLK, DAVE	A	DO	6140	LAKE LINDEN DR	SHOREWOOD	Moderate
00600204	NELSON, DALE	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00511941		A	DO	5795	CLUB LA	SHOREWOOD	Low
00621566	JOHNSON & JOHNSON BUILDE	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00621557	CHASE, STEVE	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00624939	JOY, WANDA	A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00647739	GUNDERSON, JULIAN	A	DO	6145	CLUB VALLEY RD	SHOREWOOD	Moderate
00650726	HOHAN, CHRISTINA & PALME	A	DO				Moderate
00477420	LUGOWSKI, JOE	A	DO	5655	STAR CIR	SHOREWOOD	Moderate
00477417	SELLKE, DENNIS	A	DO	5535	WATERFORD CIR	SHOREWOOD	Low
00477411	SIEGMAN, ALAN	A	DO	5609	MANITOU RD	TONKA BAY	Moderate
00477428	REISER, DEAN	A	DO	20090	EXCELSIOR BLVD	SHOREWOOD	Moderate
00612719	SCHWARTZ, KURT	A	DO	5795	CLUB LA	SHOREWOOD	Low
00515592	JOHNSON, SCOTT	A	DO	5795	CLUB LA	SHOREWOOD	Low
00623565	HUNTER, BOB	A	DO	5795	CLUB LA	SHOREWOOD	Low
00526667	ENGELKEY, WALLY	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00536928		A	DO	25505	NELSINE DR	SHOREWOOD	Low
00505902	JOHNSON, MELVIN	A	DO	5935	LAKE LINDEN CT	SHOREWOOD	Moderate
00493950		A	DO	24575	SMITHTOWN RD	SHOREWOOD	Low
00522191		A	DO	5500	CARRIE LA	SHOREWOOD	Moderate
00493918	ZIEMER, SCOTT	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00500978	MW-3	S	AB				Moderate
00500977	MW-2	S	AB				Moderate
00500976	MW-1	S	AB				Moderate
00580626	MONJAK, KEITH	A	DO	5795	CLUB LA	SHOREWOOD	Low
00495535		A	DO	5655	FAIRWAY DR	SHOREWOOD	Moderate
00591513	SCHMIDT, ROSELLA	A	DO	6055	RIVIERA LA	SHOREWOOD	Moderate
00475746		A	DO	5795	CLUB LA	SHOREWOOD	Low
00475744		A	DO	5640	HARDING AVE	SHOREWOOD	Moderate
00493914		A	DO	24315	YELLOWSTONE TR	SHOREWOOD	Moderate
00493911		A	DO				Moderate
00530051		S	AB				Moderate
00585099		A	DO	5845	RIDGE RD	SHOREWOOD	Moderate
00572725		A	DO	5275	ST ALBANS BAY RD	SHOREWOOD	Moderate

Table 6: Unlocated Wells

00572724	WOODEN NAIL REMODELING	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00589609	FAIRBANK, DENNIS	A	DO	24100	YELLOWSTONE TR	SHOREWOOD	Moderate
00520467		A	DO	5490	VINE HILL RD	SHOREWOOD	Low
00520468		A	DO	5795	CLUB LA	SHOREWOOD	Low
00530198		A	DO	4755	WEST LA	SHOREWOOD	Moderate
00530197	BARBER, STEVE	A	DO	6145	CLUB VALLEY RD	SHOREWOOD	Moderate
00530185	WARREN, MARK	A	DO	4755	WEST LA	SHOREWOOD	Moderate
00520461	WEIDNER, ARCHIE	A	DO	5370	SHADY HILLS CIR	SHOREWOOD	Low
00588933	GALUSHA, JEAN	A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00540692	MW-9	S	AB	5795	CLUB LA	SHOREWOOD	Low
00540690	MW-1A	S	AB	5795	CLUB LA	SHOREWOOD	Low
00538742	MW-1	S	AB	5795	CLUB LA	SHOREWOOD	Low
00540693	MW-6A	S	AB	5795	CLUB LA	SHOREWOOD	Low
00536142	MOORE, ALEX	A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00540691	MW-8	S	AB	5795	CLUB LA	SHOREWOOD	Low
00536276		A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00536271	SIMONS, TED	A	DO	5795	CLUB LA	SHOREWOOD	Low
00536268	ZUBERT, BRIAN	A	DO				Moderate
00510603	CARLSON, CHARLES	A	DO	24575	SMITHTOWN RD	SHOREWOOD	Moderate
00520429	THELL, JERRY	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00520424		A	DO				Moderate
00520212	ZERBY, SCOTT	A	DO	5620	CO RD NO 19	SHOREWOOD	Moderate
00520208	GARDENER,DAVE	A	DO	4795	FERNCROFT DR	SHOREWOOD	Moderate
00513886	BAUER, W.L.	A	DO	4755	WEST LA	SHOREWOOD	Moderate
00744908	KENNEDY, MARK	A	DO	6055	RIVIERA LA	SHOREWOOD	Moderate
00519732		A	DO	24315	YELLOWSTONE TR	SHOREWOOD	Moderate
00519723	SEIFERT, MIKE	A	DO	24575	SMITHTOWN RD	SHOREWOOD	Low
00537372	SWENSON, ROY E.	A	DO	24885	GLEN RD	SHOREWOOD	Moderate
00657159		A	DO	5845	COUNTRY CLUB RD	SHOREWOOD	Moderate
00711454	MORRIS, MARTY	A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00615238	UTZ, BILL	A	DO				Moderate
00688989	LEGLER, JOHN	A	DO	5795	CLUB LA	SHOREWOOD	Low
00765511	MEUSEY, JACK	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00615250	JOHNSON & JOHNSON CO.	S	AB	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00687254	FERRY, STEVE	A	DO	20675	PARKVIEW LA	SHOREWOOD	Moderate
00649249	ZUMBACH, CLARK & DEBBIE	A	DO	5795	CLUB LA	SHOREWOOD	Low
00655031		A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00655019	WATZ, NICK	A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00461038	FINA OIL & CHEMICAL	S	AB				Low
00692512	SHANKIN, NATHAN	A	DO	21095	FOREST DR	SHOREWOOD	Moderate
00792008	ROBERT CRAIG HOMES	A	DO				Moderate
00801063	HANNA, TED JR.	S	AB	4865	FERNCROFT DR	SHOREWOOD	Moderate
00700849		A	DO	5795	CLUB LA	SHOREWOOD	Low
00687271	HANZLIK, EDWARD	A	DO	6140	LAKE LINDEN DR	SHOREWOOD	Moderate
00677509	KLOSINSKI, ANDREW	A	DO	5755	COUNTRY CLUB RD	SHOREWOOD	Moderate
00735735	GYSLING, WALTER/HELEN	A	DO	5795	CLUB LA	SHOREWOOD	Low
00643924	TWIN CITIES SHORES	S	AB	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00615228	THRODAHL, PETE	A	DO	5060	SUBURBAN DR	SHOREWOOD	Moderate
00639120		A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00639119		A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00687275	ENGELHARDT, RACHEL	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00624959	LOHEIT, STEVE	A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00631463	BENUSA, JAY & DARLA	A	DO	23930	YELLOWSTONE TR	SHOREWOOD	Moderate
00658647	CONRAD, EDNA	A	DO	24575	SMITHTOWN RD	SHOREWOOD	Moderate
00660589		A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00673262		A	DO	5795	CLUB LA	SHOREWOOD	Low
00673894		A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00696473	WALDO, ANDREW	A	DO	5795	CLUB LA	SHOREWOOD	Low
00705926		A	DO	5795	CLUB LA	SHOREWOOD	Low
00658610	FISCHBACH, ROGER	A	DO	5795	CLUB LA	SHOREWOOD	Low
00718348	SCHMITT, JOHN	A	DO				Moderate
00718349	HARMANN, LEE	A	DO				Moderate
00672324		A	DO	20680	GARDEN RD	SHOREWOOD	Moderate
00595223	HARJU, BRIAN	A	DO	5985	LAKE LINDEN CT	SHOREWOOD	Moderate
00591078		A	DO				Low
00591077		A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00695917	KELLY, DUGAN	A	DO	24575	SMITHTOWN RD	SHOREWOOD	Moderate
00692965	WITTA, JAY	A	DO	5795	CLUB LA	SHOREWOOD	Low
00743437	TGS CONSTRUCTION	A	DO	5795	CLUB LA	SHOREWOOD	Low
00758226	NESTANDE, SCOTT	A	DO	6140	LAKE LINDEN DR	SHOREWOOD	Moderate
00741297	WILIMS, CHERYL	A	DO	4795	FERNCROFT DR	SHOREWOOD	Moderate
00741301	KERBER, CY	A	DO	4760	LAKEWAY TER	SHOREWOOD	Moderate

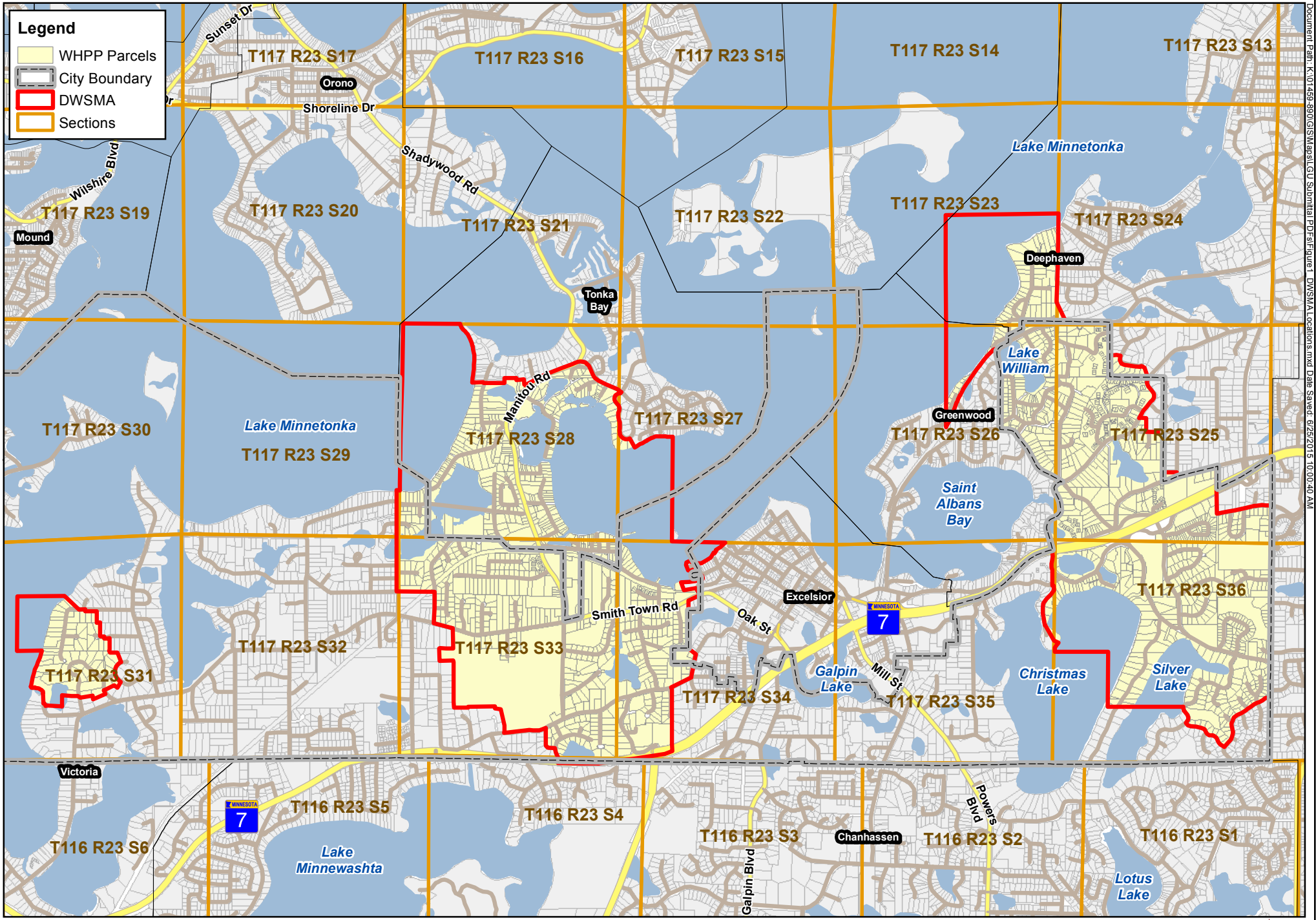
Table 6: Unlocated Wells

00632984	ULVESTAD, ROLF AND NANCY	A	DO				Moderate
00477401	ROGERS, DON	A	DO	5675	CHRISTOPHER RD	SHOREWOOD	Moderate
00744133	GOETZ, RON	A	DO	5765	ECHO RD	SHOREWOOD	Moderate
00727748	KAPOLKA, JOE	A	DO				Moderate
00687298	ANDERSON, SHARON	A	DO				Moderate
00695919	PEDERSON, JIM	A	DO	24235	MARY LAKE TR	SHOREWOOD	Moderate
00692541	HUNT, KYLE	A	DO				Moderate
00755317	SMITH PARTNERS	A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00687284	LECY BROTHERS HOME	A	DO	6140	LAKE LINDEN DR	SHOREWOOD	Moderate
00724552	LECY BROTHERS HOME	A	DO	6140	LAKE LINDEN DR	SHOREWOOD	Moderate
00741650	FISCHER, ANDREW & COLLEEN	A	DO	6125	RAMPART CT	SHOREWOOD	Moderate
00770008	EGGERS, WILLIAM & CAROL	A	DO	4660	LAKEWAY TER	SHOREWOOD	Moderate
00752475	MCGEADY, JOHN	A	DO	24100	YELLOWSTONE TR	SHOREWOOD	Moderate
00493125	MW-1	U	MW	5775	RIDGE RD	SHOREWOOD	Moderate
00750673		A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00770968	TILTON, LINDA & LOUIS	A	DO	5500	CARRIE LA	SHOREWOOD	Moderate
00760629	DAMMEN, KEENEN & KERSTIN	A	DO	5555	COVINGTON RD	SHOREWOOD	Moderate
00486408		U	MW				Moderate
00493126	MW-2	U	MW	5775	RIDGE RD	SHOREWOOD	Moderate
00493129	MW-5	U	MW	5775	RIDGE RD	SHOREWOOD	Moderate
00788226	COPPENS, JIM & KIM	A	IR				Moderate
00447089		U	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00493127	MW-3	U	MW	5775	RIDGE RD	SHOREWOOD	Moderate
00493128	MW-4	U	MW	5775	RIDGE RD	SHOREWOOD	Moderate
00501755	MW-5	U	MW	5795	CLUB LA	SHOREWOOD	Low
00545419	MW-7A	U	MW	5795	CLUB LA	SHOREWOOD	Low
00552483	MW-1	U	MW	5795	CLUB LA	SHOREWOOD	Low
00458662	MW-1	U	MW	28125	WOODSIDE RD	SHOREWOOD	Moderate
00458663	MW-2	U	MW	28125	WOODSIDE RD	SHOREWOOD	Moderate
00458664	MW-3	U	MW	28125	WOODSIDE RD	SHOREWOOD	Moderate
00501751	MW-1	U	MW	5795	CLUB LA	SHOREWOOD	Low
00501752	MW-2	U	MW	5795	CLUB LA	SHOREWOOD	Low
00501753	MW-3	U	MW	5795	CLUB LA	SHOREWOOD	Low
00501754	MW-4	U	MW	5795	CLUB LA	SHOREWOOD	Low
00272431	JOHNSON, LESLIE	A					Moderate
00272422	JOHNSON,CRAWFORD	A					Moderate
00272423	JOHNSON, CRAWFORD	A					Moderate
00272304	BORIGHT, TOM	A					Moderate
00488218	ROBERT L. LEEKLY INC.	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00272613	SVITHIOD HOME FOR THE AGED	A					Moderate
00272519	PATCH, EUGENE	A		5795	CLUB LA	SHOREWOOD	Low
00770283	PETRON, JON & SHIRA		DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00776857	FRENCH, PAMELA G	A	DO				Moderate
00776867	RENDAHL, MARK & SUSAN	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00765037	EIDSNESS, PAUL	A	DO	24100	YELLOWSTONE TR	SHOREWOOD	Moderate
00750668	DEPAUW, BOB	A	DO	5795	CLUB LA	SHOREWOOD	Low
00272538	QUALITY HOMES	A					Moderate
00272539	QUALITY HOMES	A					Moderate
00272540	QUALITY HOMES	A					Moderate
00272541	QUALITY HOMES	A					Moderate
00272542	QUALITY HOMES	A					Moderate
00783523	EVANS, BOB	A	DO				Moderate
00776860	WELLENS, MARTIN R.	A	DO	4795	FERNCROFT DR	SHOREWOOD	Moderate
00776890	TOBIN, GREG	A	DO	4865	FERNCROFT DR	SHOREWOOD	Moderate
00750686	STEINER & KOPPELMAN INC	A	DO	28210	WOODSIDE RD	SHOREWOOD	Moderate
00766292	JOHNSON, SCOTT	A	DO	26	ADDRESS UNASSIGNED	SHOREWOOD	Moderate
00272469	METRO SEWER BOARD TH6	A	TW	5795	CLUB LA	SHOREWOOD	Low
00781400	HERNT, KYLE	A	DO	28100	WOODSIDE RD	SHOREWOOD	Moderate
00600227	HOLMGREN, ERIC	A	DO	5765	ECHO RD	SHOREWOOD	Moderate
00625301	MILES, HENRY	A	DO	24100	YELLOWSTONE TR	SHOREWOOD	Moderate
00615578	ZOELLMER, DANIEL & EVELY	A	DO				Low
00615577	POTTER, LARRY	A	DO				Low
00621744	HOME REFLECTION, INC.	A	DO	23930	YELLOWSTONE TR	SHOREWOOD	Moderate
00624921	MENTH, CAROL	A	DO				Low
00585075		A	DO	5845	RIDGE RD	SHOREWOOD	Moderate
00632403		A	DO	24575	SMITHTOWN RD	SHOREWOOD	Low
00623571		A	DO	28125	WOODSIDE RD	SHOREWOOD	Moderate
00603599		A	DO				Low
00623576		A	DO	5775	RIDGE RD	SHOREWOOD	Moderate
00615230	THOMSON, RICHARD	A	DO				Moderate
00792474	FAGERLEE, DAVID AND DAWN	A	DO	5630	COVINGTON RD	SHOREWOOD	Moderate
00783511	STONEWOOD LLC	A	DO	28210	WOODSIDE RD	SHOREWOOD	Moderate

Table 6: Unlocated Wells

00788250	SAUTTER, CHUCK & AUDRE	A	DO	23715	SMITHTOWN RD	SHOREWOOD	Moderate
00461037	FINA OIL & CHEMICAL	S	AB	5795	CLUB LA	SHOREWOOD	Low
00273579	METRO SEWER BOARD TH7		TW	5795	CLUB LA	SHOREWOOD	Low
00273580	METRO SEWER BOARD TH8		TW	5795	CLUB LA	SHOREWOOD	Low
00273581	METRO SEWER BOARD TH9	A	TW	5795	CLUB LA	SHOREWOOD	Low
00272543	QUALITY HOMES	A					Moderate
00272553	HAMBURG RESIDENCE	A		28125	WOODSIDE RD	SHOREWOOD	Moderate
00272391	HASTINGS, TOM	A		5775	RIDGE RD	SHOREWOOD	Moderate
00272890	SCHREIER, A.C.	A	UN	5775	RIDGE RD	SHOREWOOD	Moderate
00770194	NELSON, NICOLE	A	DO	4865	FERNCROFT DR	SHOREWOOD	Moderate
00272665	ZUPPKE, PAUL	A					Moderate

Appendix B – Figures



Document Path: K:\01459-890\GIS\Maps\LGU Submittal PDFs\Figure1_DWSMALocations.mxd Date Saved: 6/25/2015 10:00:40 AM

CITY OF SHOREWOOD

Figure 1 - DWSMA Locations
Wellhead Protection Plan
Shorewood, MN

1 inch = 3,000 feet

N

WSB & Associates, Inc.

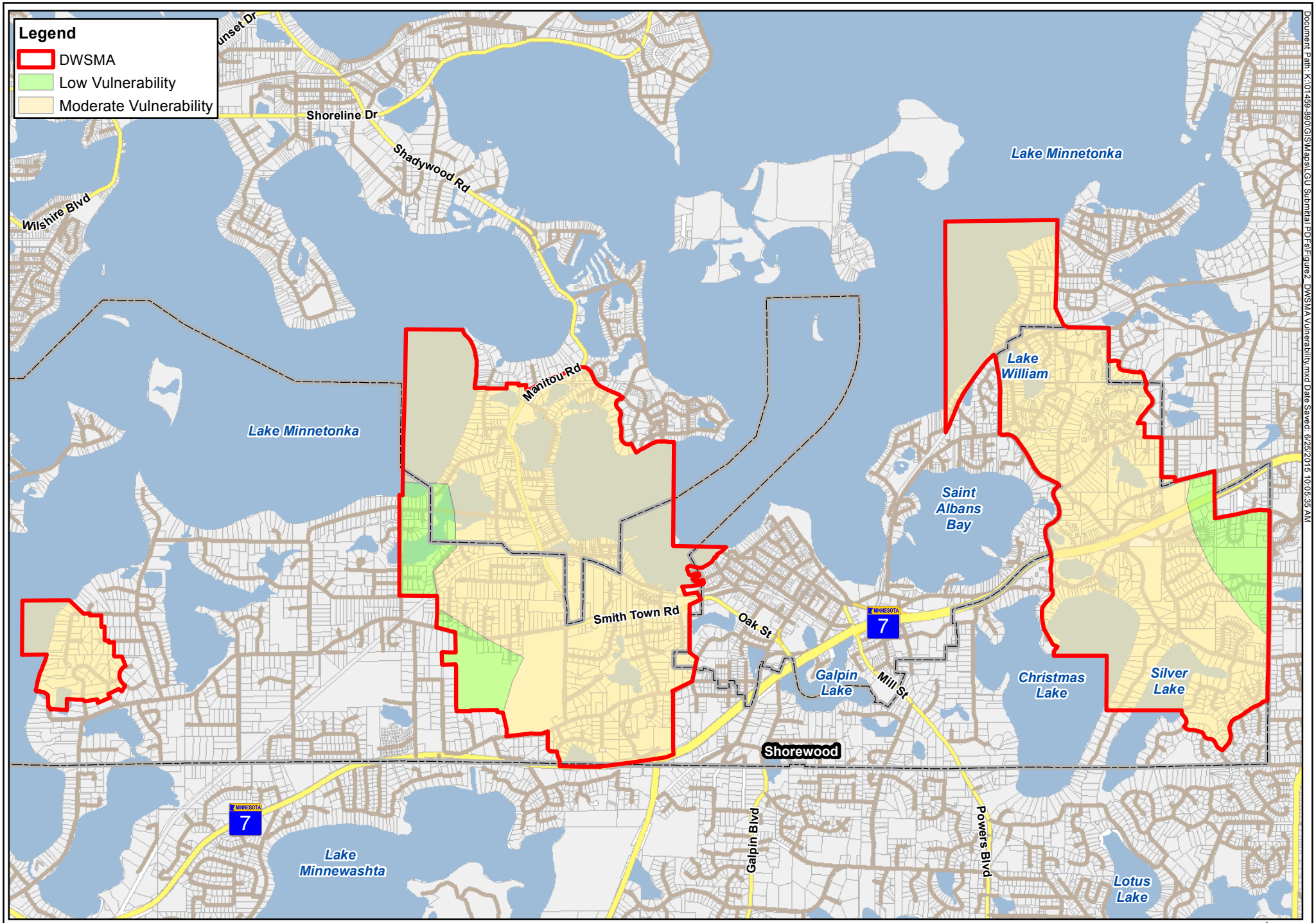
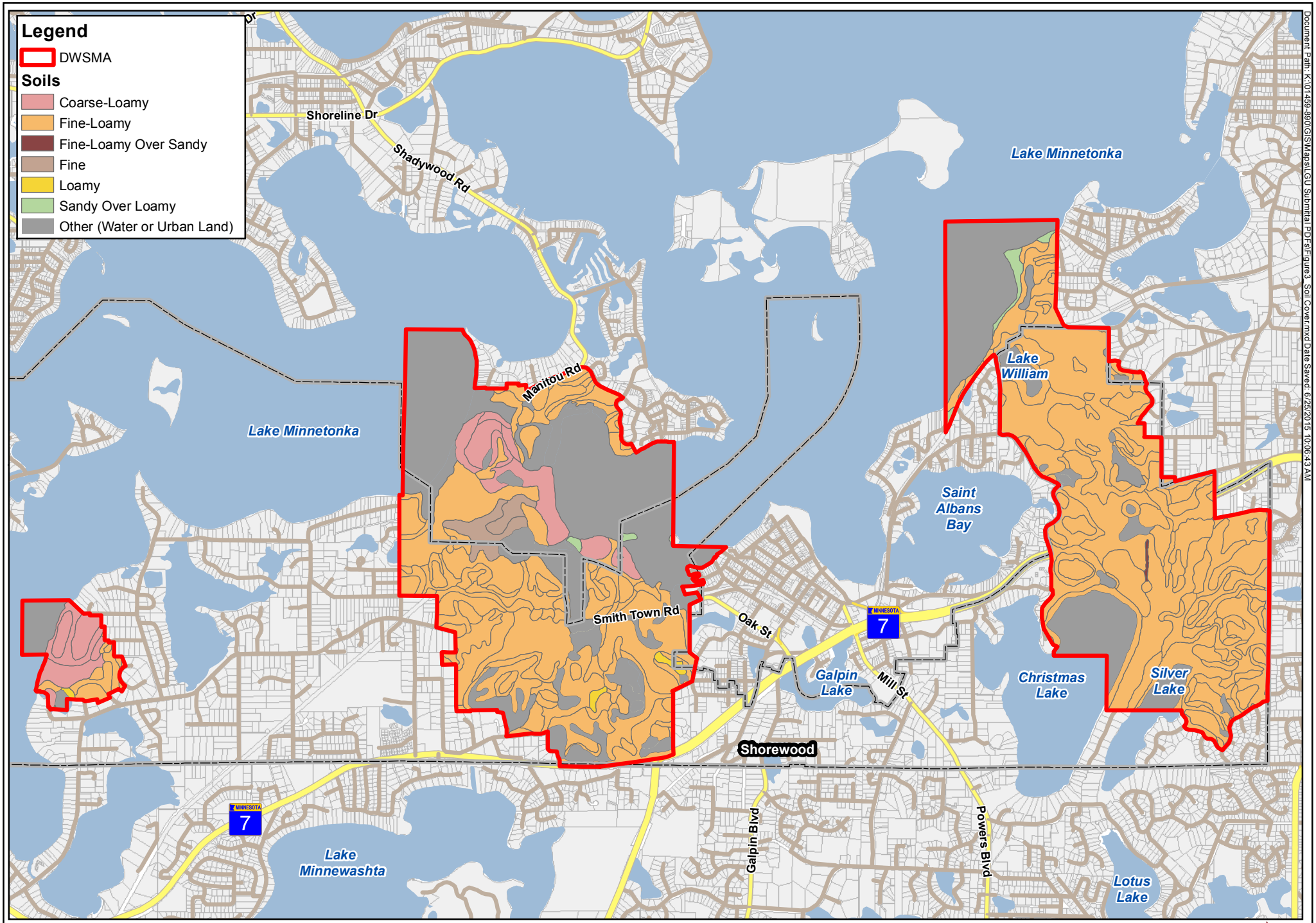


Figure 2 - DWSMA Vulnerability
Wellhead Protection Plan
Shorewood, MN

CITY OF SHOREWOOD

1 inch = 3,000 feet

WSB & Associates, Inc.



CITY OF SHOREWOOD

Figure 3 - Soil Cover
Wellhead Protection Plan
Shorewood, MN

1 inch = 3,000 feet

WSB & Associates, Inc.

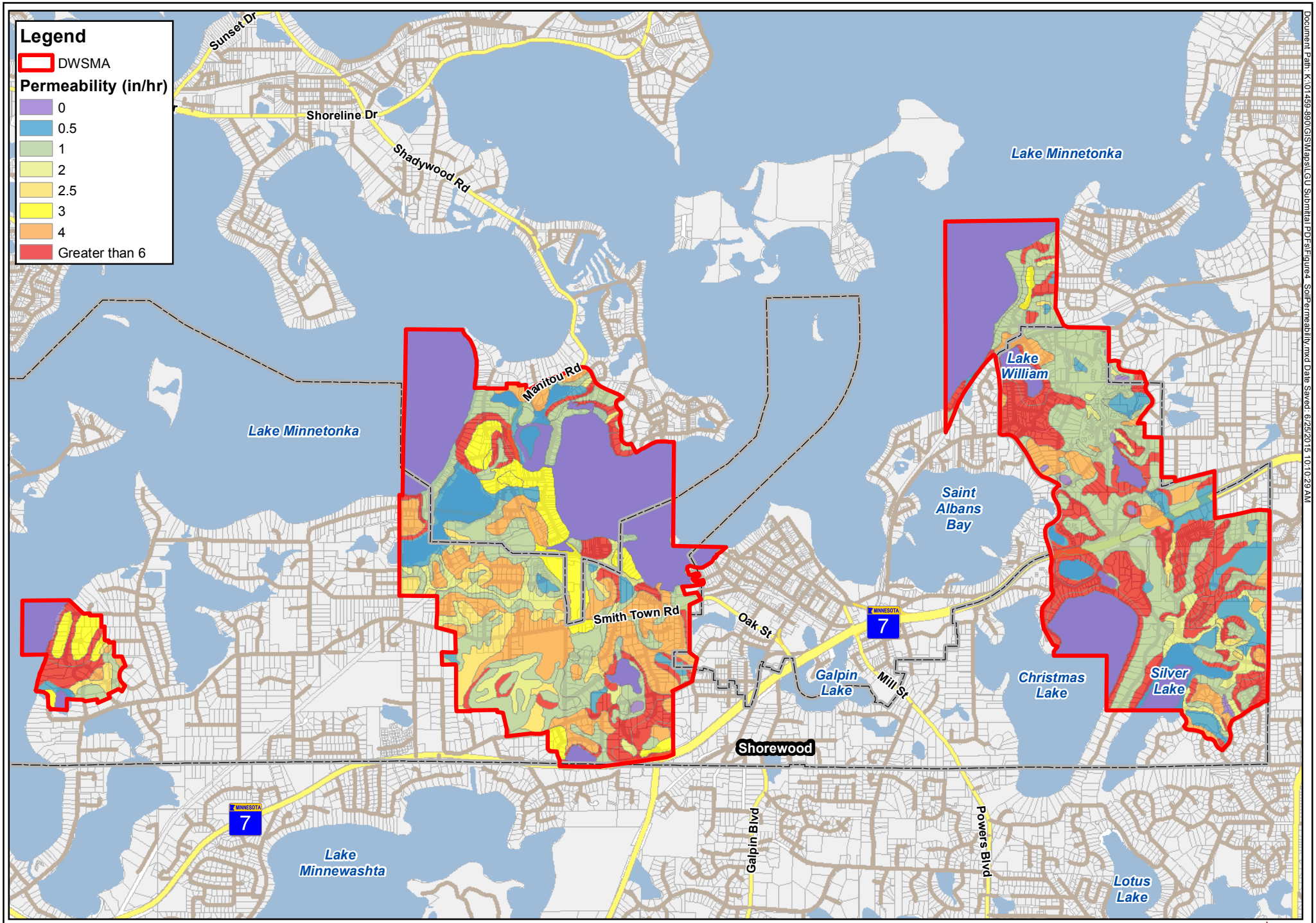
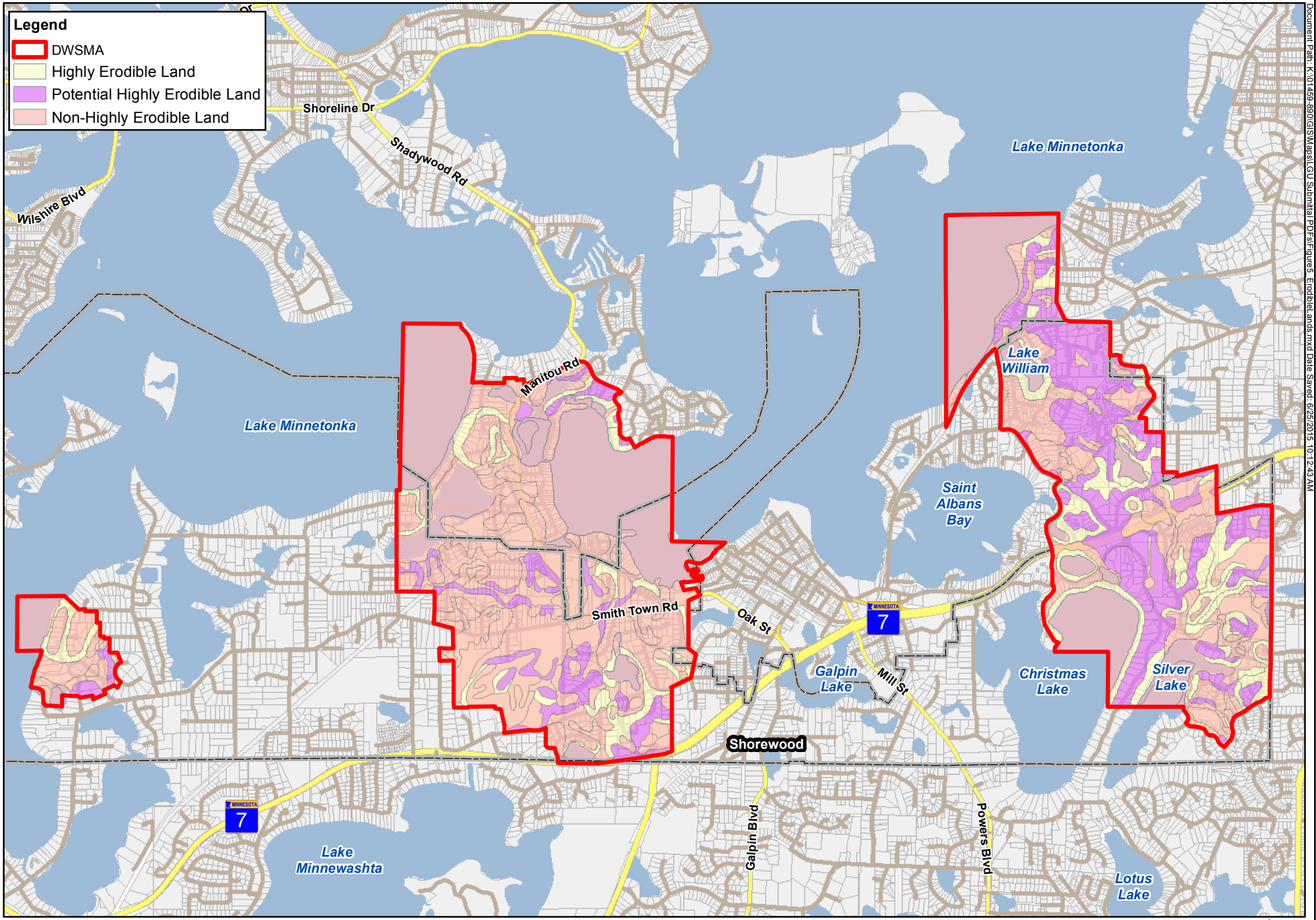


Figure 4 - Soil Permeability
Wellhead Protection Plan
Shorewood, MN

CITY OF SHOREWOOD

1 inch = 3,000 feet

WSB & Associates, Inc.

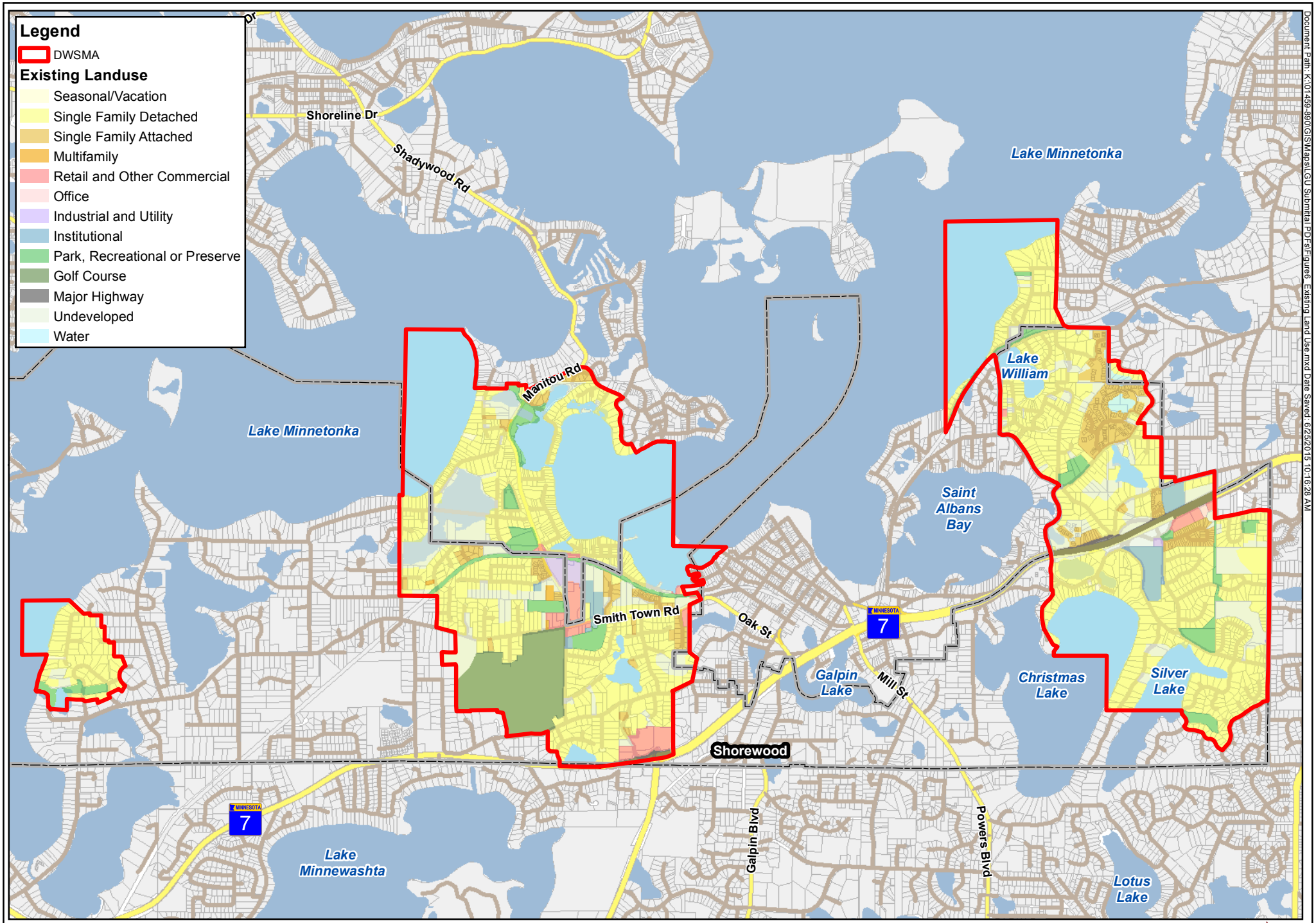


CITY OF SHOREWOOD

Figure 5 - Erodible Lands
Wellhead Protection Plan
Shorewood, MN

1 inch = 3,000 feet

WSB & Associates, Inc.

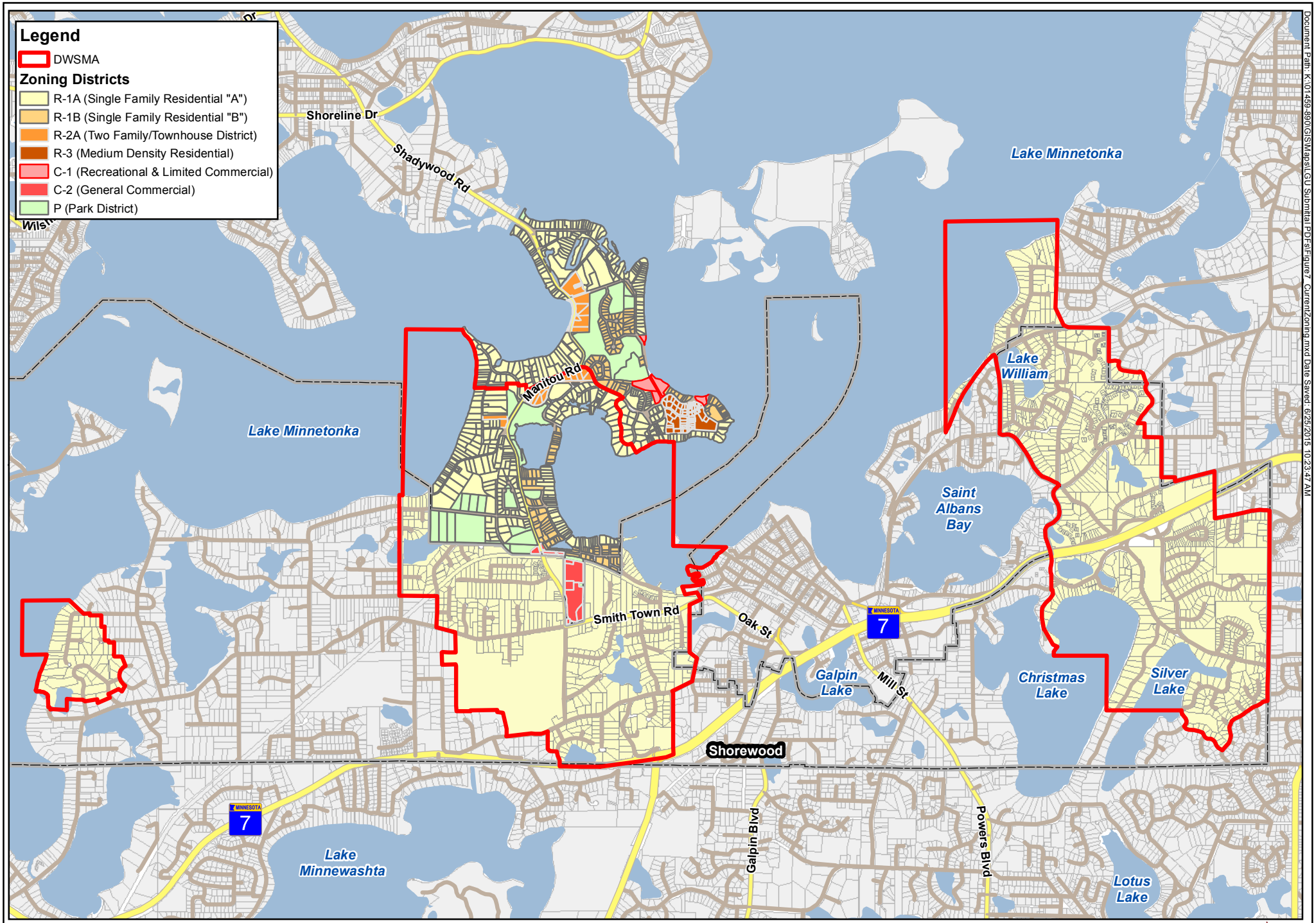


CITY OF SHOREWOOD

Figure 6 - Existing Land Use
Wellhead Protection Plan
Shorewood, MN

1 inch = 3,000 feet

WSB & Associates, Inc.



Document Path: K:\01459-890\GIS\Maps\LGU Submittal PDFs\Figure7_CurrentZoning.mxd Date Saved: 6/25/2015 10:23:47 AM

CITY OF SHOREWOOD

Figure 7 - Current Zoning
Wellhead Protection Plan
Shorewood, MN

1 inch = 3,000 feet

N

WSB & Associates, Inc.

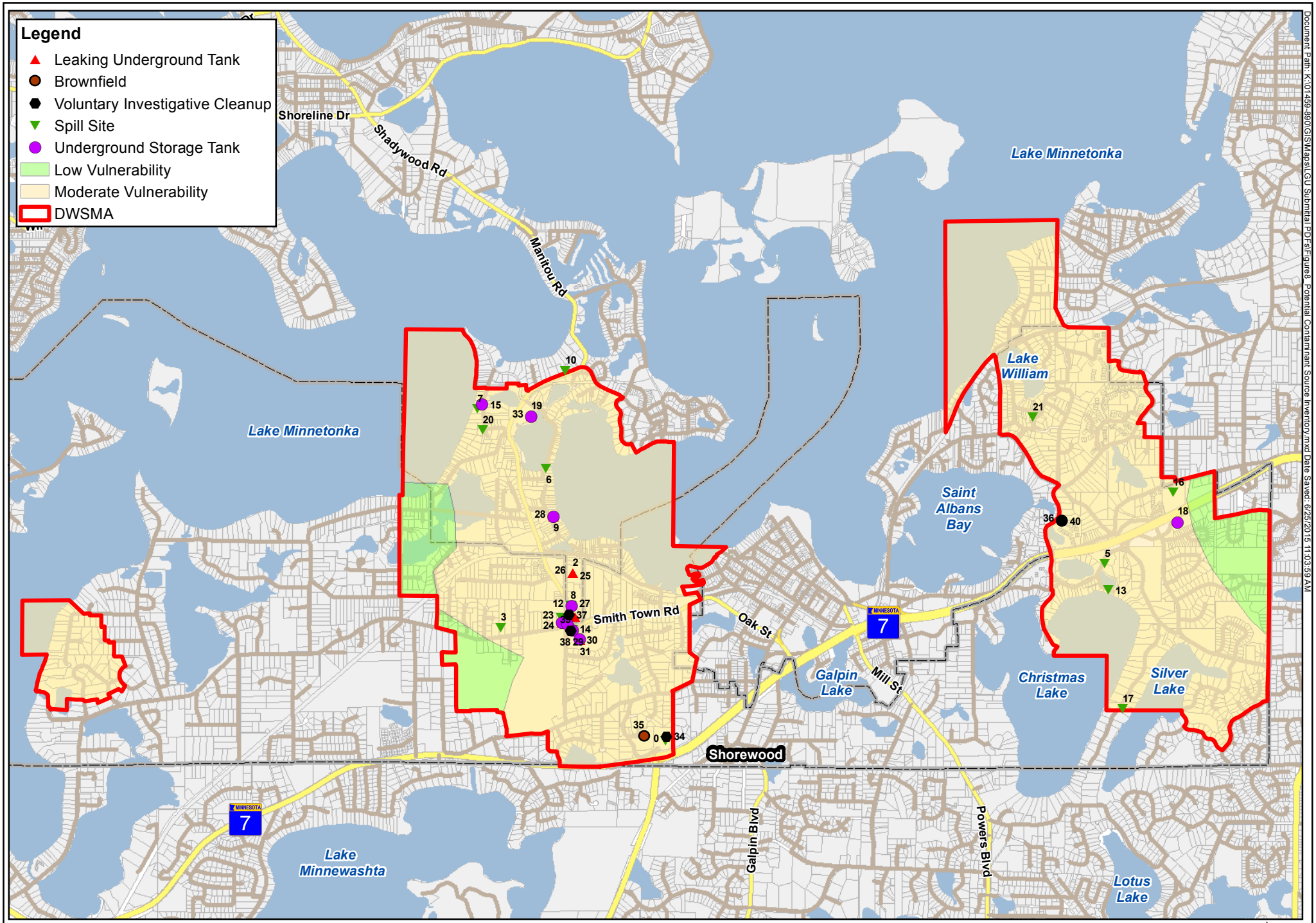
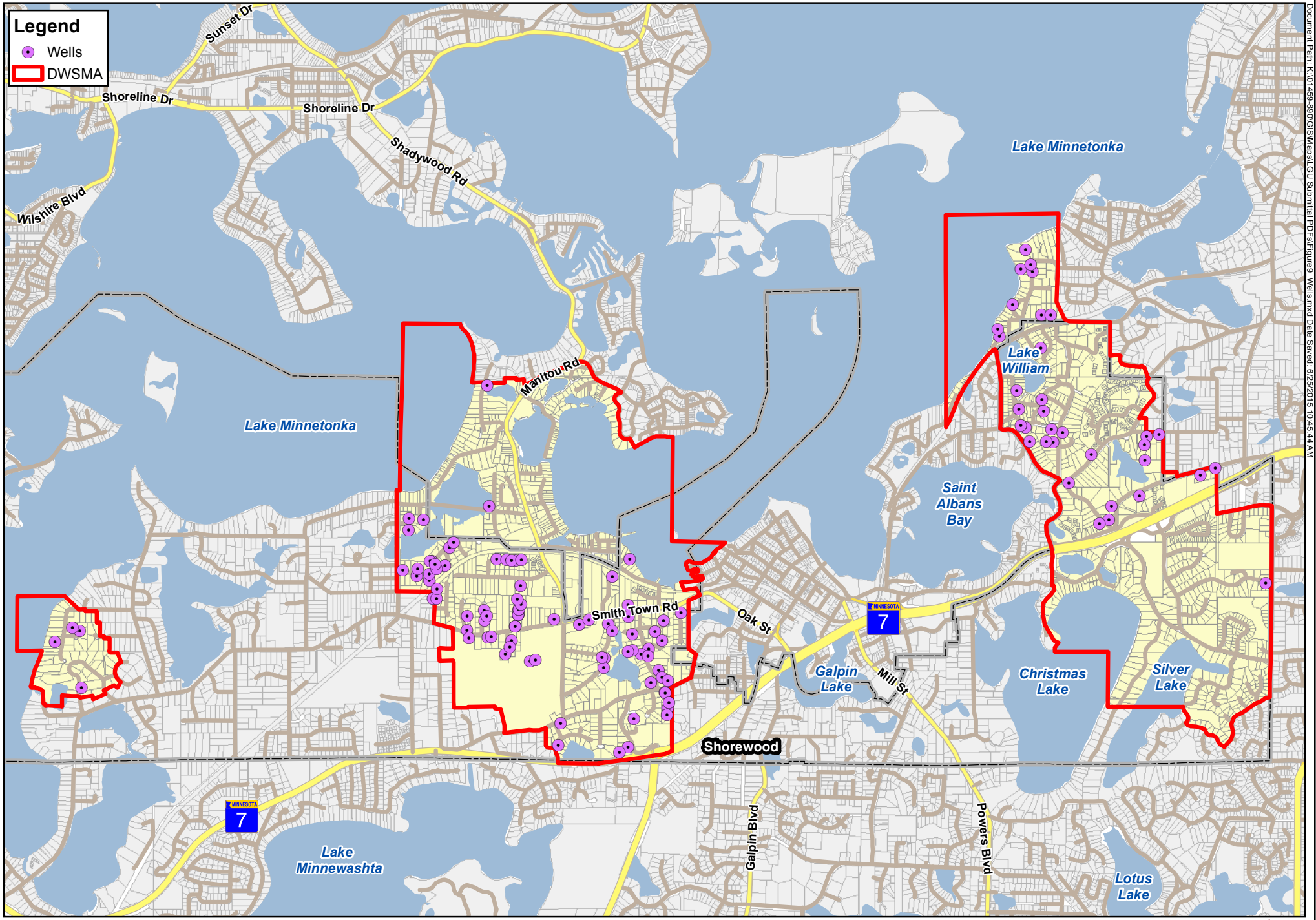


Figure 8 - Potential Contaminant Source Inventory
Wellhead Protection Plan
Shorewood, MN

CITY OF SHOREWOOD

1 inch = 3,000 feet

WSB & Associates, Inc.

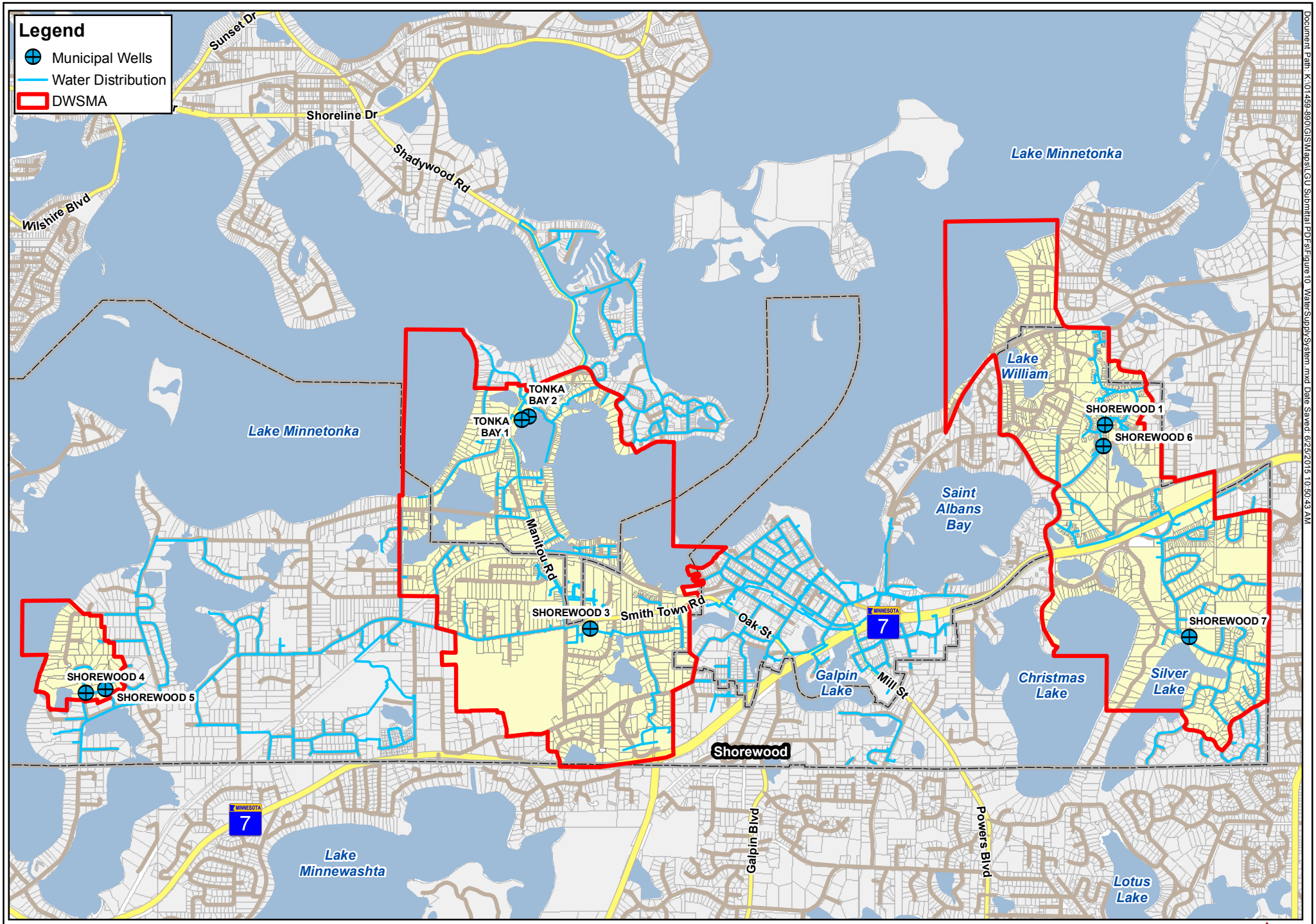


CITY OF SHOREWOOD

Figure 9 - Wells
Wellhead Protection Plan
Shorewood, MN

1 inch = 3,000 feet

WSB & Associates, Inc.



CITY OF SHOREWOOD

Figure 10 - Water Supply System
Wellhead Protection Plan
Shorewood, MN

1 inch = 3,000 feet

WSB & Associates, Inc.

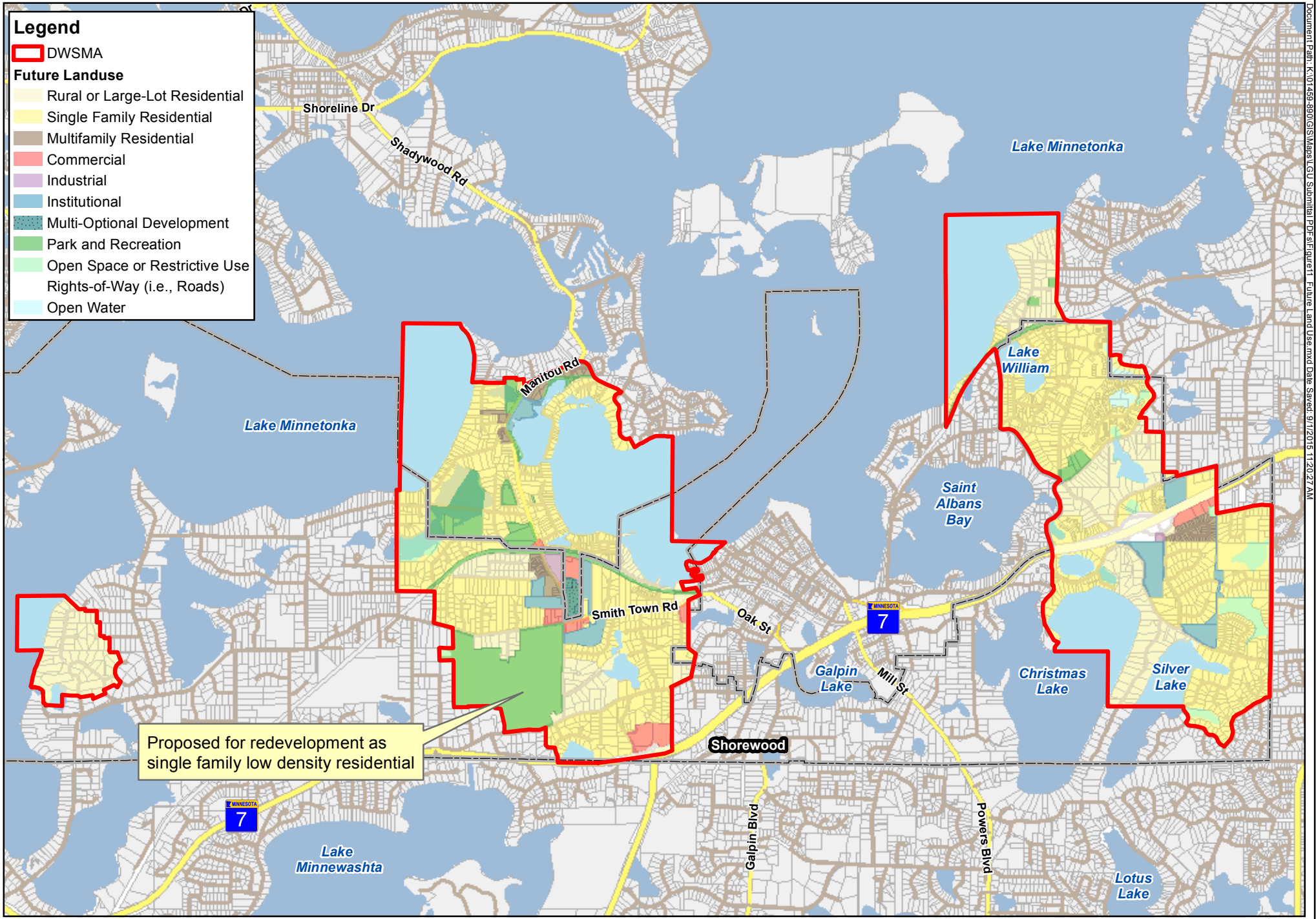
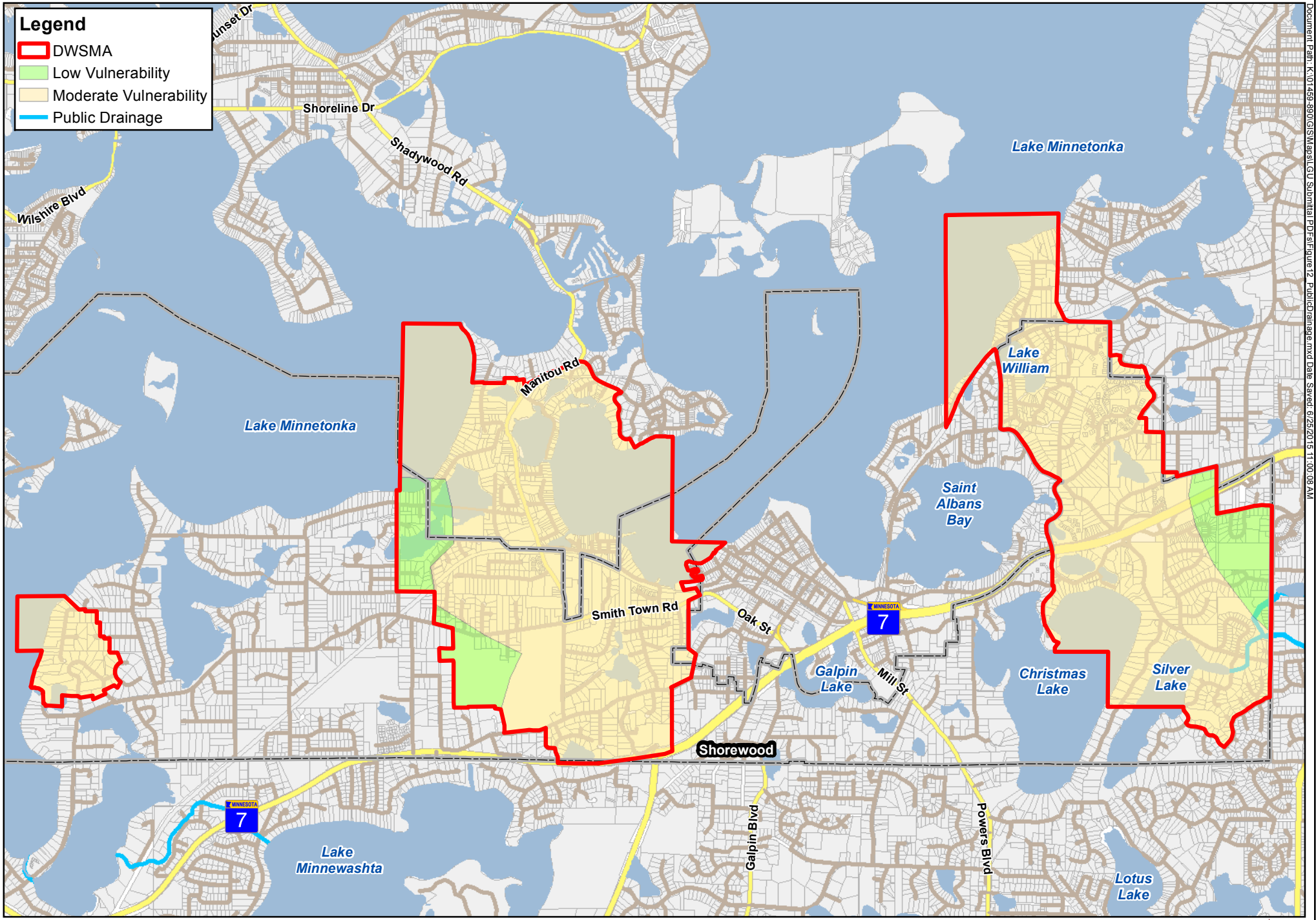


Figure 11 - Future Land Use
Wellhead Protection Plan
Shorewood, MN

CITY OF SHOREWOOD

1 inch = 3,000 feet

WSB & Associates, Inc.



Document Path: K:\01459-890\GIS\Maps\LGU Submittal PDFs\Figure12_PublicDrainage.mxd Date Saved: 6/25/2015 11:00:08 AM

CITY OF SHOREWOOD

Figure 12 - Public Drainage
Wellhead Protection Plan
Shorewood, MN

1 inch = 3,000 feet

WSB & Associates, Inc.

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 Shorewood

October 2011

Amal M. Djerrari, P.E., Hydrologist
Minnesota Department of Health

Table of Contents

Page

List of Tables

Table of Contents - Continued

List of Figures

Page

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 Shorewood (public water supply identification number 1270051). 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 areas (WHPAs) and drinking water supply management areas (DWSMAs), and the vulnerability assessments for the public water supply wells and DWSMAs. Figures 1a, 1b, and 1c show the boundaries for the WHPAs and DWSMAs. The WHPAs are defined by 10-year times of travel. Figures 1a, 1b, and 1c also show the emergency response areas (ERAs), which are defined by 1-year times 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.

2. Assessment of the Data Elements

MDH staff met with representatives of the public water supplier on March 21, 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 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	
Well Amesbury 1	232331	Primary	20x16	244	528	1973	Not Vulnerable	Bedrock	St. Peter-Jordan
Well Badger 3	161414	Primary	24x16	332	372	1981	Not Vulnerable	Bedrock	Prairie du Chien-Jordan
Well Boulder Br. 4	171020	Primary	12	398	640	1981	Not Vulnerable	Bedrock	Franconia-Ironton-Galesville
Well Boulder Br. 5	171023	Primary	12	399	640	1981	Not Vulnerable	Bedrock	Franconia-Ironton-Galesville
Well Amesbury 6	122298	Seasonal	8	276	326	1982	Not Vulnerable	Bedrock	Prairie du Chien
Well Waterford 7	416160	Primary	30x24	223	415	1986	Not Vulnerable	Bedrock	Prairie du Chien-Jordan

Table 2 - Assessment of Data Elements

Data Element	Present and Future Implications				Data Source
	Use of the Well s	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 Well s	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 Shorewood obtains its drinking water supply from five 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 aquifers used to supply drinking water is presented in Tables 3a through 3d.

Figures 3, 4a, 4b, 4c, 4d and 4e show the distribution of the aquifers and 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 3a - Description of the Hydrogeologic Setting at Shorewood Wells 4 (171020) and 5 (171023)

Aquifer	Attribute	Descriptor	Data Source
Franconia-Ironton-Galesville (FIG)	Aquifer Material	Sandstone	Well Logs
	Primary Porosity	0.20	Estimated, and porosity value used in the Metro Model.
	Aquifer Thickness	194 feet	Well 4 well log (171020)
	Stratigraphic Top Elevation	510 feet MSL	Well 4 well log (171020)
	Stratigraphic Bottom Elevation	316 feet MSL	Well 4 well log (171020)
	Hydraulic Confinement	Confined	Well 4 well log (171020)
	Transmissivity (T)	Reference Value: 5,560 ft^2/day Range of Values: 5,560 - 10,006 ft^2/day	The aquifer test plan was approved on June 27, 2011, and T was determined from a specific capacity test conducted at Shorewood Well 4 (171020). The range of transmissivity values was obtained from a specific capacity test conducted at Shorewood Well 4 (171020) and Well 5 (171023).
	Hydraulic Conductivity (K)	Reference Value: 26.6 ft^2/day Range of Values: 26.6 - 51.1 ft/day	The reference value for hydraulic conductivity was obtained from the reference value of the transmissivity and the aquifer thickness at Shorewood Well 4 (171020). The range for hydraulic conductivity was obtained from the range of transmissivity values and the aquifer thickness at Shorewood Well 4 (171020) and Well 5 (171023).
	Groundwater Flow Field	Flow to the southeast. Hydraulic Gradient: 1.6×10^{-3} feet/ft	Hennepin County Atlas (Kanivetsky, 1989)

Table 3b - Description of the Hydrogeologic Setting at Shorewood Well 3 (161414)

Aquifer	Attribute	Descriptor	Data Source
Prairie du Chien-Jordan Sandstone (OPCJ)	Aquifer Material	Dolomite and Sandstone	Well logs
	Primary Porosity	0.05 (Dolomite) and 0.20 (Sandstone)	Estimated, and porosity values used in the Metro Model.
	Aquifer Thickness	131 feet	Well log (Shorewood Well 3, 161414, for the thickness of the Prairie du Chien dolomite and Excelsior Well 1, 205674, for the thickness of the Jordan Sandstone).
	Stratigraphic Top Elevation	645 feet MSL	Well 3 well log (161414)
	Stratigraphic Bottom Elevation	514 feet MSL	Well 3 well log (161414) and estimated aquifer thickness.
	Hydraulic Confinement	Confined	Well 3 well log (161414)
	Transmissivity (T)	Reference Value (OPCJ): 12,342 ft^2/day Reference Value (OPDC): 7,038 ft^2/day Reference Value (CJDN): 5,304 ft^2/day	The aquifer test plan was approved on June 27, 2011, and T was determined from a specific capacity test conducted at Shorewood Well 3 (161414). The reference values for the transmissivity of the Prairie du Chien and Jordan were calculated from the reference values of the hydraulic conductivity of the Prairie du Chien and Jordan and the formation thicknesses at Shorewood Well 3 (161414).
	Hydraulic Conductivity (K)	Reference Value (OPDC): 261 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 the formation thicknesses at Wells 1 (232331) and 6 (122298). This value is also in agreement with that used in the Metro Model (Metropolitan Council, 2009). The reference value for the hydraulic conductivity of the Prairie du Chien was back-calculated from the reference value for the transmissivity, the reference value for the hydraulic conductivity of the Jordan Aquifer, and the formation thicknesses at Shorewood Well 3 (161414).
	Groundwater Flow Field	Flow to the southeast. Hydraulic Gradient: 1.6×10^{-3} feet/ft	Hennepin County Atlas (Kanivetsky, 1989)

Table 3c - Description of the Hydrogeologic Setting at Shorewood Wells 1 (232331) and 6 (122298)

Aquifer	Attribute	Descriptor	Data Source
Prairie du Chien-Jordan Sandstone (OPCJ)	Aquifer Material	Dolomite and Sandstone	Well logs
	Primary Porosity	0.05 (Dolomite) and 0.20 (Sandstone)	Estimated and porosity values used in the Metro Model.
	Aquifer Thickness	244 feet	Well 1 well log (232331)
	Stratigraphic Top Elevation	650 feet MSL	Well 1 well log (232331)
	Stratigraphic Bottom Elevation	406 feet MSL	Well 1 well log (232331)
	Hydraulic Confinement	Confined	Well 1 well log (232331)
	Transmissivity (T)	Reference Value (OPCJ): 21,104 ft^2/day Reference Value (OPDC): 16,565 ft^2/day Reference Value (CJDN): 4,539 ft^2/day	The aquifer test plan was approved on June 27, 2011, and T was determined from a specific capacity test conducted at Shorewood Well 7 (416160). The reference values for the transmissivity of the Prairie du Chien and Jordan were calculated from the reference values of the hydraulic conductivity of the Prairie du Chien and Jordan and the formation thicknesses at Shorewood Well 1 (232331).
	Hydraulic Conductivity (K)	Reference Value (OPDC): 107 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 Wells 1 (232331) and 6 (122298). This value is also in agreement with that used in the Metro Model (Metropolitan Council, 2009). The reference value for the hydraulic conductivity of the Prairie du Chien was back-calculated from a specific capacity test conducted at Shorewood Well 6 (122298) and the formation thickness at this well.
	Groundwater Flow Field	Flow to the southeast. Hydraulic Gradient: 1.3 x 10^{-3} feet/ft	Hennepin County Atlas (Kanivetsky, 1989)

Table 3d - Description of the Hydrogeologic Setting at Shorewood Well 7 (416160)

Aquifer	Attribute	Descriptor	Data Source
Prairie du Chien-Jordan Sandstone (OPCJ)	Aquifer Material	Dolomite and Sandstone	Well logs
	Primary Porosity	0.05 (Dolomite) and 0.20 (Sandstone)	Estimated and porosity values used in the Metro Model.
	Aquifer Thickness	205 feet	Well 7 well log (416160)
	Stratigraphic Top Elevation	705 feet MSL	Well 7 well log (416160)
	Stratigraphic Bottom Elevation	500 feet MSL	Well 7 well log (416160)
	Hydraulic Confinement	Confined	Well 7 well log (416160)
	Transmissivity (T)	Reference Value (OPCJ): 21,104 ft^2/day Reference Value (OPDC): 17,789 ft^2/day Reference Value (CJDN): 3,315 ft^2/day	The aquifer test plan was approved on June 27, 2011, and T was determined from a specific capacity test conducted at Shorewood Well 7 (416160). 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 Shorewood Well 7 (416160).
	Hydraulic Conductivity (K)	Reference Value (OPDC): 131 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 Wells 1 (232331) and 6 (122298). This value is also in agreement with that used in the Metro Model (Metropolitan Council, 2009). The reference value for the hydraulic conductivity of the Prairie du Chien was back-calculated from the reference value for the transmissivity, the reference value for the hydraulic conductivity of the Jordan Aquifer, and the formation thicknesses at Shorewood Well 7 (416160).
	Groundwater Flow Field	Flow to the southeast. Hydraulic Gradient: 1.6 x 10^{-3} feet/ft	Hennepin County Atlas (Kanivetsky, 1989)

4. Delineation of the Wellhead Protection Area

4.1 Delineation Criteria

The boundaries of the WHPAs for the city of Shorewood are shown in Figures 5a, 5b, and 5c. 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 boundaries.
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 1974-5226. 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 (FIG): 5,560 ft^2/day Reference Value (OPCJ): 21,104 ft^2/day	The aquifer test plans were approved on June 27, 2011, and T was determined from specific capacity tests conducted at Shorewood Well 4 (171020), Shorewood Well 7 (416160), and Shorewood Well 3 (161414).
Time of Travel	10 years	The public water supplier selected a 10 year time of travel.

Information provided by the city of Shorewood 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 1974-5226. 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.

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

Well Name	Unique Number	Total Annual Withdrawal (gal/yr)				
		2006	2007	2008	2009	2010[1]
1	232331	6,224,000	4,024,000	1,745,000	3,619,000	**20,738,000**
3	161414	0	0	35,304,000	**40,813,000**	30,040,000
4	171020	0	0	26,636,000	**32,047,000**	11,714,000
5	171023	0	0	**24,566,000**	6,662,000	18,604,000
6	122298	**8,876,000**	7,643,000	5,834,000	28,100	374,000
7	416160	0	0	82,159,000	**94,497,000**	59,615,000
Totals		15,100,000	11,667,000	176,244,000	177,666,100	141,085,000

Source: DNR State Water Use Database System Permit Number 1974-5226.

[1] Source: City of Shorewood. 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 (gallons/year)
214487	1	MINNETONKA COUNTRY CLUB ASSOC	1966-0030	Quaternary Buried Artesian	Golf Course/ Commercial & Institutional	26,240,000
529487	2	SHOREWOOD VILLAGE CENTER	1975-6064	Quaternary Buried Artesian	Commercial and Institutional	380,000
205674	1	EXCELSIOR, CITY OF	1975-6164	Prairie du Chien-Jordan	Municipal	20,180,000
205675	2	EXCELSIOR, CITY OF	1975-6164	Prairie du Chien-Jordan	Municipal	16,340,000
232336	3	EXCELSIOR, CITY OF	1975-6164	Prairie du Chien-Jordan	Municipal	73,250,000
223349	1	TONKA BAY, CITY OF	1979-6313	Prairie du Chien-Jordan	Municipal	33,610,000
205657	2	TONKA BAY, CITY OF	1979-6313	St. Peter-Jordan	Municipal	38,770,000
200195	3	CHANHASSEN, CITY OF	1981-6089	Prairie du Chien-Jordan	Municipal	158,590,000
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
709304	9	CHANHASSEN, CITY OF	1981-6089	Prairie du Chien-Jordan	Municipal	58,560,000
200810	WEST	CHANHASSEN, CITY OF	1981-6089	Prairie du Chien-Jordan	Municipal	140,000

4.2 Method Used to Delineate the Wellhead Protection Area

The WHPAs for the city of Shorewood Well 4 (171020) and Well 5 (171023) were determined using an existing regional MODFLOW Model that simulates porous media groundwater flow within the major aquifers and aquitards within the seven-county metropolitan area.

The WHPA for Shorewood Well 6 (122298) was determined using a calculated fixed radius procedure to address flow within the secondary porosity features of the Prairie du Chien Group.

The WHPAs for Shorewood Well 1 (232331), Well 3 (161414), and Well 7 (416160) 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 Shorewood Well 1 (232331), Well 3 (161414), Well 4 (171020), Well 5 (171023), and Well 7 (416160) were determined using an existing regional MODFLOW Model that was developed by Barr Engineering Company for the Metropolitan Council (Metropolitan 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) Ironton-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 Shorewood 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 Tables 3a, 3b, 3c, and 3d.
- The pumping rates from Table 5 were assigned to the city of Shorewood wells.
- The pumping rates from Table 6 were assigned to the permitted high-capacity wells located within two miles of the city of Shorewood 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, 20, and 20 percent were used for the Prairie du Chien Dolomite, the Jordan Sandstone, and the Franconia-Ironton-Galesville Sandstones, 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 Shorewood (i.e., Prairie du Chien-Jordan and Franconia-Ironton-Galesville Aquifers).

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 Shorewood Well 4 (171020). 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 Shorewood wells, the uncertainty of the hydraulic conductivity can be great. To evaluate the impact of this uncertainty on the WHPA delineation, a horizontal hydraulic conductivity was also estimated from a specific capacity test conducted at Shorewood Well 5 (171023). This latter value is larger than the one estimated from the specific capacity test conducted at Shorewood Well 4 (171020) (Table 3a).

Results - The capture zone was estimated using both the high and low hydraulic conductivity value (Figure 5a). A high value for the hydraulic conductivity yields an elongated capture zone. A decrease in hydraulic conductivity decreases the length of the capture zone and increases the distance to the stagnation point, making the capture zone more circular in shape and centered on the well.

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. And, 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 exist. Specific to the setting in Shorewood, Delineation Technique 3 of the guidance (MDH, 2005) addresses wells such as Shorewood Well 1 (232331), Well 3 (161414), and Well 7 (416160) 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.

Delineation Technique 2 of the guidance (MDH, 2005) addresses wells, such as Shorewood Well 6 (122298), which are open only to a fractured or solution-weathered aquifer. The delineation involved using 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 Shorewood Well 4 (171020) and Well 5 (171023) in Figure 5a consists of a composite of the 10-year porous media capture zones calculated using the model parameters for the base-case and the modified parameters for the sensitivity analysis. The WHPA for Well 6 (122298) is based only on the calculated fixed radius procedure (with extension) to address flow within the secondary porosity features of the Prairie du Chien Group. The WHPAs for Well 1 (232331), Well 3 (161414), and Well 7 (416160) consist of a composite of the porous media aquifer delineation and the fractured rock delineation (Figure 5b and 5c). 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 Shorewood 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 zones for porous media aquifers that contribute 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, the exceptions being Well 5 (171023) and Well 6 (122298), for which capture zones were delineated using only the groundwater flow model. A sensitivity analysis for transmissivity was performed by analyzing the variation of Well 5 (171023) and Well 6 (122298) capture zones to a two-fold increase in transmissivity. This range was based on the results of specific capacity tests performed in these two Shorewood wells. The analysis revealed a slight variation in the estimated capture zones that was accounted for in the final WHPA delineation using a composite capture area, developed for the whole range of transmissivities at Well 5 (171023) and Well 6 (122298).

Specific to the hydrogeological conditions in Shorewood, 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). Therefore, the uncertainty associated with this parameter is minimized.
- 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 B(2).
- 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 3b, 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 WHPAs for Well 1 (232331), Well 3 (161414), and Well 7 (416160) consist of a composite of the porous media aquifer delineation and the fractured rock delineation (Figure 5b and 5c)

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 (Figures 1a, 1b, and 1c):

- 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 DWSMAs. These vulnerability assessments are used to help define potential contamination sources within the DWSMAs and to select appropriate measures for reducing the risk that they present to the public water supply.

6.1 Assessment of Well Vulnerability

Well 4 (171020), Well 5 (171023), and Well 6 (122298) are nonvulnerable; this assessment is based upon the following conditions:

1) Grouting information is not known at some city of Shorewood wells (i.e., Well 1 [232331] and Well 5 [171023]), and the wells may not be up to code. However, based on water quality results, the borehole integrity does not appear to be compromised.
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) A water sample was collected from Shorewood Well 4 (171020) on March 30, 2011, and analyzed for tritium. Tritium was detected at less than one tritium unit (i.e., 0.9 TU).

Well 1 (232331), Well 3 (161414), and Well 7 (416160) are vulnerable; this assessment is based upon the following conditions:

1) Grouting information is not known at Well 1 (232331), and the well may not be up to code.
2) Water samples were collected from Shorewood Well 1 (232331), Well 3 (161414), and Well 7 (416160) on March 30, 2011, and analyzed for tritium. Tritium was detected at more than 1 TU in all samples (i.e., 4.8 TU, 1.3 TU, and 5.4 TU in the samples from Well 1 [232331], Well 3 [161414], Well 7 [416160], respectively).

6.2 Assessment of the Drinking Water Supply Management Area Vulnerability

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

1) Water chemistry data from wells located within the DWSMAs 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 aquifer exhibits a very low geologic sensitivity throughout the DWSMA of Shorewood Wells 4 (171020) and 5 (171023). The L-scores from wells in the area vary from 4 to 11, indicating that 40 to 110 feet of clayey material overlies the Franconia-Ironton-Galesville Aquifer (Figure 6a). In addition, the static water levels in those wells are 30 to 50 feet lower than Lake Minnetonka's average water level, further corroborating that the deep aquifers are not in direct connection with the lake.
3) The low vulnerability status for Wells 4 (171020) and 5 (171023) DWSMA is in accordance with the low tritium level that was detected in the sample from Well 4 (171020) (Figure 6a). The Franconia-Ironton-Galesville Aquifer used by Shorewood is, therefore, isolated from the direct vertical recharge of surface water.
4) Review of the geologic logs contained in the CWI database and geological maps and reports indicate that the aquifer exhibits a very low geologic sensitivity throughout the DWSMA of Shorewood Well 3 (161414). The L-scores from wells in the area vary from 2 to 21, indicating that 20 to 210 feet of clayey material overlay the Prairie du Chien-Jordan Aquifer (Figure 6b). In addition, the static water levels in those wells are 30 to 50 feet lower than Lake Minnetonka's average water level, further corroborating that the deep aquifers are not in direct connection with the lake.
5) The low to moderate vulnerability status for the DWSMA of Well 3 (161414) is in accordance with the relatively low tritium level that was found in Well 3 (Figure 6b).
6) The low to moderate vulnerability status for Wells 1 (232331), 6 (122298), and 7 (416160) DWSMA is in accordance with the tritium level that was detected in Wells 1 (232331), and 7 (416160) (Figure 6c). The Prairie du Chien-Jordan Aquifer around Wells 1 (232331), 6 (122298), and 7 (416160) may not be isolated from the direct vertical recharge of surface water, as indicated by elevated tritium levels in water from those wells.

7. Selected References

Balaban, N.H., (Ed.) (1989), *Geologic atlas of Hennepin County, Minnesota,* County Atlas Series, C-4, Minnesota Geological Survey, St. Paul, Minn., 9 plates, scale 1:100,000 and smaller.

Geologic Sensitivity Project Workgroup (1991), *Criteria and guidelines for assessing geologic sensitivity of ground water resources in Minnesota,* Minnesota Department of Natural Resources, Division of Waters, St. Paul, Minn., 122 p.

Harbaugh, A.W., Banta, E.R., Hill, M.C., and McDonald, M.G. (2000), *MODFLOW-2000, the U.S. Geological Survey modular ground-water model--user guide to modularization concepts and the ground-water flow process*, Open-File Report, 00-92, U.S. Geological Survey, Reston, Va., 121 p.

Kanivetsky, R. (1989), Bedrock hydrogeology, in *Geologic atlas of Hennepin County, Minnesota,* Balaban, N.H., (Ed.), County Atlas Series, C-4, Plate 6, Minnesota Geological Survey, St. Paul, Minn., scale 1:150,000.

Selected References - Continued

McDonald, M.G., and Harbaugh, A.W. (1988), *A modular three-dimensional finite-difference ground-water flow model*, Techniques of Water-Resource Investigation, 06-A1, U.S. Geological Survey, 576 p.

Metropolitan Council of the Twin Cities Area (2009), *Twin Cities Metropolitan Area regional groundwater flow model version 2.00: Technical report in support of the Metropolitan Area Master Water Supply Plan,* St. Paul, Minn., 142 p.

Meyer, G.N., and Hobbs, H.C. (1989), Surficial geology, in *Geologic atlas of Hennepin County, Minnesota,* Balaban, N.H., (Ed.), County Atlas Series, C-4, Plate 3, Minnesota Geological Survey, St. Paul, Minn., scale 1:100,000.

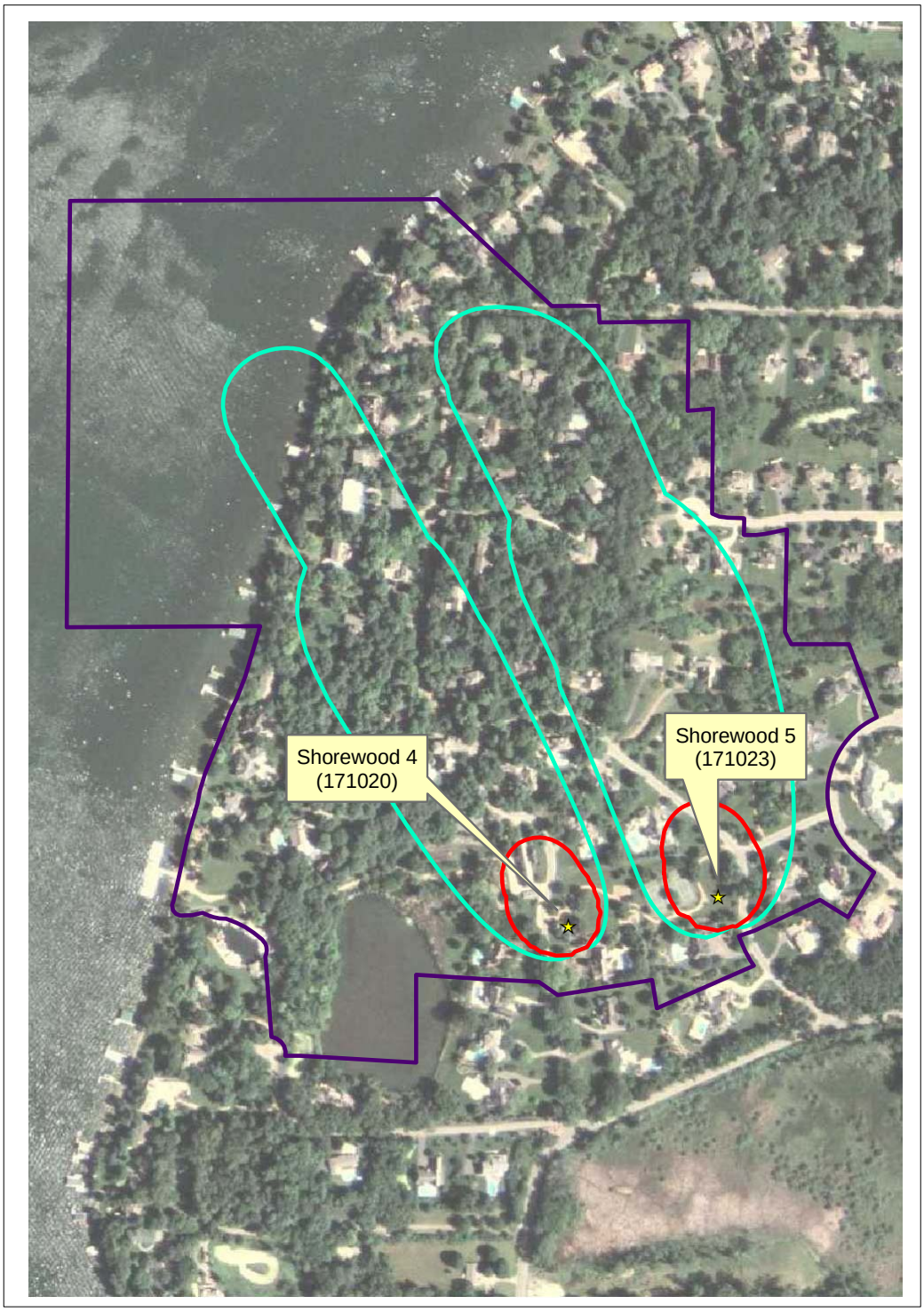
Minnesota Department of Health (2010), *Minnesota public land survey system quarter-quarter sections* (derived from section corners), computer file, St. Paul, Minn.

Piegat, J, (1989), Sensitivity of ground-water systems to pollution, in *Geologic atlas of Hennepin County, Minnesota,* Balaban, N.H., (Ed.), County Atlas Series, C-4, Plate 7, Minnesota Geological Survey, St. Paul, Minn., scale 1:100,000.

Minnesota Department of Health (2005), *Guidance for delineating wellhead protection areas in fractured and solution-weathered bedrock in Minnesota,* St. Paul, Minn., 80 p.

Steffen, K. (2004), *Soil survey of Hennepin County, Minnesota*, Soil Survey, U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C., 1059 p., 64 sheets, scale 1:12,000.

Figures



MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 1a
Drinking Water Supply Management Area
Wells 4 and 5
(Shorewood, MN)

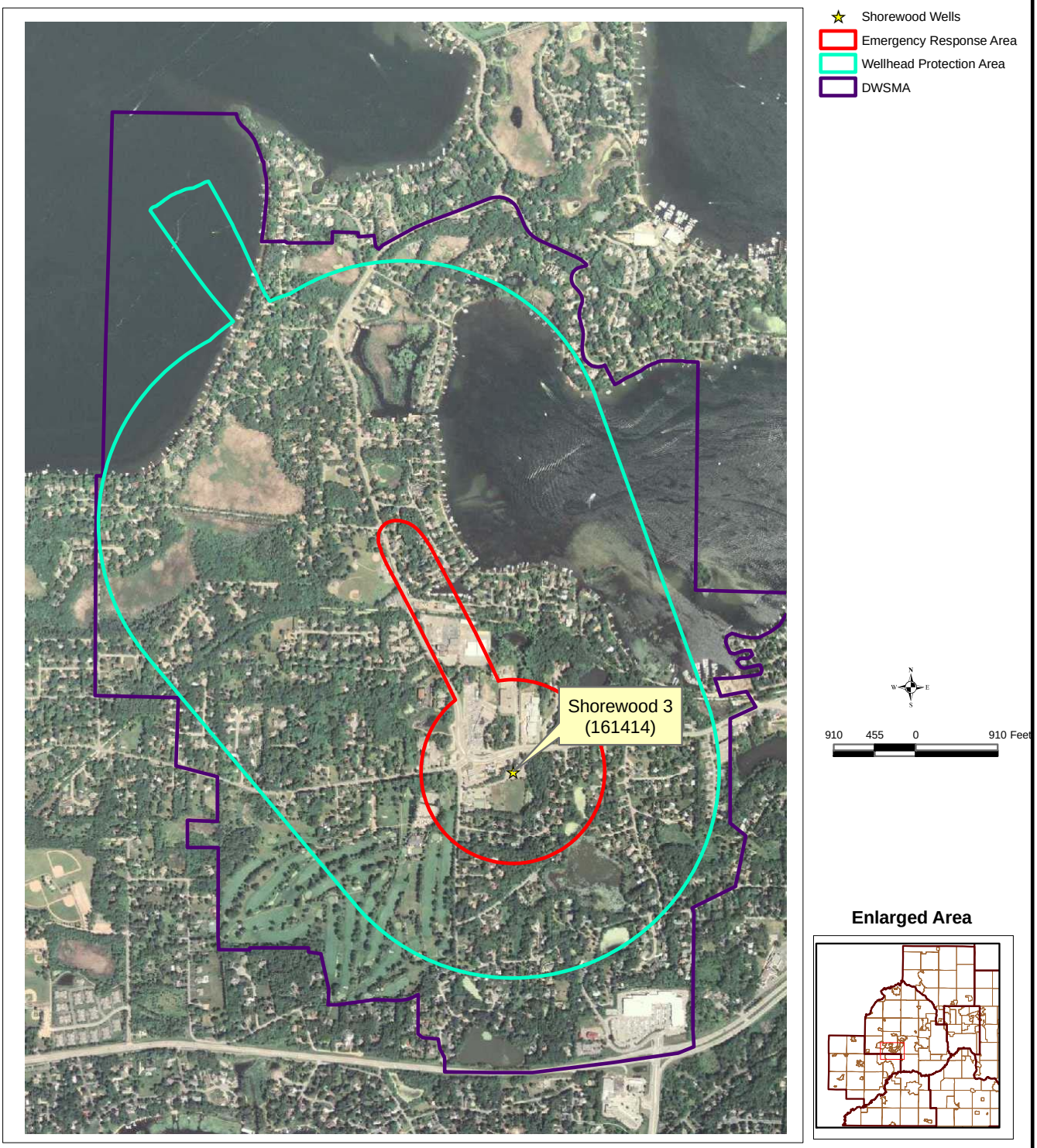
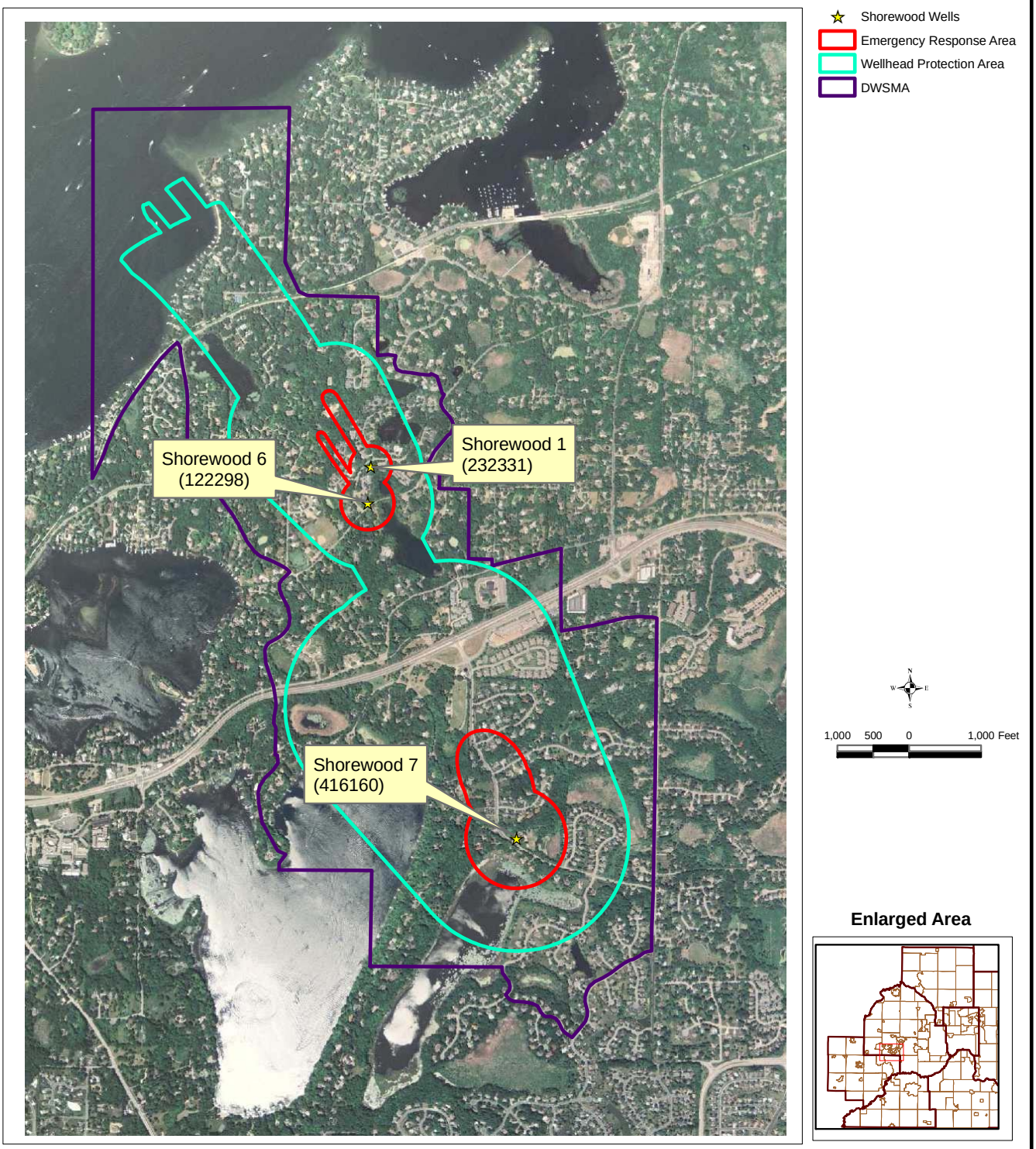
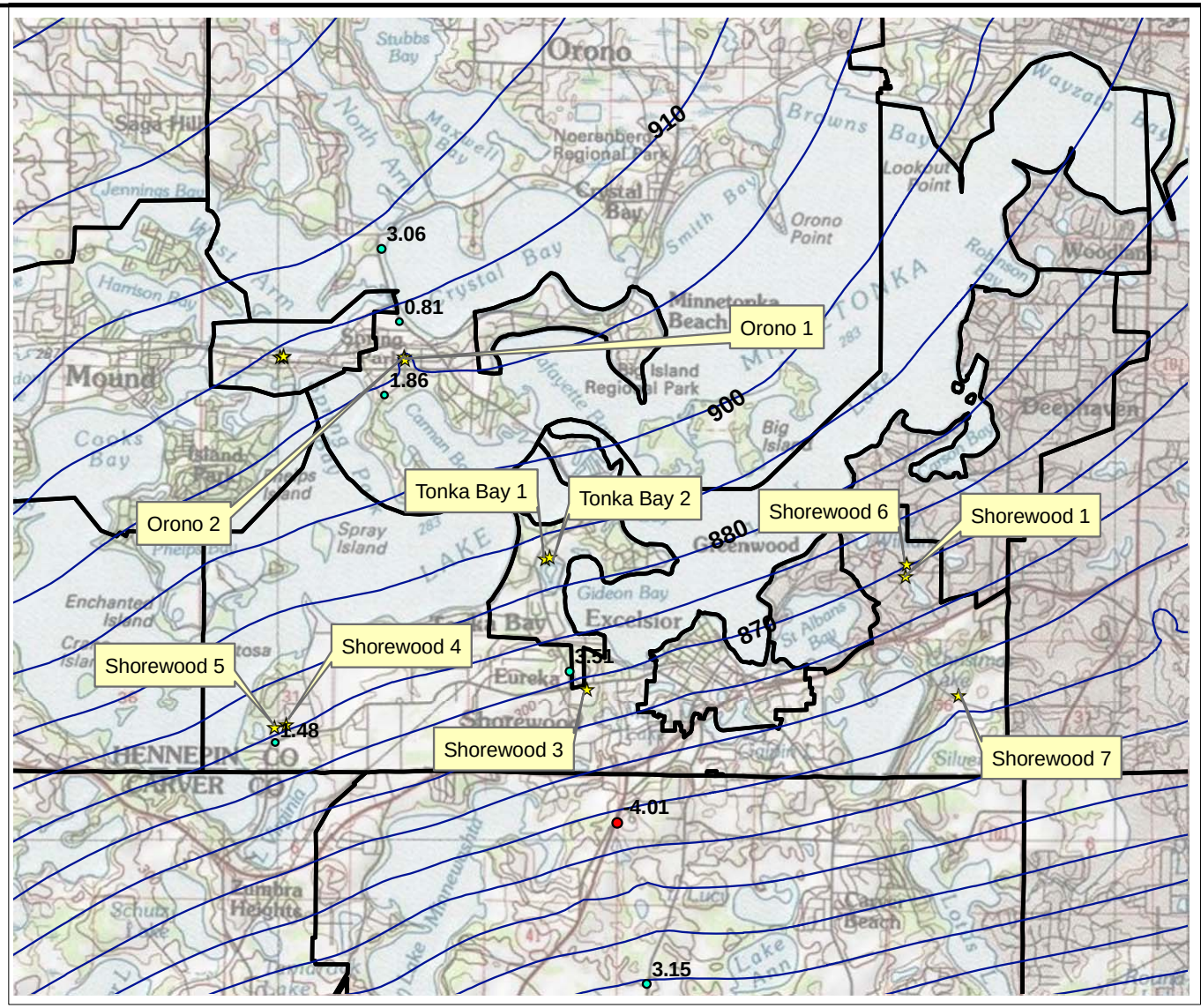


Figure 1b
Drinking Water Supply Management Area
Well 3
(Shorewood, MN)



MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 1c
Drinking Water Supply Management Area
Wells 1, 6, and 7
(Shorewood, MN)



CJDN Residuals (in meters)

RESIDUALHE

- 0 - 2
- 2 - 4
- 4 - 6
- 6 - 8
- 8 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 18
- 19 - 26
- Tonka_Bay_wells
- Shorewood_wells

CJDN Residuals (in meters)

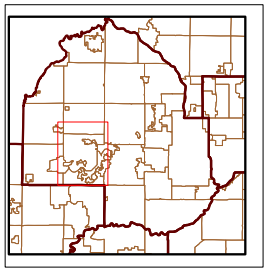
RESIDUALHE

- -12.8 - -12.0
- -11.9 - -10.0
- -9.9 - -8.0
- -7.9 - -6.0
- -5.9 - -4.0
- -3.9 - -1.5
- -1.4 - -0.2

920 **Hydraulic Head Contours (in feet above MSL)**

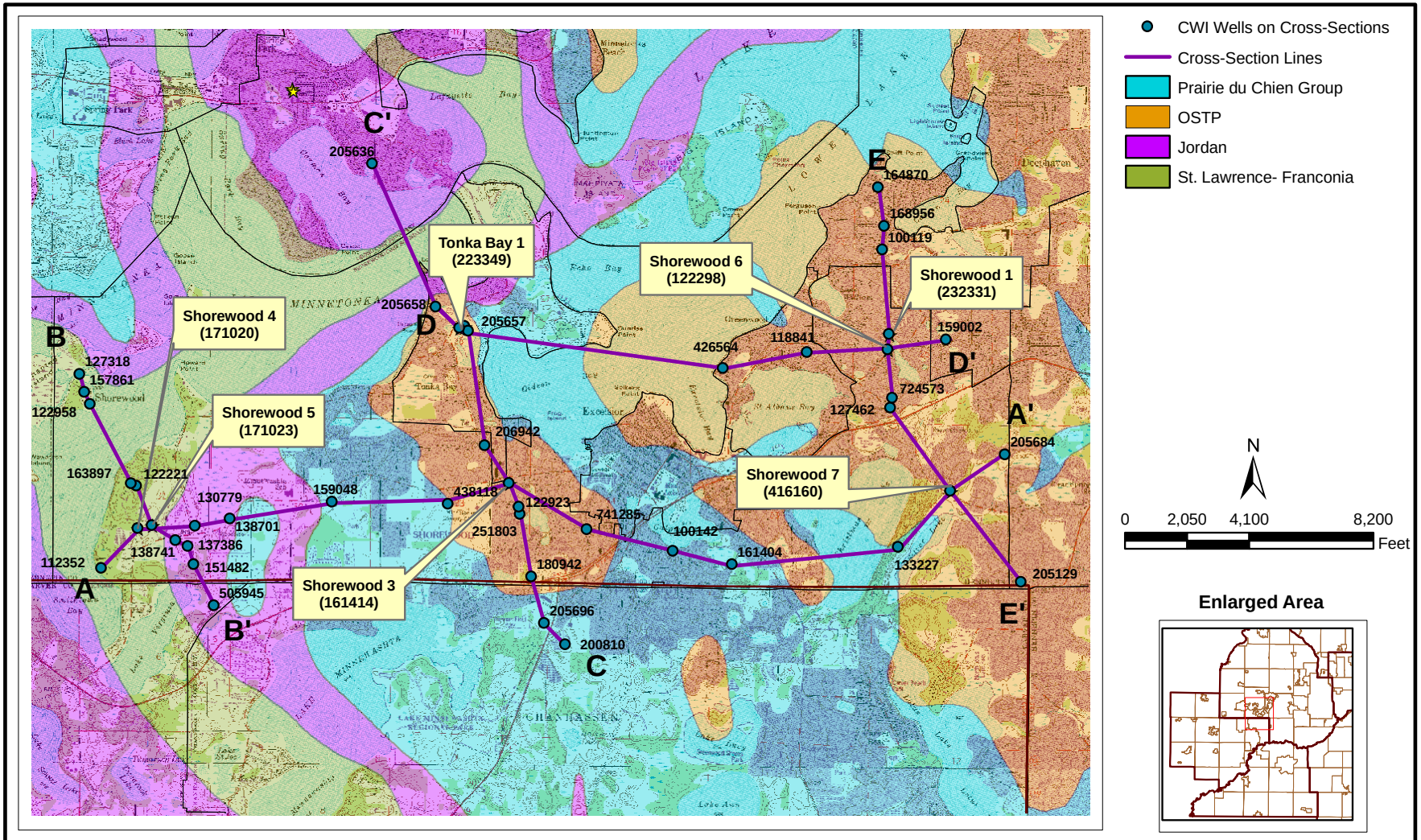
3,600 1,800 0 3,600 Feet

Enlarged Area



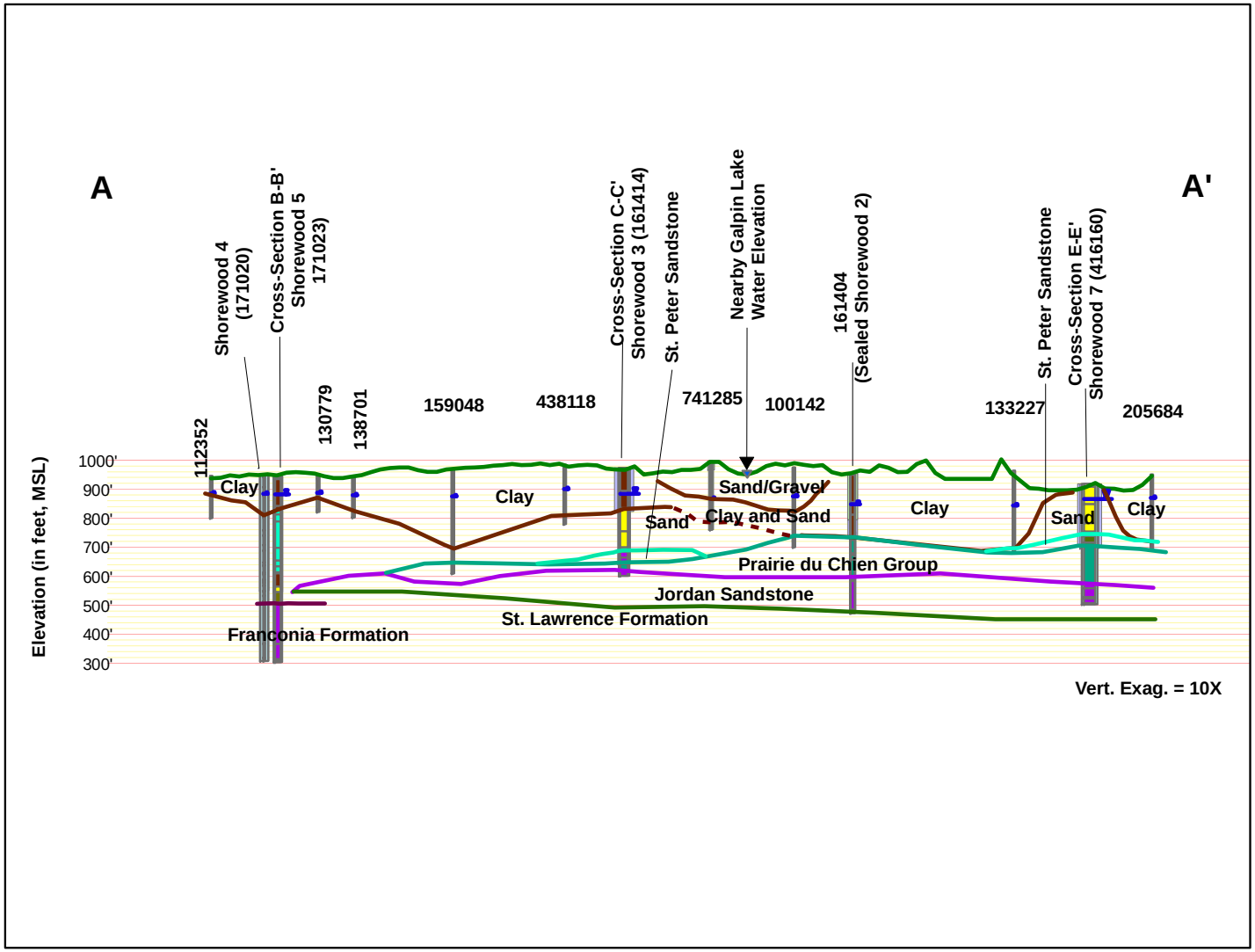
MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 2
Modeled Groundwater Flow Field andSpatial Distribution of Modeling Errors
Jordan Sandstone Aquifer
(Shorewood, MN)



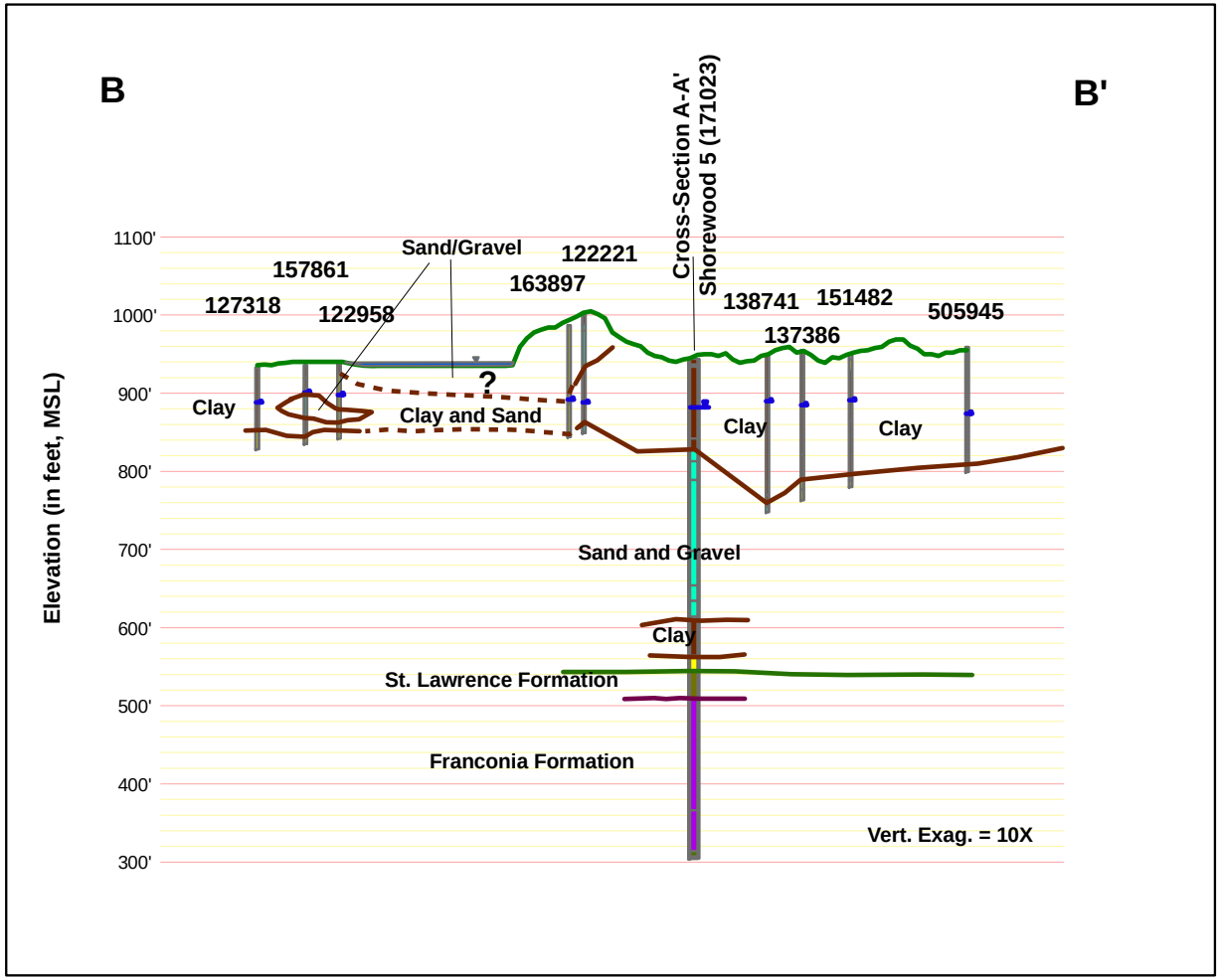
MINNESOTA MDH DEPARTMENT OF HEALTH

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



MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 4a
Geologic Cross-Section A-A'
(Shorewood, MN)



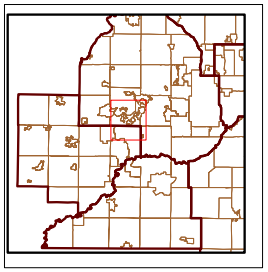
Stratigraphy

Primary Lithology

- Unkown
- Fill
- Boulder
- Soil
- Clay
- Sand
- Gravel
- Cobble
- Dolomite
- Shale
- Siltstone
- Sandstone

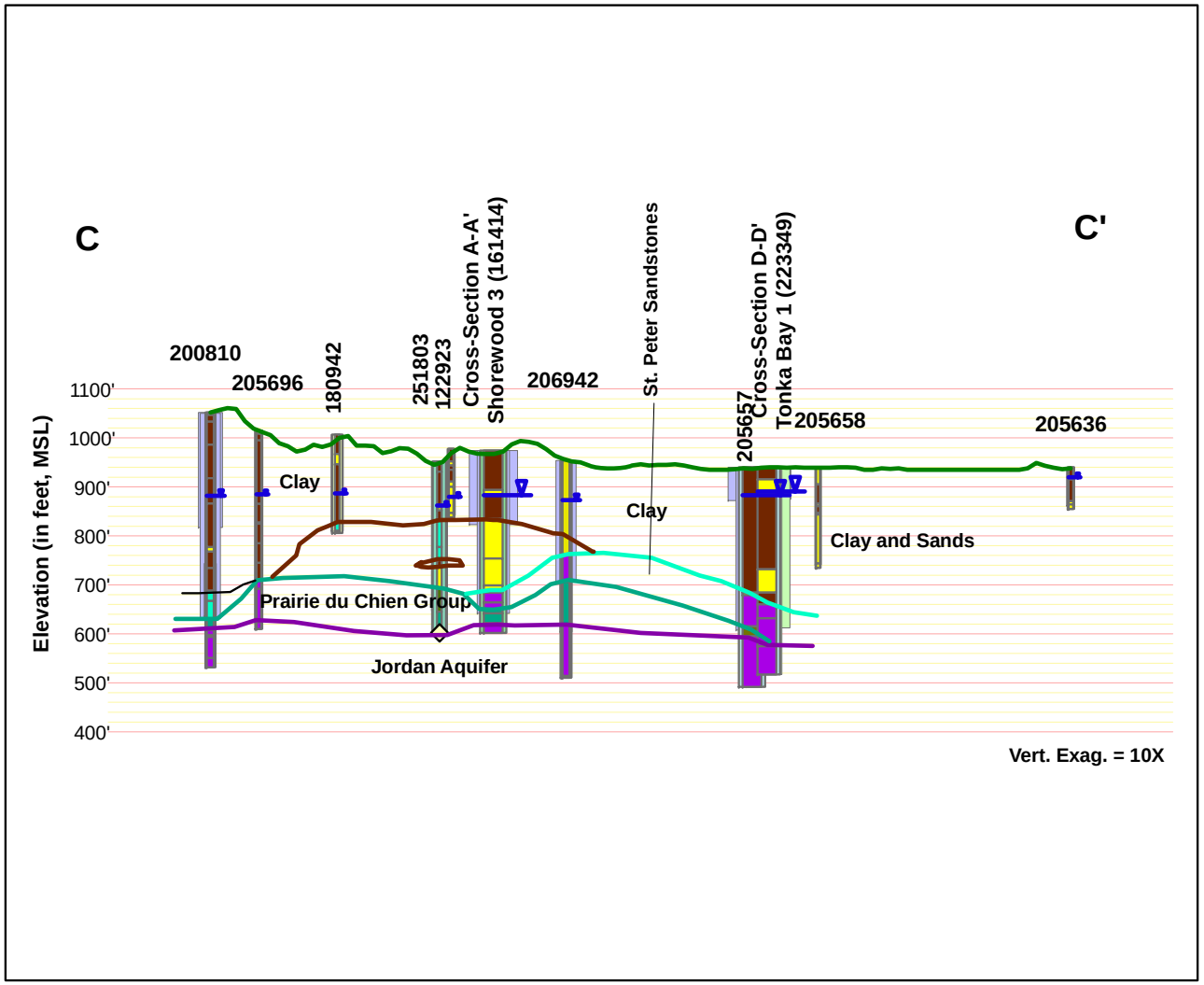
0 1,000 2,000 4,000 Feet

Enlarged Area



MINNESOTA MDH DEPARTMENT OF HEALTH

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



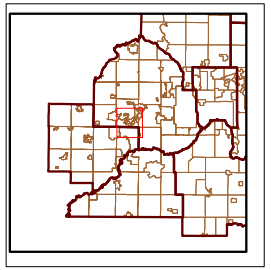
Stratigraphy

Primary Lithology

- Unkown
- Fill
- Drift
- Boulder
- Soil
- Clay
- Sand
- Gravel
- Cobble
- Dolomite
- Shale
- Siltstone
- Sandstone

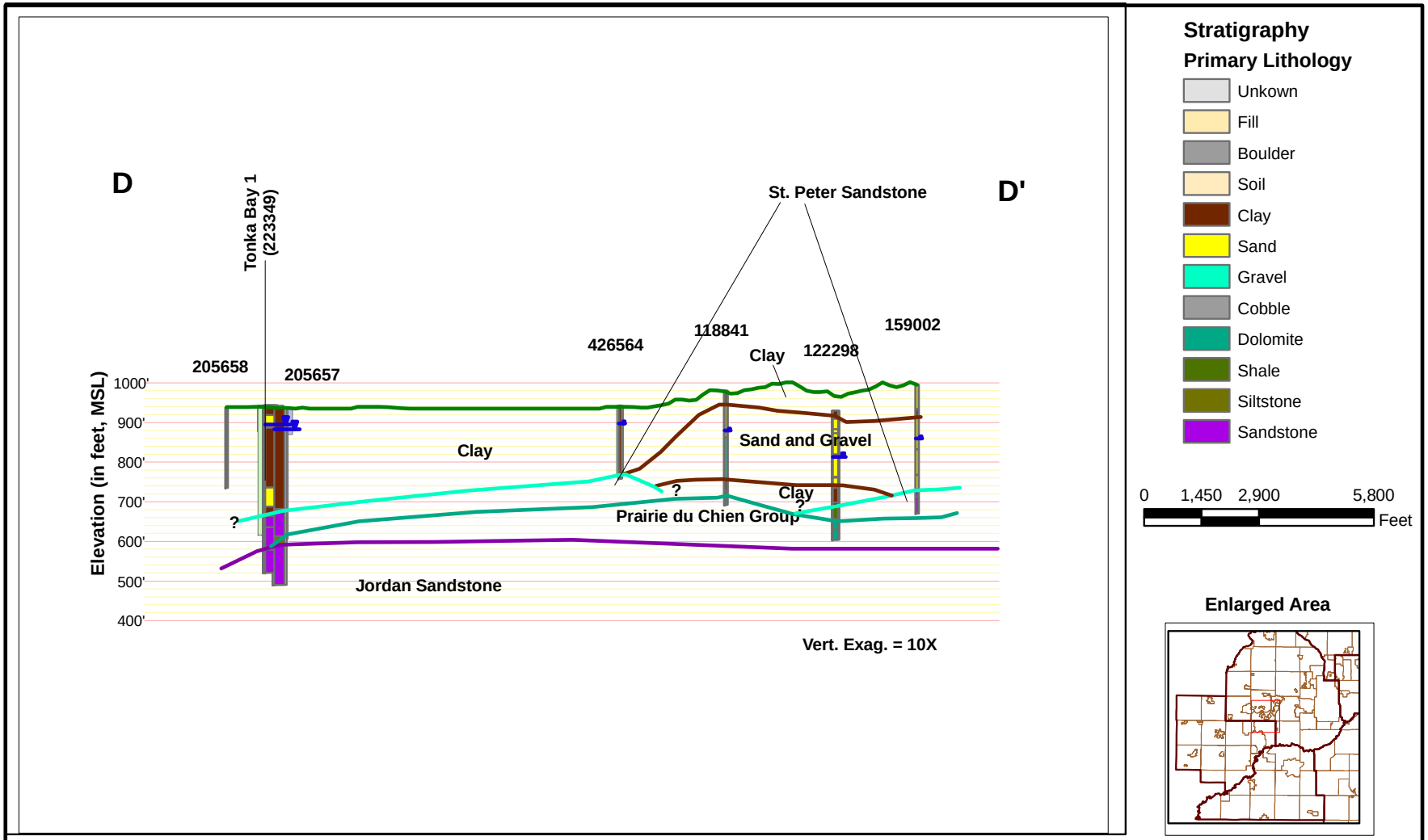
0 750 1,500 3,000 4,500 6,000 Feet

Enlarged Area



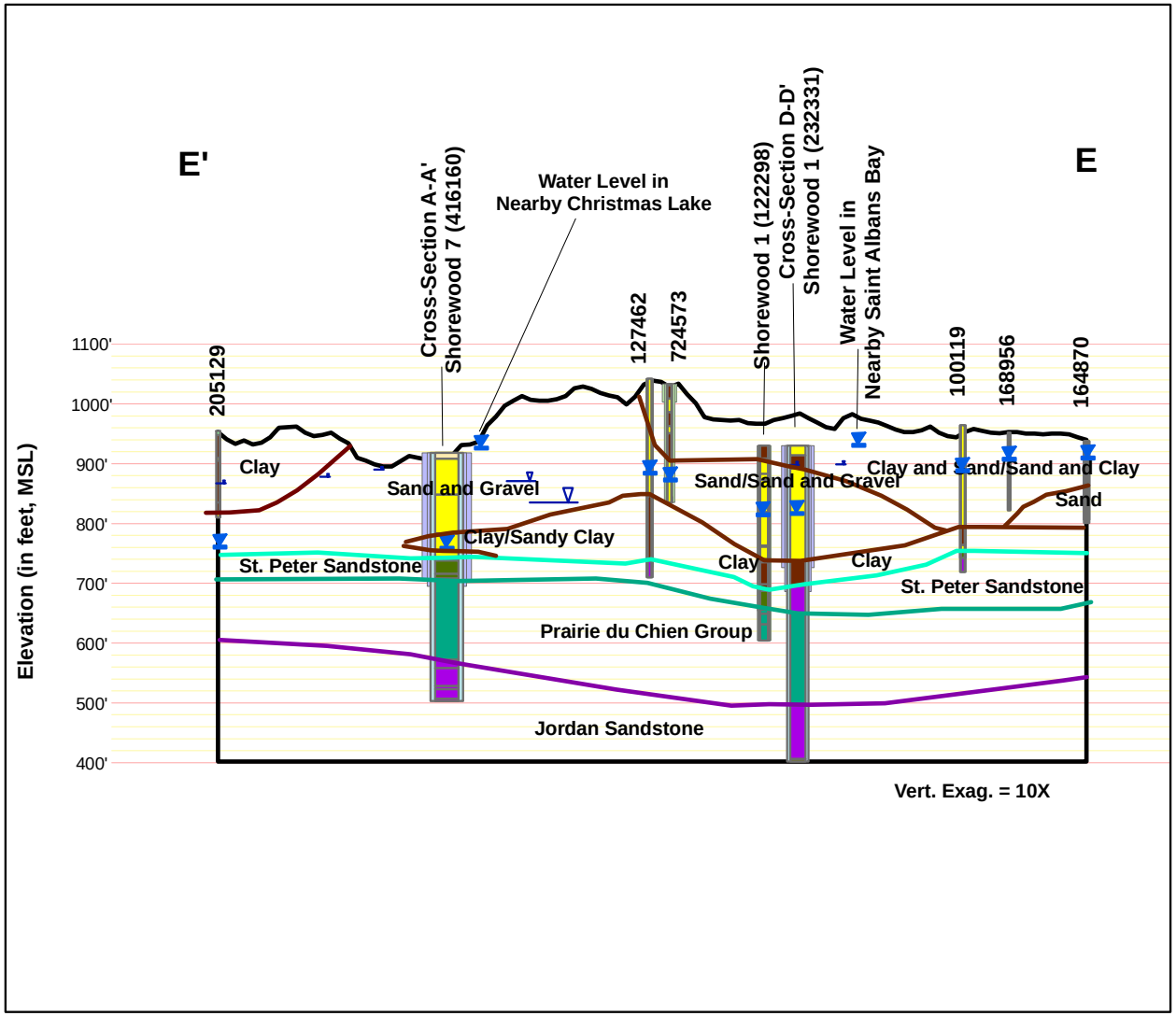
MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 4c
Geologic Cross-Section C-C'
(Shorewood, MN)

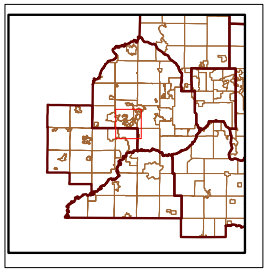


MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 4d
Geologic Cross-Section D-D'
(Shorewood, MN)

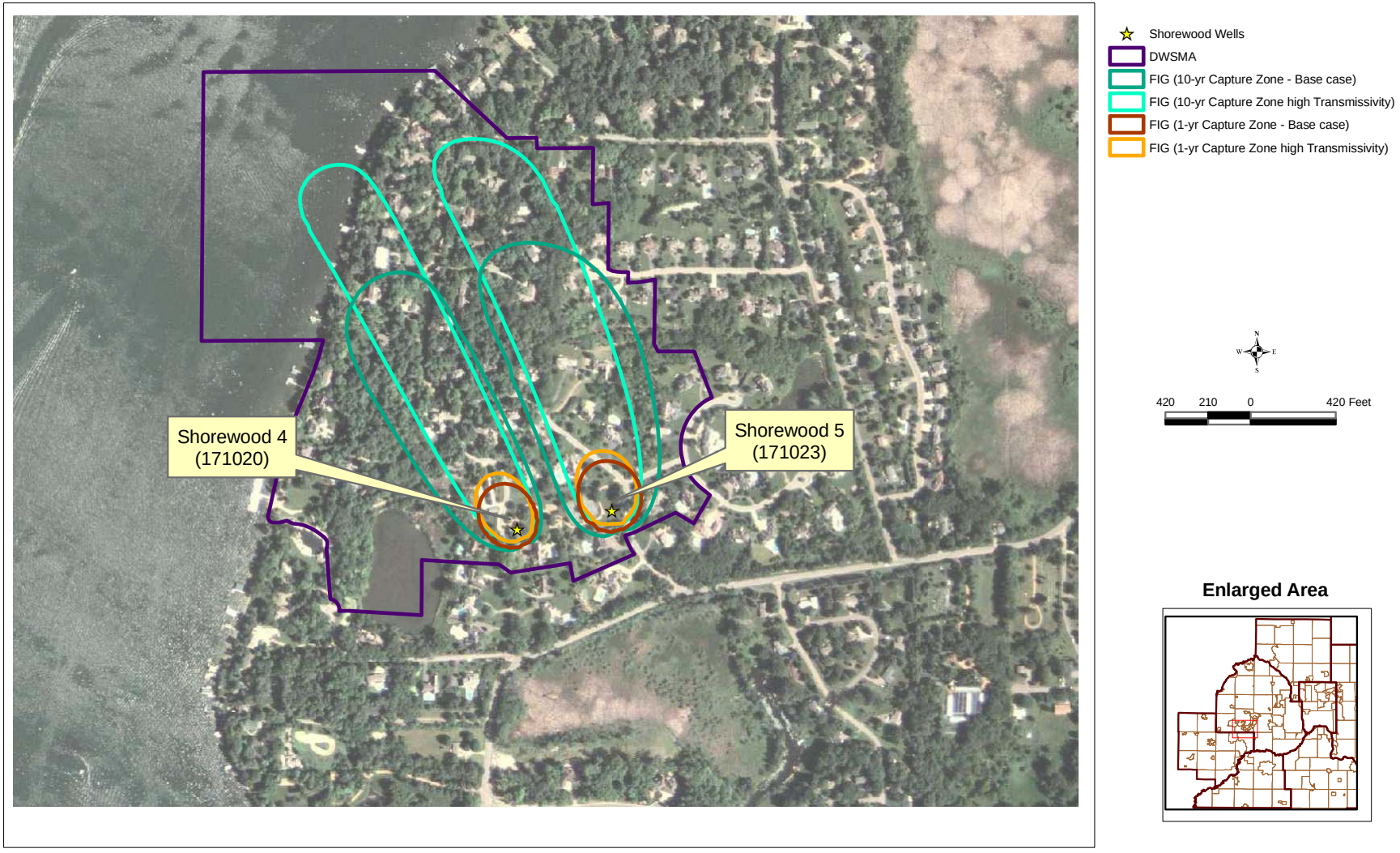


Enlarged Area



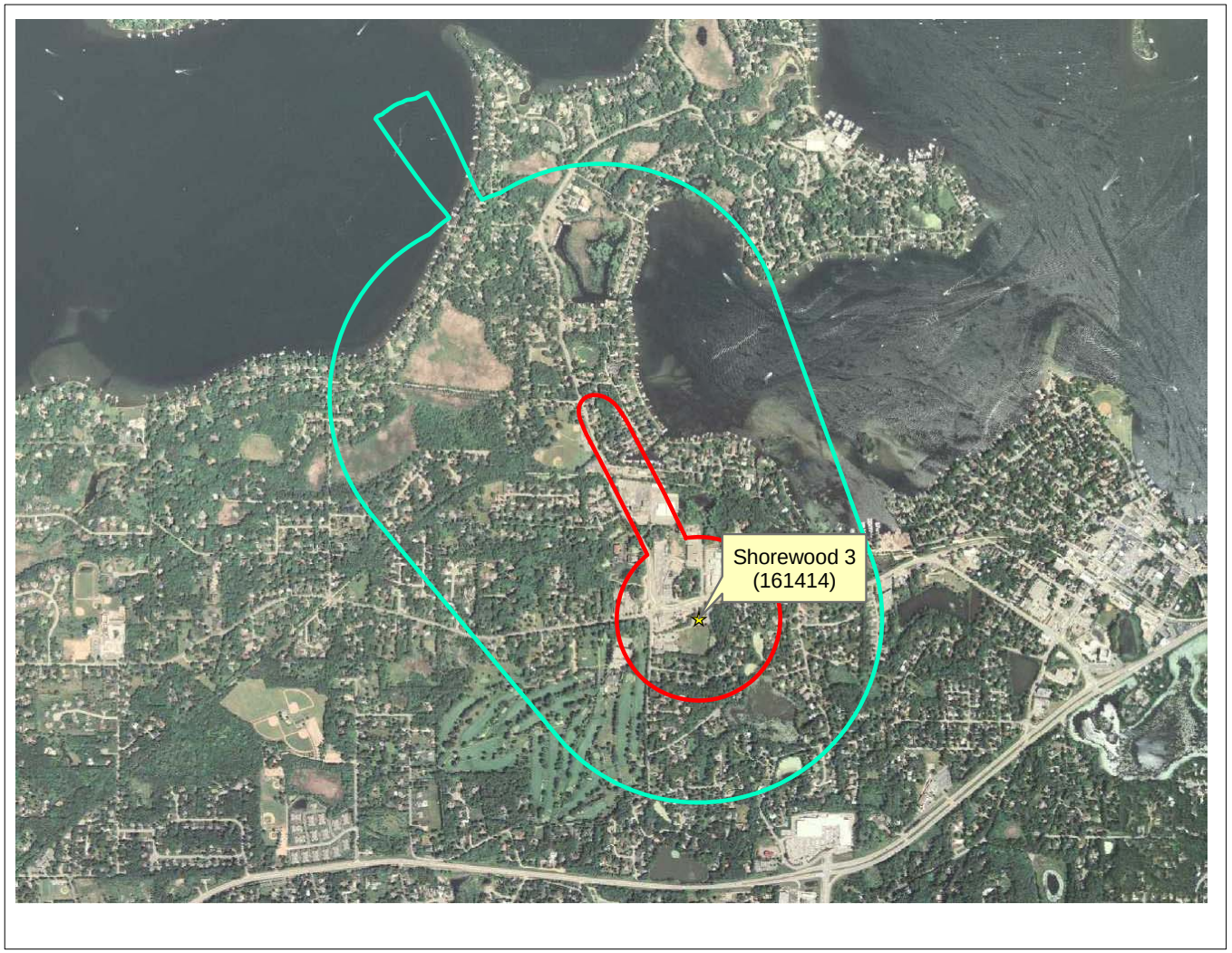
MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 4e
Geologic Cross-Section E-E'
(Shorewood, MN)



MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 5a
Wellhead Protection Area Delineation
Wells 4 and 5
(Shorewood, MN)



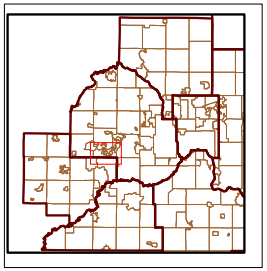
MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 5b
Wellhead Protection Area Delineation
Well 3
(Shorewood, MN)

Shorewood Wells
Emergency Response Area
Wellhead Protection Area

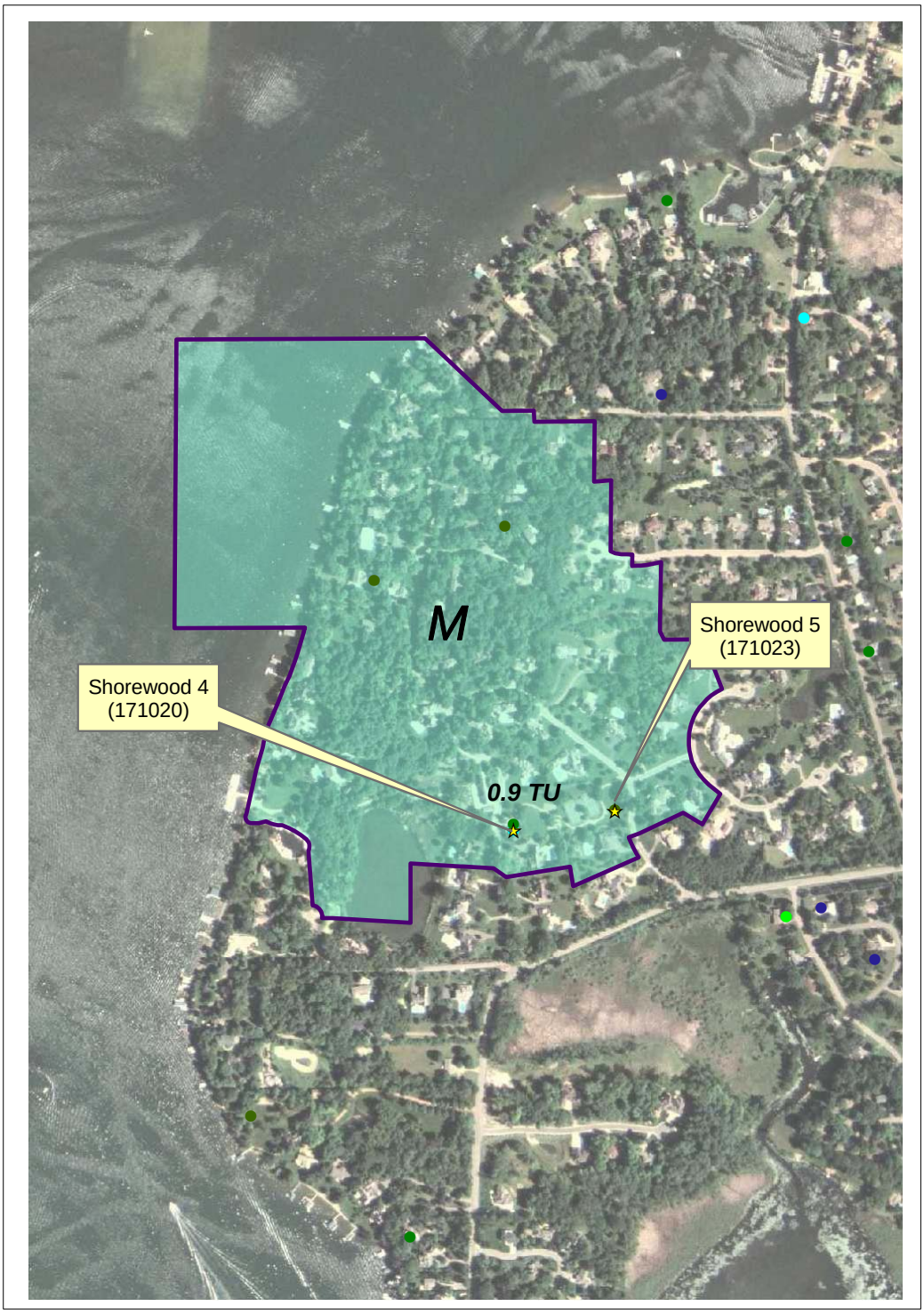
1,400 700 0 1,400 Feet

Enlarged Area



MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 5c
Wellhead Protection Area Delineation
Wells 1, 6, and 7
(Shorewood, MN)



Shorewood Wells
DWSMA
L: Low
M: Moderate
VL: Very Low

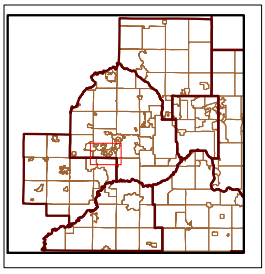
L-scores

L (1-3)
L (4-7)
M
VL (8-11
VL (>12)

0.9 TU: Tritium Results from March 30, 2011 Sampling (In tritium units)

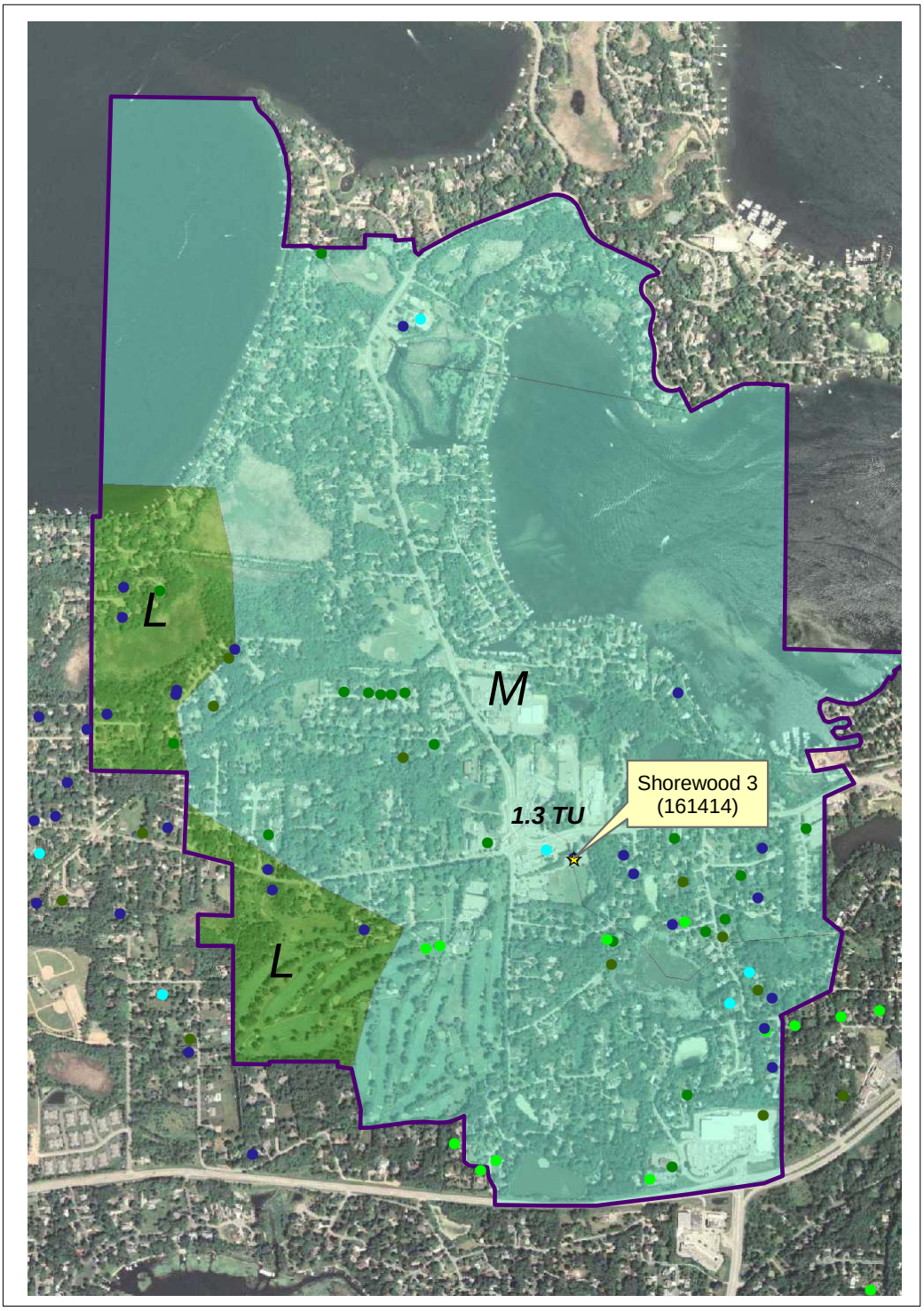
410 205 0 410 Feet

Enlarged Area



MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 6a
Drinking Water Supply Management Area Vulnerability
Wells 4 and 5
(Shorewood, MN)

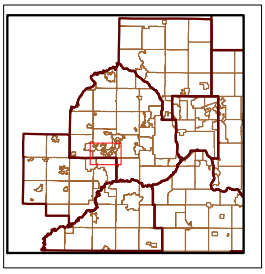


Shorewood Wells
DWSMA
DWSMA Vulnerability
L: Low
M: Moderate
L-scores
H
L (1-3)
L (4-7)
M
VL (8-11
VL (>12)

1.3 TU: Tritium Results from March 30, 2011 Sampling (In tritium units)

770 385 0 770 Feet

Enlarged Area



MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 6b
Drinking Water Supply Management Area Vulnerability
Well 3
(Shorewood, MN)

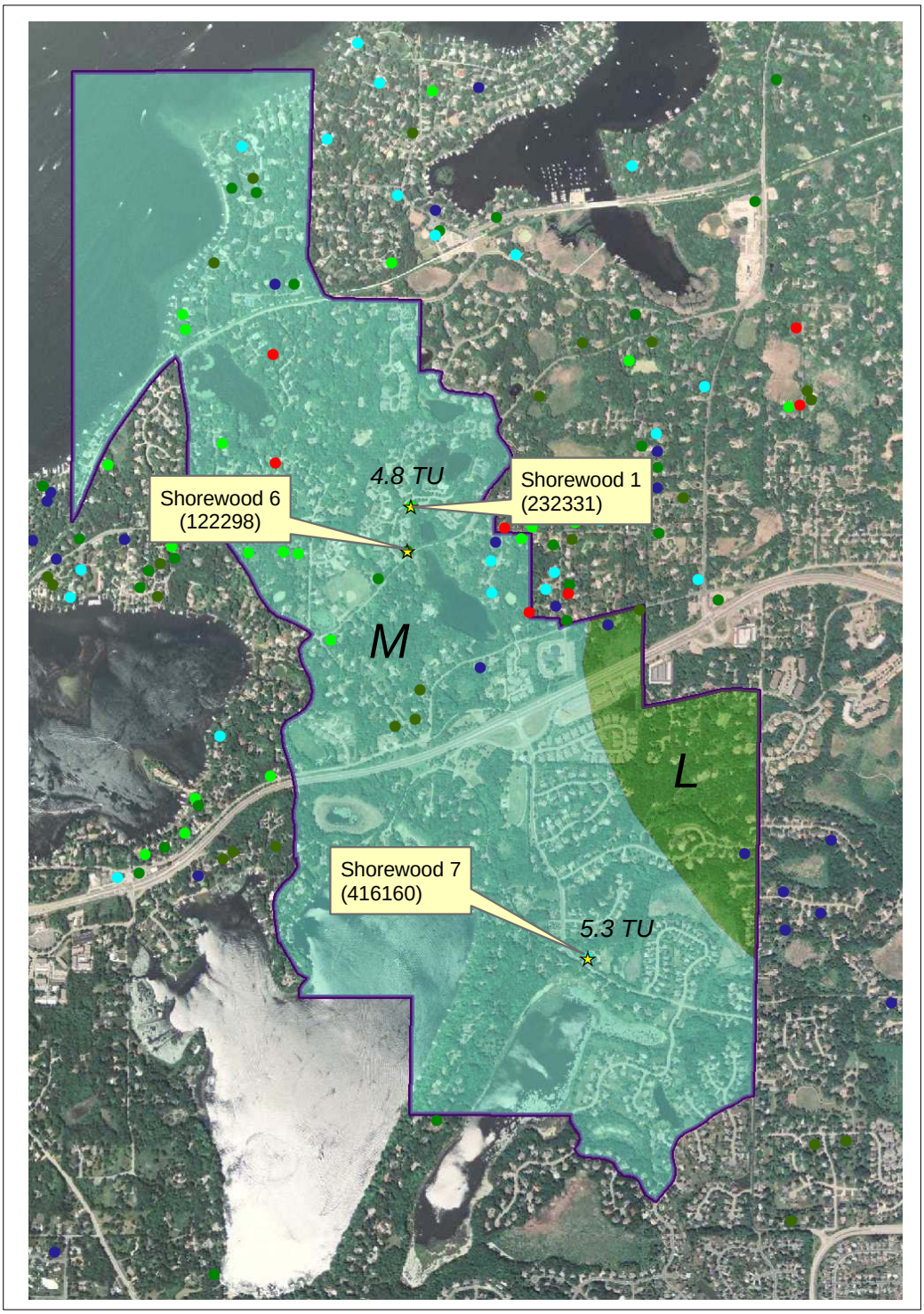


Figure 6c
Drinking Water Supply Management Area Vulnerability
Wells 1, 6, and 7
(Shorewood, MN)

Appendix D – Inner Wellhead Management Zone Surveys

MINNESOTA MDH DEPARTMENT OF HEALTH
Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1270051 **COMMUNITY**
NAME	Shorewood
ADDRESS	Shorewood Water Superintendent, 5755 Country Club Road, Shorewood, MN 55331

FACILITY (WELL) INFORMATION

NAME	Well Amesbury #1
FACILITY ID	S01
UNIQUE WELL NO.	232331
COUNTY	Hennepin

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

☐ **YES** (Please attach a copy)
☐ **NO** ☐ **UNDETERMINED**

PWS ID / FACILITY ID	1270051 S01	**UNIQUE WELL NO.**	232331

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	1270051 S01	UNIQUE WELL NO.	232331

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		Y	78	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	58	N
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	1270051 S01	UNIQUE WELL NO.	232331

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				
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		Y	40	N
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
SWD	Storm water drain pipe, 12 inches or greater	50	20		Y	55	N

* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.

[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.

[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.

[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.

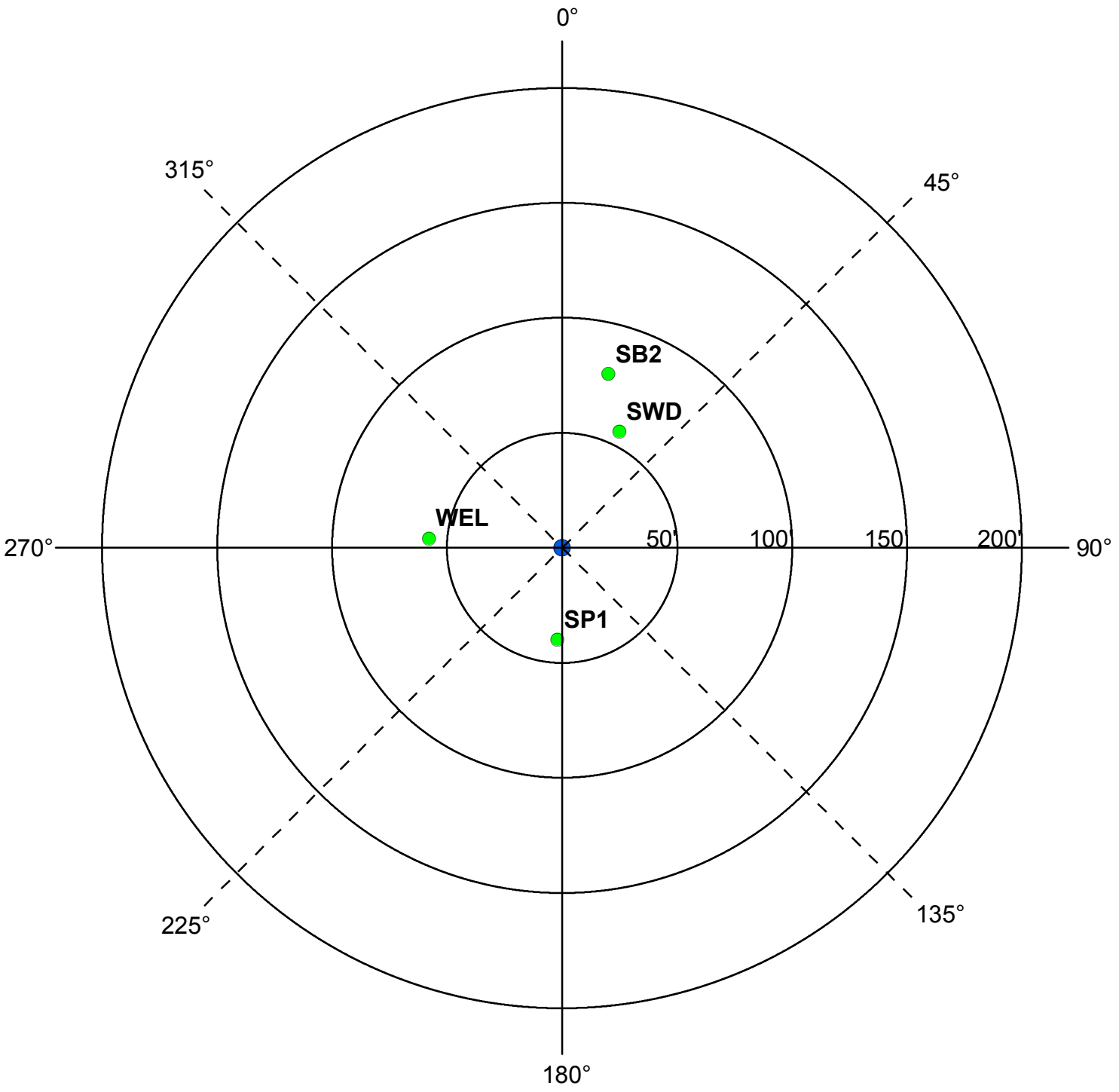
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

PWS ID / FACILITY ID	1270051 S01	UNIQUE WELL NO.	232331

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	9 - 20 - 2011

PWS ID / FACILITY ID	1270051 S01	UNIQUE WELL NO.	232331

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

MINNESOTA MDH DEPARTMENT OF HEALTH
Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1270051 **COMMUNITY**
NAME	Shorewood
ADDRESS	Shorewood Water Superintendent, 5755 Country Club Road, Shorewood, MN 55331

FACILITY (WELL) INFORMATION

NAME	Well Badger #3
FACILITY ID	S03
UNIQUE WELL NO.	161414
COUNTY	Hennepin

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

☐ **YES** (Please attach a copy)
☐ **NO** ☐ **UNDETERMINED**

PWS ID / FACILITY ID	1270051 S03	**UNIQUE WELL NO.**	161414

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	1270051 S03	UNIQUE WELL NO.	161414

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		Y	43	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.		N		
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		Y	60	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	1270051 S03	UNIQUE WELL NO.	161414

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				
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
SWD	Storm water drain pipe, 12 inches or greater	50	20		Y	71	N

* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.

[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.

[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.

[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.

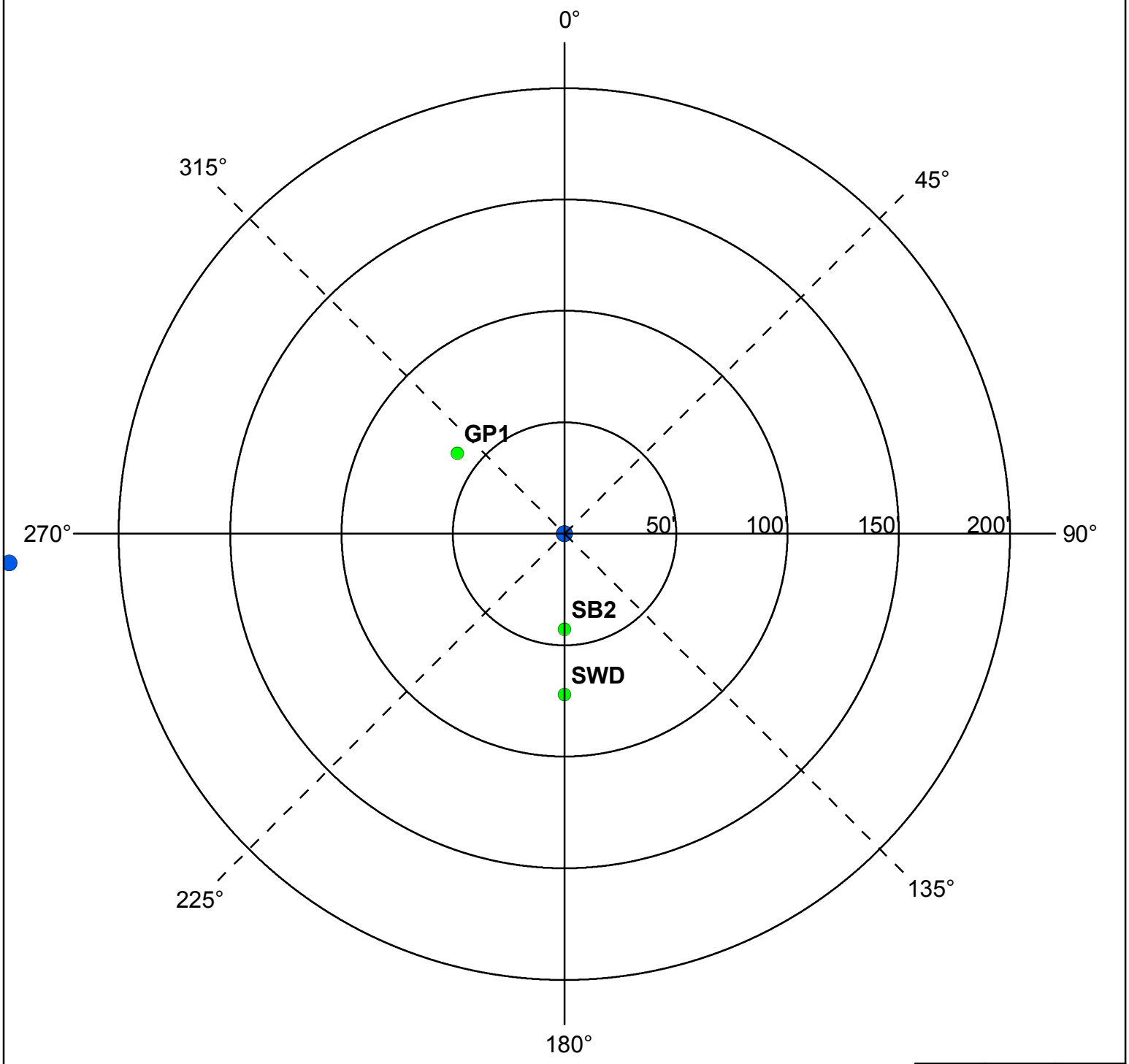
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

PWS ID / FACILITY ID	1270051 S03	UNIQUE WELL NO.	161414

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	9 - 20 - 2011

PWS ID / FACILITY ID	1270051 S03	UNIQUE WELL NO.	161414

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

COMMENTS

Sanitary Sewer line is at 43 feet.

There is a second gravel pocket at an unkown sdistance or direction.

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

MINNESOTA MDH DEPARTMENT OF HEALTH
Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1270051 **COMMUNITY**
NAME	Shorewood
ADDRESS	Shorewood Water Superintendent, 5755 Country Club Road, Shorewood, MN 55331

FACILITY (WELL) INFORMATION

NAME	Well Boulder Br. #4
FACILITY ID	S04
UNIQUE WELL NO.	171020
COUNTY	Hennepin

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

☐ **YES** (Please attach a copy)
☐ **NO** ☐ **UNDETERMINED**

PWS ID / FACILITY ID	1270051 S04	**UNIQUE WELL NO.**	171020

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	1270051 S04	UNIQUE WELL NO.	171020

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	67	
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	1270051 S04	UNIQUE WELL NO.	171020

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				
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
SBM	Sewer, buried collector, municipal, pressurized, open jointed, or unapproved materials	50	50		Y	70	N
DWT	Discharge of water treatment chemical waste	50	50		Y	30	N

* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.

[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.

[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.

[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.

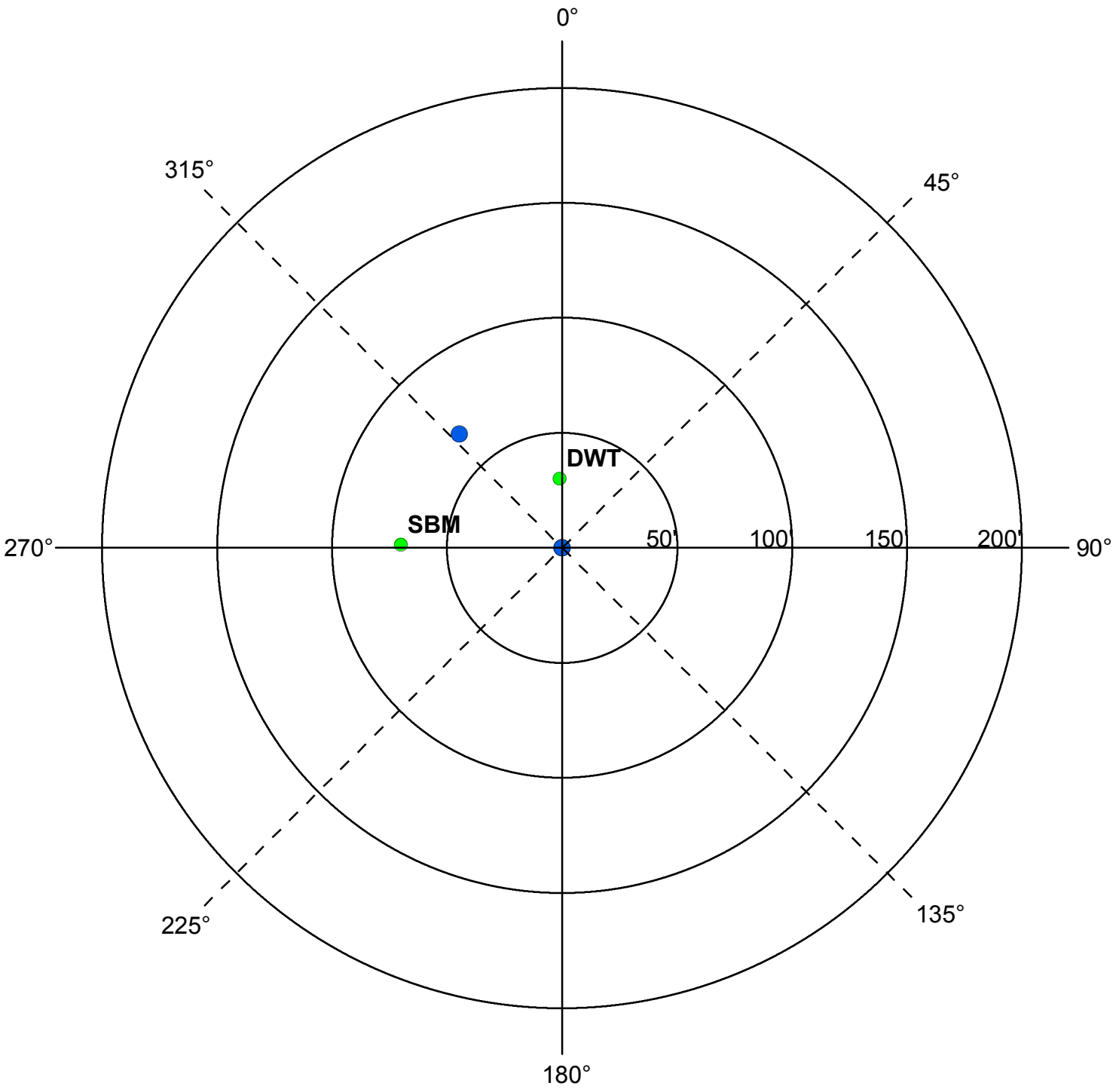
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

PWS ID / FACILITY ID	1270051 S04	UNIQUE WELL NO.	171020

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	9 - 20 - 2011

PWS ID / FACILITY ID	1270051 S04	UNIQUE WELL NO.	171020

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

COMMENTS

9/20/2011 - Location for PCSI Type Gravel Pocket could not be determined.

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

MINNESOTA MDH DEPARTMENT OF HEALTH
Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1270051 **COMMUNITY**
NAME	Shorewood
ADDRESS	Shorewood Water Superintendent, 5755 Country Club Road, Shorewood, MN 55331

FACILITY (WELL) INFORMATION

NAME	Well Boulder Br. #5
FACILITY ID	S05
UNIQUE WELL NO.	171023
COUNTY	Hennepin

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

☐ **YES** (Please attach a copy)
☐ **NO** ☐ **UNDETERMINED**

PWS ID / FACILITY ID	1270051 S05	**UNIQUE WELL NO.**	171023

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	1270051 S05	UNIQUE WELL NO.	171023

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.		N		
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	1270051 S05	UNIQUE WELL NO.	171023

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				
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
SBM	Sewer, buried collector, municipal, pressurized, open jointed, or unapproved materials	50	50		Y	60	N

* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.

[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.

[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.

[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.

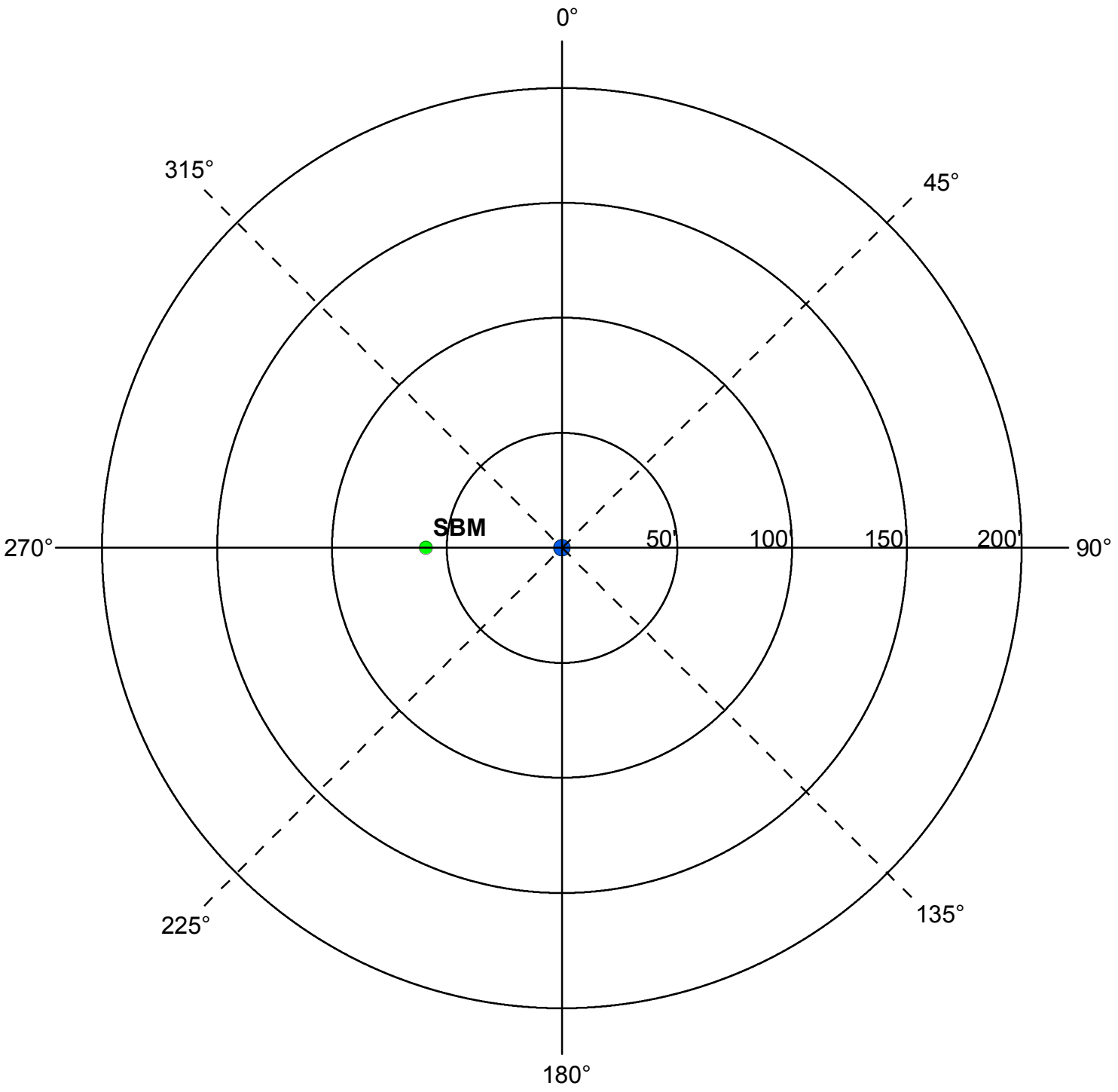
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

PWS ID / FACILITY ID	1270051 S05	UNIQUE WELL NO.	171023

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	9 - 20 - 2011

PWS ID / FACILITY ID	1270051 S05	UNIQUE WELL NO.	171023

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

MINNESOTA MDH DEPARTMENT OF HEALTH
Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1270051 **COMMUNITY**
NAME	Shorewood
ADDRESS	Shorewood Water Superintendent, 5755 Country Club Road, Shorewood, MN 55331

FACILITY (WELL) INFORMATION

NAME	Well Amesbury #6
FACILITY ID	S06
UNIQUE WELL NO.	122298
COUNTY	Hennepin

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

☐ **YES** (Please attach a copy)
☐ **NO** ☐ **UNDETERMINED**

PWS ID / FACILITY ID	1270051 S06	**UNIQUE WELL NO.**	122298

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	1270051 S06	UNIQUE WELL NO.	122298

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		Y	68	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		Y	78	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.		N		
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	1270051 S06	UNIQUE WELL NO.	122298

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				
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		Y	55	N
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
SBM	Sewer, buried collector, municipal, pressurized, open jointed, or unapproved materials	50	50		Y	70	N
SWD	Storm water drain pipe, 12 inches or greater	50	20		Y	55	N

* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.

[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.

[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.

[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.

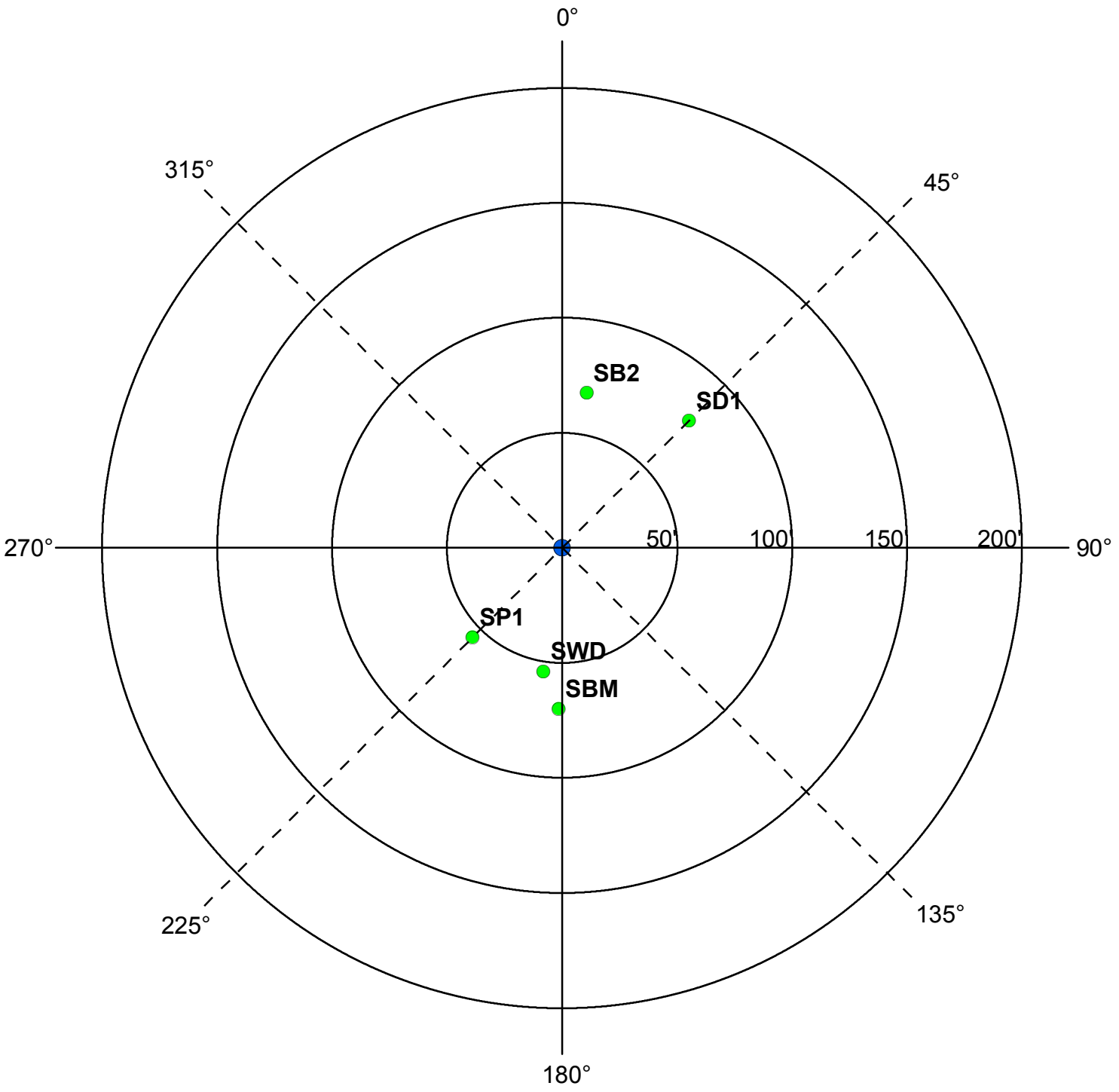
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

PWS ID / FACILITY ID	1270051 S06	UNIQUE WELL NO.	122298

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	9 - 20 - 2011

PWS ID / FACILITY ID	1270051 S06	UNIQUE WELL NO.	122298

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

MINNESOTA MDH DEPARTMENT OF HEALTH
Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1270051
NAME	Shorewood
ADDRESS	Shorewood Water Superintendent, 5755 Country Club Road, Shorewood, MN 55331

COMMUNITY

FACILITY (WELL) INFORMATION

NAME	Well Waterford #7
FACILITY ID	S07
UNIQUE WELL NO.	416160
COUNTY	Hennepin

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

☐ **YES** (Please attach a copy)
☐ **NO** ☐ **UNDETERMINED**

PWS ID / FACILITY ID	1270051 S07	**UNIQUE WELL NO.**	416160

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	1270051 S07	UNIQUE WELL NO.	416160

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		Y	118	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		Y	100	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.		N		
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		Y	80	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	1270051 S07	UNIQUE WELL NO.	416160

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				
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
SBM	Sewer, buried collector, municipal, pressurized, open jointed, or unapproved materials	50	50		Y	57	N

* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.

[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.

[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.

[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.

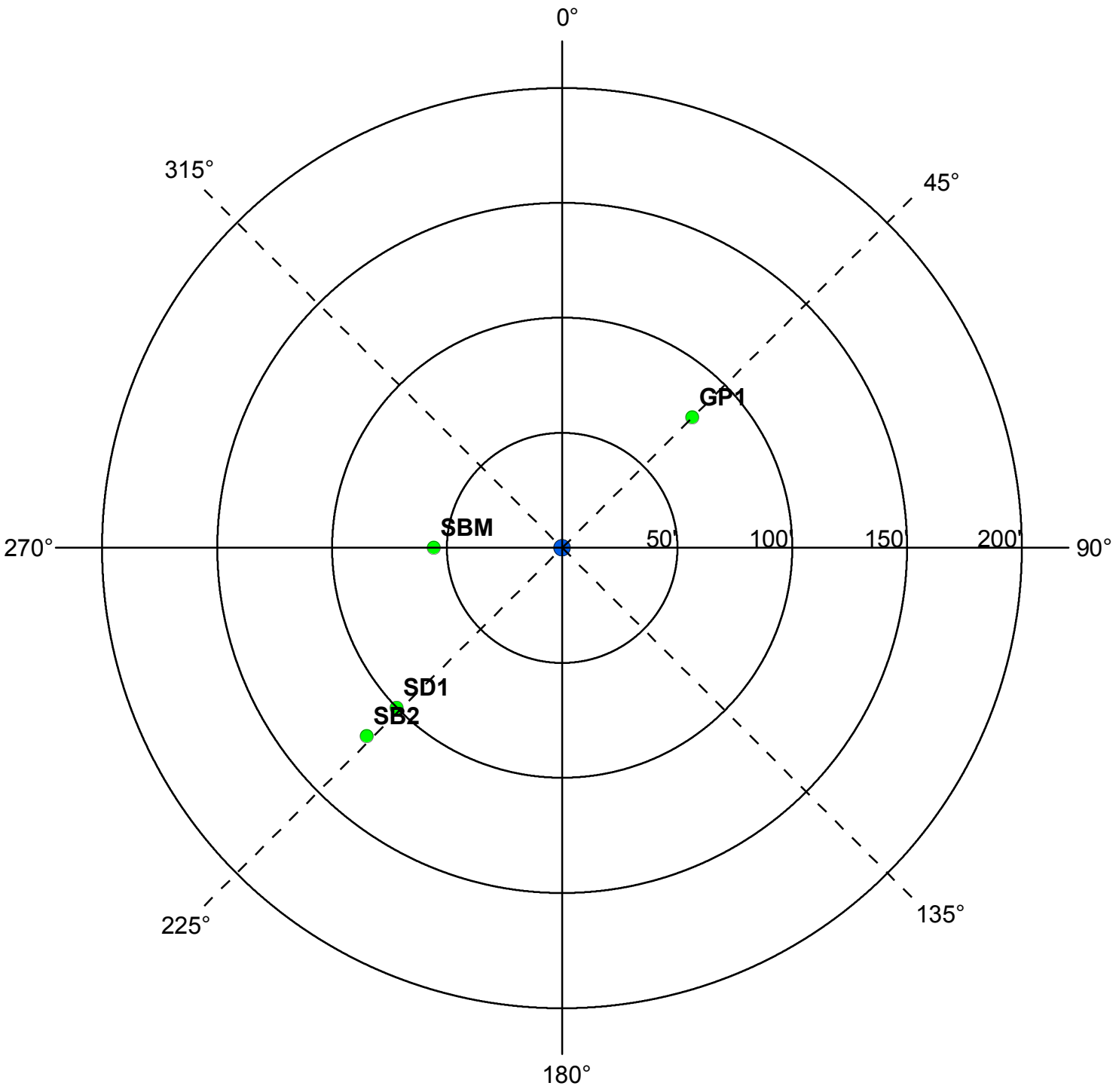
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

This form is based on the new isolation distances in Minnesota Rules, Chapter 4725, related to wells and borings adopted August 4, 2008, and Minnesota Rules, Chapter 4720, related to wellhead protection.

PWS ID / FACILITY ID	1270051 S07	UNIQUE WELL NO.	416160

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	9 - 20 - 2011

PWS ID / FACILITY ID	1270051 S07	UNIQUE WELL NO.	416160

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