City of Big Lake
160 Lake Street North • Big Lake, MN 55309

2016 WELLHEAD PROTECTION PLAN

Part 2

WSB Project No. 2997-02

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Wellhead Protection Plan
Part 2
City of Big Lake, Minnesota

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PUBLIC WATER SUPPLY PROFILE

PUBLIC WATER SUPPLY

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GENERAL INFORMATION

Unique Well Number(s): 220959, 217948, 523954, 659386, 705488, 763778
Size of Population Served by Municipal Water: Approximately 10,298
County: Sherburne

PUBLIC WATER SUPPLY WELLS

Local Well Name	Unique Number	Aquifer	Casing Depth (ft)	Well Depth (ft)	Date Constructed
Well No. 1	220959	Mt. Simon-Fond Du Lac	104	210	1957
Well No. 2	217948	Mt. Simon-Fond Du Lac	105	230	1967
Well No. 3	163648	Mt. Simon-Red Clastics	119	300	1980
Well No. 4	523954	Mt. Simon	125	192	1993
Well No. 5	659386	Mt. Simon-Red Clastics	78	178	2001
Well No. 6	705488	Mt. Simon-Fond Du Lac	110	202	2004
Well No. 7	763778	Mt. Simon-Hinckley	109	220	2008

DOCUMENTATION LIST

Step	Date Performed
Part I Approval Notice Received from MDH	December, 2014
Scoping 2 Meeting Held (4720.5349, subp. 1)	March 13, 2015
Scoping Decision Notice Received (4720.5340, subp. 2)	March 19, 2015
Remaining Portion of Plan Submitted to Local Government Units (LGUs) (4720.5350, subp. 1 & 2)	September 24, 2015
Review Considered (4720.5350, subp. 3)	October to November, 2015
Public Hearing Conducted (4720.5350, subp. 4)	December 9. 2015
Remaining Portion WHP Plan Submitted (4720.5360, subp. 1)	February 8, 2016
Approved Review Notice Received	TBD

EXECUTIVE SUMMARY

The Wellhead Protection (WHP) Plan (Plan) for the City of Big Lake (City) addresses the seven municipal water supply wells used by the City (Wells No. 1, 2, 3, 4, 5, 6 and 7) and the associated source water aquifers (the Mt. Simon - Fond Du Lac, Red Clastics, and Hinckley formations – the aquifers from which the municipal wells pump water).

Part 1 of the Plan was completed and approved in December of 2014 by Leggette, Brashears & Graham, Inc. and the Minnesota Department of Health (MDH) respectively. The Part 1 Plan presented: the delineation of the Wellhead Protection Areas (WHPA); the drinking water supply management area (DWSMA); and the vulnerability assessments for the system's wells and aquifers within the DWSMA. The location of the DWSMA is described by **Figure 1A**, the parcels included in the DWSMAs in **Figure 1B**, and the boundaries of the DWSMAs in **Figure 2.** Water supply wells covered by this delineation and this Part 2 Plan Update are listed on **page 4**.

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

- Moderate vulnerability areas – wells and tanks
- High vulnerability areas – all land uses and potential contaminant sources (including 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; and
- A review of the wellhead and source water protection evaluation program and the City's alternative water supply contingency strategy.

The goals and objectives of this Plan focus on: managing potential contaminant sources within the DWSMA; reducing the potential contaminant pathways to the source water aquifer that may be provided by private wells; and educating property owners and water supply users.

The City of Big Lake'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 which provides water to the municipal system. This will include increased public education of the Wellhead and Source Water Protection Program and groundwater-related issues, as well as management of the identified potential contaminant sources and conveyance mechanisms within the DWSMA.

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

Implementation of these goals will be achieved through direct management efforts within 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. Septic Systems (ISTS)
E. Data Collection
F. Water Conservation
G. Implementation
H. Evaluation

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

CHAPTER ONE

DATA ELEMENTS AND ASSESSMENT (4720.5200)

I. REQUIRED DATA ELEMENTS

In accordance with Minnesota Rules Chapter 4720.5200, the following data elements are considered for evaluation in a Wellhead Protection (WHP) Plan. Those elements required for evaluation are determined by the Minnesota Department of Health (MDH) based on the Drinking Water Supply Management Area (DWSMA) vulnerability as described in the MDH Scoping 2 Decision letter received by the City on April 4, 2014.

A. Physical Data Elements

Physical data elements include the collection, consideration, and analysis of precipitation, geology, soils, and water resources.

1. Precipitation

Due to the vulnerability setting, precipitation is a required data element to be reviewed and submitted. There are three precipitation gauging stations near the City. These stations are in sections 3, 16, and 36 of Big Lake Township. All of the stations are volunteer reported collection sites which are coordinated by the Soil and Water Conservation District. **Table 1, Appendix A** contains the precipitation data for the last five consecutive years. As shown in the table, complete data was only available for the monitoring station located in Section 36. Based on this station, average rainfall for the five years of record analyzed was approximately 31 inches. During this data set, the greatest monthly rainfall occurred in May of 2012.

2. Geology

All geological analyses were conducted and are included in the Part 1 Plan (**Appendix C**). Results of Part 1 indicate low geologic sensitivity near Wells No. 1, 2, 4, and 7, moderate near Well No. 5, and very high near Well No. 6. In addition, bedrock geology is provided in **Figure 3, Appendix B**.

3. Soil Conditions

Surficial soil types within the DWSMA are shown on **Figure 4, Appendix B.** Since portions of the Big Lake municipal wells and source water aquifer within the DWSMA are classified as vulnerable, surficial soil characteristics must be evaluated. Issues related to surficial soil characteristics or the surficial soil types also may have an effect on the management strategies developed for the DWSMA. As outlined on **Figure 4, Appendix B**, the surficial geology in the City's DWSMA consists primarily of sandy soils with pockets of sandy or sandy-skeletal in a few areas and coarse-loamy soils along the St. Francis River. There are also very small areas of fine-loamy and loamy soils in the most northeast portion of the DWSMA.

Rapid erosion is capable of transporting contaminants some distance both vertically and horizontally, however, the entire area in the City's DWSMA has low susceptibility for erosion, as outlined on **Figure 5, Appendix B**.

According to the United States Department of Agriculture (USDA), the soil in the areas of the DWSMA range from soil classification A to A/D. Soil classification A is described to have high infiltration rates.

4. Water Resources

Since portions of the City's DWSMA are classified with high vulnerability, surface water resources must be evaluated based on their potential influence and impact to the communities water supply. Major and minor watershed units are included in **Figure 6, Appendix B**. The entire DWSMA is located within the Mississippi River – St. Cloud Major watershed. The entire West DWSMA is within the Elk River minor watershed and the East DWSMA is primarily within the Elk River minor watershed, with the southern portion included in the Mississippi River minor watersheds.

The Public Waters Inventory Map shown in **Figure 7, Appendix B** displays public waters and wetlands in the DWSMA. A portion of Blacks Lake is contained in the southern portion of the West DWSMA. The majority of Big Lake can be found within the western portion of the East DWSMA. Also shown in **Figure 7, Appendix B** are wetlands within the City's DWSMA. The majority of the wetlands are located in the southern portion of the West DWSMA and within the north-eastern portion of the East DWSMA.

Figure 8, Appendix B indicates the location of shoreland districts and floodplains in the DWSMA. As shown in the figure, the flood plain of the surface water bodies that are within or located near the City's DWSMAs extend into the DWSMA. The flood plain for Big Lake is contained within the moderate vulnerability section of the DWSMA. However, the flood plain for Lake Mitchell, located outside of the DWSMA, extends into the West DWSMA within the high vulnerability area.

B. Land Use Data Elements

Land use elements include the collection, consideration, and analysis of present and future land use, zoning, public utility services, and a potential contaminant source inventory (PCSI).

1. Land Use

Figure 9, Appendix B shows the DWSMA superimposed over the existing land use maps. Existing land uses include agricultural, undeveloped or vacant land, single-family residential, multi-family residential, industrial and commercial land. As shown in the figure, the West DWSMA contains mostly residential land use types with a small area of agricultural land use. The agricultural land use is located within the flood plain of Blacks Lake and within the high vulnerability portion of the West DWSMA. Within the East DWSMA, the land use type varies. However, within the high vulnerability portion of the East DWSMA, there is a large area of agricultural and industrial land use.

Figure 10, Appendix B indicates the existing zoning within the DWSMA. The majority of the land used for commercial and industrial purposes is located along the railroad tracks and U.S. Highway 10. Portions of the DWSMA located north of U.S. Highway 10 are considered high vulnerability.

2. PCSI

A 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.

Data points collected from the MPCA WIMN database were first properly located through site investigation, aerial photography, and additional research. Once the points were assigned to the

proper locations, 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 PCS codes were added to the sites and a table and map (**Table 2, Appendix A and Figure 11, Appendix B**) were produced to display the locations and types of potential contaminants throughout the DWSMA.

Data points were also collected from the CWI. These wells were included in all vulnerability types and were coded appropriately. **Figure 12, Appendix B** contains the location of the water distribution system, public wells, and private wells. Tables for both the public and private wells are also included in **Appendix A** as **Tables 3 and 4**. In addition, sealed wells are included in **Table 5, Appendix A**.

An effort was also made to locate previously unlocated wells. The locations for all unlocated wells except two were determined. A table of the unlocated and remaining unlocated wells, are included in **Tables 6A and 6B, Appendix A**.

Septic system information was collected from the City database. The database was reduced to only include those septic systems that are located within the high vulnerability section of the DWSMA. **Table 7, Appendix A** includes the list of septic systems while **Figure 13, Appendix B** includes a display of the septic system locations.

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

Provided below is a summary of PCSI results:

- Public and Private Wells: There are 131 known private wells and nine public wells located within the DWSMA according to the CWI.

- Individual Sewage Treatment Systems (ISTSs): 47 known septic systems are located within the high vulnerability sections of the DWSMA.

- Hazardous Waste Generator (HWG): Eight sites were identified within the high vulnerability portion of the DWSMA as a small to minimal quantity HWG. Six sites are active and two are inactive.

- Leak Sites: There are five areas classified by the MPCA WIMN database as leak sites within the moderate and high vulnerability sections, one of which is active. All leak sites are leaking underground storage tanks (LUST).

- Storage Tank Sites: 10 storage tank sites, some containing multiple tanks at a particular site, were classified within the DWSMA using the MDH requirements based on vulnerability. Seven of the storage tank sites are active. All of the storage tanks identified within the DWSMA are underground tanks.

- Other: Also identified within the DWSMA were two inactive Voluntary Investigation and Cleanup sites, two inactive petroleum brownfields, and one active solid waste, permit by rule site.

- IWMZ Results: Located within 200 ft of the municipal wells are watertight sewage treatment devices, buried sanitary sewer pipes, large stormwater drain pipes and ponds, a commercial compost site, a scrap yard, an operating well, a petroleum storage or prep area, and gravel pockets for clear water drainage.

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

3. Public Utility Services

Included in **Figures 12, 13, and 14, Appendix B** are the public utilities located within the DWSMAs for water distribution, sanitary sewer, and storm sewer respectively. Portions of the City's DWSMA do not have municipal utilities, therefore, septic systems and private wells are utilized as shown in the figures.

Figure 16, Appendix B shows the current transportation routes that pass through the City's DWSMA. Within the West DWSMA, passes County Road 73. Within the East DWSMA passes Minnesota State Highway 25, County Road 5 and Hwy 10.

Figure 17, Appendix B shows the location of public drainage systems within the DWSMAs. The main drainage route is located in the north-eastern portion of the East DWSMA.

To the City's knowledge, no oil or gas pipelines exist within the DWSMA boundary, per the National Pipeline Mapping System.

C. Water Quantity Data Elements

1. Surface Water Quantity

Figure 7, Appendix B indicates the public waters and public water wetlands located in the DWSMA. The Elk River flows adjacent and through the northern part of the DWSMA however low, mean, and high flows have not been established. There are four lakes in the DWSMA where the DNR has established ordinary high water marks (OHW). Big Lake has an OHW elevation of 927.9 ft, Blacks Lake has an OHW of 927.9 ft, Preusse Lake an OHW of 925.7 ft, and Forest Pond has an established OHW of 926 ft above sea level.

There are two appropriations permits for surface water pumping from the Elk River in or near the DWSMA (Section 17, Twp 33, Rng. 27). The purpose of these permits is for major crop irrigation. Permit #1957-0188 is allowed up to 0.8 million gallons (MG) and permit #1963-0726 is allowed 4.1 MG to be pumped annually.

The City is not aware of any surface water and groundwater conflicts at this time.

2. Groundwater Quantity

The quantity of groundwater was assessed as part of the WHP Plan Part 1 included in **Appendix C**. As analyzed in Part 1, the maximum withdrawal by the City occurred in 2008 as 478.6 MG. The projected water use over the next five years is approximately 612.5 MG. According to the City's DNR Appropriations, the City is allotted 610.0 MG to be withdrawn per year. The City will need to install another well and apply for another appropriations permit within the next five years.

The City has noticed a potential groundwater conflict between Well No. 7 and the nearby irrigation systems.

To the City's knowledge no known environmental boreholes exist within the DWSMA boundaries.

D. Water Quality Data Elements

1. Surface Water Quality

Due to the moderate and high vulnerability of the source aquifer, the quality of surface water was reviewed. Water quality data is available with the DNR but is not being monitored for drinking water protection purposes. Surface waters are shown in **Figure 7, Appendix B.** There are four waterbodies in the DWSMA (Blacks Lake, Big Lake, Presse Lake, and Elk River), of which two (Big Lake and Elk River) are on the 2014 Impaired Waters List (MPCA). According to the MPCA website, there are 10 surface water quality monitoring sites within the DWSMA. Monitoring data is not available for Blacks Lake and Presse Lake, and both lakes are not listed as impaired by the MPCA. A summary of the surface water quality is on file at the City.

2. Groundwater Quality

The City monitors water quality per Minnesota and Federal Regulations. The City summarizes monitoring data in its annual Consumer Confidence Report, which is available to the public on the City's website, and is attached in **Appendix E**. The groundwater quality within the municipal wells utilized for the public water supply is adequate. The raw water contains radionuclides above the maximum contaminant level set by the MDH and U.S. Environmental Protection Agency (EPA) as part of the Maximum Contaminant Level (MCL) National Primary Drinking Water Regulations and requires treatment to reduce levels. In addition, concentrations of iron and manganese exceed the Secondary Maximum Contaminant Levels (SMCLs). Although, concentrations exceeding the SMCLs are not impactful to human health, they do pose aesthetic concerns and require treatment to reduce levels to below SMCLs.

In addition to the constituents already being treated for within the City's treatment system, the concentration of nitrates within the City municipal wells is also increasing.

All wells within the DWSMAs also contain concentrations of tritium greater than one Tritium Unit (TU), except Well No. 7. Tritium is not a health hazard, but is an indicator of vertical migration travel time and aquifer vulnerability. The presence of tritium indicates the likely connection between surface water and groundwater based on the relatively young water age.

To the City's knowledge, no groundwater tracer studies have been conducted within the DWSMA boundaries.

II. ASSESSMENT OF DATA ELEMENTS

Based on the data available for the required data elements, present and future implications of the data elements are described below for the use of the wells, quality and quantity of water supplying the public water supply wells, and the land and groundwater uses in the DWSMA.

A. Use of the Well

The data elements collected and analyzed as part of the development of the WHP Plan indicate areas of concern and the potential for improvement to aid in the protection of the public water

supply system. City well construction and maintenance information is updated for every maintenance activity. Records are kept on file by the Public Works Department at the water treatment plant.

B. Quality and Quantity of Water Supplying the Public Water Supply Well

Quantity of water supplying the public water supply is available, however, addition wells will need to be installed to sustain projected use.

Nitrate concentrations within the groundwater are of concern from a water quality standpoint and will need to be addressed.

In addition, a study of the interference between Well No. 7 and the surrounding irrigation systems will be addressed.

C. The Land and Groundwater Uses in the DWSMA

Land use within the DWSMA boundaries is of concern, especially within the high vulnerability areas. Because the DWSMA is comprised of mainly sandy soils, the use of private wells and septic systems provides an opportunity for potential contamination of the public water supply. Nitrates have been identified as a contaminant of concern in the City's drinking water. Land-uses in which lawn fertilization is common should be monitored, particularly those within highly vulnerable portions of the DWSMA, as fertilizer is a source of nitrates.

The western DWSMA, west and adjacent to Lake Mitchell is primarily built out and predominantly residential in nature in both moderate and highly vulnerable areas. Much of the eastern DWSMA for the City is still undeveloped and is planned for long range residential use accept for those lands directly adjacent to U.S. Highway 10. There is existing industrial land use within areas of high vulnerability. Hazardous waste sites have been identified in the industrial park located adjacent to and north of U.S. Highway 10 at 177th Street with addition multiple activities just south of this as well. In addition, those items found within the IWMZ provide an opportunity for improvement to enhance the protection of the groundwater source. Additional industrial shown in future land use maps indicate more of this growing to the south of U.S. Highway 10, but much of that is outside of the DWSMA.

Current estimated population for the City of Big Lake is 10,298 (source: US Census Bureau). Estimates show a continued growth in population with 10,298 in 2013. Actual census from 2010 is 10,060 which equates to a 2.4% growth over those three years. Subsequent to this, Big Lake Township census data shows a decrease in population which may be an indication of anticipated expansion of the City boundaries (rather than or including) additional people moving to the community.

CHAPTER TWO

IMPACT OF CHANGES ON PUBLIC WATER SUPPLY WELLS (4720.5220)

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

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

I. POTENTIAL CHANGES IDENTIFIED

A. Physical Environment

No changes to the physical environment are expected over the next 10 years or the life of this Plan.

B. Land Use

Future land use, as developed within the City's 2030 Comprehensive Plan are included in **Figure 15, Appendix B**. Future land use suggests mostly residential land use with a reduction in agricultural land use. Much of this is planned for areas within the eastern DWSMA and northern portions of the western DWSMA, some within the high vulnerability area. Additionally, some commercial development is planned within the eastern DWSMA (along U.S. Highway 10) between the 177th Industrial Park and (west to) County Road 43. Development practices and stipulations on uses that may include use or storage of hazardous materials should be avoided.

C. Surface Water

No changes to the surface water within the DWSMA boundaries are expected over the next 10 years or the life of this Plan.

D. Groundwater

Concentrations of nitrate are expected to increase within the groundwater over the next 10 years or the life of this plan. In addition, groundwater use is also expected to increase as the population increases.

II. IMPACT OF CHANGES

A. Changes Identified Above Influence on Existing Water and Land Government Programs and Regulations

Federal and State Regulations

All tank operators and owners must comply with both federal and state regulations for USTs. At the federal level, UST operators and owners 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.

Above ground 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 regulates tanks.

In accordance with the Wetland Conservation Act and the Municipal Separate Storm Sewer System (MS4) program, the MPCA has regulations ensuring the protection of surface water bodies. Upon new development or large expansion projects, developers and cities are required to manage stormwater runoff in a way that protects the quality and quantity of surface water, and in areas with high vulnerability aquifers, these policies serve the purpose of protecting groundwater as well.

Sherburne County Regulations
Sherburne County regulates land use and zoning in those areas of the DWSMA outside of the city limits. The County has floodplain and shoreland standards as well as stormwater management and erosion control adopted in their ordinances. All of these ordinances provide protects for surface waters and ultimately ground waters. The County also provides waste management programs including household hazardous, solid waste and composting. They have an ordinance on subsurface sewage treatment systems which regulate ISTS'.

The County's zoning regulations include an Urban Expansion District which covers much of the DWSMA area outside of City limits. This district has a stated purpose of allowing some development to occur on a short term basis designed to facilitate integration of these places into the city on public infrastructure. The district also calls for land use decisions to be made collaboratively between the local governments involved (City, Township, County).

The County adopted the 2030 Comprehensive Plan in September 2011 which outlines the County's role in addressing land and public infrastructure issues within the County. The Comprehensive Plan describes overall objectives and policies that are designed to guide the County toward the accomplishment of its visions by the year 2030. The plan specifically addresses ground water and its sensitivity to pollution in the county and the use of wellhead protection plans and wise land use management within wellhead protection areas because of this issue.

City of Big Lake
The City of Big Lake requires that for new subdivisions, individual wells may be used for irrigation purposes only unless City Council approves private wells where extension of the existing water system is not feasible. With regard to septic systems, the City requires connection to the public sewer system where available and abandonment of individual septic systems. Shoreland and Floodplain zones regulate land uses and provide a method of protection for surface waters.

B. Administrative, Technical, and Financial Considerations

With existing cost-share programs and grant opportunities, the City will have resources available to regulate the public water supply's source water and implement the management strategies found herein. Funds to support ongoing wellhead and source water protection efforts that go beyond available grant opportunities will come from the City's water utility fund.

CHAPTER THREE

ISSUES, PROBLEMS, AND OPPORTUNITIES (4720.5230)

I. WATER USE AND LAND USE ISSUES, PROBLEMS, AND OPPORTUNITIES

A. Source Water Aquifer

The source water aquifer is susceptible to contamination as the DWSMA is classified to range between moderate and high vulnerability. In addition, the agricultural land use activities that occur above the sandy soil profile of the DWSMA are of concern which can pose a problem for drinking water treatment. There is an opportunity to mitigate the transport of nitrates and try to reduce the potential for other potential contaminants from reaching the source water aquifer from the surface.

B. Groundwater Quality

As stated previously, the increasing concentration of nitrates is an issue that poses a problem for drinking water treatment. There is an opportunity to mitigate the transport of nitrates from the surface into the groundwwater aquifer through treatment, best management practices, and public education.

C. Drinking Water Supply Management Areas

Within the DWSMA, there are issues with land use types that occur within the high vulnerability area and specifically within the IWMZ. There is an opportunity to consider these concerns and through Chapter Five, reduce their potential to impact the source water aquifer.

II. ASSESSMENT OF WATER USE AND LAND USE ISSUES, PROBLEMS, AND OPPORTUNITIES

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

At the beginning of the WHP 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 results of the Part 1 Plan to LGUs. The City was not informed of any issues, problems, or opportunities by the LGUs during that time. In addition, another opportunity for public comment was provided during the Public Hearing where no comments were received.

B. Issues, Problems, and Opportunities Related to the Data Elements

Part 1 and Part 2 of the 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 Wellhead Protection Rules and the most recent and accurate data will be utilized at that time. To support on-going wellhead protection efforts, the City will collect data on wells, water quality and land use within its DWSMA. Due to limited resources to independently collect the full range of data and recreate the necessary databases, the City will continue to mainly rely on

databases maintained by the State and County agencies to obtain and verify data, as needed.

C. 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 WHP goals identified in this Plan. State and LGUs currently enforce land use ordinances, zoning laws, sewer ordinances, well permits, and groundwater use appropriation permits. It is anticipated that most local issues may be adequately addressed through these existing processes and adopting of best management practices.

As part of the management strategies for this plan, it is recommended that future land use planning and well siting take into account the vulnerable or very vulnerable areas when siting development that is likely to include potential contaminants.

CHAPTER FOUR

WELLHEAD PROTECTION GOALS (4720.5240)

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

Goals outlined in this part were selected based on the information gathered and compiled from the data elements, delineations of the 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 moderately and highly vulnerable. 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 considering policies that control future siting of potential contaminants.

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 which provides water to the municipal system. This will include increased public education of the Wellhead and Source Water Protection Program and groundwater-related issues, as well as management of the identified potential contaminant sources and conveyance mechanisms within the DWSMA.

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

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 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. Septic Systems (ISTS)***
- ***E. Data Collection***
- ***F. Water Conservation***
- ***G. Implementation***
- ***H. Evaluation***

II. Plan of Action

A. Well Management

Objective A1: Televise Wells No. 1 and 2.

Action A1: When major maintenance activities occur for Wells No. 1 and 2, grant funding shall be applied for to televise the wells.

Who:	City Staff, Contractor
Cooperators:	MDH
Time Frame:	During large maintenance projects
Priority:	High
Estimated Cost:	$2,000 to $2,500 each well
How:	City shall apply for grant funding when it is available and feasible to include televising during well rehabilitation projects for Wells No. 1 and 2.

Objective A2: Develop strategies to replace Wells No. 1 and 2.

Action A2.1: Strategies shall begin to be developed and planned for to replace Wells No. 1 and 2.

Who:	City Staff, Engineering Consultant
Cooperators:	MDH
Time Frame:	Following activity A1 when grant funding is available
Priority:	Medium – pending results of video inspection
Estimated Cost:	TBD after video inspection
How:	City shall apply for grant funding to conduct a study of how best to replace Wells No. 1 and 2.

Action A2.2: Remove Wells No. 1 and 2.

Who:	City Staff, Engineering Consultant
Cooperators:	MDH
Time Frame:	Timeframe dictated by activity A1 and A2.1
Priority:	TBD based on video inspection
Estimated Cost:	TBD based on video inspection
How:	Based on the results of Action A2.1, the City shall seek grant funding to begin implementing the removal of Wells No. 1 and 2. This may include the installation of test wells, further study that may be needed, and the planning of addition Wells to support the water demand.

Objective A3: Take measures to promote proper sealing of abandoned, unused, unmaintained, or damaged wells.

Action A3: 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:	County, MDH
Time Frame:	Year 5 and Year 9
Priority:	Low
Estimated Cost:	$500 each mailing
How:	Use the City's website, newsletter, or direct mailing to make well owners aware of well sealing cost-share programs.

Objective A4: Investigate the remaining 'unlocated' wells within the DWSMA as dictated in Table 6B, Appendix A.

Action A4: City shall make attempt to locate the remaining unlocated wells. Information utilized in the effort to locate shall be documented.

Who:	City Staff
Cooperators:	MDH
Time Frame:	On-going
Priority:	Low
Estimated Cost:	Varies
How:	City shall inform staff members of the remaining unlocated wells so that all are aware in the event they come across the well during field services. In addition, attempts, when feasible, shall be made to contact property owners that may have knowledge pertaining to the unlocated well. If well remains as unlocated, City shall keep record of efforts made to locate the wells.

Objective A5: Verify location of high capacity wells finished in bedrock formations.

Action A5: The location of high capacity wells finished in bedrock formations shall be verified and a GPS location shall be taken.

Who:	City Staff, Engineering Consultant
Cooperators:	MDH, DNR
Time Frame:	Year 9
Priority:	Low
Estimated Cost:	$1,000 to develop list, location verification cost will vary
How:	A list of high capacity wells shall be determined. Efforts will be made to verify the location of each well. If verified, the well shall be located through a GPS point. If not verified, the City shall keep record of efforts made to verify the location.

Objective A6: Management of IWMZ.

Action A6: Review and update IWMZ survey form for all wells in cooperation with MDH.

Who:	City Staff
Cooperators:	MDH
Time Frame:	Year 8
Priority:	Low
Estimated Cost:	None – MDH cost and City Staff time
How:	If changes are made to the items identified in the IWMZ, update the survey and maintain record until the next MDH survey. Seek grant funding to Cooperate with MDH to complete the next IWMZ survey.

Objective A7: Update DNR Water Supply Plan or the Contingency Strategy form.

Action A7: If required by DNR, update the Water Supply Plan and include the date of approval into the WHP Plan. If not required, City will complete the Contingency Strategy form to include in the WHP Plan.

Who:	City Staff
Cooperators:	MDH, DNR
Time Frame:	When required by DNR or Year 5
Priority:	Medium
Estimated Cost:	$2,500 to $5,000
How:	City will seek grant funding to aid in the completion of the emergency strategy within the DNR Water Supply Plan or to complete a separate Contingency Strategy to include in their WHP Plan.

B. Public Education

Objective B1: Develop a public support and understanding for the WHP Plan through the use of websites, newsletter, and handouts.

Action B1.1: Include information about WHP in City newsletters, on the City's website, or in direct mailers, perhaps in conjunction with the City's MS4 permitting requirements.

Who:	City Staff
Cooperators:	MDH, MRWA, County
Time Frame:	Year 4
Priority:	Medium
Estimated Cost:	$500
How:	Identify and obtain existing educational materials available from MDH and other sources. Submit newsletters through website, as a direct mailing, or as a handout at City Hall.

Action B1.2: Post the WHP Plan on the City website.

Who:	City Staff
Cooperators:	MDH
Time Frame:	Year 1
Priority:	Low
Estimated Cost:	None, City staff time
How:	Once approved, post a digital copy of the WHP Plan on the City's website so that it is available publicly.

Objective B2: Provide education on nitrates and BMPs to reduce nitrate levels in groundwater.

Action B2: Include information about nitrates in groundwater through the use of newsletter, website links, or handouts.

Who:	City Staff
Cooperators:	MDH, MRWA, County
Time Frame:	Year 4
Priority:	Medium
Estimated Cost:	$500
How:	Identify and obtain existing educational materials available from MDH and other sources. Submit newsletters through website, as a direct mailing, or as a handout at City Hall.

Objective B3: Provide education on lawn care management.

Action B3: Include information about proper lawn care management and their contribution to groundwater quality.

Who:	City Staff
Cooperators:	MDH, MRWA
Time Frame:	Year 7
Priority:	Low
Estimated Cost:	$500
How:	Identify and obtain existing educational materials available from MDH and other sources. Submit newsletters through website, as a direct mailing, or as a handout at City Hall. If applicable, include information on nitrate concentrations in Groundwater that may be impacted by improper lawn care.

Objective B4: Educate emergency management officials of importance of spills/cleanup within the DWSMA due to its sensitivity.

Action B4: Send a summary memo to the Fire Department, County Emergency Manager, County Engineer, and MnDOT regarding the DWSMA location, sensitivity, and importance of spill cleanup within the management area.

Who:	City Staff
Cooperators:	MDH, MRWA, Fire Department, MnDOT, County
Time Frame:	Year 5
Priority:	High
Estimated Cost:	$500
How:	Develop of summary memo to provide to local emergency management officials on the DWSMA location and importance of spill cleanup within the management areas.

C. Storage Tank Management

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

Action C1: Update list of storage tank owners and contact each property owner and make them aware of their placement within the City's DWSMA, proper management of storage tanks, and what to do if there is a spill.

Who:	City Staff
Cooperators:	MDH, County, MPCA, MRWA
Time Frame:	Year 5
Priority:	Low
Estimated Cost:	$1,500
How:	Using the PCSI developed as part of this WHP Plan, send direct mailing to those properties identified to contain a storage tank. Direct mailing shall include, if feasible, educational brochure for either AST or UST as indicated by the PCSI.

D. Septic Systems

Objective D1: Educate property owners about the need for having onsite sewage treatment systems that comply with environmental standards and other regulations.

Action D1: Educate property owners about ISTS systems and proper maintenance of them through newsletters, website links, or direct mailings.

Who:	City Staff
Cooperators:	MDH, County, MPCA, MRWA
Time Frame:	Year 7 to Year 9
Priority:	Low
Estimated Cost:	$1,500
How:	Using the PCSI developed as part of this WHP Plan, send direct mailing to those properties identified to contain a septic system. Direct mailing shall include education material on the need for proper maintenance of septic system.

Objective D2: Maintain a septic system inventory.

Action D2: Build off the inventory in this report to maintain an accurate inventory of septic system locations in the DWSMA.

Who:	City Staff
Cooperators:	MDH, County
Time Frame:	On-going
Priority:	Low
Estimated Cost:	None – Staff time
How	Using Table 7 and Figure 13, maintain the septic system database within the high vulnerability portion of the DWSMA. Consider submitting a survey to septic system owners to aid in the amendment process near year 10 of the Plan.

E. Data Collection

Objective E1: Identify nitrate sources near Well No. 6.

Action E1: Using available sources of data, with the cooperation of the MDH or other agencies, try to identify sources of nitrates near Well No. 6.

Who:	City Staff, Engineering Consultant
Cooperators:	MDH, MPCA, USDA, County
Time Frame:	On-going
Priority:	High
Estimated Cost:	$500 - $1,000 for grant, cost of study TBD with application
How	When grant funding is available, conduct a study near Well No. 6 to determine sources of nitrates near Well No. 6. Study shall utilize available data as much as possible. In cooperation with MDH, perform water quality sampling and testing to assist in the study.

Objective E2: Conduct a stable isotope follow-up at Well No. 6.

Action E2.1: Request assistance from MDH to develop Nitrate Isotope investigation for Well No. 6.

Who:	City Staff, MDH
Cooperators:	Engineering Consultant
Time Frame:	Year 4
Priority:	High
Estimated Cost:	None – MDH Funded
How	Through grant funding or in conjunction with the MDH testing requirements, perform isotope follow-up testing near Well No. 6 with respect to Elk River.

Action E2.2: Near Elk River, perform stable isotope testing at Well No. 6 in conjunction with the MDH.

Who:	City Staff, MDH
Cooperators:	Engineering Consultant
Time Frame:	Year 5
Priority:	High
Estimated Cost:	None – MDH Funded
How	Through grant funding or in conjunction with the MDH testing requirements, perform isotope follow-up testing near Well No. 6 with respect to Elk River.

Objective E3: Conduct a study to determine potential locations for a new municipal well.

Action E3: In conjunction with MDH Staff, determine potential locations for a new municipal well.

Who:	City Staff, MDH
Cooperators:	Engineering Consultant
Time Frame:	Year 1 or Year 2
Priority:	Medium
Estimated Cost:	None – MDH Funded
How	Utilizing available data and knowledge of MDH Staff, conduct a study to suggest potential locations for a new municipal well. Grant funding may be applied for to drill test wells or other monitoring wells to assist in the study.

Objective E4: Conduct a study to determine impact of Well No. 3 on DWSMA boundary.

Action E4: If Well No. 3 is considered for use as a municipal well, a study shall be conducted to determine its impact on DWSMA boundary and potential need to amend the WHP Plan.

Who:	City Staff, MDH
Cooperators:	Engineering Consultant
Time Frame:	When necessary
Priority:	Medium
Estimated Cost:	$5,000
How	If the City decides to utilize Well No. 3 as a municipal well, rather than an emergency well, grant funding will be sought after to conduct a study on the impact to the DWSMA boundary and the need to amend the WHP Plan.

Objective E5: Identify upcoming ordinance changes, variances, or conditional use permits in the DWSMA when they occur.

Action E5: The City will submit a request to Sherburne County Zoning that they be notified of upcoming ordinance changes, variances, or conditional use permits in the DWSMA.

Who:	City Staff
Cooperators:	Sherburne County Zoning
Time Frame:	Year 3
Priority:	Medium
Estimated Cost:	$500 for request; follow-up will vary
How	City will request to be notified by the County of new changes to existing land uses. If determined to be potentially impactful, grant funding will be applied for to evaluate whether the proposed changes will affect the DWSMA.

Objective E6: Obtain large laminated map of DWSMA.

Action E6: Request DWSMA map from MDH.

Who:	City Staff
Cooperators:	MDH
Time Frame:	Year 1
Priority:	Low
Estimated Cost:	MDH to print map – MDH Cost
How	City will request that MDH print and send/deliver a large DWSMA map for the City's use. Map shall be placed in a location within City (i.e. public works garage, city office, etc.) where it will be available to view in case of an emergency.

Objective E7: Request all wells be sampled for tritium.

Action E7: Request MDH to sample all public wells for tritium to provide information on surface-groundwater connectivity and aquifer recharge rate.

Who:	City Staff
Cooperators:	MDH
Time Frame:	Year 8
Priority:	Medium
Estimated Cost:	None - MDH funded
How	City will request that MDH sample all public wells for tritium during the eighth year of the Plan.

Objective E8: Develop strategies to gain a better understanding of nitrates within the DWSMA and groundwater.

Action E8.1: The City will meet with resource professionals to develop a plan for implementing nutrient management measures with landowners within the DWSMA.

Who:	City Staff
Cooperators:	MDH, MRWA, County, MDA, Consultant
Time Frame:	When grant funding is available or Year 7 to Year 8
Priority:	High
Estimated Cost:	$5,000 to $7,000 depending on meeting results
How	Following the meeting, the City will seek grant funding to work cooperatively with MRWA, Sherburne County, MDH, MDA, and others to develop a plan.

Action E8.2: The City will seek external funding and technical expertise to support the implementation of the nutrient management techniques suggested by the resource professionals.

Who:	City Staff
Cooperators:	MDH
Time Frame:	When grant funding is available or Year 7 to Year 8
Priority:	High
Estimated Cost:	Cost will vary depending on implementation activity
How	City will apply for grant funding to specifically implement those items suggested during the meeting with resource professionals on how to mitigate or improve the transport of nitrates into the groundwater source within the DWSMA.

Objective E9: Monitor and study the interaction between Well No. 7 and nearby irrigation systems.

Action E9: The City will apply for grant funding through the MDH to collaborate with experts to develop a monitoring program and study of groundwater levels within Well No. 7 and surrounding irrigation systems.

Who:	City Staff
Cooperators:	MDH, DNR, Consultants
Time Frame:	Year 8
Priority:	High
Estimated Cost:	$500-$1,000 grant application, Cost of study TBD with grant application
How	City will seek grant funding to monitor the interaction between Well No. 7 and the surrounding irrigation systems.

F. Water Conservation

Objective F1: Implement a community-wide water conservation program

Action F1: Implement conservation measures included in the Water Supply Plan as a part of the Comprehensive Plan.

Who:	City of Big Lake Staff
Cooperators:	MDH, MCES, DNR
Time Frame:	When applicable
Priority:	Medium
Estimated Cost:	$500 for education, cost of additional activities may vary
How	Educate the public to encourage users to voluntarily incorporate water saving habits and tools into their lifestyles, improve the exiting water system's operation and maintenance procedures and incorporate costs associated with water conservation programs; and ensure that all customers are paying for the water they use through audits, leak detection, and meter replacement or calibration as needed.

G. Implementation

Objective G1: Track and report WHP Plan activities.

Action G1: Utilize the 3-ring binder developed as part of this WHP Plan to keep track of and organize WHP efforts.

Who:	City Staff, Engineering Consultant
Cooperators:	MDH
Time Frame:	Every year
Priority:	Low
Estimated Cost:	No additional cost
How:	On a yearly basis, update the WHP binder to include those WHP items that have been completed. Share results of the binder update with City staff.

H. Evaluation

Objective H1: Evaluate Plan

Action H1: Complete an evaluation report every two and one-half years

Who:	City Staff, Engineering Consultant
Cooperators:	MDH
Time Frame:	Every two and one-half years
Priority:	Low
Estimated Cost:	$1,500 to $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 City Staff and to MDH.

CHAPTER SIX

EVALUATION PROGRAM (4720.5270)

The success of the Plan must be evaluated in order to determine whether the implementation activities are accomplishing the intent of the Plan. Monitoring will be ongoing and a written evaluation of the Plan and associated activities will be conducted every two and a 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 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 an impact on water quality. In addition, water quality problems that may still be occurring will be identified.

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 Plan, as well as an evaluation of the costs and benefits of the Plan activities. This report may be completed using the MDH Wellhead Protection Program Evaluation form. A copy of the report will be sent to the MDH Source Water Protection Unit in St. Paul. The City will also keep a copy of the report in its records. The intent of the evaluation is to compile a complete and comprehensive study of the implementation of the source management strategies for use when the City updates or revises this Plan. As required by the Wellhead Protection Rules, this Plan will be updated every 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.

In December of 1997, the City completed its Water Emergency and Conservation Plan as part of its Comprehensive Plan update. As required, the plan was submitted to the DNR Waters-Water Permit Programs and the Metropolitan Council for review and approval. The plan has been adopted by the City and incorporated in the City's 2030 Comprehensive Plan. Copies of the Water Emergency and Conservation Plan (**Appendix F**) and the 2030 Comprehensive Plan are available from the City.

Appendix A - Tables

Table 1: Precipitation

Backyard Monitoring Station
Location: Big Lake Township - S71,T33N, R27W, SS3

	2010	2011	2012	2013	2014	5 yr avg	Yearly	
Jan	-	-	-	0.56	1.09	0.83	**2010**	0
Feb	-	-	-	1.29	1.53	1.41	**2011**	0
Mar	-	-	-	2.62	0.94	1.78	**201**	12.4
Apr	-	-	-	2.66	5.57	4.12	**2013**	29.89
May	-	-	-	3.40	8.70	6.05	**2014**	36.43
Jun	-	-	-	4.62	6.41	5.52	**Average**	39.36
Jul	-	-	-	3.87	2.32	3.10		
Aug	-	-	-	0.91	4.74	2.83		
Sep	-	-	-	3.83	4.45	4.14		
Oct	-	-	-	3.39	0.68	2.04		
Nov	-	-	10.90	0.94	-	5.92		
Dec	-	-	1.50	1.80	-	1.65		

Total	0	0	12.4	29.89	36.43	39.36

Backyard Monitoring Station
Location: Big Lake Township - S71, R33N, T27W, SS36

	2010	2011	2012	2013	2014	5 yr avg	Yearly	
Jan	0.55	1.24	0.42	0.53	0.95	0.74	**2010**	35.16
Feb	0.66	1.16	0.3	1.04	0.36	0.70	**2011**	32.53
Mar	1.18	1.83	2.3	1.71	1.05	1.61	**201**	28.35
Apr	1.27	2.08	1.65	3.22	4.28	2.50	**2013**	27.17
May	3.11	7.5	12.37	3.85	6.98	6.76	**2014**	33.93
Jun	8.95	2.89	3.24	5.62	8.92	5.92	**Average**	31.362
Jul	3.58	8.47	3.94	3.4	1.38	4.15		
Aug	3.56	5.63	0.88	0.59	3.73	2.88		
Sep	6.4	0.44	0.29	1.49	3.59	2.44		
Oct	2.59	0.89	0.83	3.43	0.66	1.68		
Nov	1.49	0.18	0.92	1.12	1.12	0.97		
Dec	1.49	0.22	1.21	1.17	0.91	1.00		

Total	35.16	32.53	28.35	27.17	33.93	31.362

Table 1: Precipitation

Backyard Monitoring Station

Location: Big Lake Township - S71, R33N, T27W, SS16

	2010	2011	2012	2013	2014	5 yr avg
Jan	0.55	0.74	0.39	-	-	0.56
Feb	0.65	0.72	1.47	-	-	0.946667
Mar	1.21	2.51	1.37	-	-	1.696667
Apr	1.92	3.41	1.89	-	-	2.406667
May	2.87	6.64	12.33	-	-	7.28
Jun	8.39	3.51	2.64	-	-	4.846667
Jul	3.85	8.19	4.9	-	-	5.646667
Aug	4.37	4.79	1.16	-	-	3.44
Sep	6.61	0.49	-	-	-	3.55
Oct	2.11	0.86	-	-	-	1.485
Nov	1.68	0.24	-	-	-	0.96
Dec	0.95	0.55	-	-	-	0.75
Total	35.16	32.65	26.15	0	0	33.56833

Yearly	
2010	35.16
2011	32.65
201	26.15
2013	0
2014	0
Average	33.56833

Table 2: PCSI - Sites
Excluding Private Wells and ISTS

FIGURE ID	PARCEL ID NUMBER	NAME	ADDRESS	CITY	ZIP CODE	ACTIVITY	PCS CODE	STATUS	MATERIAL CODE	MPCA_ID	TOTAL	COMMENT	DWSMA ID	VULNERABILITY
0	65-020-3207	Manufacturing Partners Inc	301 County Road 43 NW	Big Lake	55309	Leak Site	LUST	A		7606	1	Leak (hydraulic Fluid)	East	Moderate
1	65-508-0305	Renu Coatings Removal LLC	20060 177th St	Big Lake	55309	Hazardous Waste, Small to Minimal QG	HWG	A		MNS000190827	1		East	High
2	65-577-0105	Holiday Stationstore #132	281 Jefferson Blvd	Big Lake	55309	Leak Site	LUST	I		18525	1	Leak (gasoline)	East	Moderate
3	65-553-0120	Remmele Engineering Inc - Plant 40	17465 198th Ave	Big Lake	55309	Voluntary Investigation & Cleanup (VIC)	PCS	I		VP23440	1		East	High
4	65-584-0010	Titan Sports	511 Jefferson Blvd	Big Lake	55309	Leak Site	LUST	I		15958	1		East	Moderate
5	65-505-0110	Viper Motorcycle Manufacturing - Big Lake	19950 177th St Ste F	Big Lake	55309	Hazardous Waste, Small to Minimal QG	HWG	I		MNS000123919	1		East	High
6	65-553-0120	Remmele Engineering Plant 40	17465 198th Ave	Big Lake	55309	Petroleum Brownfield	PCS	I		3687	1		East	High
7	65-020-3101	Petersen Gladiolus	18040 US Highway 10	Big Lake	55309	Tank Site	UST	A	F000	9319	3	1 Gas, 1 Diesel, and 1 Fuel Oil (1 gas removed)	East	Moderate
8	65-516-0106	Northern Prairie Polymers LLC	20015 176th St	Big Lake	55309	Hazardous Waste, Small to Minimal QG	HWG	A		MNS000116095	1		East	High
9	65-508-0210	Paragon Store Fixtures	20020 176th St	Big Lake	55309	Hazardous Waste, Small to Minimal QG	HWG	A		MNS000103358	1		East	High
10	65-516-0110	Cargill Kitchen Solutions	20021 176th St	Big Lake	55309	Industrial Stormwater Permit	STROUT	A		MNRNE3BCH	1		East	High
11	65-019-1403	ISD 727 Big Lake	601 Minnesota Ave	Big Lake	55309	Tank Site	UST	A	F000	13563	1	Tank(removed 10,000 gal fuel oil. 6,000 gal fuel o	East	Moderate
12	65-532-0105	Coborn's Pharmacy 2031	711 Rose Dr	Big Lake	55309	Tank Site	UST	A	F000	123925	4	3 gas (15,000, 10000, 6,000) 1 diesel (6,000)	East	Moderate
13	10-117-4000	Big Lake Elementary School	17901 205th Ave	Big Lake	55309	Tank Site	UST	I	F000	122661	1	UST 10,000 gal fuel oil	East	Moderate
14	65-516-0106	Industrial Molded Rubber Products	20015 176th St	Big Lake	55309	Industrial Stormwater Permit	STROUT	A		MNRNE395C	1		East	High
15	65-020-3406	Big Lake Compost Facility	18041 198th Ave	Big Lake	55309	Solid Waste, Permit By Rule	SWMS	A		PBR000690	1	Solid Waste	East	Moderate
16	65-412-0150	Casey's General Store #1796	461 Jefferson Blvd	Big Lake	55309	Tank Site	UST	A	F000	18771	2	2 10,000 gal gas	East	Moderate
17	65-508-0305	Custom Turning	20060 177th St Ste A	Big Lake	55309	Hazardous Waste, Small to Minimal QG	HWG	A		MNS000102780	1		East	High
18	65-553-0110	RTI Remmele Medical Inc Plant 30	17701 198th Ave	Big Lake	55309	Petroleum Brownfield	PCS	I		3728	1		East	Moderate
19	65-420-0145	Big Lake Veterinary Clinic	350 Fern St	Big Lake	55309	Leak Site	LUST	I		13548	1	Leak Fuel Oil	East	Moderate
20	65-020-2300	ISD 727 Big Lake Elementary School	701 Minnesota Ave	Big Lake	55309	Tank Site	UST	A	F000	9359	1	20,000 gal fuel oil removed. 6,000 gal fuel	East	Moderate
21	65-412-0105	Formerly Peterson Amoco BP	401 Jefferson Blvd	Big Lake	55309	Leak Site	LUST	I		11954	1	Leak (Feul Oil, Gas, Used Oil), Tank (6 removed (4	East	Moderate
22	65-019-1403	ISD 727 Big Lake Schools	501 Minnesota Ave	Big Lake	55309	Tank Site	UST	A	F000	18868	1	Tank (6,000 gal fuel oil)	East	Moderate
23	65-017-3306	Westrum Electric	591 Park Ave	Big Lake	55309	Hazardous Waste, Small to Minimal QG	HWG	I		313090839	1		East	High
24	65-577-0105	Holiday Stationstore #132	281 Jefferson Blvd	Big Lake	55309	Tank Site	UST	A	F000	313090839	3	4 gasoline removed (2 E-10, 1 E-85 remain)	East	Moderate
25	65-553-0120	Remmele Engineering Inc - Plant 40	17465 198th Ave	Big Lake	55309	Tank Site	UST	R	F000	124511	1	Tank Removed	East	High
26	65-553-0120	Remmele Engineering Inc - Plant 40	17465 198th Ave	Big Lake	55309	Hazardous Waste, Small to Minimal QG	HWG	A		MND980792568	1		East	High
27	65-553-0120	Remmele Engineering Inc - Plant 40	17465 198th Ave	Big Lake	55309	Industrial Stormwater Permit	STROUT	A		MNR0539NG	1		East	High
28	65-553-0110	RTI Remmele Medical Inc Plant 30	17701 198th Ave	Big Lake	55309	Voluntary Investigation & Cleanup (VIC)	PCS	I		VP15130	1		East	Moderate
29	65-553-0110	RTI Remmele Medical Inc Plant 30	17701 198th Ave	Big Lake	55309	Hazardous Waste, Small to Minimal QG	HWG	A		MND980792550	1		East	Moderate
30	65-412-0105	Formerly Peterson Amoco BP	401 Jefferson Blvd	Big Lake	55309	Leak Site	UST	R	F000	11954	6		East	Moderate

Table 3: PCSI - Public Wells

FIGURE ID	PARCEL ID NUMBER	WELL NAME	ADDRESS	CITY	ZIP CODE	PCS CODE	STATUS	UNIQUE NUMBER	DWSMA VULNERABILITY
0	10-120-2403	BIG LAKE FIRE HALL	20243 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00483950	High
1	65-019-3411	BIG LAKE 3		BIG LAKE	55309	WEL	A	00163649	Moderate
2	65-475-0020	BIG LAKE 5	4430 PINTAIL ST	BIG LAKE	55309	WEL	A	00659386	High
3	65-019-3411	BIG LAKE 3		BIG LAKE	55309	WEL	A	00163648	Moderate
4	65-020-1201	BIG LAKE 6	17985 203RD AVE NW	BIG LAKE	55309	WEL	A	00705488	High
5	65-567-0020	BIG LAKE 7	29298 PREUSSE LAKE RD	BIG LAKE	55309	WEL	A	00763778	Moderate
6	65-020-3406	BIG LAKE 4	18041 198TH AVE	BIG LAKE	55309	WEL	A	00523954	Moderate
7	65-019-1403	BIG LAKE 2	501 MINNESOTA AVE	BIG LAKE	55309	WEL	A	00217948	Moderate
8	65-419-0110	BIG LAKE 1		BIG LAKE	55309	WEL	A	00220959	Moderate

Table 4: PCSI - Private Wells

FIGURE ID	PIN	FACILITY NAME	ADDRESS	CITY	ZIP CODE	PCS CODE	STATUS	UNIQUE NUMBER	TOTAL
1	10-120-1300	PETERSEN, EWALD T	18040 US HIGHWAY 10 NW	BIG LAKE	55309	WEL	A	00150489	1
2	10-511-0110	LOCATION PROPERTIES, LLC		BIG LAKE	55309	WEL	A	00221157	1
3	65-415-0031	THE CHRCH OF MARY OF THE VISITATION		BIG LAKE	55309	WEL	A	00502525	1
4	10-120-2400	SMITH, MAURICE & EVANGELINE -TRUST		BIG LAKE	55309	WEL	A	00225864	1
5	10-444-0215	STILLINGS, ROBERT J & JEANA	18169 203RD AVE NW	BIG LAKE	55309	WEL	A	00438150	1
6	65-017-3313	MC KIE, STUART A & MARY	641 PARK AVE E	BIG LAKE	55309	WEL	A	00452420	1
7	65-464-0160	LEVIS, DAVID A & MUELLER, VICKI M	1251 VERNON ST	BIG LAKE	55309	WEL	A	00451808	1
8	10-485-0170	MITCHELL, MICHAEL S & KAREN	20587 197TH ST NW	BIG LAKE	55309	WEL	A	00624127	1
9	10-553-0105	SMITH, MAURICE & EVANGELINE -TRUST	20185 COUNTY ROAD 43	BIG LAKE	55309	WEL	A	00439938	1
10	65-020-2210	IND SCHOOL DIST 727		BIG LAKE	55309	WEL	A	00232381	1
11	10-117-3405	STEIN, CLYDE L & DORENE	20595 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00452597	1
12	65-473-0110	LAHR, DENNIS O & TRISHA A	1271 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00458510	1
13	10-117-4400	SANFORD & SONS, INC	17740 205TH AVE NW	BIG LAKE	55309	WEL	A	00449242	1
14	65-553-0110	REMMELE ENGINEERING, INC	17701 198TH AVE	BIG LAKE	55309	WEL	A	00217950	1
15	10-444-0120	SEBRING, BRADLEY A & PENNY	20363 181ST CIR NW	BIG LAKE	55309	WEL	A	00438266	1
16	65-020-2210	IND SCHOOL DIST 727		BIG LAKE	55309	WEL	A	00438254	1
17	10-457-0115	LOUKUSA, NATHAN P & LORI L	19764 206TH AVE NW	BIG LAKE	55309	WEL	A	00601782	1
18	65-464-0140	GANGL-DICKENSON, JENNA &DICKENSON,R	1231 VERNON ST	BIG LAKE	55309	WEL	A	00451806	1
19	65-464-0170	ARBUCKLE, BEVERLY ANN	1261 VERNON ST	BIG LAKE	55309	WEL	A	00450354	1
20	65-121-2400	GALLUS, JAMES & ANN-TRUSTEES		BIG LAKE	55309	WEL	A	00437243	1
21	65-464-0110	HAGEN, PAMELA R	611 PARK AVE E	BIG LAKE	55309	WEL	A	00451809	1
22	10-485-0155	KRAEMER, BRUCE A	20537 197TH ST NW	BIG LAKE	55309	WEL	A	00617506	1
23	65-417-0020	CHRISTIAN, LUKE	431 SHORE ACRES DR	BIG LAKE	55309	WEL	A	00126327	1
24	65-020-3406	CITY OF BIG LAKE	18041 198TH AVE	BIG LAKE	55309	WEL	A	00523955	1
25	10-485-0120	KELLY, PATRICK D	19789 206TH AVE NW	BIG LAKE	55309	WEL	A	00621719	1
26	65-430-0220			BIG LAKE	55309	WEL	A	00126691	1
27	65-017-3309	BASS, KEVIN B	701 PARK AVE E	BIG LAKE	55309	WEL	A	00404781	1
28	65-445-0140	ABBOTT, CARL E & MARLYS L	1101 BIRCH AVE	BIG LAKE	55309	WEL	A	00404786	1
29	65-445-0125	HENSEL, RICHARD & GLORIA	680 PARK AVE E	BIG LAKE	55309	WEL	A	00404787	1
30	65-019-1401	BIG LAKE CEMETERY ASSOCIATION		BIG LAKE	55309	WEL	A	00439884	1
31	65-445-0110	NIELSEN, ROBERT A & SANDY	620 PARK AVE E	BIG LAKE	55309	WEL	A	00404705	1
32	65-020-2210	IND SCHOOL DIST 727		BIG LAKE	55309	WEL	A	00232380	1
33	10-117-3410	BORCHARDT, CHARLES & JUDY	18080 205TH AVE NW	BIG LAKE	55309	WEL	A	00184454	1
34	10-129-1000	URWIN, LARRY B & BARBARA B	17930 193RD AVE NW	BIG LAKE	55309	WEL	A	00217949	1
35	10-457-0175	HARTWIG, ERNEST R & ELAINE B	20687 198TH ST NW	BIG LAKE	55309	WEL	A	00610097	1
36	10-457-0160	SMOLENSKI, JOHN JR & DEBRA	20671 198TH ST NW	BIG LAKE	55309	WEL	A	00561651	1
37	10-457-0105	BERGGREN, GARY W & WENDY P	19732 206TH AVE NW	BIG LAKE	55309	WEL	A	00544724	1
38	65-499-0110	DAVIS, TIMOTHY J	751 PARK AVE E	BIG LAKE	55309	WEL	A	00404780	1
39	65-017-3306			BIG LAKE	55309	WEL	A	00456030	1
40	10-457-0120	LOUKUSA, NATHAN P & LORI L		BIG LAKE	55309	WEL	A	00588028	1
41	65-467-0110	HOULE, GREG A	730 PARK AVE	BIG LAKE	55309	WEL	A	00458509	1
42	10-485-0145	THATCHER, DANYON & MICHELLE	20500 197TH ST NW	BIG LAKE	55309	WEL	A	00661068	1
43	10-485-0115	HOLLAND, JUSTIN M & JENNIFER	19797 206TH AVE NW	BIG LAKE	55309	WEL	A	00635864	1
44	10-485-0135	JARDINE, KENT AND JULIE	20549 197TH ST NW	BIG LAKE	55309	WEL	A	00618157	1

45	10-485-0165	MCCOMAS, GREGORY W & LISA M	20555 197TH ST NW	BIG LAKE	55309	WEL	A	00631413	1
46	10-457-0130	FENDRICH, SCOTT R & MICHELLE L	20603 198TH ST NW	BIG LAKE	55309	WEL	A	00666586	1
47	10-457-0140	KARNOWSKI, DEVON	20627 198TH ST NW	BIG LAKE	55309	WEL	A	00574236	1
48	10-457-0150	O'DONNELL, PATRICK & LINDA M	20655 198TH ST NW	BIG LAKE	55309	WEL	A	00563834	1
49	65-583-0105	NORTHERN STAR APARTMENTS LLC	19591 STATION ST	BIG LAKE	55309	WEL	A	00247616	1
50	10-120-2401	SMITH, GREGORY R	20169 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00649568	1
51	65-121-2405	GALLUS, JAMES & ANN-TRUSTEES	20260 172ND ST NW	BIG LAKE	55309	WEL	A	00633167	1
52	10-444-0260	DZIURA, THOMAS C & NADYNNE	20251 180TH CT NW	BIG LAKE	55309	WEL	A	00465525	1
53	10-444-0230	MULLER, JOHN	18121 203RD AVE NW	BIG LAKE	55309	WEL	A	00498485	1
54	10-444-0225	ZOUBEK, JASON S & SWAN, HEATHER	18137 203RD AVE NW	BIG LAKE	55309	WEL	A	00495768	1
55	10-444-0220	TIGUE, STEPHANIE L & JEFFREY B	18153 203RD AVE NW	BIG LAKE	55309	WEL	A	00517899	1
56	10-444-0205	EID, TIMOTHY J & JENNIFER	18197 203RD AVE NW	BIG LAKE	55309	WEL	A	00465527	1
57	10-444-0265	MACIEJ, B & STAMPER, B	20275 180TH CT NW	BIG LAKE	55309	WEL	A	00465526	1
58	10-444-0235	KVARNLOV, BRIAN N & EILEEN M	18111 203RD AVE NW	BIG LAKE	55309	WEL	A	00492371	1
59	10-444-0240	JOHNSON, DUWAYNE R & CHERI L	18101 203RD AVE NW	BIG LAKE	55309	WEL	A	00492370	1
60	10-444-0245	CALL, TIMOTHY M & NICOLE L	20298 180TH CT NW	BIG LAKE	55309	WEL	A	00474354	1
61	10-444-0270	LANE, WILLIAM R & BETTY A	20287 180TH CT NW	BIG LAKE	55309	WEL	A	00518871	1
62	10-443-0115	CONLIN, DANIEL & MARY	18190 203RD AVE NW	BIG LAKE	55309	WEL	A	00523033	1
63	10-450-0115	LOHI, MARKUS PETTERI & SARAH BETH	18138 203RD AVE NW	BIG LAKE	55309	WEL	A	00558005	1
64	10-450-0105	JOHNSON, MICKEY J	18170 203RD AVE NW	BIG LAKE	55309	WEL	A	00610258	1
65	10-443-0110	SCHEERZ, DANIEL	20383 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00515126	1
66	10-444-0130	DAHLEN, JOHN & JESSICA	18068 203RD AVE NW	BIG LAKE	55309	WEL	A	00526517	1
67	10-444-0135	USCENSKY, STEVEN & HEIDI JO	18056 203RD AVE NW	BIG LAKE	55309	WEL	A	00494290	1
68	10-444-0110	MCCORMICK, JAMES G & DEBRA	20348 181ST CIR NW	BIG LAKE	55309	WEL	A	00514730	1
69	10-444-0140	DOKKEBAKKEN, B & IVORY, C	18038 203RD AVE NW	BIG LAKE	55309	WEL	A	00470399	1
70	10-444-0115	KENDALL, RONALD & LINDA	20386 181ST CIR NW	BIG LAKE	55309	WEL	A	00537211	1
71	10-462-0125	STALLER, MARK C & KELLY S	18099 204TH AVE NW	BIG LAKE	55309	WEL	A	00557166	1
72	10-440-0140	WOLBECK, MICHAEL	20423 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00535327	1
73	10-462-0130	SANDFORD, EDWARD C & KRISTINE M	18091 204TH AVE NW	BIG LAKE	55309	WEL	A	00557988	1
74	10-462-0135	SADDOG CORPORATION	18087 204TH AVE NW	BIG LAKE	55309	WEL	A	00568979	1
75	10-120-1100	IND SCHOOL DIST 727		BIG LAKE	55309	WEL	A	00458550	1
76	10-462-0120	PULLAM, ANDREW & CHERYL	20468 181ST ST NW	BIG LAKE	55309	WEL	A	00556098	1
77	10-121-2102	MOORES, DAN W	17369 205TH AVE NW	BIG LAKE	55309	WEL	A	00169414	1
78	10-462-0230	BOSKOWITZ, STEVEN	18062 204TH AVE NW	BIG LAKE	55309	WEL	A	00627004	1
79	10-462-0115	HAJOVY, IVAN & MELISSA M	20474 181ST ST NW	BIG LAKE	55309	WEL	A	00580810	1
80	10-121-2200	ADCOCK, SCOTT C & MARTHA E	17533 205TH AVE NW	BIG LAKE	55309	WEL	A	00462911	1
81	10-462-0225	OLSON, VICTOR DONALD	18074 204TH AVE NW	BIG LAKE	55309	WEL	A	00633096	1
82	10-462-0220	SADDOG CORPORATION	18086 204TH AVE NW	BIG LAKE	55309	WEL	A	00585518	1
83	10-121-2202	PERARO, BARBARA ANN	17503 205TH AVE NW	BIG LAKE	55309	WEL	A	00506548	1
84	10-440-0120	JOHNSON, JODI L	20459 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00504062	1
85	10-462-0110	GARDNER, MICHAEL & CINDY	20486 181ST ST NW	BIG LAKE	55309	WEL	A	00557155	1
86	10-462-0105	SHERIDAN, EDWARD P & LYNN M	20490 181ST ST NW	BIG LAKE	55309	WEL	A	00557154	1
87	10-462-0210	LENNARD, RODNEY	18085 205TH AVE NW	BIG LAKE	55309	WEL	A	00633089	1
88	10-440-0110	SUNDSTROM, REYNOLD & JUDITH	18173 205TH AVE NW	BIG LAKE	55309	WEL	A	00535330	1
89	10-462-0205	LARSEN, ADAM & WERNER, STACEY	18063 205TH AVE NW	BIG LAKE	55309	WEL	A	00606014	1

90	10-116-3410	LOOSE, GERALD A & LANAE L	17360 205TH AVE NW	BIG LAKE	55309	WEL	A	00582148	1
91	65-445-0145	IVERSEN, DANIEL MICHAEL	641 GLENWOOD AVE E	BIG LAKE	55309	WEL	A	00496826	1
92	65-445-0230	LLOYD, KATHLEEN L	761 GLENWOOD AVE E	BIG LAKE	55309	WEL	A	00169439	1
93	10-441-0140	JENSEN, RUSSELL C & SUZANNE M	20517 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00561560	1
94	10-441-0140	JENSEN, RUSSELL C & SUZANNE M	20517 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00458625	1
95	65-445-0135	CHRISTENSON, ROBERT	1121 BIRCH AVE	BIG LAKE	55309	WEL	A	00544725	1
96	10-441-0130	DEUTSCHE BANK NTC	20541 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00458544	1
97	65-445-0130	VITO, MICHAEL D & ELDER, NADYNE	1141 BIRCH AVE	BIG LAKE	55309	WEL	A	00404701	1
98	65-445-0130	VITO, MICHAEL D & ELDER, NADYNE	1141 BIRCH AVE	BIG LAKE	55309	WEL	A	00404757	1
99	10-441-0120	ECCLES, TIMOTHY G & PAMELA A	20565 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00458621	1
100	65-445-0115	USHER, DAVID G	640 PARK AVE E	BIG LAKE	55309	WEL	A	00480271	1
101	65-467-0150	KUPARI, DAVID & DEBORAH H	1161 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00468302	1
102	10-441-0110	POULIOT, TIMOTHY L&STEWART, LYNDSEY	20575 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00580808	1
103	65-017-3314	SEGLER, RUTH ANN	651 PARK AVE E	BIG LAKE	55309	WEL	A	00495603	1
104	10-117-4000	SANFORD, JEFFREY & JAMES W		BIG LAKE	55309	WEL	A	00458622	1
105	10-116-3200	SANFORD, JEFFREY & JAMES W		BIG LAKE	55309	WEL	A	00458623	1
106	65-472-0120	WEHMAS, WARREN S & CAROL E	1230 VERNON ST	BIG LAKE	55309	WEL	A	00535306	1
107	65-472-0115	GRUBER, TERESA ANNE	1240 VERNON ST	BIG LAKE	55309	WEL	A	00529211	1
108	65-464-0160	LEVIS, DAVID A & MUELLER, VICKI M	1251 VERNON ST	BIG LAKE	55309	WEL	A	00658655	1
109	65-472-0105	HAMMER, JOE L	1260 VERNON ST	BIG LAKE	55309	WEL	A	00568992	1
110	65-473-0120	HELM, TRAVIS N	1261 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00569191	1
111	65-473-0110	LAHR, DENNIS O & TRISHA A	1271 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00569192	1
112	10-117-3101	FAHLAN, LAUREL L	20691 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00537259	1
113	10-117-1305	GAPEN, DEBORAH M	17925 211TH AVE NW	BIG LAKE	55309	WEL	A	00587126	1
114	65-414-0218	WALLEN, MICHAEL C & SHELLY L	828 POWELL ST N	BIG LAKE	55309	WEL	A	00405813	1
115	10-444-0255	CHASE, RICHARD L & CARR, LESLIE J	20264 180TH CT NW	BIG LAKE	55309	WEL	A	00468346	1
116	10-444-0210	MATICH, JOSHUA & JUSTINE	18185 203RD AVE NW	BIG LAKE	55309	WEL	A	00642727	1
117	65-413-0430	PIKALA, DAVID C	831 SHORE ACRES DR	BIG LAKE	55309	WEL	A	00437225	1
118	10-450-0110	WELLS FARGO BANK	18154 203RD AVE NW	BIG LAKE	55309	WEL	A	00526600	1
119	10-444-0105	ZAISER, ANN E	18116 203RD AVE NW	BIG LAKE	55309	WEL	A	00531560	1
120	10-444-0125	MINTLE, MATTHEW & STATTS, JODI	20325 181ST CIR NW	BIG LAKE	55309	WEL	A	00525935	1
121	10-462-0145	KAPALA, ELISSA J	18065 204TH AVE NW	BIG LAKE	55309	WEL	A	00561569	1
122	10-462-0140	MCCLURE, DANIELLE & VAUGHN, THERESA	18075 204TH AVE NW	BIG LAKE	55309	WEL	A	00561559	1
123	10-462-0215	KISNER, RODNEY & DEBRA K - TRUSTEE	20495 181ST ST NW	BIG LAKE	55309	WEL	A	00585508	1
124	65-445-0150	NERDAHL, DAVID PAUL & KAREN MARIE	621 GLENWOOD AVE	BIG LAKE	55309	WEL	A	00609372	1
125	65-457-0140	HORVATH, MONTY A & SCHILLING, STACI	1140 BIRCH AVE	BIG LAKE	55309	WEL	A	00537965	1
126	65-457-0110	NOYES, NORMA	1150 BIRCH AVE	BIG LAKE	55309	WEL	A	00537964	1
127	65-445-0120	MILLER, RANDALL W & KELLY J	670 PARK AVE E	BIG LAKE	55309	WEL	A	00600236	1
128	65-017-3315	MOSES, DAVID & JENNIFER	1270 VERNON ST	BIG LAKE	55309	WEL	A	00470392	1
129	65-457-0130	HECTOR, DONALD P & VALERIE L	1015 COUNTY ROAD 43 NW	BIG LAKE	55309	WEL	A	00429132	1
130	65-578-0105	CHERRYWOOD OF BIG LAKE LLC	171 HENRY RD	BIG LAKE	55309	WEL	A	00789734	1
131	10-120-1100	IND SCHOOL DIST 727		BIG LAKE	55309	WEL	U	00458538	1

Table 5: PCSI - Sealed Wells

PARCEL ID NUMBER	OWNER NAME	ADDRESS	CITY	ZIP	STATUS CODE	USE CODE	UNIQUE NUMBER
65-020-1201	CITY OF BIG LAKE	17985 203RD AVE NW	BIG LAKE	55309	S	AB	00696927
65-471-0120	SEEFELD, PAUL & JANELLE L	3090 LAKE RIDGE DR	BIG LAKE	55309	S	AB	00173049
65-481-0708	ROSFJORD, RYAN D & ROBERTA J	4650 POND VIEW DR	BIG LAKE	55309	S	AB	00140804
65-475-0020	CITY OF BIG LAKE	4430 PINTAIL ST	BIG LAKE	55309	S	AB	00424069
65-579-0105	KLEINBANK			55309	S	AB	00452335
65-475-0020	CITY OF BIG LAKE	4430 PINTAIL ST	BIG LAKE	55309	S	AB	00659438
10-457-0175	HARTWIG, ERNEST R & ELAINE B	20687 198TH ST NW	BIG LAKE	55309	S	AB	00537278
65-567-0010	BIG LAKE ECONOMIC DEVELOPMENT AUTH			55309	S	AB	00765451
10-444-0210	MATICH, JOSHUA & JUSTINE	18185 203RD AVE NW	BIG LAKE	55309	S	AB	00526516

Table 6A: PCSI - Previously Unlocated Wells

FIGURE ID	PIN	FACILITY NAME	ADDRESS	CITY	ZIP CODE	STATUS CODE	UNIQUE NUMBER	TOTAL	DWSMA ID	LOCATION FOUND
0	10-117-4000	SANFORD, JEFFREY & JAMES W		BIG LAKE TOWNSHIP	55309	A	00805619	1	EAST	Y
1	65-017-3306	ROSSMAN, JEFFREY M & RENEE L	691 PARK AVE	BIG LAKE	55309	A	00159957	1	EAST	Y
4	10-441-0130	DEUTSCHE BANK NTC	20541 COUNTY ROAD 43 NW	BIG LAKE	55309	A	00186291	1	EAST	Y
5	65-017-3306	ROSSMAN, JEFFREY M & RENEE L	691 PARK AVE	BIG LAKE	55309	A	00188784	1	EAST	Y
6	65-017-3306	ROSSMAN, JEFFREY M & RENEE L	691 PARK AVE	BIG LAKE	55309	A	00188783	1	EAST	Y
7	10-117-4000	SANFORD, JEFFREY & JAMES W		BIG LAKE TOWNSHIP	55309	A	00153959	1	EAST	Y
8	10-117-1300	ALCOTT, DARREL &NIELSON, J	18045 211TH AVE NW	BIG LAKE	55309	A	00791775	1	EAST	Y
9	65-019-1102	IND SCHOOL DIST 727		BIG LAKE	55309	A	00457832	1	EAST	Y
10	65-019-1102	IND SCHOOL DIST 727		BIG LAKE	55309	A	00457831	1	EAST	Y
11	65-583-0105	NORTHERN STAR APARTMENTS LLC	19591 STATION ST	BIG LAKE	55309	A	00215995	1	EAST	Y
12	10-120-2400	SMITH, MAURICE & EVANGELINE -TRUST		BIG LAKE TOWNSHIP	55309	A	00433912	1	EAST	Y
13	10-120-2400	SMITH, MAURICE & EVANGELINE -TRUST		BIG LAKE TOWNSHIP	55309	A	00155275	1	EAST	Y
14	65-508-0210	PARAGON REAL ESTATE LLC	20020 176TH ST NW	BIG LAKE MN	55309	A	00417999	1	EAST	Y
15	65-020-2210	IND SCHOOL DIST 727		BIG LAKE	55309	A	00433913	1	EAST	Y
16	10-120-2400	SMITH, MAURICE & EVANGELINE -TRUST		BIG LAKE TOWNSHIP	55309	A	00438261	1	EAST	Y
17	10-120-2400	SMITH, MAURICE & EVANGELINE -TRUST		BIG LAKE TOWNSHIP	55309	A	00451818	1	EAST	Y

Table 6B: PCSI - Remaining Unlocated Wells

FIGURE ID	PIN	FACILITY NAME	ADDRESS	CITY	ZIP CODE	STATUS CODE	UNIQUE NUMBER	TOTAL	DWSMA ID	LOCATION FOUND
2		UNKNOWN		BIG LAKE	55309	A	00105218	1	WEST	N
3		UNKNOWN		BIG LAKE	55309	A	00175922	1	WEST	N

Table 7: PCSI - Septic Systems

FIGURE ID	PARCEL ID NUMBER	OWNER NAME	PHYSICAL ADDRESS	CITY	ZIP CODE	PCS CODE	STATUS CODE	TOTAL	DWSMA VULNERABILITY
0	65-017-3304	NOBLE, ANDREW J & WHITCOME-NOBLE, A	1281 VERNON ST	Big Lake	55309	ISTS	A	1	High
1	65-017-3306	ROSSMAN, JEFFREY M & RENEE L	691 PARK AVE	Big Lake	55309	ISTS	A	1	High
2	65-017-3309	BASS, KEVIN B	701 PARK AVE E	Big Lake	55309	ISTS	A	1	High
3	65-017-3311	GOEB, ROBERT V & LAVONNE	1220 VERNON ST	Big Lake	55309	ISTS	A	1	High
4	65-017-3313	MC KIE, STUART A & MARY	641 PARK AVE E	Big Lake	55309	ISTS	A	1	High
5	65-017-3314	SEGLER, RUTH ANN	651 PARK AVE E	Big Lake	55309	ISTS	A	1	High
6	65-017-3315	MOSES, DAVID & JENNIFER	1270 VERNON ST	Big Lake	55309	ISTS	A	1	High
7	65-020-2200	SEEHAFER, GORDON	1081 COUNTY ROAD 43 NW	Big Lake	55309	ISTS	A	1	High
8	65-020-2201	DAVIDS, JULIE A	1091 COUNTY ROAD 43 NW	Big Lake	55309	ISTS	A	1	High
9	65-020-2202	MARQUART, MARLYCE E	1071 COUNTY ROAD 43 NW	Big Lake	55309	ISTS	A	1	High
10	65-445-0110	NIELSEN, ROBERT A & SANDY	620 PARK AVE E	Big Lake	55309	ISTS	A	1	High
11	65-445-0115	USHER, DAVID G	640 PARK AVE E	Big Lake	55309	ISTS	A	1	High
12	65-445-0120	MILLER, RANDALL W & KELLY J	670 PARK AVE E	Big Lake	55309	ISTS	A	1	High
13	65-445-0125	HENSEL, RICHARD & GLORIA	680 PARK AVE E	Big Lake	55309	ISTS	A	1	High
14	65-445-0130	VITO, MICHAEL D & ELDER, NADYNE	1141 BIRCH AVE	Big Lake	55309	ISTS	A	1	High
15	65-445-0135	CHRISTENSON, ROBERT	1121 BIRCH AVE	Big Lake	55309	ISTS	A	1	High
16	65-445-0140	ABBOTT, CARL E & MARLYS L	1101 BIRCH AVE	Big Lake	55309	ISTS	A	1	High
17	65-445-0145	IVERSEN, DANIEL MICHAEL	641 GLENWOOD AVE E	Big Lake	55309	ISTS	A	1	High
18	65-445-0210	VARNER, CALIXTUS JOHN & DEBRA A	741 GLENWOOD AVE	Big Lake	55309	ISTS	A	1	High
19	65-445-0220	MONSON, MATTHEW & CASSANDRA KATHRYN	751 GLENWOOD AVE	Big Lake	55309	ISTS	A	1	High
20	65-445-0230	LLOYD, KATHLEEN L	761 GLENWOOD AVE E	Big Lake	55309	ISTS	A	1	High
21	65-445-0240	GERKE, JULIE A	791 GLENWOOD AVE	Big Lake	55309	ISTS	A	1	High
22	65-457-0110	NOYES, NORMA	1150 BIRCH AVE	Big Lake	55309	ISTS	A	1	High
23	65-457-0120	ETZEL, CHRISTOPHER & CAROL	1151 COUNTY ROAD 43 NW	Big Lake	55309	ISTS	A	1	High
24	65-457-0130	HECTOR, DONALD P & VALERIE L	1015 COUNTY ROAD 43 NW	Big Lake	55309	ISTS	A	1	High
25	65-457-0140	HORVATH, MONTY A & SCHILLING, STACI	1140 BIRCH AVE	Big Lake	55309	ISTS	A	1	High
26	65-464-0110	HAGEN, PAMELA R	611 PARK AVE E	Big Lake	55309	ISTS	A	1	High
27	65-464-0120	BODINE, CHARLES F & BETH	601 PARK AVE E	Big Lake	55309	ISTS	A	1	High
28	65-464-0140	GANGL-DICKENSON, JENNA &DICKENSON,R	1231 VERNON ST	Big Lake	55309	ISTS	A	1	High
29	65-464-0150	LAIS, VINCENT J	1241 VERNON ST	Big Lake	55309	ISTS	A	1	High
30	65-464-0160	LEVIS, DAVID A & MUELLER, VICKI M	1251 VERNON ST	Big Lake	55309	ISTS	A	1	High
31	65-464-0170	ARBUCKLE, BEVERLY ANN	1261 VERNON ST	Big Lake	55309	ISTS	A	1	High
32	65-464-0180	GRAHAM, SCOTT	1271 VERNON ST	Big Lake	55309	ISTS	A	1	High
33	65-467-0110	HOULE, GREG A	730 PARK AVE	Big Lake	55309	ISTS	A	1	High
34	65-467-0120	SAUE, KEITH A & BARBARA J	1160 BIRCH AVE	Big Lake	55309	ISTS	A	1	High
35	65-467-0130	PAYE, CHRISTOPHER L & JENNIFER M	750 PARK AVE E	Big Lake	55309	ISTS	A	1	High
36	65-467-0140	ANDERSON-BACHLER, JARED	770 PARK AVE E	Big Lake	55309	ISTS	A	1	High
37	65-467-0150	KUPARI, DAVID & DEBORAH H	1161 COUNTY ROAD 43 NW	Big Lake	55309	ISTS	A	1	High
38	65-472-0105	HAMMER, JOE L	1260 VERNON ST	Big Lake	55309	ISTS	A	1	High
39	65-472-0110	SILBERG, KEVIN A	1250 VERNON ST	Big Lake	55309	ISTS	A	1	High
40	65-472-0115	GRUBER, TERESA ANNE	1240 VERNON ST	Big Lake	55309	ISTS	A	1	High
41	65-472-0120	WEHMAS, WARREN S & CAROL E	1230 VERNON ST	Big Lake	55309	ISTS	A	1	High
42	65-473-0110	LAHR, DENNIS O & TRISHA A	1271 COUNTY ROAD 43 NW	Big Lake	55309	ISTS	A	1	High
43	65-473-0120	HELM, TRAVIS N	1261 COUNTY ROAD 43 NW	Big Lake	55309	ISTS	A	1	High
44	65-473-0150	KRAEMER, BRUCE & WANDA	781 PARK AVE E	Big Lake	55309	ISTS	A	1	High
45	65-499-0105	KLAERS, DONALD C & OLSON, CONNIE L	1281 COUNTY ROAD 43 NW	Big Lake	55309	ISTS	A	1	High
46	65-499-0110	DAVIS, TIMOTHY J	751 PARK AVE E	Big Lake	55309	ISTS	A	1	High

Appendix B - Figures

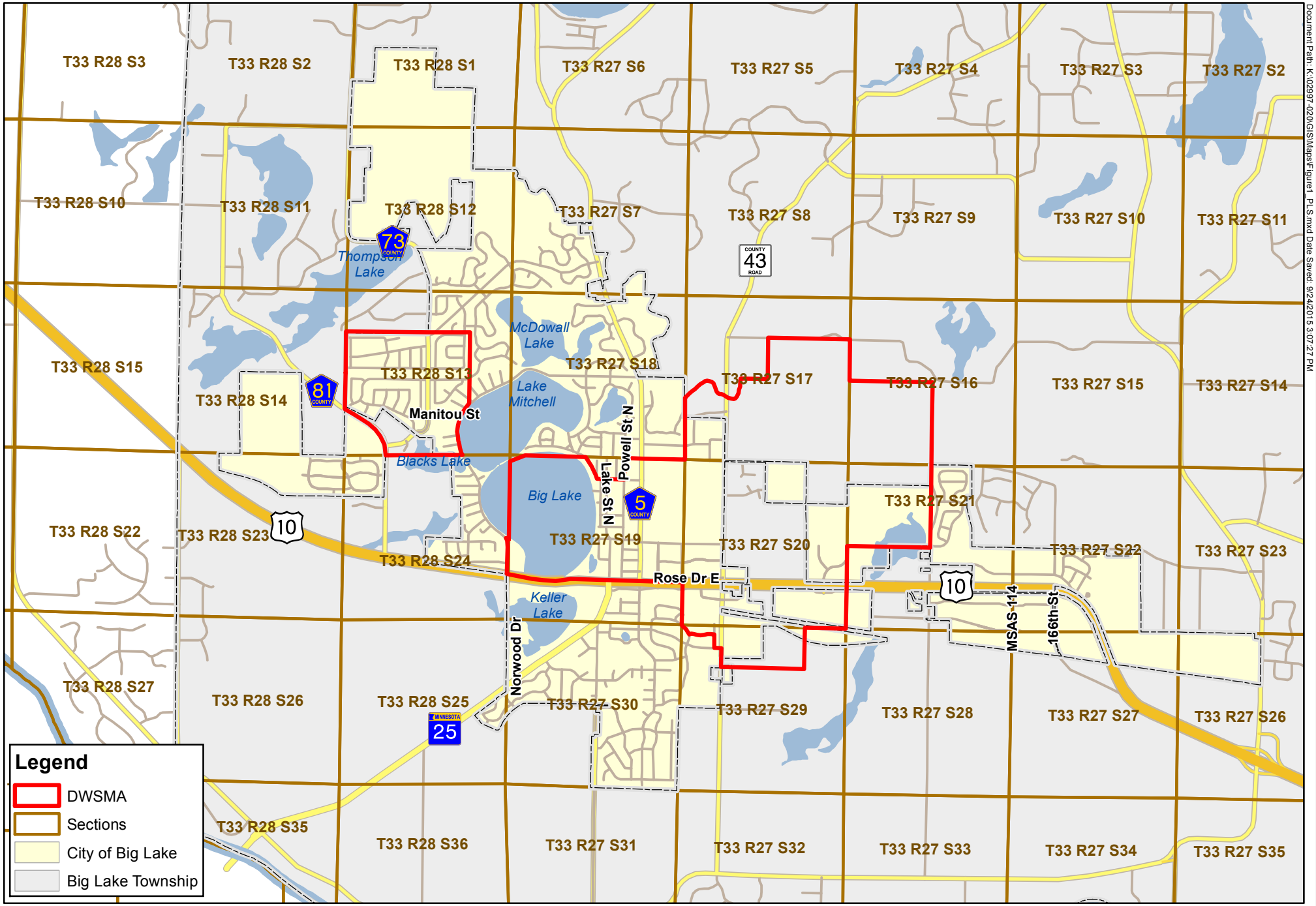

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Figure 1A - Public Land Survey Map
Wellhead Protection Plan
Big Lake, MN

1 inch = 4,000 feet

N

WSB & Associates, Inc.

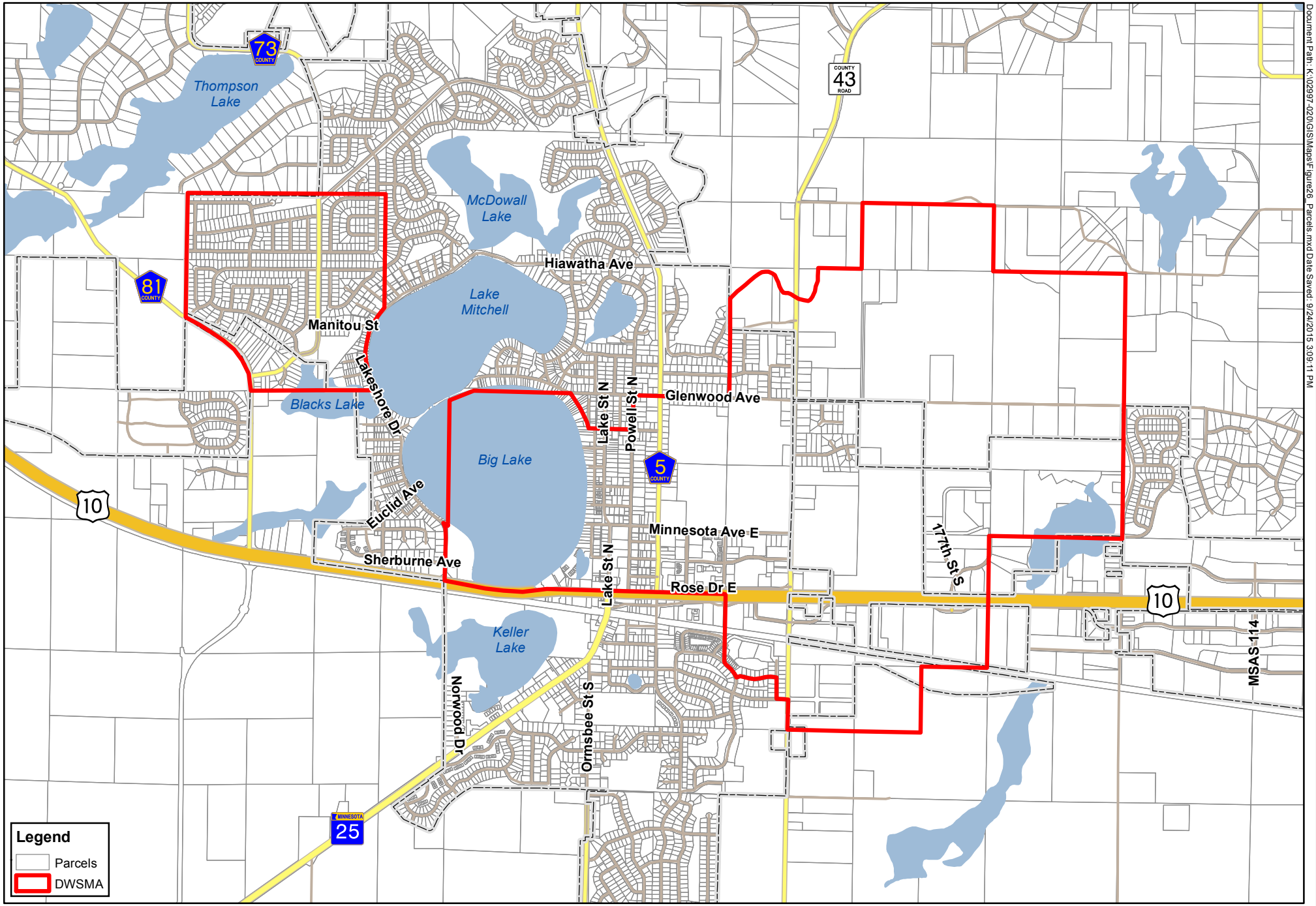

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Figure 1B - Parcels
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

CITY OF Big Lake

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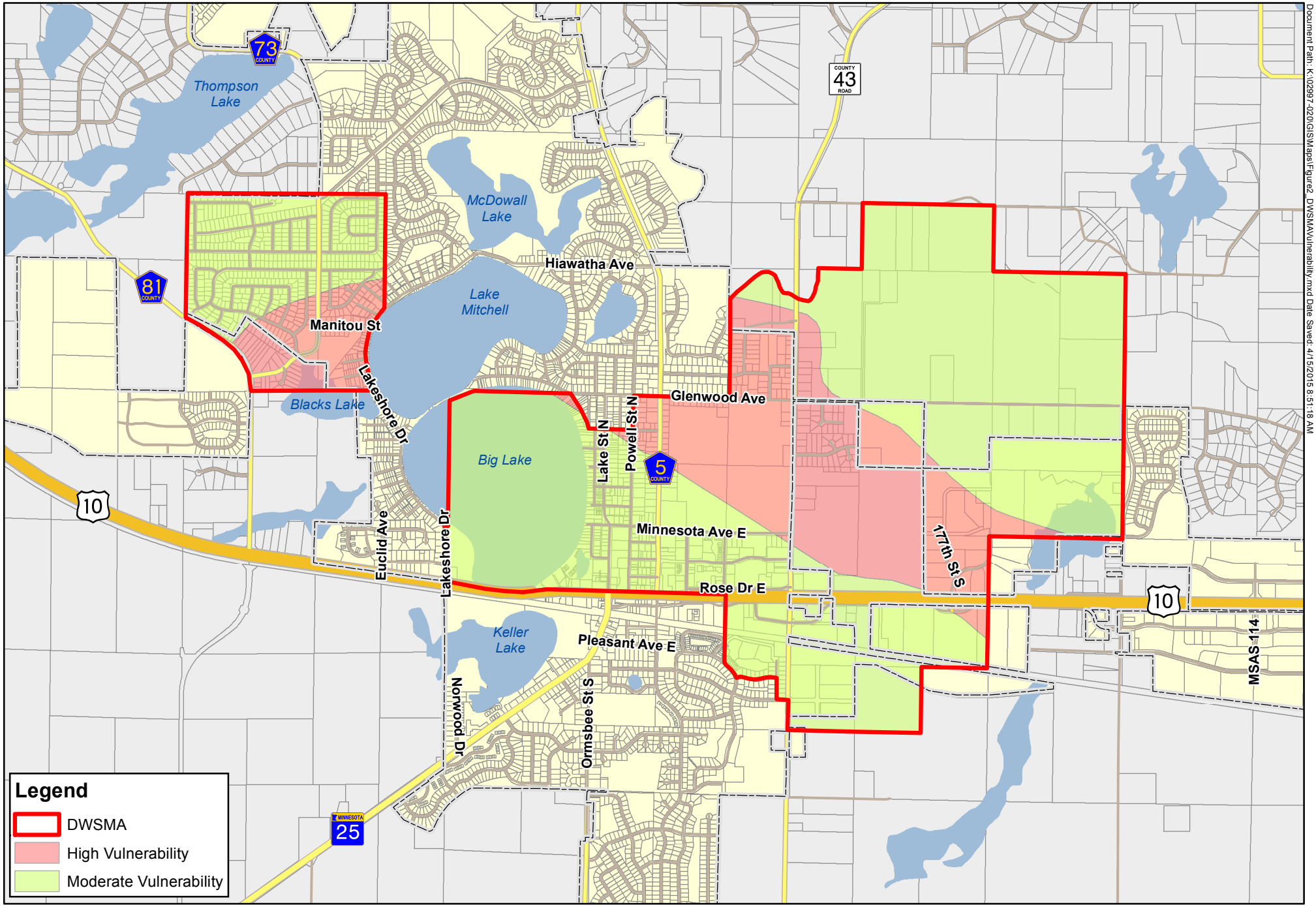

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Figure 2 - DWSMA Vulnerability
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

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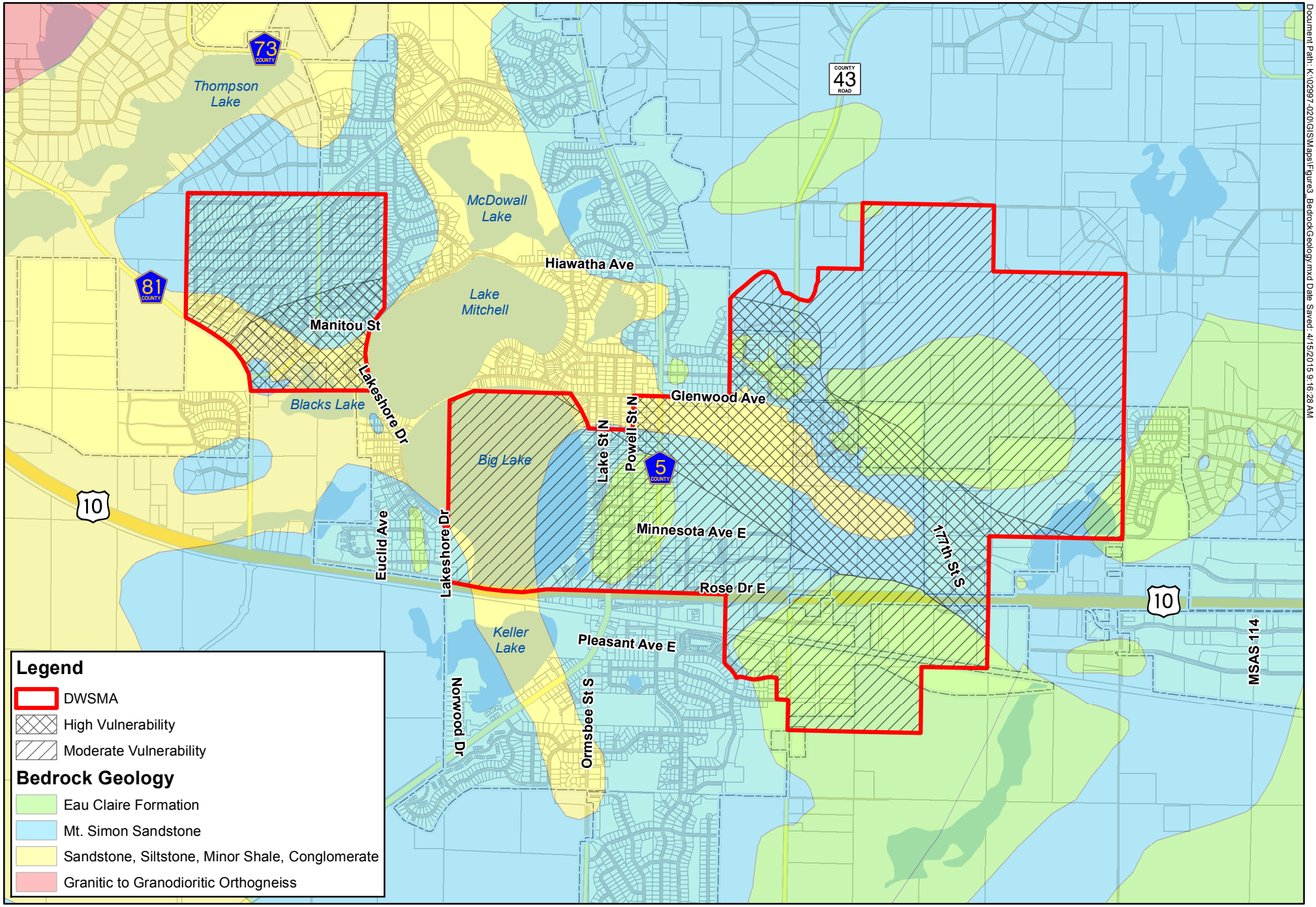

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Figure 3 - Bedrock Geology
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

N

CITY OF Big Lake

WSB & Associates, Inc.

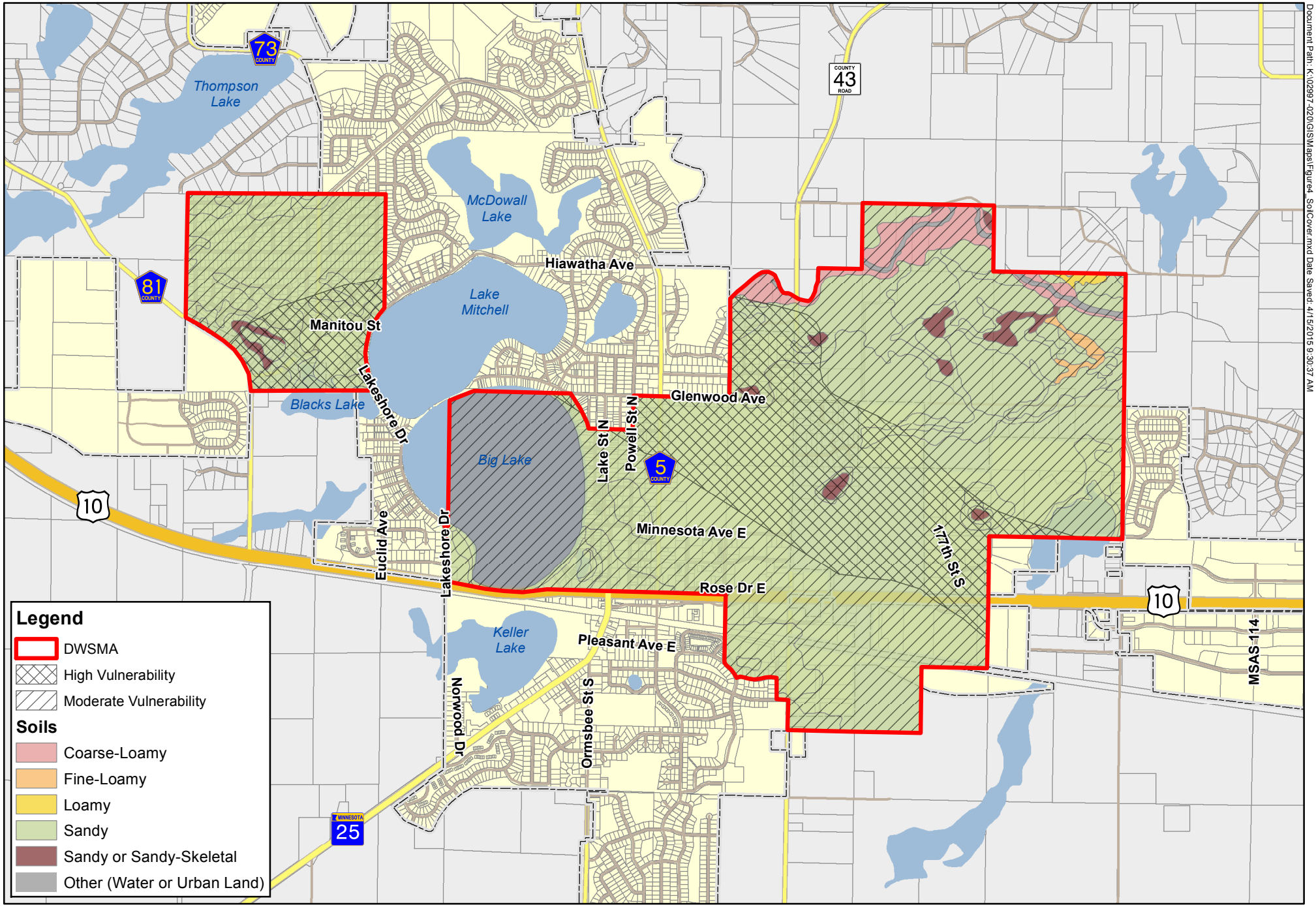

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Figure 4 - Soil Cover
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

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WSB & Associates, Inc.

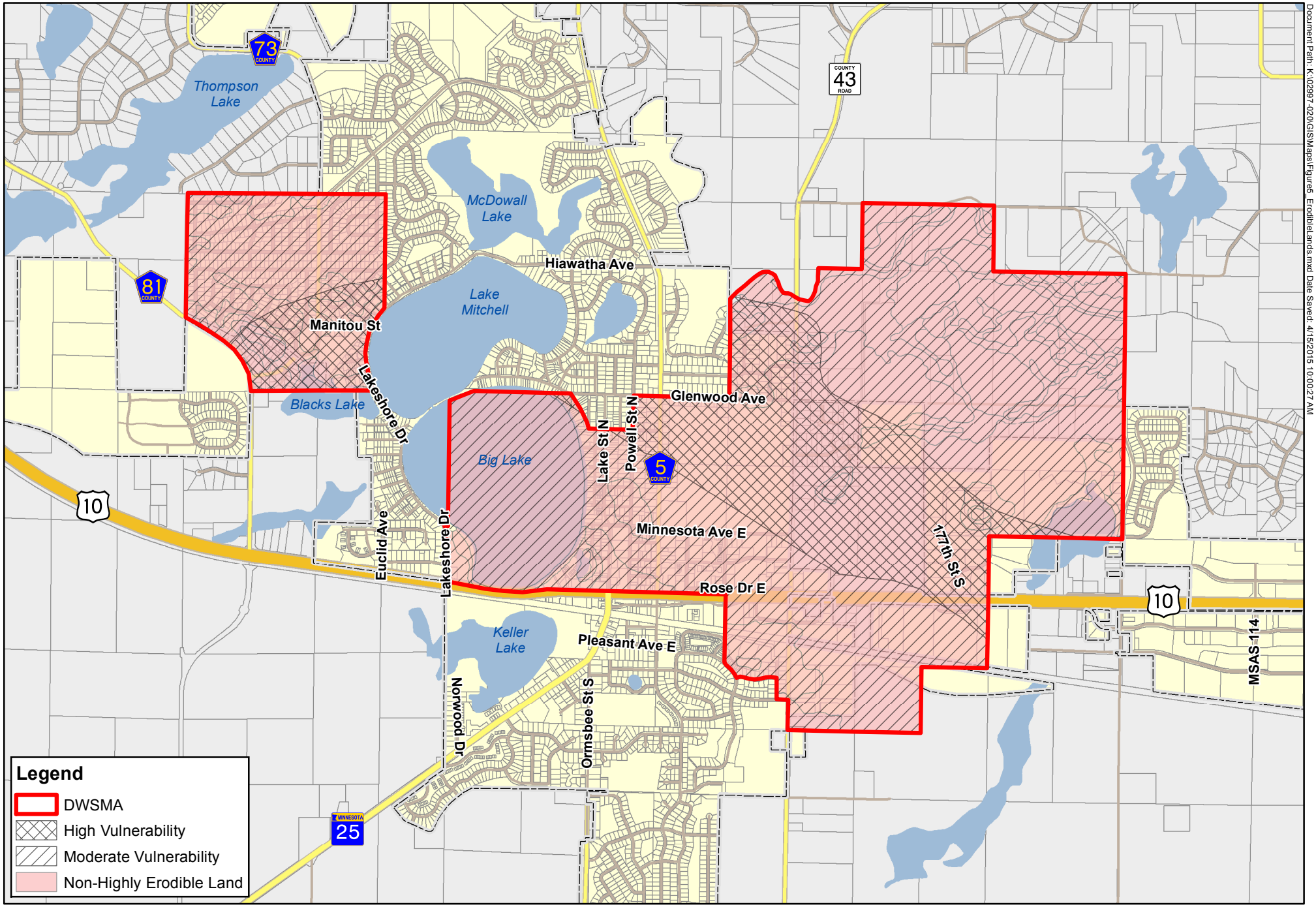

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Figure 5 - Erodible Lands
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

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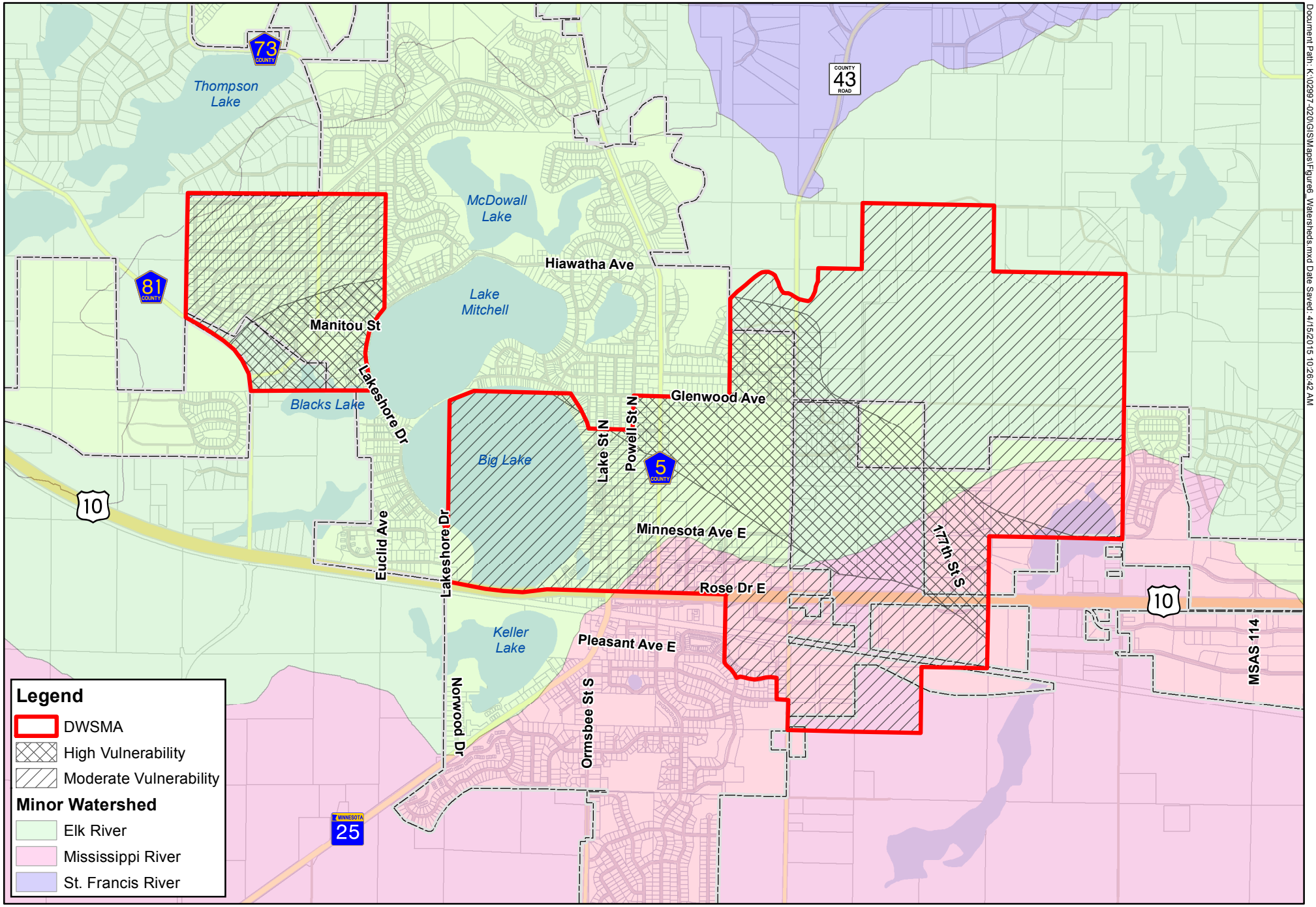
WSB & Associates, Inc.



**The Entire Area is in the Mississippi River - St. Cloud Major Watershed

Figure 6 - Watersheds
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

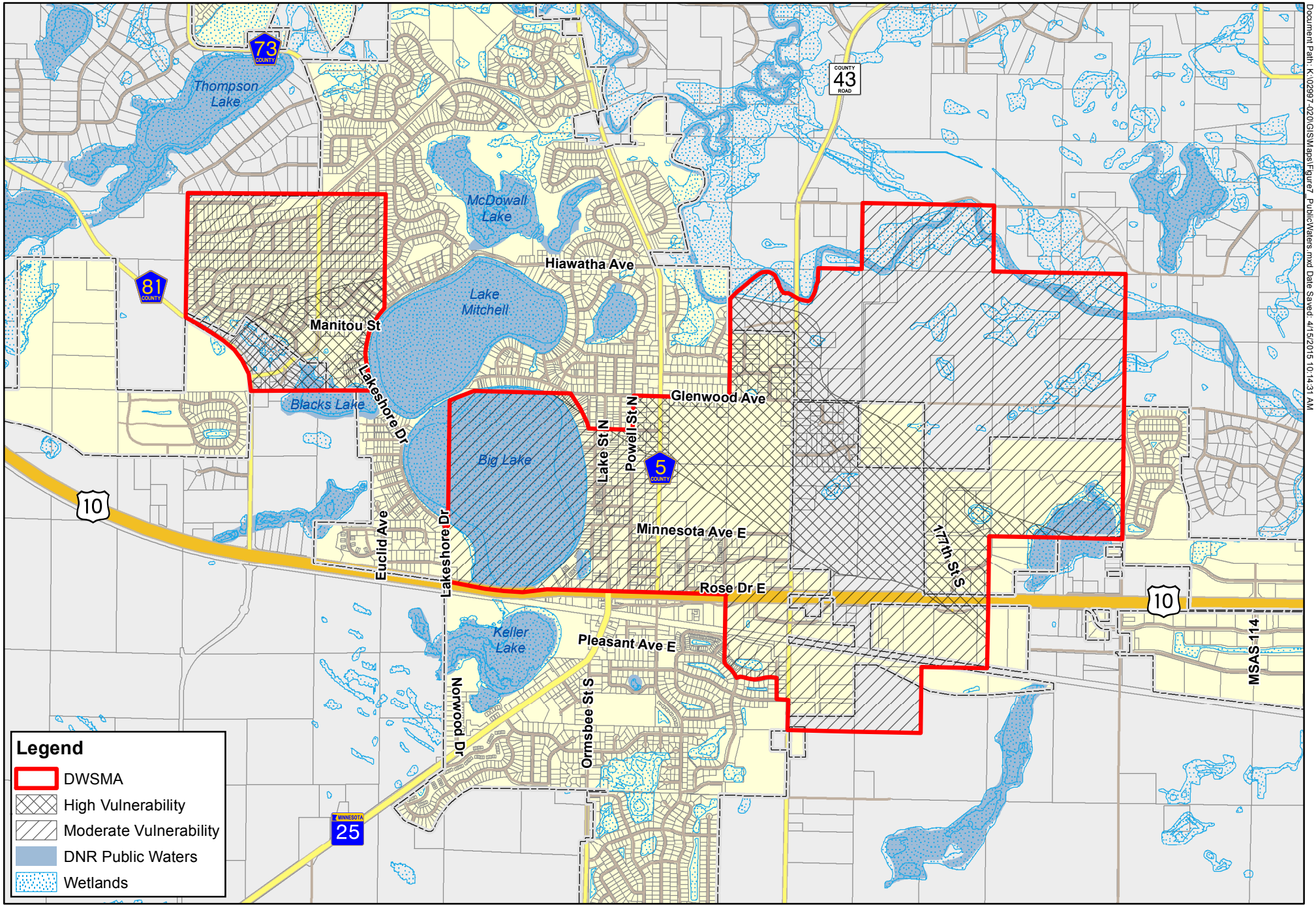


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Figure 7 - Public Waters
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

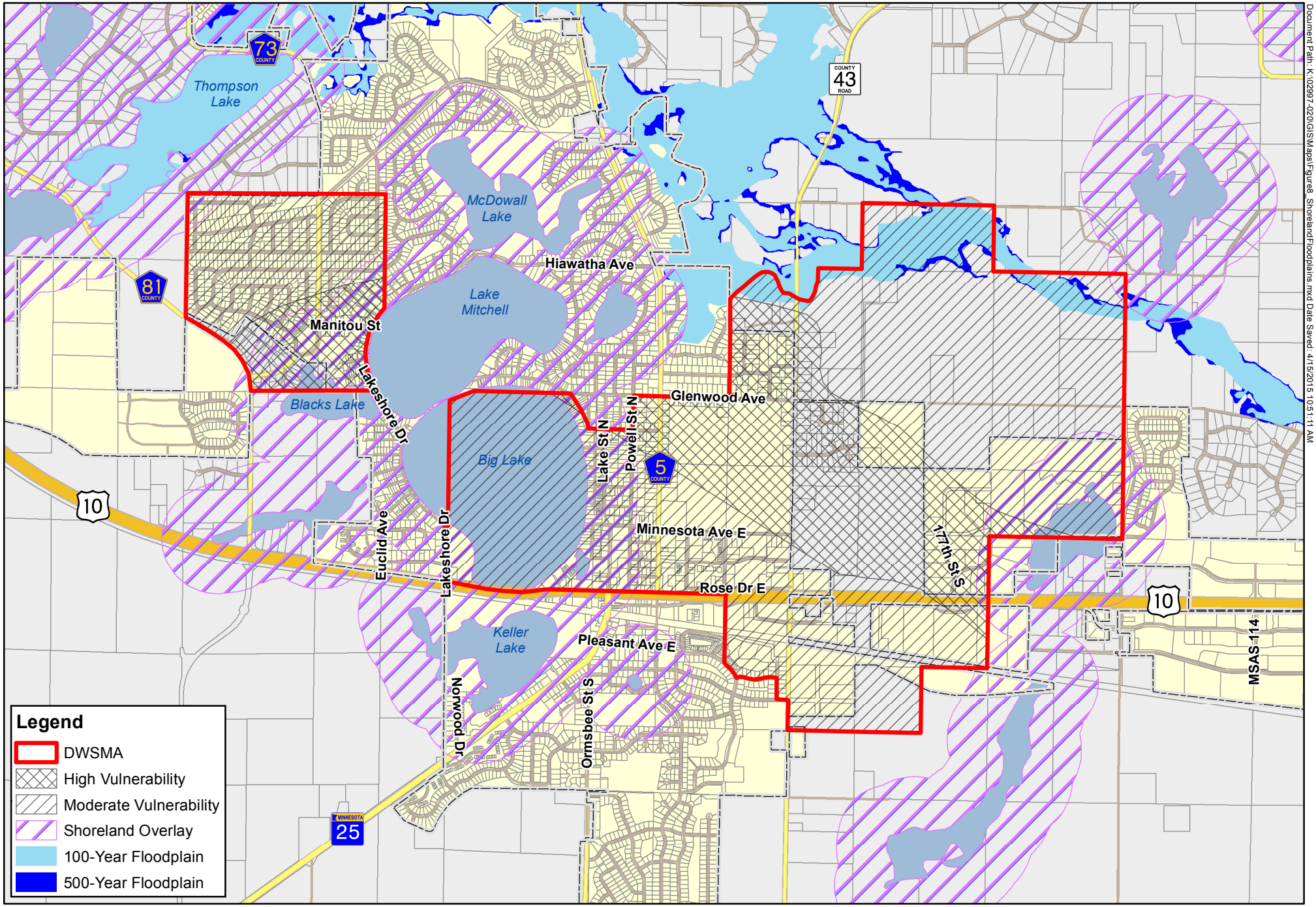

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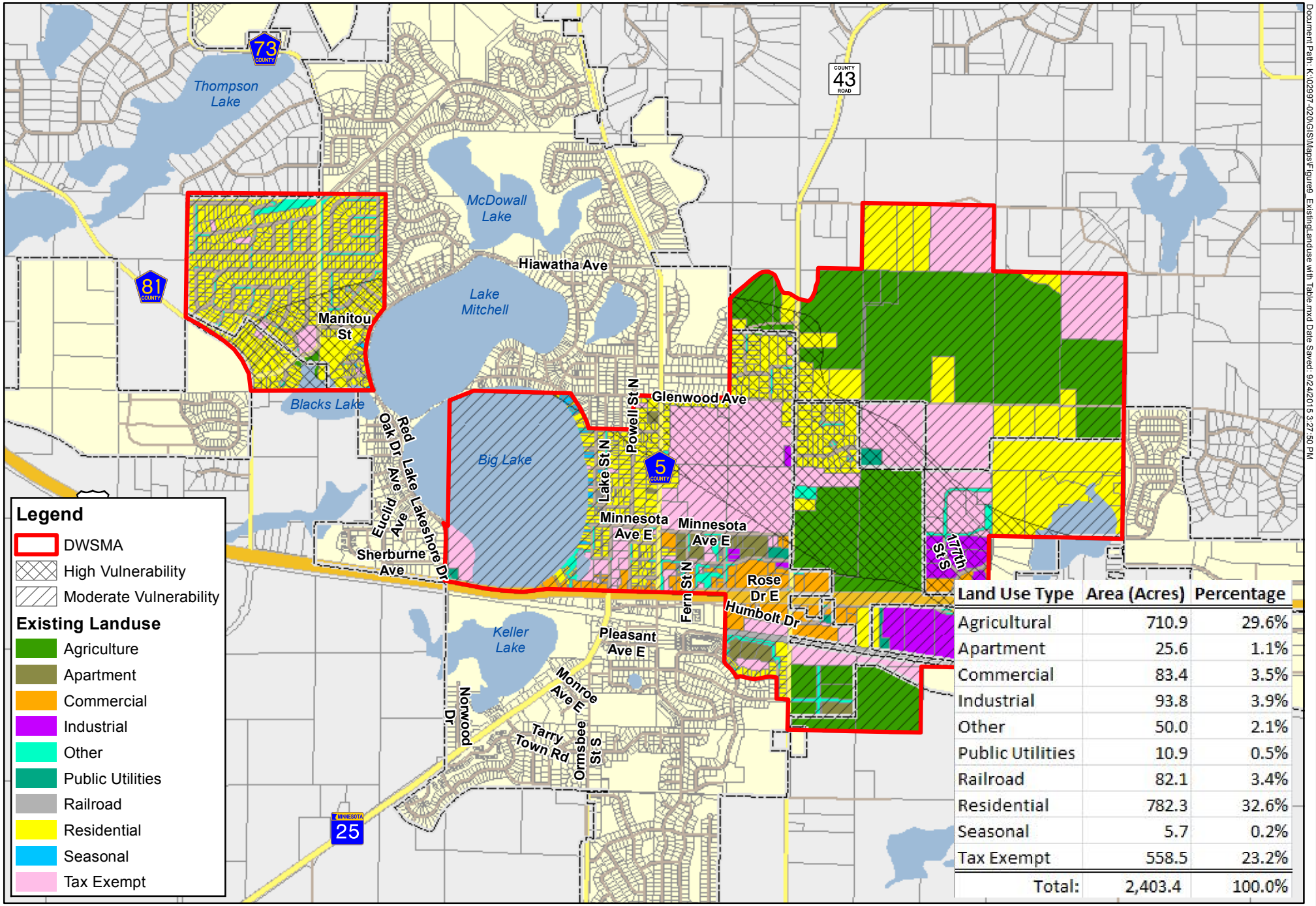
Figure 8 - Shoreland Classification and Floodplains
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

CITY OF Big Lake

WSB & Associates, Inc.



Land Use Type	Area (Acres)	Percentage
Agricultural	710.9	29.6%
Apartment	25.6	1.1%
Commercial	83.4	3.5%
Industrial	93.8	3.9%
Other	50.0	2.1%
Public Utilities	10.9	0.5%
Railroad	82.1	3.4%
Residential	782.3	32.6%
Seasonal	5.7	0.2%
Tax Exempt	558.5	23.2%
Total:	2,403.4	100.0%

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Figure 9 - Existing Land Use
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

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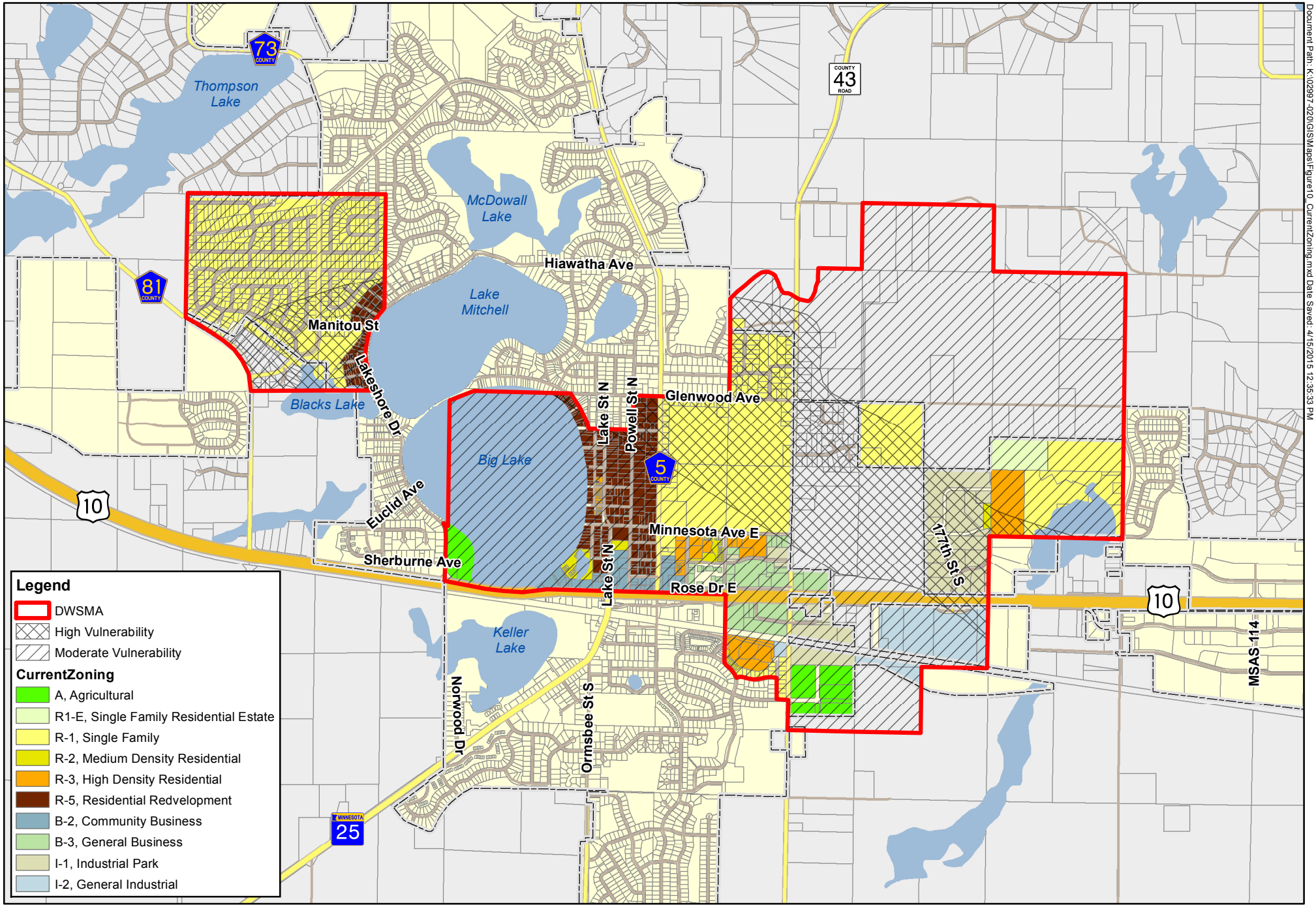

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Figure 10 - Current Zoning
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

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WSB & Associates, Inc.

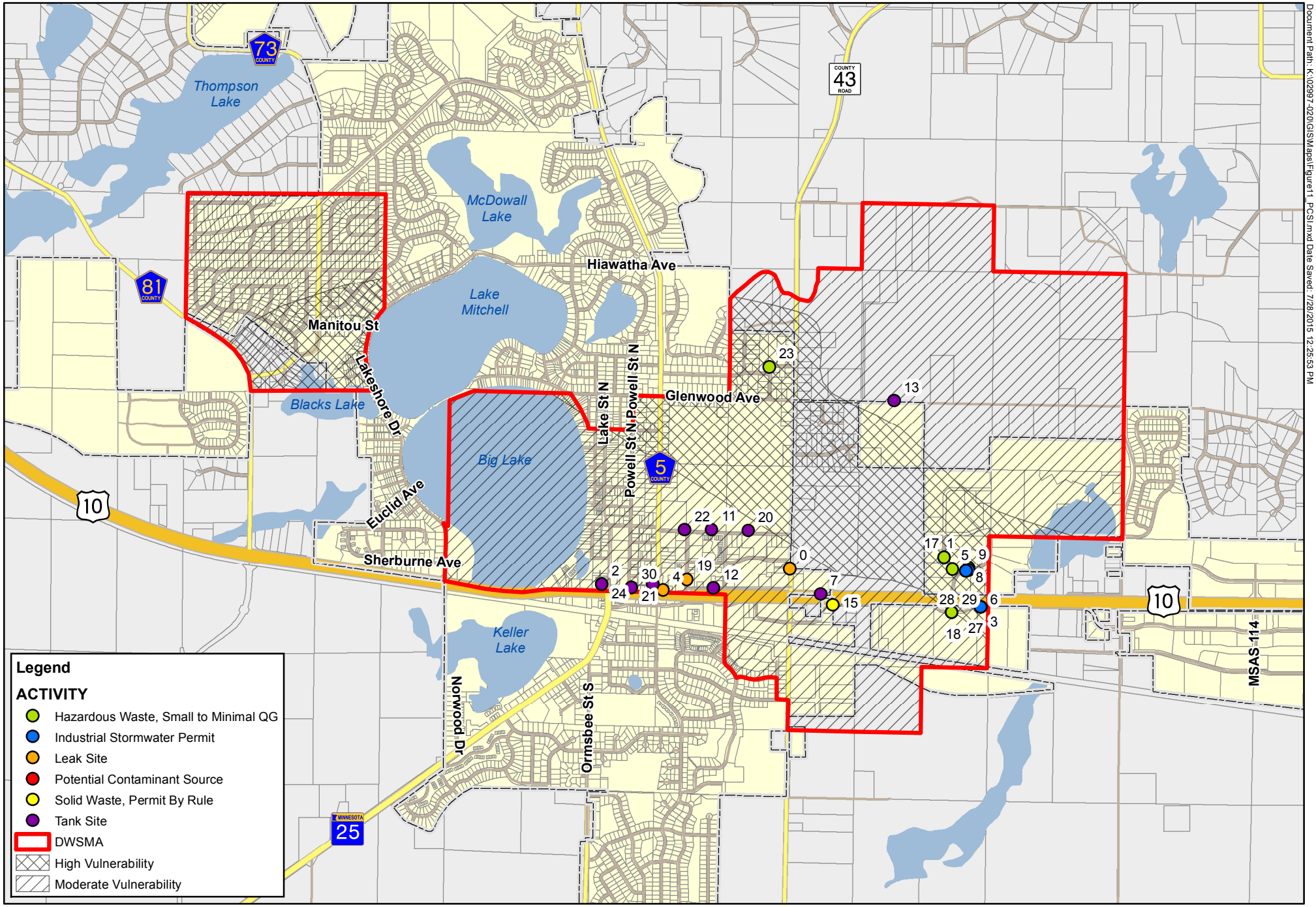

Figure 11: PCSI - Sites
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

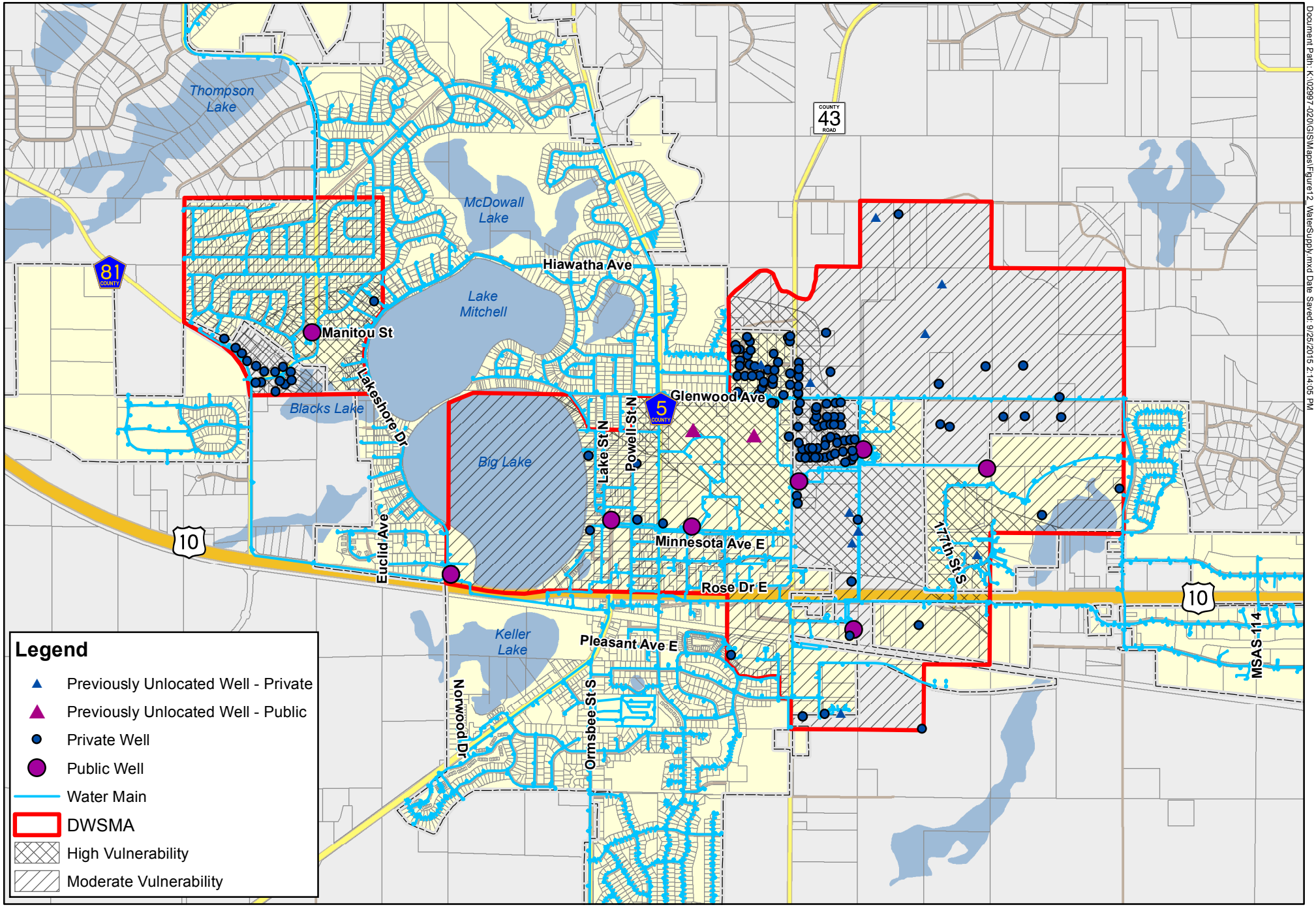

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Figure 12 - Water Supply System
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

N

CITY OF Big Lake

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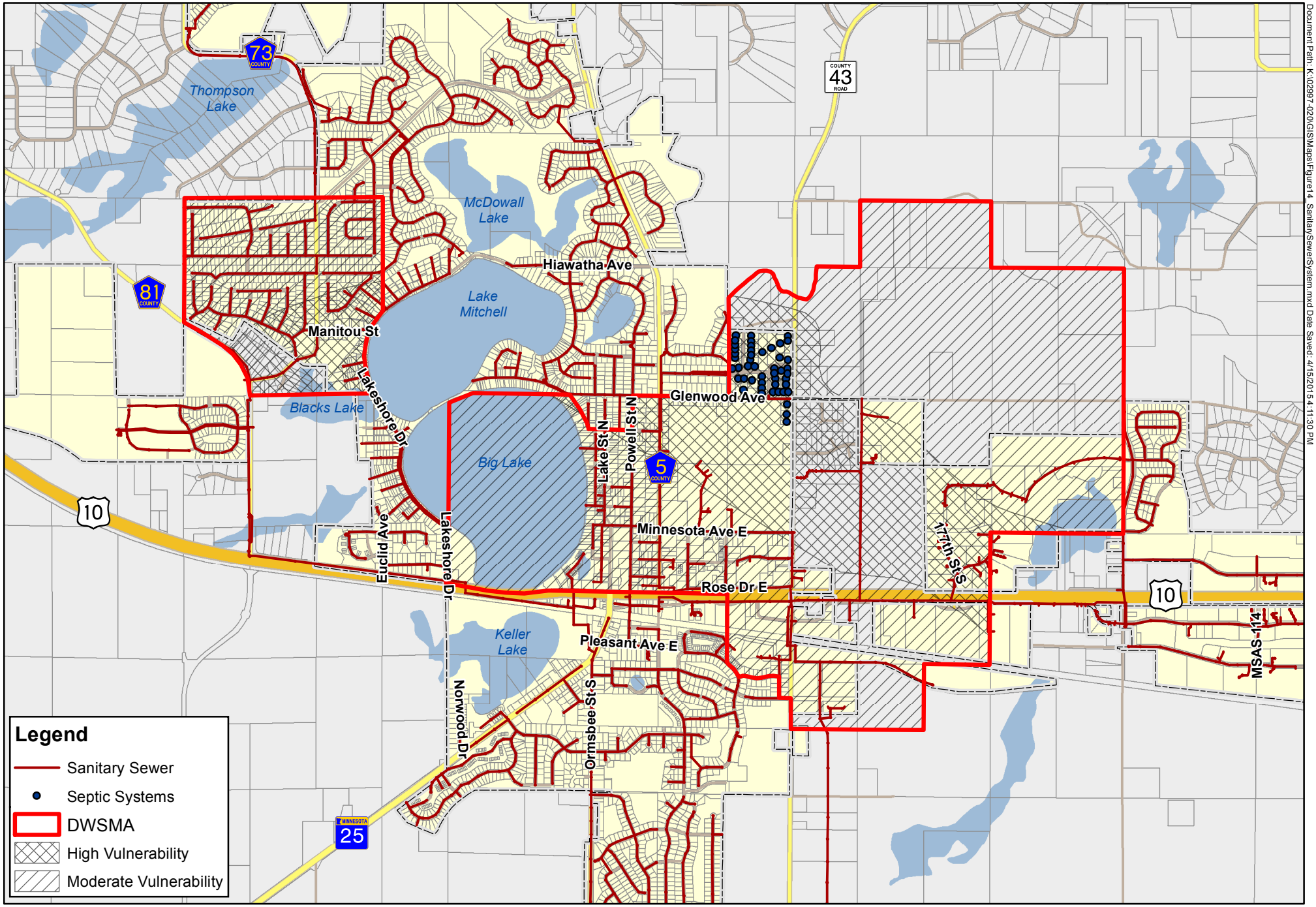

Figure 13 - Sanitary Sewer System
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

CITY OF Big Lake

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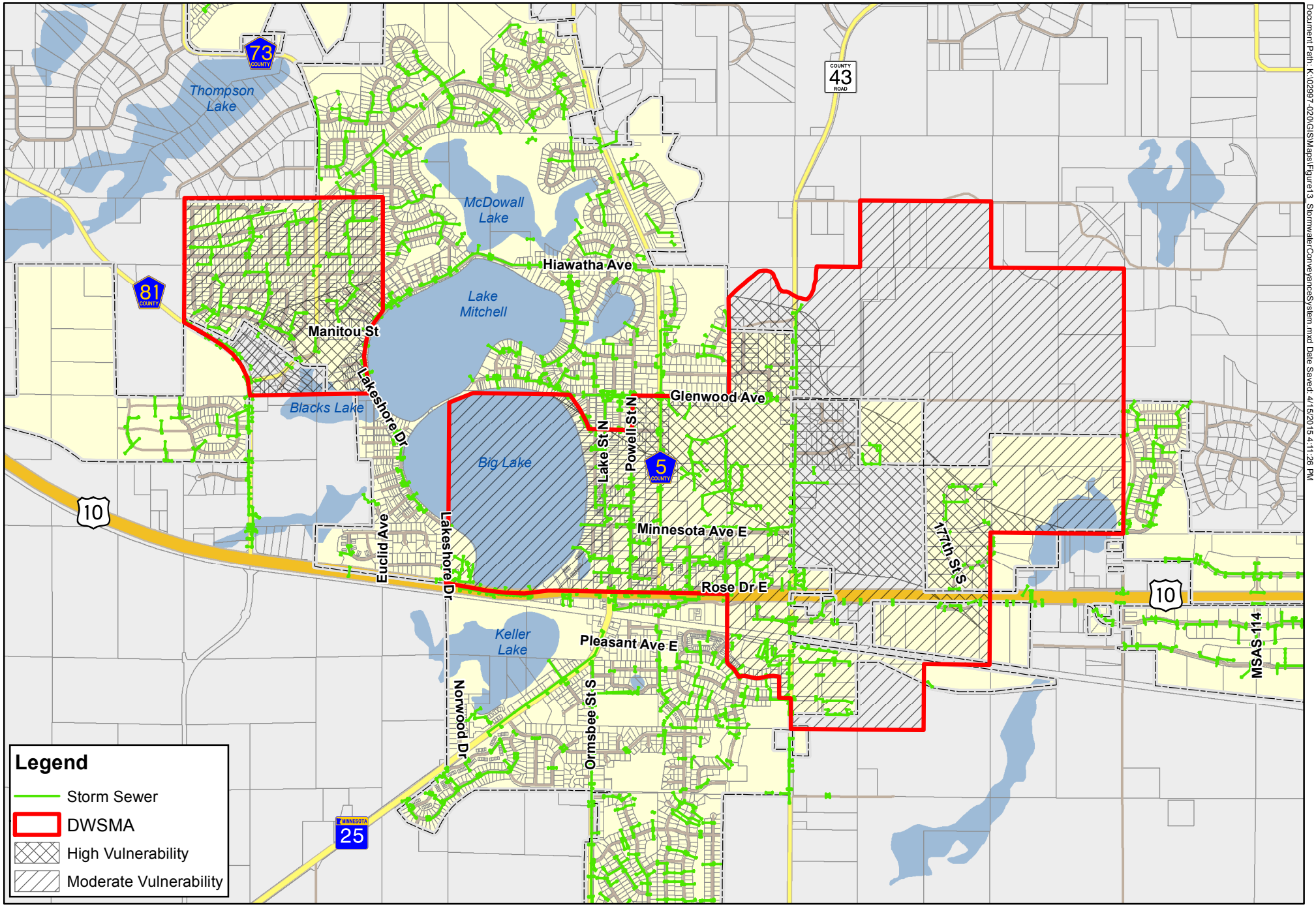

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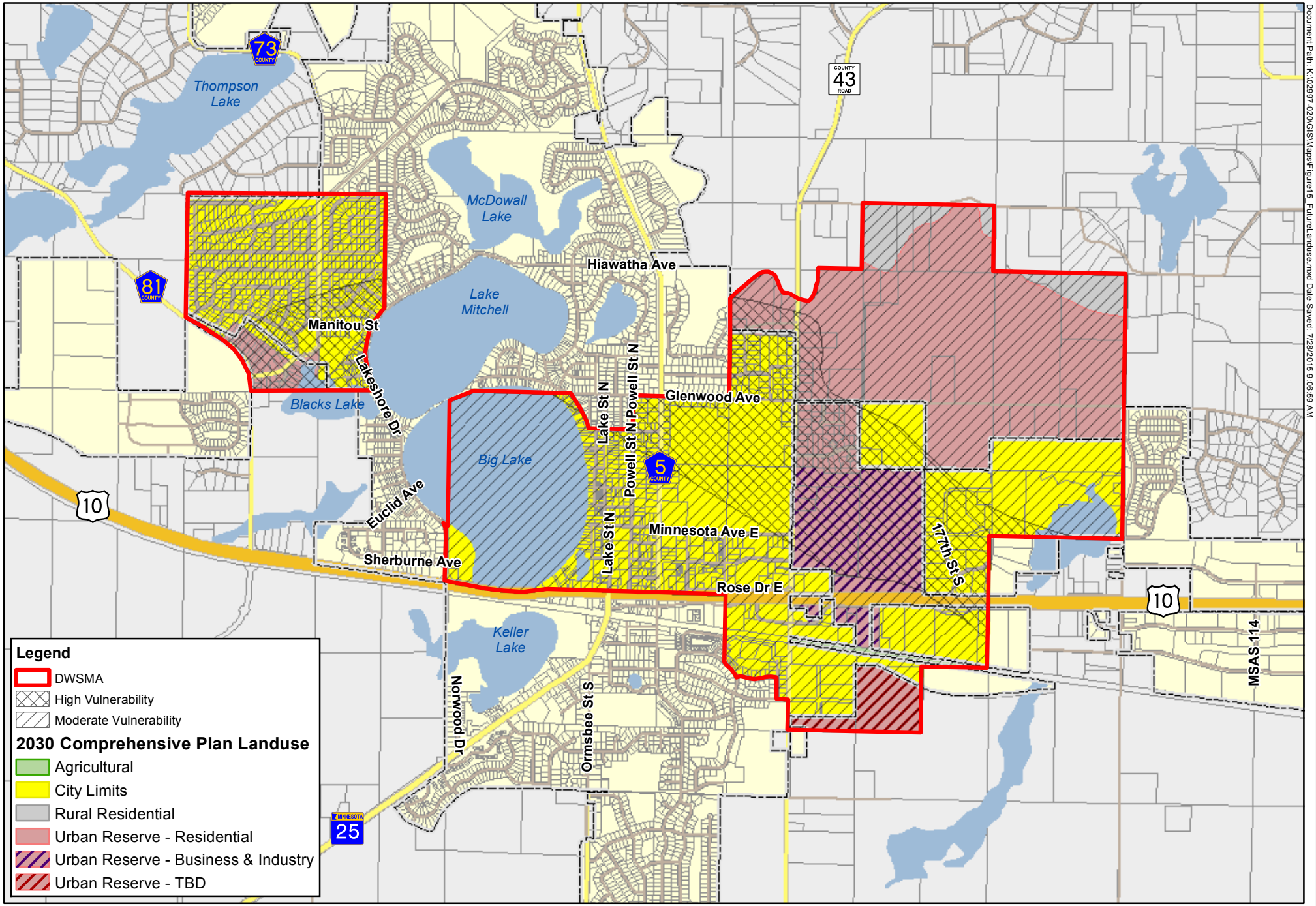
Figure 14 - Stormwater Conveyance System
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

N

City of Big Lake

WSB & Associates, Inc.



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CITY OF Big Lake

Figure 15 - Future Land Use
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,500 feet

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WSB & Associates, Inc.

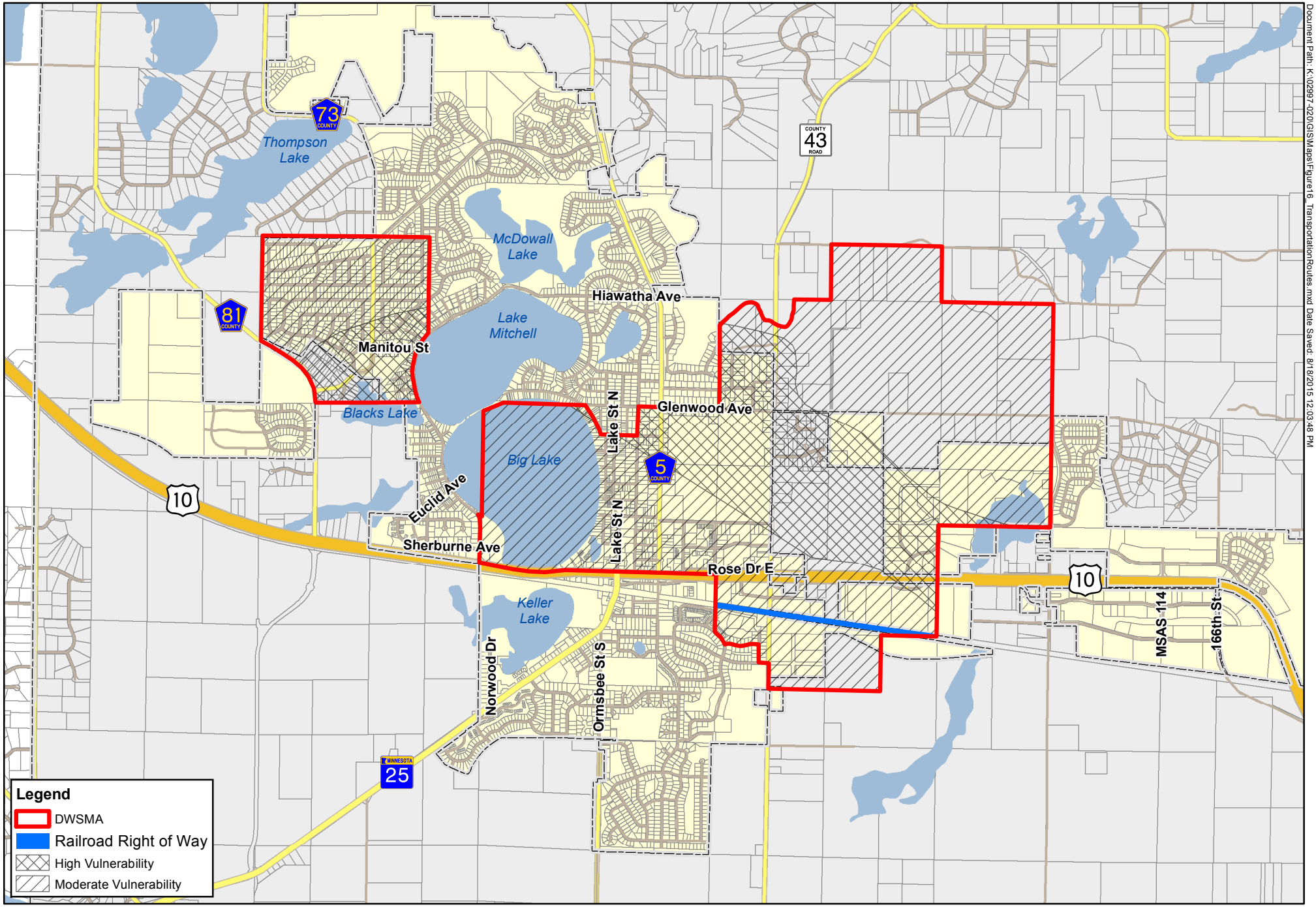

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Figure 16 - Current Transportation Routes
Wellhead Protection Plan
Big Lake, MN

1 inch = 2,962 feet

CITY OF Big Lake

WSB & Associates, Inc.

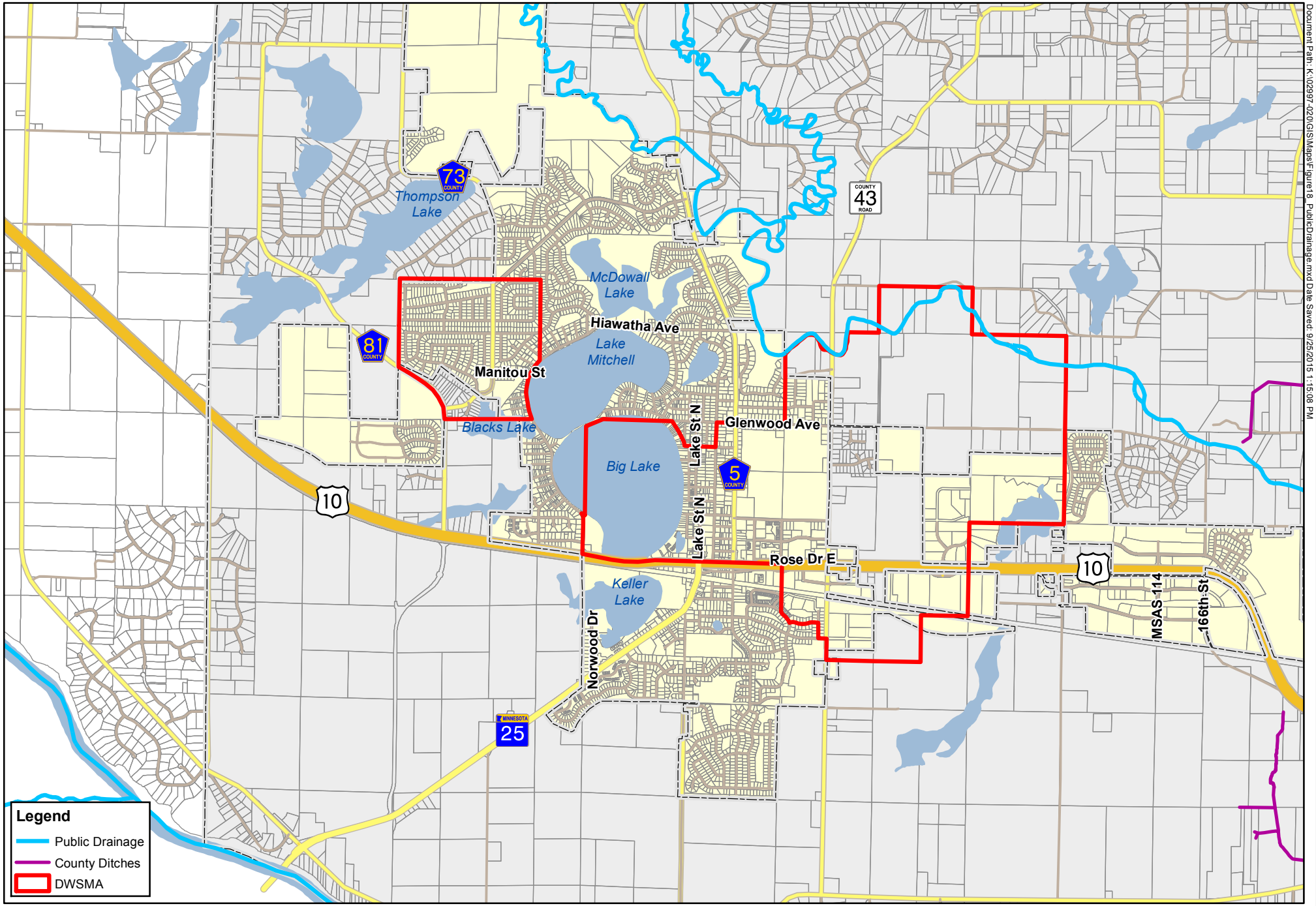

Figure 17 - Public Drainage Map
Wellhead Protection Plan
Big Lake, MN

1 inch = 3,514 feet

Appendix C – Wellhead Protection Plan Part 1

Amendment to the Wellhead Protection Plan

Part 1

Delineation of Wellhead Protection Area, Drinking Water Supply Management Area, and Drinking Water Supply Management Area Vulnerability Assessment

December 2014

Prepared for

The City of Big Lake

by

Leggette, Brashears & Graham, Inc.

Table of Contents Page

List of Tables

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Glossary of Terms

Data Element. A specific type of information required by the Minnesota Department of Health to prepare a Wellhead Protection Plan.

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

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

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

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

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

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

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

Acronyms

ATP - Aquifer Test Plan

CFR - Calculated Fixed Radius

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

SWUDS – State Water Use Database System

UGE - Upgradient Extensions

UMN - University of Minnesota

USDA - United States Department of Agriculture

USGS - United States Geological Survey

1. Introduction

Leggette, Brashears and Graham, Inc. (LBG) has developed Part 1 of the Wellhead Protection (WHP) Plan for the City of Big Lake (City) (public water supply identification number 1710002). The work was performed in accordance with the Minnesota Wellhead Protection Rule (MR), parts 4720.5100 to 4720.5590. The City's original WHP Plan was completed in December, 2005. The WHP plan is being amended now because almost ten years have expired, and City Wells No. 6 and 7 have been added since the approval of its last WHP Plan.

The results of the development of this amended WHP Plan are presented in the text below, on Tables 1 through 6, Figures 1 through 12, and in Appendix A, which are listed in the Table of Contents.

This report presents delineations of the wellhead protection area (WHPA) and drinking water supply management area (DWSMA), and the vulnerability assessments for the public water supply well and DWSMA. Figure 9 shows the boundaries of the WHPAs and the DWSMAs. These are based on a WHPA that are defined by a 10-year time of travel. Figure 9 also shows the emergency response area (ERA), which is defined by a 1-year time of travel.

This report also lists the technical information that was used to prepare this portion of the WHP Plan in accordance with the MR. Information pertaining to the Aquifer Test Plan (ATP) and the well vulnerability sheets can be obtained from the (Minnesota Department of Health) MDH.

The primary City Wells included in the WHP Plan are listed in Table 1. Well 3 (163648) is an emergency well. An inner wellhead management zone, which is the area within a 200-feet radius around the well, serves as the wellhead protection area for the emergency wells and is not displayed in this report.

Table 1 - Water Supply Well Information
City of Big Lake

Local Well Name	Unique Number	Type	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed/ Reconstructed	Well Vulnerability	Aquifer
Well No. 1	220959	Primary	12	104	210	1957	Vulnerable	Mt. Simon-Fond Du Lac
Well No. 2	217948	Primary	12	105	230	1967	Vulnerable	Mt. Simon-Fond Du Lac
Well No. 3	163648	Emergency	12	119	300	1980	Vulnerable	Mt. Simon-Red Clastics
Well No. 4	523954	Primary	18x12	125	192	1993	Vulnerable	Mt. Simon
Well No. 5	659386	Primary	24	78	178	2001	Vulnerable	Mt. Simon-Red Clastics
Well No. 6	705488	Primary	18	110	202	2004	Vulnerable	Mt. Simon-Fond Du Lac
Well No. 7	763778	Primary	24x18	109	220	2008	Not Vulnerable	Mt. Simon-Hinckley

2. Assessment of the Data Elements

Table 2 presents the assessment of the data elements as outlined in the MDH's scoping letter of Nov. 15, 2012 relative to the present and future implications of planning items that are specified in MR, part 4720.5210.

Table 2 - Assessment of Data Elements

Data Element	Present and Future Implications				Data Source (See Selected References for Numbered Citations)
	Use of the Well (s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Precipitation	H	H	H	H	MN Climatology Working Group, City
Geology					
Maps and geologic descriptions	H	H	H	H	MGS, 2000 and 2013, CWI
Subsurface data	H	H	H	H	MGS, 2000 and 2013, CWI
Borehole geophysics	H	H	H	H	MGS
Surface geophysics	H	H	H	H	None Available

Data Element	Present and Future Implications				Data Source (See Selected References for Numbered Citations)
	Use of the Well (s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Maps and soil descriptions	M	H	H	H	NRCS
Water Resources					
Watershed units	L	M	L	M	National Hydrography Dataset (USGS)
List of public waters	L	H	L	L	DNR, National Hydrography Dataset (USGS)
Land Use					
Parcel boundaries map	L	L	L	L	Sherburne County GIS Data
Political boundaries map	L	H	L	L	ESRI Data
PLS map	L	H	L	L	ESRI Data
Public Utility Services					
Transportation routes and corridors	L	M	M	M	ESRI
Storm/sanitary sewers and PWS system map	M	L	L		City, County
Public drainage systems map or list	L	L			ESRI Data
Records of well construction, maintenance, and use	H	H	H	H	City, CWI, MDH Files
Surface Water Quantity					
Stream flow data	M	H	M		USGS, DNR, Metropolitan Council
Ordinary high water mark data	L	L			FEMA, DNR
Permitted withdrawals	L	L			DNR
Protected levels/flows	L	L			DNR
Water use conflicts	L	L			DNR
Groundwater Quantity					
Permitted withdrawals	H	H	H	H	DNR
Groundwater use conflicts	H	H	H	H	DNR
Water levels	H	H	H	H	DNR, MPCA, MDH, City
Surface Water Quality					
Monitoring data summary	L	M			MDH, MPCA, MDA, DNR, City
Groundwater Quality					
Monitoring data	H	H	H	H	MPCA, MDH, USGS
Isotopic data	H	H	H	H	MPCA, MDH. USGS, UMN
Tracer studies	H	H	H	H	None Available
Contamination site data	H	H	H	M	City, MPCA and MDA
MPCA and MDA spills/release reports	H	H	H		MPCA and MDA

Definitions Used for Assessing Data Elements:

High (H) – The element has a direct impact.

Moderate (M) – The element has an indirect or marginal impact.

Low (L) – The element has little if any impact.

Shaded – The element was not required by MDH for preparing the WHP Part 1 Plan.

3. General Descriptions

3.1 Description of the Water Supply System

The City, shown on Figure 1, obtains its drinking water supply from six primary wells, City Wells No. 1, 2 and 4 through 7. The wells are shown on Figure 2 and Table 1 summarizes information regarding them.

3.2 Description of the Hydrogeologic Setting

The hydrologic setting for the Mt. Simon Sandstone aquifer is described in Minnesota Department of Health (MDH), 2003. A summary of the hydrologic conditions at the City Wells is presented in Table 3.

The geology in the vicinity of the City consists of Quaternary-age glacial and post-glacial deposits that are underlain by Cambrian-aged bedrock. Terrace deposits composed primarily of outwash sand are predominant throughout the study area as seen in cross-section on Figures 3 and 4. These sand deposits overly regionally extensive glacial till deposits. While the till does appear to be present over most of the area of the study, there does appear to be an area around City Well No. 7 where the outwash sand is found from the surface to the bedrock as shown on Figure 3.

Two buried bedrock valleys are present in the area of the City's eastern wells. One trends east to west north of Wells No. 1, 2 and 4 and south and west of Wells No. 6 and 7. Another valley trends north to south between Wells No. 1 and 3. Starting at the eastern side of Big Lake and to the west, the Mt. Simon bedrock is largely absent over large areas In these areas primarily clay-rich till overlies the Fond du Lac Formation or other, deeper bedrock units. However, Mt. Simon sandstone is still present in isolated areas, such as the area north of City Well No. 5, as seen on Figure 2. There are also isolated areas of the Eau Claire formation aquitard overlying the Mt. Simon sandstone, particularly in the areas of City Wells No. 1, 4, 6, and 7, which is also shown on Figure 2.

Table 3 - Description of the Hydrogeologic Setting at Wells No. 1, 2 and 4 Through 7

Aquifer	Attribute	Descriptor	Data Source
Mt. Simon (CMTS)	Aquifer Material	Sandstone	City Well Logs
	Primary Porosity	0.23	Typical of aquifer material.
	Aquifer Thickness	56-108 ft	City Well Logs
	Stratigraphic Top Elevation	836-874 feet MSL	City Well Logs
	Stratigraphic Bottom Elevation	737-814 feet MSL	City Well Logs
	Hydraulic Confinement	Confined	City Well Logs
	Transmissivity (T)	Reference Value/Range 5,250 ft^2/day (2,180 – 9,718 ft^2/day)	The reference value for the transmissivity of the Mt. Simon Aquifer was determined from pumping tests conducted at City Well No. 6 (705488) in July of 2004 and City Well No. 7 (763778) in July of 2008.
	Hydraulic Conductivity (K)	Reference Value/Range : 30 ft/day (15 – 114 ft/day)	See above.
	Groundwater Flow Field	Flow to the east and south (slightly variable) Hydraulic Gradient: 1.25 x 10^{-3} feet/foot	Measured from model results. Flow generally to southeast toward Mississippi River with some trending southwest from Elk River toward City Wells No. 6 and 7.

4. Delineation of the Wellhead Protection Area

4.1 Delineation Criteria

The boundaries of the WHPA for the City are shown in Figure 9. Table 4 provides descriptions of how the delineation criteria that are specified under MR, part 4720.5510 were included in the model.

Table 4 - Description of WHPA Delineation Criteria

Criterion	Descriptor	How the Criterion was Addressed
Flow Boundary	Mississippi and Elk Rivers and Big Lake	The rivers and lake provide boundary conditions within the regional model north and south of the City. They are included in the local model and help set the local groundwater flow.
Flow Boundary	Other High-Capacity Wells (Appendix A)	The pumping amounts were determined based on the averaged 2007-2011 pumped volumes. The pumping amounts of these high-capacity wells were included in the methods used for the delineation.
Daily Volume of Water Pumped	See Table 5	Pumping information was obtained from the Minnesota Department of Natural Resources Appropriations Permit 1979-3190. The annual pumped volumes were converted to a daily volume pumped by a well.
Groundwater Flow Field	See Figure 7	The model calibration process addressed the relationship between the calculated versus observed groundwater flow field.
Aquifer Transmissivity	Reference Value 5,250 ft^2/day	The reference value for the transmissivity of the Mt. Simon Aquifer was determined from pumping tests conducted at City Well No. 6 (705488) in July of 2004 and Well No. 7 (763778) in July of 2008.
Time of Travel	10 years	The public water supplier selected a 10-year time of travel.

Information provided by the City and from the Minnesota Department of Natural Resources (DNR) SWUDS database were used to identify the maximum volume of water pumped annually by each well over the previous five-year period. The volumes pumped from the wells over previous five years and the rates used in the delineation are summarized in Table 5. The total volume illustrated in Table 5 (762.8 MGY) is approximately 41% greater than the highest single-year demand over the period of record (540.8 MGY in 2009), indicating a conservative delineation volume. The daily volume of discharge used as an input parameter in the model was calculated by dividing the annual withdrawal volume by 365 days.

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

Well Name	**Unique Number**	**Total Annual Withdrawal (million gallons/year[MGY])**					Maximum Withdrawal 2008 - 2012 (MGY)	5-Year Projected Value (MGY)	Withdrawal used in Current WHP Plan (MGY)
		2009	**2010**	**2011**	**2012**	**2013**			
Well No. 1	220959	**27.6**	8.7	0.6	1.3	.6	27.6	46.0	46.0
Well No. 2	217948	**97.2**	84.2	89.0	4.2	31.4	97.2	52.0	97.2
Well No. 3	163648	20.0	**24.0**	20.0	1.0	2.2	24.0	Emergency	n/a
Well No. 4	523954	**157.1**	133.1	105.5	122.4	126.6	157.1	156.9	157.1
Well No. 5	659386	**111.4**	89.7	72.6	75.8	62.6	111.4	97.2	111.4
Well No. 6	705488	77.8	82.4	60.9	**129.5**	118.9	129.5	166.0	166.0
Well No. 7	763778	49.7	85.8	87	**144.4**	110.8	144.4	185.1	185.1
Totals		540.8	508.0	435.7	478.6	485.1	478.6	612.5	762.8

- Source: The DNR State Water Use Database System (SWUDS) Permit Number 1979-3190.

4.2 Method Used to Delineate the Wellhead Protection Area

Figure 9 shows the WHPA delineated for the City Wells using the results of the porous media modeling delineations. The WHPA is a composite of all the areas identified using methods described in this report that potentially contribute recharge to the aquifers used by the City Wells within a 10-year time of travel.

4.2.1. Porous Media Delineations

The porous media delineations of the WHPA for the City Wells were completed using an existing regional MODFLOW model, Metromodel 2.0, which was provided by the Metropolitan Council (Met Council, 2009). MODFLOW is a 3D, cell-centered, finite difference, saturated flow model developed by the USGS (Harbaugh et al., 2005).

The regional Metromodel 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 local-scale model, limited to parts of Sherburne and Wright Counties, was extracted from the regional seven-county model and is shown on Figure 5. The local model and all of the modeling for this amendment was completed using GMS (Aquaveo, 2013), a pre- and post-processor for MODFLOW. The local model was created using the technique of local grid refinement where a smaller, more refined grid is used within the regional model. The heads computed from the regional model then provide some of the boundary conditions for the local model as specified heads. The size of the domain and the general flow-field characteristics of the model were based on the Metromodel and the results of the original delineation.

The local model domain was divided into a three-dimensional, non-uniform grid. The model has 295 rows, 293 columns, and five layers. The details of the Metromodel were then translated to the local-scale model using GMS. Finer grid spacing was applied in the local model with telescopic mesh refinement used in the area of the site where the City wells are located. This grid spacing (~10 m in the area of the City's wells) provides better definition in the area of the flow field where simulating the influence of pumping from the wells was critical. The base of the model is variable at an elevation of approximately 100 meters (m) above mean sea level (amsl). There are 5 layers in the model to represent the bedrock units and unconsolidated materials. These layers correspond to the approximate vertical extent of the various stratigraphic units observed in the vicinity of the City. Layer 1 represents an outwash sand layer that appears to be present at the surface over the majority of the model area. Layer 2 primarily represents a clay till layer that also appears to be fairly widespread in the model area. Layer 2 also includes areas where the Eau Claire confining unit is present. Layers 3-5 represent primarily the Mt. Simon sandstone and glacial till in the area of the City Wells with overlying bedrock units being represented in these layers south of a fault system occurring south of the City. The unconsolidated materials in Layers 3, 4, and 5 are considered to have more sand than the clay-rich till represented in Layer 2 and thus have a slightly higher conductivity (0.5 m/d in Layer 2 and 1.0 m/d in

the Layers 3-5). The geology in the area of the City's Wells can be seen on Figures 3 and 4 and all 6 cross-sections in the original Part 1 report.

The size of the domain and the general flow-field characteristics of the model were based on the results of the original delineations, and a preliminary analysis using the regional model.

Changes were made to the original Metromodel defined characteristics in the area of interest around the City's Wells. The entire local model was reduced from 9 to 5 layers as Layers 1-5 of the Metromodel, in this area, were defined exactly the same. Reducing them to a single layer eliminated significant numerical complexity in the model while maintaining an accurate discretization of aquifer properties. Site specific information allowed for more accurate definition of aquifer characteristics. These changes were confined primarily to the layering in the area of the City. One of the changes was to import the bedrock geology shapefiles from the 2013 Geologic Atlas of Sherburne County (MGS, 2013) to better define areas of both the Mt. Simon sandstone and till areas as wells as those portions of the Mt. Simon sandstone that are overlain by the Eau Claire formation The resulting model is assumed to better reflect the actual conditions found in the area of interest. Also, the thicknesses of the aquifers had to be slightly changed to match the data from the well logs for the City Wells

In addition to the previously mentioned changes, the following modifications were incorporated in the refined model:

- The pumping rates from Table 5 were assigned to the City Wells.
- The pumping rates from Table 1 in Appendix A were assigned to the permitted high-capacity wells located within the local model boundary.

A series of 20 particles were launched at each well. A porosity of 23 percent was used for the Mt. Simon aquifer.

As part of the sensitivity analysis, groundwater pathline analyses were performed to delineate the 1-, 5- and 10-year capture zones and ultimately the WHPA. The pathline analysis consisted of using MODPATH, a flowpath calculation program, to determine the capture zone for each of the City Wells. This was completed by tracing 20 flow paths from each well for a 10-year travel time in each of the three layers of the model the wells were located in (Layers 3-5).

The resulting WHPA boundaries (Figure 9) are a composite of the 10-year capture zones calculated using this model for the base case parameters and the parameter values used in the sensitivity analysis and are discussed in the following section. The model input files are available upon request from the MDH.

4.3 Results of Model Calibration and Sensitivity Analysis

The goal of numerical model calibration is to obtain a reasonable correlation between the simulated model results and observed field data. The calibration process is generally completed by running a series of steady-state simulations (simulations where the flow magnitude and direction are constant with time), comparing calculated heads to the measured heads at wells within the model domain while changing the model parameters until the best match between the two is achieved. After a model is reasonably calibrated a sensitivity analysis is used to determine the impact that changes to an input parameter have on the output of the model. In areas where there is a great deal of uncertainty in the physical parameters, either as a consequence of lack of data or based on the uncertainty associated with the interpretation of available data (i.e. pumping test analyses), a number of models are generally run to observe the effect on the model results over the range of potential values for each of the significant parameters. While none of the individual capture zones delineated as part of this analysis should be considered the "correct" one, it is assumed that the actual capture zone is encompassed by the resulting concatenation of analysis zones.

4.3.1. Calibration

The calibration plot, showing measured versus simulated hydraulic head values, for Layers 1 through 5 of the local model is illustrated on Figure 6. The plot shows that the simulated values and measured head values generally compare quite favorably and have a normalized root mean squared (NRMS) error of approximately 11 percent. Much of the error stems from areas near the edges of the grid where the model is less accurate and there are large numbers of calibration points measured. These portions of the model still calibrate reasonably well and are outside the area of interest. Therefore, no further effort was put into improving the calibration once the simulated heads in the area of interest closely matched the measured heads. Using only the calibration points within 10 miles of the City's Wells (over 330 points) the NRMS error is less than 9.5%.

More extensive observation data collected within the same general time period and more accurate, site-specific transmissivity values throughout the model domain would improve calibration and model confidence.

The groundwater flow field and hydraulic heads in the area of the City for the calibrated model are shown on Figure 7. The 1-, 5-, and 10-year capture zones predicted using the calibrated model are shown on Figure 8. However, due to the amount of variability associated with the physical characteristics of the aquifer; an uncertainty analysis was completed as part of the modeling effort

4.3.2. Sensitivity Analysis

Sensitivity is the amount of change in model results caused by the variation of a particular input parameter. For example, changing the hydraulic conductivity of an area can change the calculated head values in and around the area of the modified model as compared to the heads in unmodified model. Because of the relative simplicity of the area of interest in this model, the size and orientation of the modeled capture zone may be sensitive to any of the input parameters:

The **pumping rate** determines the volume of the aquifer that donates water to the well. Increasing the pumping rate will expand the capture zone, for a given thickness, and decreasing is will make the capture zone smaller.

- **Results –** The pumping rate for each well was defined by Minnesota Rules and therefore is not a variable for consideration in this analysis.

The **direction of groundwater flow** and gradient can often be variable and change significantly with changing conditions such as fluctuations in local surface water elevations or the pumping rates in local wells.

- **Results** – The regional flow direction and gradient were determined through the modeling process and closely resemble the flow direction and gradient determined through mathematical analysis of the measured heads in the area. The models were calibrated to hydraulic heads, and the local refined model calibration mirrored the regional calibration. Based on the regional observation data, the characteristics of the flow field and the use of the aquifers of interest there is not likely to be a significant change to the flow field.

The **horizontal hydraulic conductivity** influences the size and shape of the capture zone. A change in the hydraulic conductivity of the aquifer will alter the location of the capture zones.

The **horizontal hydraulic conductivity** influences the size and shape of the capture zone.

- **Results** - The pumping test at City Well No. 7 indicates the hydraulic conductivity of the Mt. Simon aquifer is approximately 30 ft/d (9.1 m/d) while analysis of pumping test data at City Well No. 6 indicates the hydraulic conductivity of the aquifer, including both the bedrock and the overlying unconsolidated material, could be as high as 114 (ft/d) (35 m/d) and as low 26 ft/d (8 m/d). Differences in the conductivity of the Mt. Simon can be expected between areas where it is overlain by the Eau Claire confining unit and areas where the Mt. Simon is the surficial bedrock, having been exposed to weathering. All of the transmissivity data and the analysis can be found in the Aquifer Test Plan documentation from the MDH.

The aquifer **thickness** and **porosity** influence the size and shape of the capture zone by limiting the water-bearing volume within a given area of aquifer. Decreasing or increasing either thickness or porosity forces a proportional decrease or increase in the areal extent of the capture zone.

- **Results** - The thickness of the aquifer around the wells in the model was adjusted to reflect the approximate thickness of the Mt. Simon Sandstone from the well logs. In addition, the conductivity at each well in the model was modified such that the modeled transmissivity would match the transmissivity calculated from the actual thickness and referenced conductivity from Table 3.

4.4 Addressing Model Uncertainty

Using computer models to simulate groundwater flow always requires that simplifying assumptions be made. Local geology can be highly variable and information from well logs and pumping tests indicates that this is likely the case near the City Wells. Unfortunately, existing information is not detailed enough to define this degree of variability and interpretation of log and test data is often inconsistent. For models of the scale used in this study, the information and computational ability does not exist to precisely delineate the WHPA. To account for this, a number of models are run to examine the various potential WHPAs for the wells, given the range of the input data mentioned previously.

MODFLOW models were used to delineate the capture zones for the Mt. Simon Aquifer that supplys water to the City Wells. As described previously, the hydraulic conductivity was the single variable identified that could cause the greatest change in the WHPAs for the City Wells. The range of hydraulic conductivity determined from testing and analysis is summarized in Table 3. Simulations were completed using the reference value for the conductivity. The Mt. Simon conductivity value was then doubled and halved to create the range for the uncertainty analysis.

Capture areas were then delineated for the assessed range of aquifer conductivities for a time-of-travel period of 10 years and are shown on Figure 9. The WHPAs for the City wells consist of a composite of the three porous media aquifer delineations for the refererence and high and low conductivity values used in the uncertainty analysis, shown on Figure 9.

4.5 Conjunctive Delineation

Consideration for completing a conjunctive delineation is based on the high vulnerability at City Well No. 6 and the presence of tritium and stable isotopes in groundwater samples collected from City Wells No. 1 and 2 and 4 through 6, and the presence of surface water features within or near the WHPA. The one surface water feature is Big Lake, located approximately 600 feet west of Well No. 1 (Figure 9). After reviewing the data, a conjunctive delineation was not necessary for the following reasons:

- Significant presence of glacial till across the majority of the WHPA near Big Lake as shown on available CWI well logs, hydrogeologic cross sections presented in the City's Addendum A WHP Plan in 2003 completed by MDH, and on new cross sections 7-7' and 8-8' included as Figures 3 and 4;

- Presence of the confining Eau Claire Formations above the Mt. Simon Sandstone aquifer near City Wells No.1, 4, and 7 as shown on the 10-county metro bedrock map (MGS, 2013); and,

- Groundwater elevations in wells near Big Lake are lower than the surface water elevation in Big Lake, indicating a poor connection between the lake and the aquifer.

- The stable isotope results for Wells 2, 4 and 5 are not indicating a contribution of surface water. Well 1 was sampled on two occasions, and the stable isotope results fell off the meteoric water line, but are not indicating a significant contribution of surface water (Appendix B).

Although no conjunctive delineation was completed, additional characterization of the groundwater system is recommended considering the presence of tritium in previous groundwater samples from City Wells No. 1, 2, 4, and 6.

5. Delineation of the Drinking Water Supply Management Area

The boundaries of the DWSMA were defined by LBG and the public water supplier using the following features (Figure 9):

- Roads, and
- Public Land Survey System coordinates.

6. Vulnerability Assessments

The Part 1 Wellhead Protection Plan includes the vulnerability assessments for the public water supply well and DWSMA. These vulnerability assessments are used to help define potential contamination sources within the DWSMA and to select appropriate measures for reducing the risk that they present to the public water supply.

6.1 Assessment of Well Sensitivity

Review of site-specific data from the CWI and data presented in the previous model report indicates that sufficient low permeability material overlies the Mt. Simon aquifer across the majority of the DWSMA. However, the area closer to City Well No. 5 is considered moderate geologic sensitivity, while the area closer to Well No. 6 is considered very high sensitivity due to the lack of low permeability material and a static water level within 20 feet of grade.

The assessment of geologic sensitivity is a useful metric when estimating the relative vertical downward travel time of contaminants from grade level to the water table or source aquifer. A Level-3 DNR geologic sensitivity assessment was used for the City Wells. The Level-3 DNR geologic sensitivity rating is an empirical value determined by dividing the cumulative thickness of low permeability units above the aquifer by 10 (DNR, 1991). The resulting score is termed the "L-score". A higher L-score indicates more low-permeability material above the aquifer, and therefore a lower vulnerability. A low L-score represents higher vulnerability. For example, a rating of L-1 has a higher vulnerability than L-9, because there is less low-permeability material present above the aquifer. A Level-3 assessment was conducted since the aquifers are overlain by varying thicknesses of clay. As mentioned above, points are also assigned to casing integrity and depth, pumping rate, isolation distance to contaminant sources, and chemical data, in addition to the geologic sensitivity.

A Level-3 assessment was also conducted for all CWI wells located in the vicinity of the DWSMA delineation. The geologic sensitivity "L-scores" were calculated by MDH using a Geographic Information System tool that utilizes lithology information from the MN CWI. Figure 10 illustrates the geologic sensitivity for the DWSMA as determined by mapping L-scores from the 85 well logs across the DWSMA. Several wells were excluded from this analysis and include those wells where "drift" was logged in the borehole. Since drift is an ambiguous geologic term and does not specifically indicate clay or sand, those logs were eliminated from the sensitivity analysis and noted on Figure 10 as "insufficient data". Geologic sensitivity near the City Wells ranges from low near Wells No. 1, 2, 4 and 7, moderate near Well No. 5, to Very High near Well No. 6.

6.2 Assessment of Well Vulnerability

The well vulnerability assessment was conducted in accordance with the MDH guidance document, Assessing Well Vulnerability for Wellhead Protection (MDH, 1997). The vulnerability of a well is scored based on the following six categories: DNR geologic sensitivity rating, casing integrity, casing depth, pumping rate, isolation distance from contaminant sources, and chemical and isotopic information.

Chemistry results are included as Attachment B and support the moderate and high vulnerability ratings across the DWSMA. Specifically, the elevated levels of chloride, bromide/chloride ratios, and Tritium isotopes indicate significant recharge of surface water and younger groundwater. It should be noted that Well 7 (763778) has a low vulnerability rating due to the lack of tritium detected in groundwater at this well.

Vulnerability assessment rating sheets and vulnerability scores for Wells No. 1 and 2 and Wells No. 4 through 7 were obtained from the MDH and reviewed by LBG. Figure 11).

7. Assessment of the Drinking Water Supply Management Area Vulnerability

Once the geologic sensitivity was determined for wells in the DWSMA and vulnerability ratings were determined for the City Wells, the vulnerability ratings for the DWSMA could be determined. Vulnerability across the DWSMA ranges from moderate near Wells No. 1, 2 4, and 7 and high near Wells No. 5 and 6. The reason for the high vulnerability near Wells 5 and 6 is due to less impermeable clay material above the aquifer as well as the absence of the Eau Claire Formation in a bedrock valley that trends northwest to southeast across the DWSMAs.

With the exception of Well 7 (763778), tritium has been detected above 1 Tritium Unit (T.U) in all of the City Wells. Therefore, the vulnerability rating in the vicinity of the City Wells and across the DWSMA was increased one level compared to the sensitivity rating (Figure 11).

8. Comparing Original Part 1 to Amended Part 1

The original Part 1 was completed using an analytic element model that represented the aquifer using a single thickness, a groundwater flow gradient and limited conductivity values. The amended model employs MODFLOW to represent the complex geology in the Big Lake area and allows for variable thickness as well as the highly variable flow directions induced by both the Mississippi and Elk Rivers. Different pumping rates and the addition of two new wells, City Wells No. 6 and 7, are modifications and additions from the earlier study.

The additions and modifications in both boundary conditions and modeling method lead to some significant changes in the WHPA delineations as seen in Figure 12. The WHPAs for Wells No. 1 and 2 are similar to the original. City Well No. 3 has been reclassified as emergency use. The WHPAs for Wells No. 4 and 5 are similar if not smaller than the original areas and completely new WHPAs have been delineated for City Wells No. 6 and 7, which did not exist when the original Part 1 was prepared.

9. Recommendations

Upon completion of this Part 1 WHP Plan amendment, the following recommendations are provided for the City to consider for better understanding the hydrogeologic conditions of the source aquifers and refinement of future WHPA delineations.

- Continue to periodically collect samples of City Well water and local surface water and conduct stable isotope and nitrogen isotope analyses of these to evaluate the mixture of surface water and groundwater and track changes over time.

- Conduct testing near City Well No. 6 to better determine how well connected the capture area of the well is to water at or near the surface and what the travel time from the surface to the well is to better design protection for this highly sensitive well.

- Continue collecting and analyzing groundwater samples for existing MDH contaminant monitoring program.

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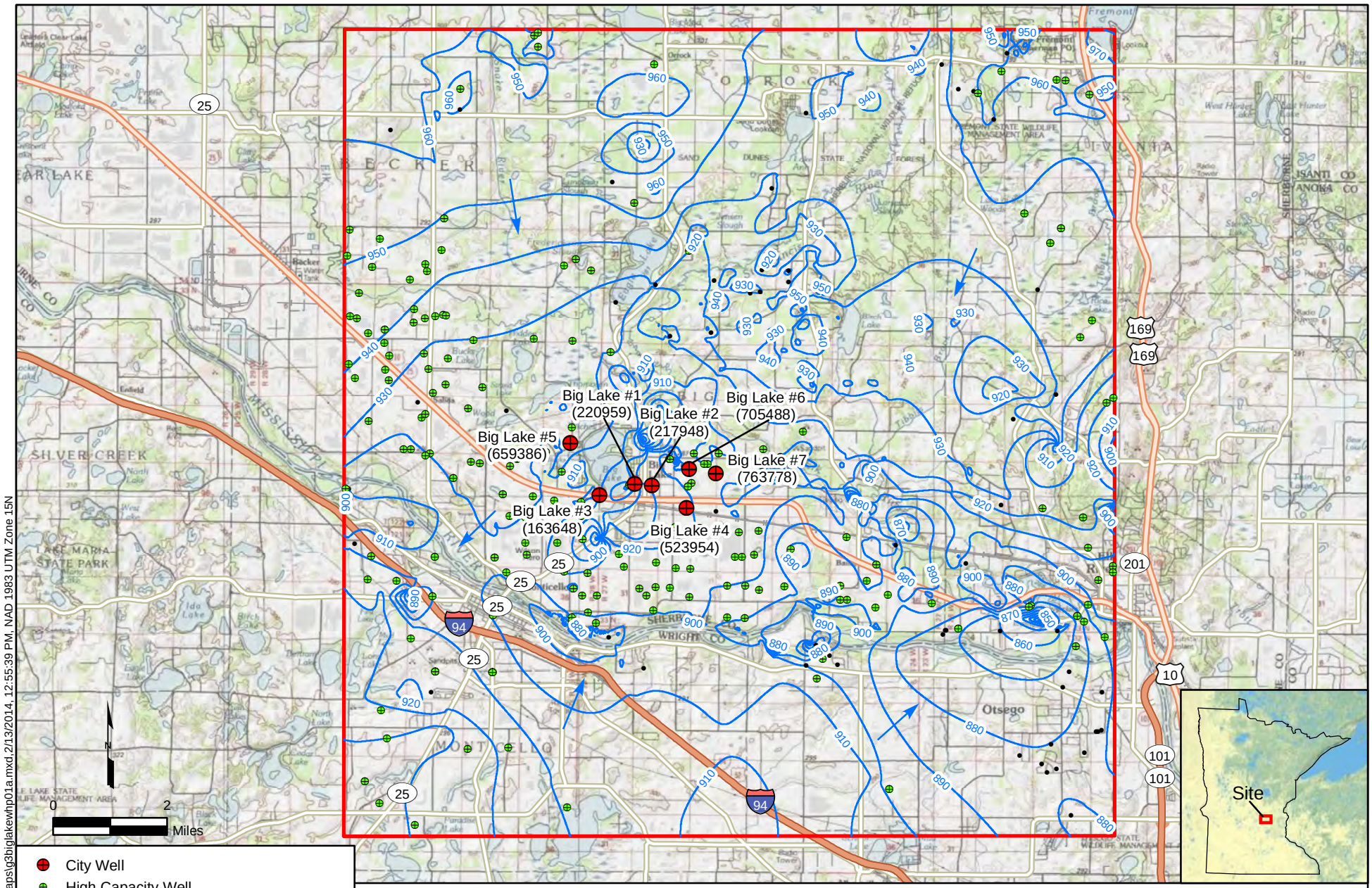
Figures



Source: ESRI Online Imagery: Copyright: 2010 National Geographic Society. CWI Online and CWI Wells Database.

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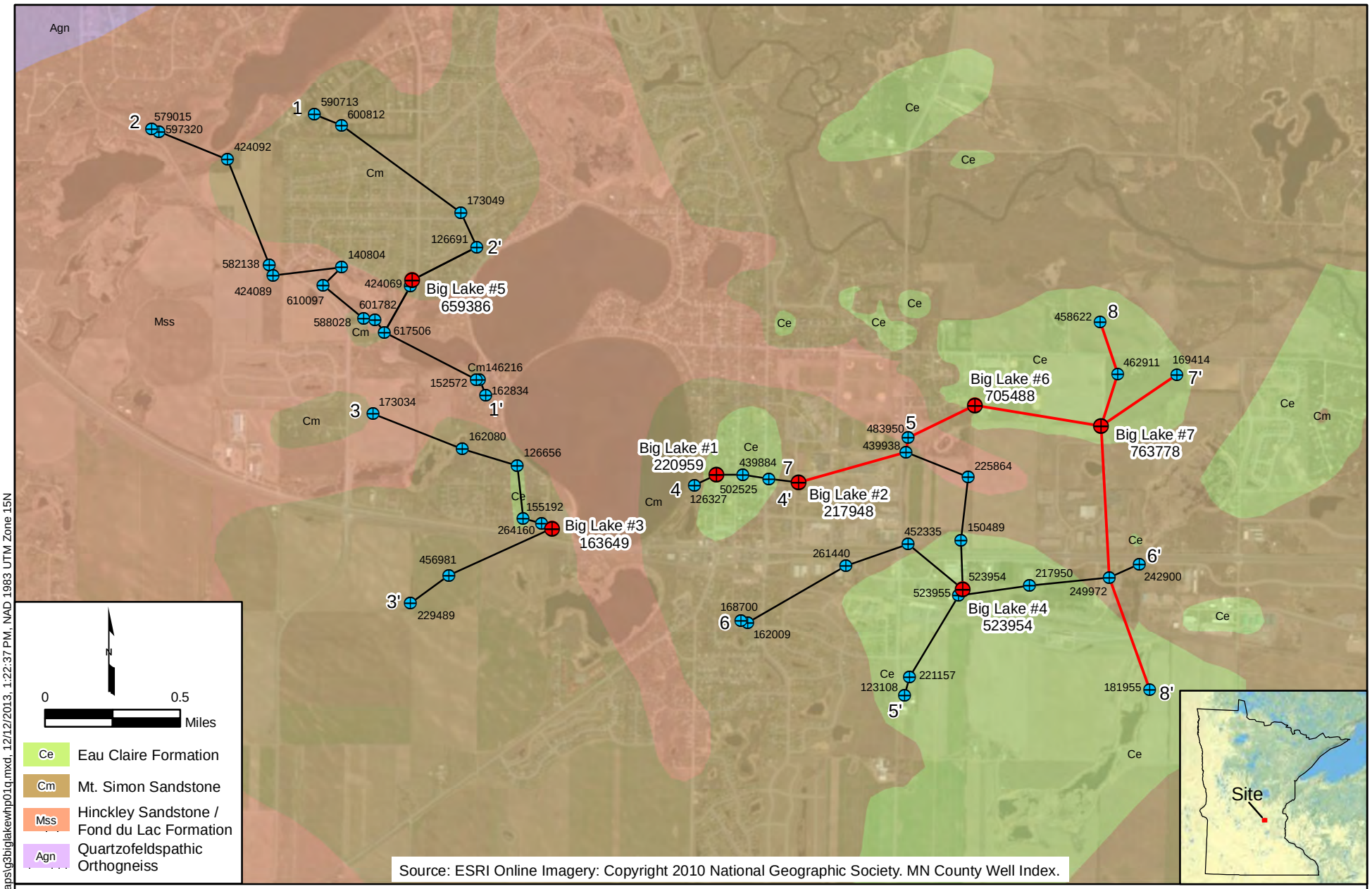
CITY OF BIG LAKE

BIG LAKE, MINNESOTA

SITE LOCATION, HIGH CAPACITY WELLS, GROUNDWATER ELEVATION CONTOURS, AND LOCAL MODEL BOUNDARY

FILE:	g3biglakewhp01a.MXD	DATE:	2/13/2014	FIGURE:	1

G:\GIS\Big_Lake_WHP\maps\g3biglakewhp01a.mxd, 2/13/2014, 12:55:39 PM, NAD 1983 UTM Zone 15N



City Well
CWI Well On Cross Section
2003 Cross Section Location
2013 Cross Section Location

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CITY OF BIG LAKE

BIG LAKE, MINNESOTA

2003 AND 2013 HYDROGEOLOGIC CROSS SECTION LOCATIONS AND BEDROCK GEOLOGY

FILE: g3biglakewhp01q.MXD | DATE: 12/12/2013 | FIGURE: 2

G:\GIS\Big_Lake_WHP\maps\g3biglakewhp01q.mxd, 12/12/2013, 1:22:37 PM, NAD 1983 UTM Zone 15N

7 West

7' East

Big Lake 2 (217948) | 439938 | 483950 | Big Lake 6 (705488) | Big Lake 7 (763778) | 169414

1967 | 1987 | 1992 | 2004 | 2008 | 1980

Outwash | Till | CMTS | CECR | PMFL | PMHN

Elevation (ft amsl)

950 | 900 | 850 | 800 | 750 | 700 | 650

0 300 600 Feet

1 inch = 600 feet horizontal
1 inch = 50 feet vertical

Screened Interval

Completed as Open Hole

Till, Silt, Silty Clayey Sand

Sand and Gravel

CECR Eau Claire Formation

CMTS Mt. Simon Sandstone

PMHN Hinckley Sandstone

PMFL Fond du Lac Formation

Source: Geologic information from Minnesota County Well Index.

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CITY OF BIG LAKE

BIG LAKE, MINNESOTA

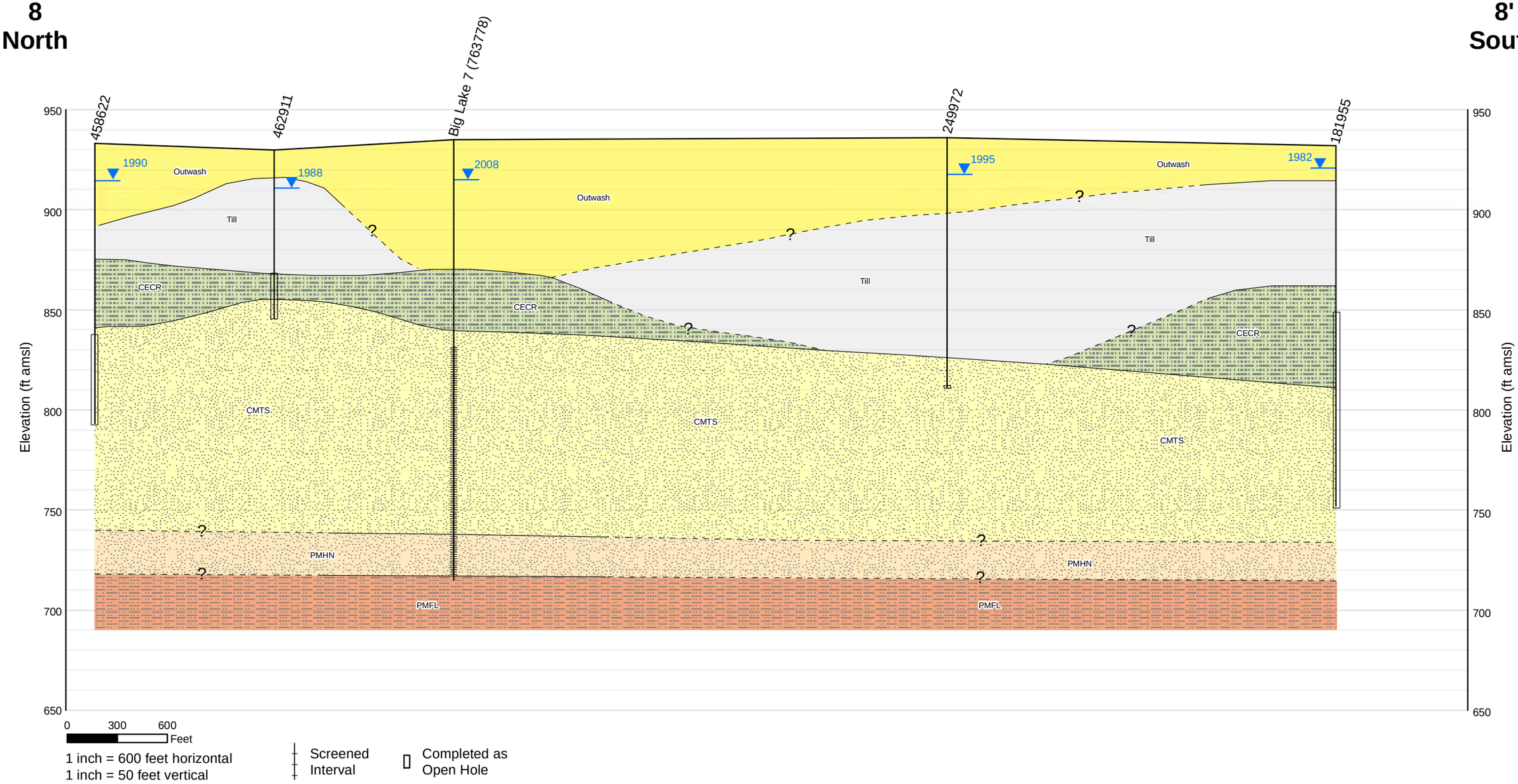
HYDROGEOLOGIC CROSS-SECTION 7-7'

FILE: g3biglakewhp01r-xsect-7.MXD	DATE: 12/12/2013	FIGURE: 3

G:\GIS\Big Lake WHP\maps\g3biglakewhp01r-xsect-7.mxd, 12/12/2013, 11:46:22 AM, NAD 1983 StatePlane Minnesota South FIPS 2203 Feet

8 North

8' South



Till, Silt, Silty Clayey Sand

Sand and Gravel

CECR Eau Claire Formation

CMTS Mt. Simon Sandstone

PMHN Hinckley Sandstone

PMFL Fond du Lac Formation

Source: Geologic information from Minnesota County Well Index.

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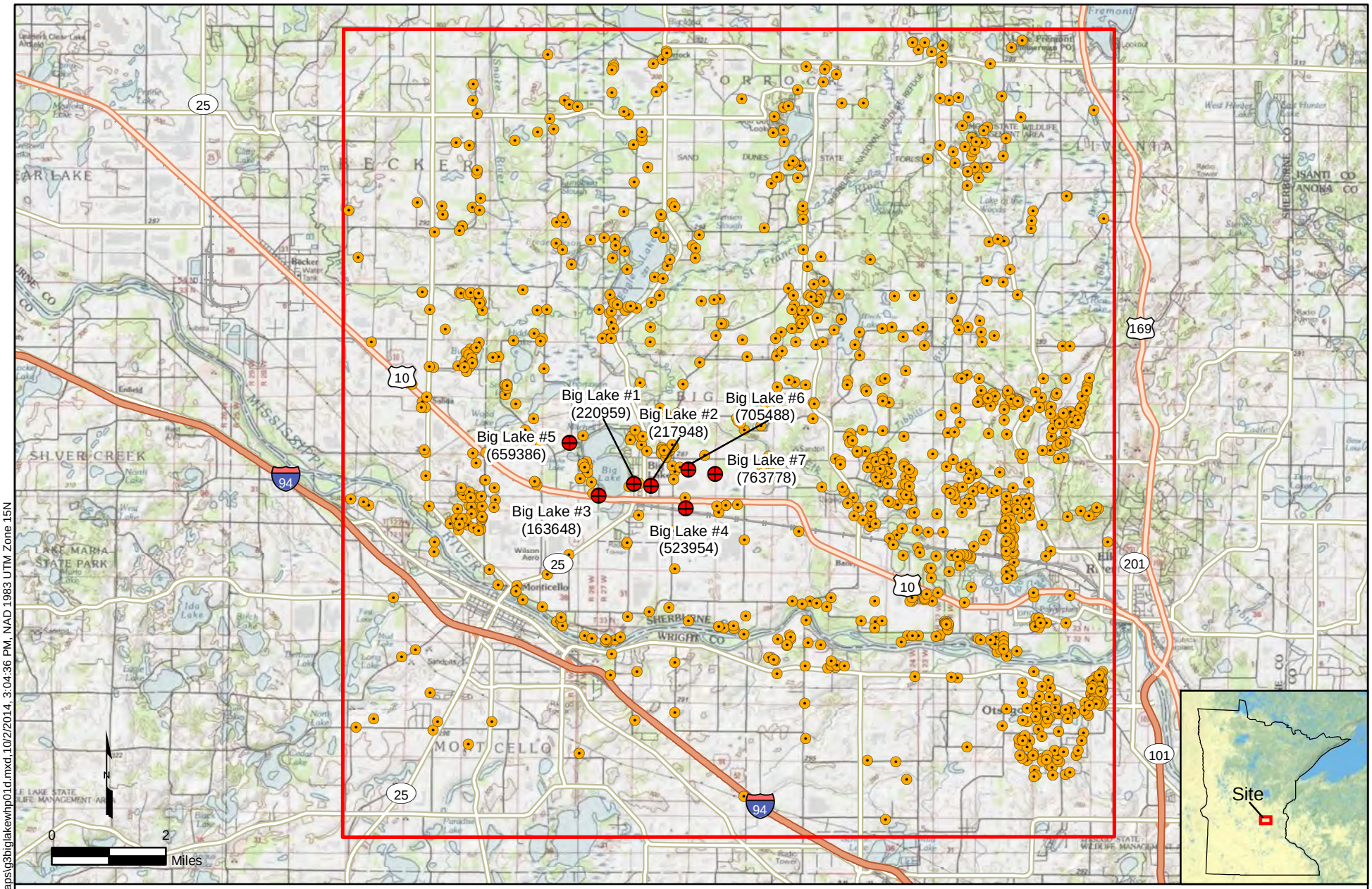
CITY OF BIG LAKE

BIG LAKE, MINNESOTA

HYDROGEOLOGIC CROSS-SECTION 8-8'

FILE: g3biglakewhp01s-xsect-8.MXD	DATE: 3/7/2014	FIGURE: 4

G:\GIS\Big Lake WHP\maps\g3biglakewhp01s-xsect-8.mxd, 3/7/2014, 11:42:59 AM, NAD 1983 StatePlane Minnesota South FIPS 2203 Feet



G:\GIS\Big_Lake_WHP\maps\g3biglakewhp01d.mxd,10/2/2014, 3:04:36 PM, NAD 1983 UTM Zone 15N

City Well
Calibration Points
Local Model Domain

Source: ESRI Online Imagery: Copyright: 2010 National Geographic Society. CWI Online and CWI Wells Database.

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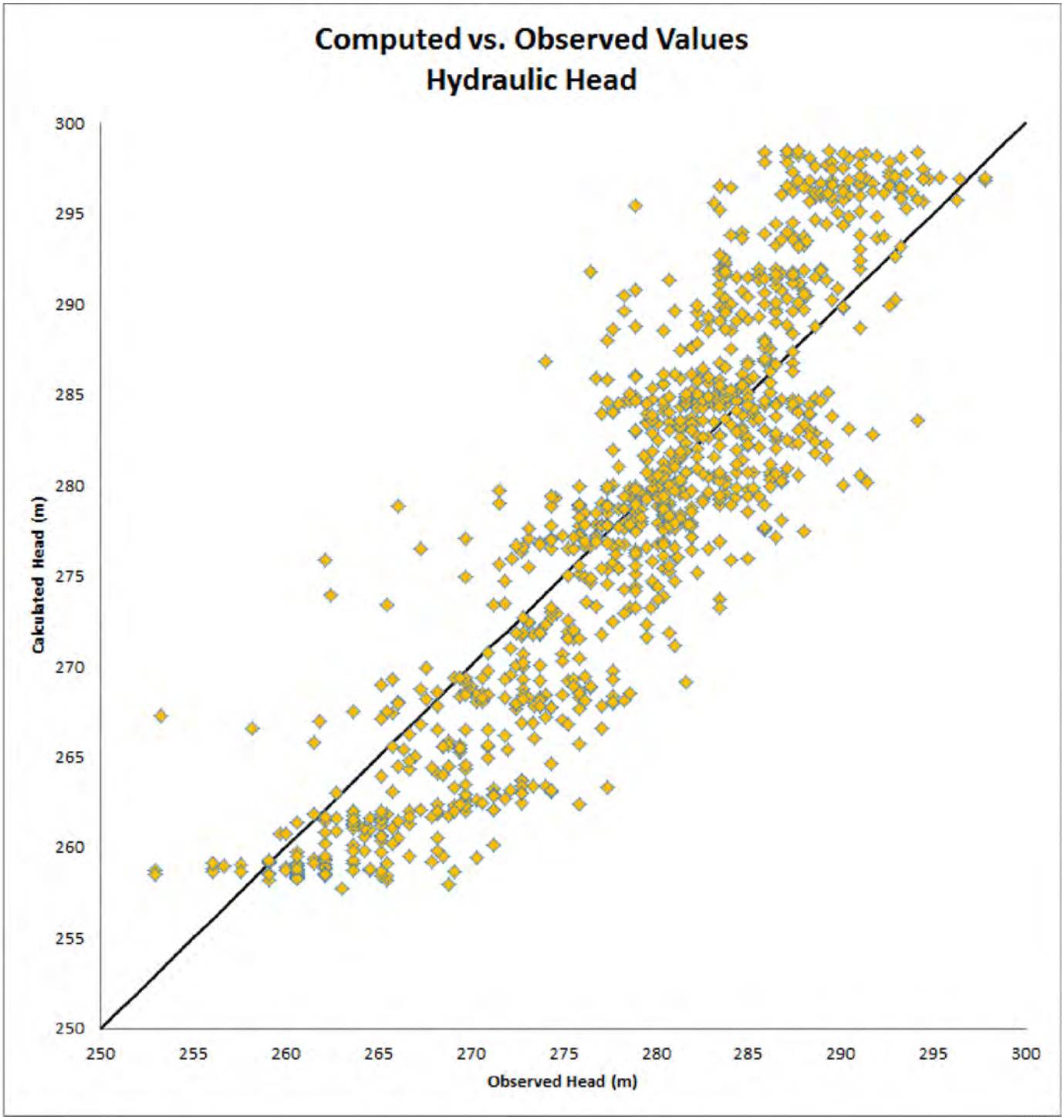
CITY OF BIG LAKE

BIG LAKE, MINNESOTA

LOCAL MODEL DOMAIN

FILE:	g3biglakewhp01d.MXD	DATE:	10/2/2014	FIGURE:	5



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CITY OF BIG LAKE
BIG LAKE, MINNESOTA

LOCAL MODEL CALIBRATION

FILE:	g3biglakewhp01g.MXD	DATE:	10/2/2014	FIGURE:	6

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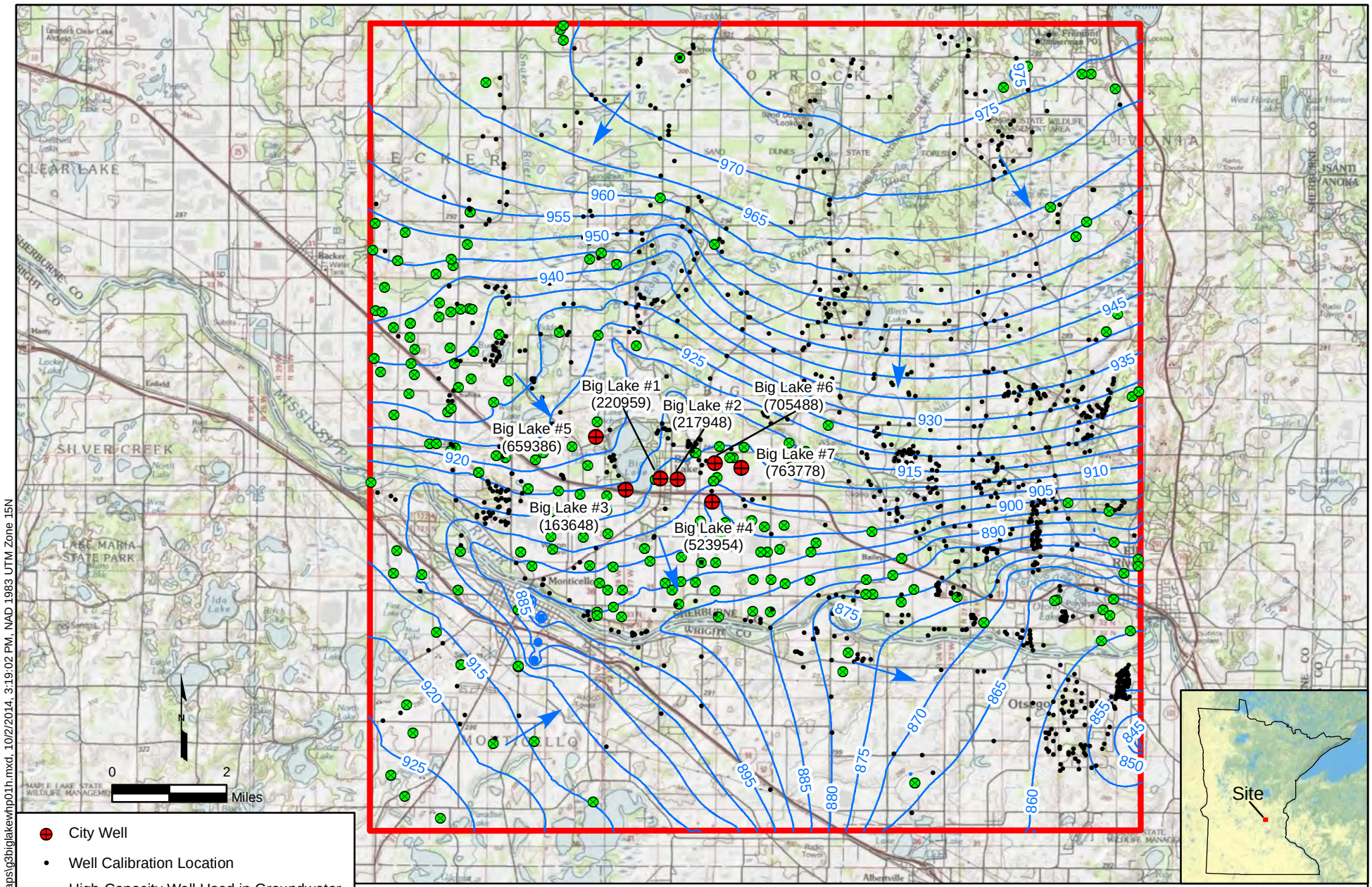

- City Well
- Well Calibration Location
- High-Capacity Well Used in Groundwater Flow Model
- Simulated Potentiometric Surface Contour (feet amsl)
- Groundwater Flow Direction
- Local Model Domain

Source: ESRI Online Imagery: Copyright 2010 National Geographic Society. MN County Well Index. MN DNR Appropriations Database (SWUDS)

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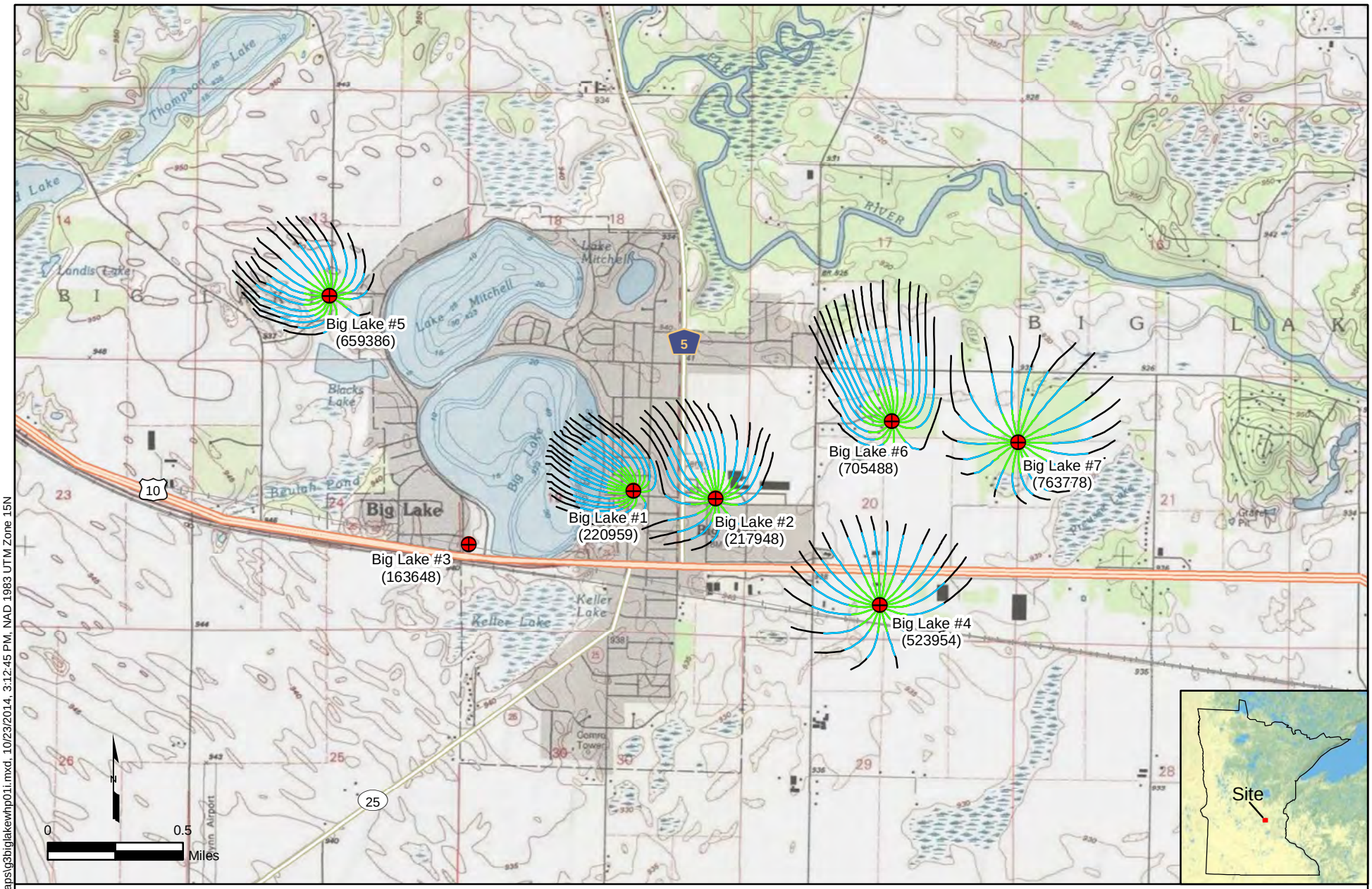
CITY OF BIG LAKE

BIG LAKE, MINNESOTA

SIMULATED GROUNDWATER EQUIPOTENTIAL CONTOURS

FILE:	g3biglakewhp01h.MXD	DATE:	10/2/2014	FIGURE:	7

G:\GIS\Big_Lake_WHP\maps\g3biglakewhp01h.mxd, 10/2/2014, 3:19:02 PM, NAD 1983 UTM Zone 15N



G:\GIS\Big_Lake_WHP\maps\g3biglakewhp01i.mxd, 10/23/2014, 3:12:45 PM, NAD 1983 UTM Zone 15N

- City Well
- 1-Year Flowpaths Mt. Simon Aquifer
- 5-Year Flowpaths Mt. Simon Aquifer
- 10-Year Flowpaths Mt. Simon Aquifer

Source: ESRI Online Imagery: Copyright 2010 National Geographic Society. MN County Well Index. Bedrock Geology (S-20-2000).

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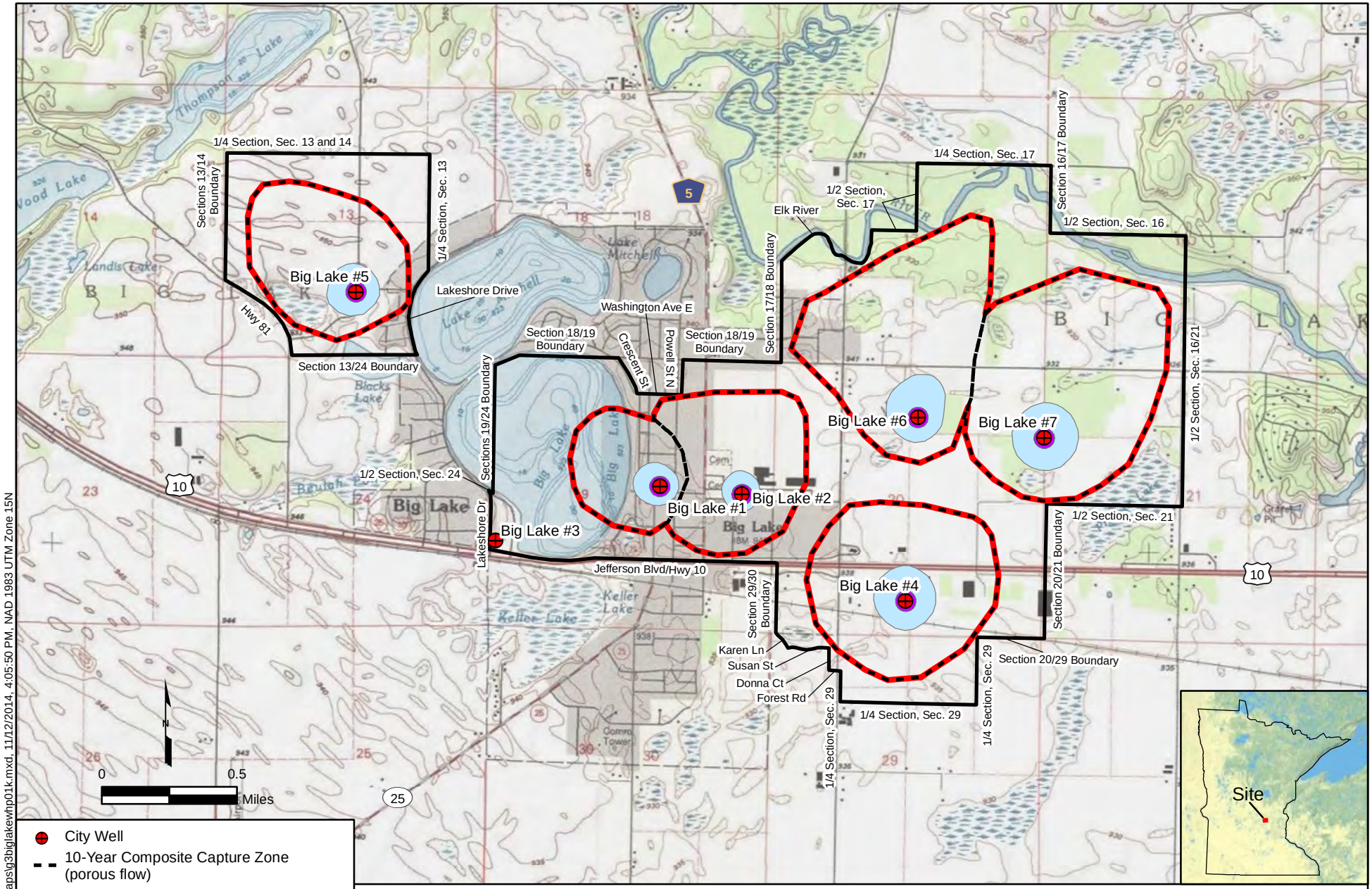
CITY OF BIG LAKE

BIG LAKE, MINNESOTA

1, 5, AND 10 YEAR FLOWPATHS FOR CALIBRATED MODEL
MT. SIMON AQUIFER

FILE:	g3biglakewhp01i.MXD	DATE:	10/3/2014	FIGURE:	8



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Source: ESRI Online Imagery: Copyright 2010 National Geographic Society. MN County Well Index.

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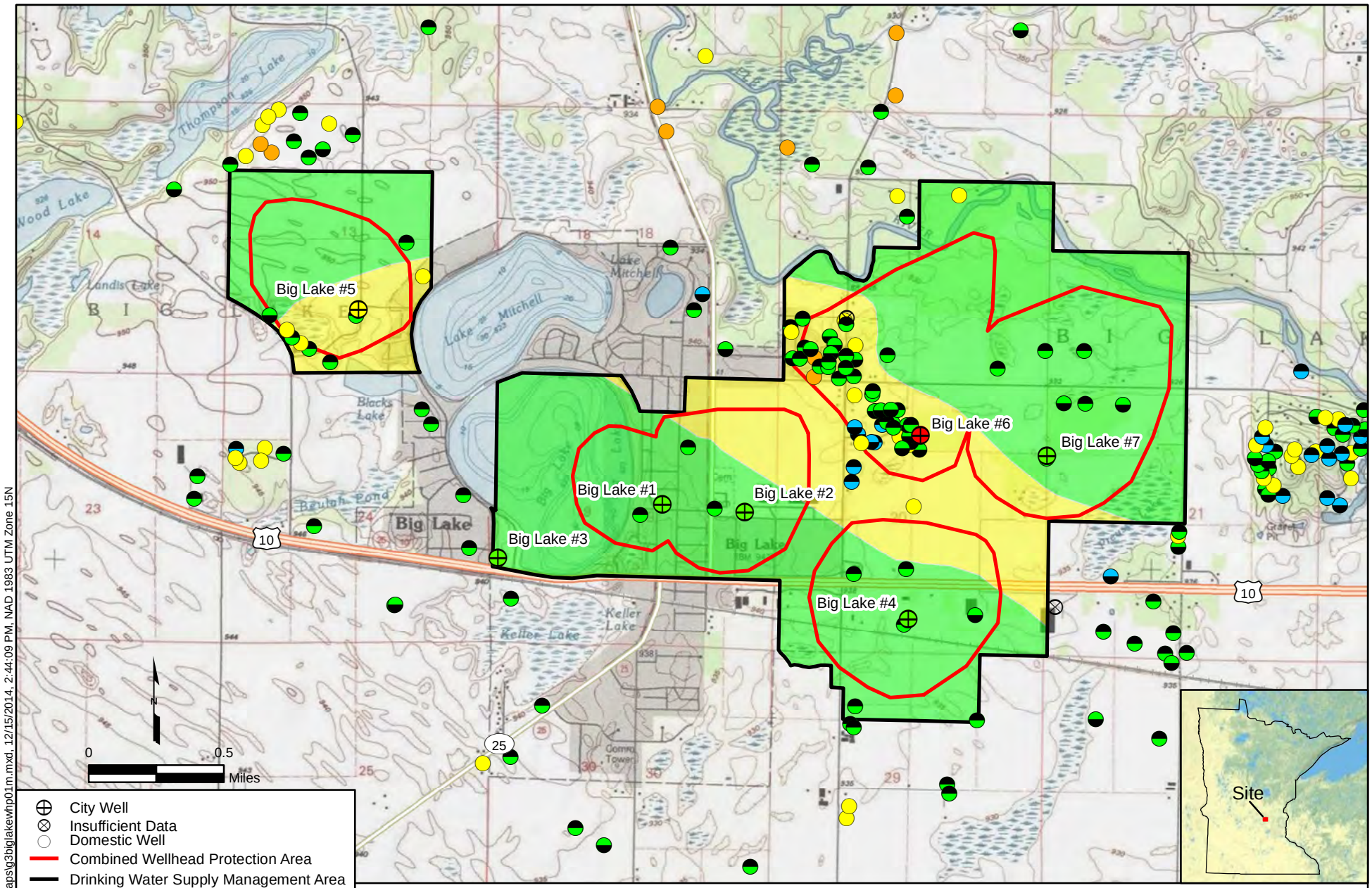
CITY OF BIG LAKE

BIG LAKE, MINNESOTA

COMBINED WELLHEAD PROTECTION AREA BOUNDARIES AND DRINKING WATER SUPPLY MANAGEMENT AREAS

FILE:	DATE:	FIGURE:
g3biglakewhp01k.MXD	11/12/2014	9



Source: Copyright 2011 National Geographic Society, i-cubed. MN County Well Index.

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CITY OF BIG LAKE

BIG LAKE, MINNESOTA

DRINKING WATER SUPPLY MANAGEMENT AREAS
GEOLOGIC SENSITIVITY ASSESSMENT

FILE:	g3biglakewhp01m.MXD	DATE:	12/15/2014	FIGURE:	10

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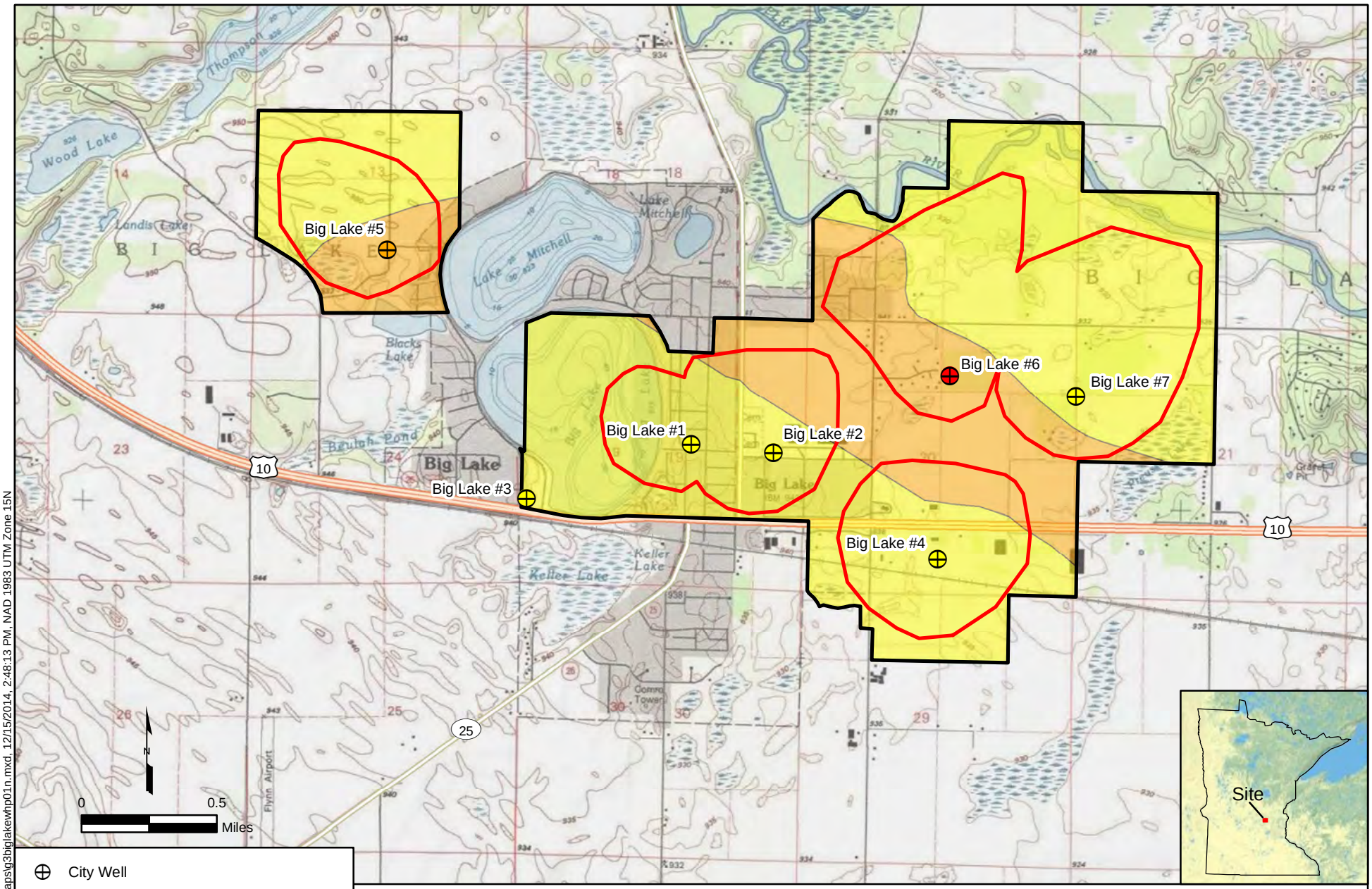

G:\GIS\Big_Lake_WHP\maps\g3biglakewhp01n.mxd, 12/15/2014, 2:48:13 PM, NAD 1983 UTM Zone 15N

- City Well
- Combined Wellhead Protection Area
- Drinking Water Supply Management Area

DWSMA Vulnerability
- Very High
- High
- Moderate
- Low

Source: ESRI Online Imagery: Copyright 2010 National Geographic Society. MN County Well Index.

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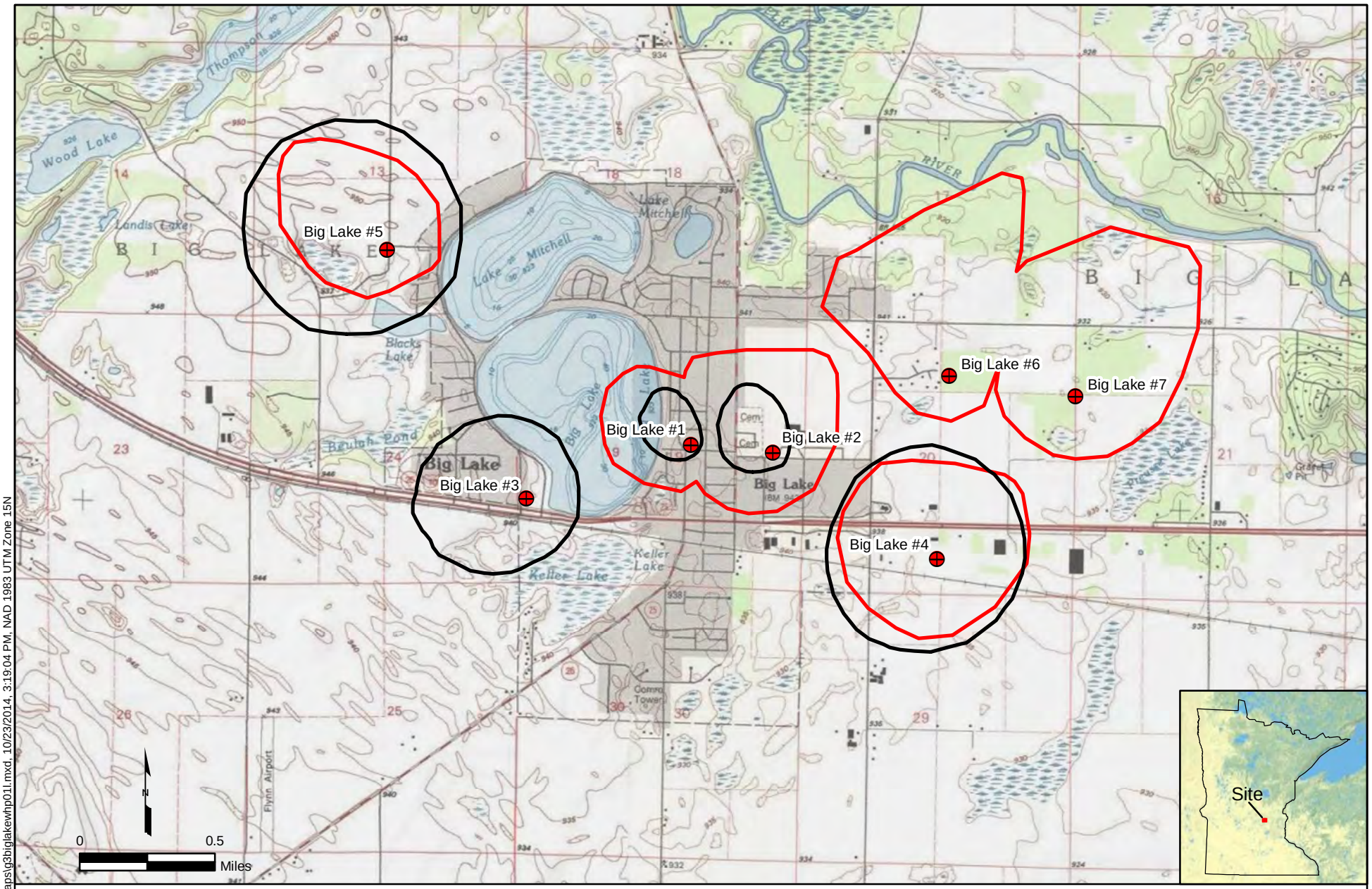
CITY OF BIG LAKE
BIG LAKE, MINNESOTA

DRINKING WATER SUPPLY MANAGEMENT AREAS
VULNERABILITY ASSESSMENT

FILE:	g3biglakewhp01n.MXD	DATE:	12/15/2014	FIGURE:	11



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City Well
2014 Amended Wellhead Protection Area
2003 Original Wellhead Protection Area

Source: ESRI Online Imagery: Copyright 2010 National Geographic Society. MN County Well Index.

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CITY OF BIG LAKE

BIG LAKE, MINNESOTA

ORIGINAL AND AMENDED WELLHEAD PROTECTION AREAS

FILE:	g3biglakewhp01l.MXD	DATE:	10/3/2014	FIGURE:	12

Appendix A

Other High Capacity Wells Included in Model

Appendix A - Other Permitted High-Capacity Wells Included in Model

Unique Number	Well Name	Aquifer	DNR Permit Number	Use	Average Withdrawal (2007-2011) MGY
114496	ARNESON, MARTIN	QBAA	1977-3084	Major Crop Irrigation	10.6
126505	WILTS, HARLAN NO.1	CMFL	1977-3315	Major Crop Irrigation	32.08
126508	GRAMSEY, KATHERINE NO.1	PMSU	1977-3206	Major Crop Irrigation	13.68
126512	THOMPSON, RICHARD	QBAA	1977-3267	Major Crop Irrigation	4.68
126513	GRAMSEY, BOB	CMRC	1977-3335	Major Crop Irrigation	13.74
126519	DECHENE, JIM NO.1	QBAA	1977-3381	Major Crop Irrigation	37.8
167972	SALK SCHOOL	CMSH	1980-3169	Non-Crop Irrigation	10.98
170088	ZIMMERMAN ELEMENTARY SCH	CMTS	1980-3168	Non-Crop Irrigation	7.78
173034	GRAHAM, BOB	QBAA	1981-3098	Major Crop Irrigation	13.28
178851	CAREFREE COUNTRY CLUB NO	QBAA	2003-3038	Waterworks	0.52
178857	CAREFREE COUNTRY CLUB NO	QBAA	1982-3104	Non-Crop Irrigation	16.74
181955	URWIN, LARRY	CEMS	1982-3234	Major Crop Irrigation	7.1
181971	GRAMSEY, BOB	QWTA	1982-3130	Major Crop Irrigation	8.98
182191	GRAMSEY, BOB	QWTA	1986-3113	Major Crop Irrigation	10.58
188756	ERICKSON,VINCE	QBAA	1997-3194	Major Crop Irrigation	20.48
188785	WESTON, JOHN	CMTS	1983-3262	Major Crop Irrigation	5.78
188786	BERNDT, GARY	QWTA	1984-3016	Major Crop Irrigation	22.4
214542	TOM HAMMER WELL NO.1	QWTA	1972-0135	Major Crop Irrigation	13.2
217949	URWIN, HAROLD NO.1	CMTS	1966-0319	Major Crop Irrigation	24.88
217951	WINGARD, JOHN NO.1	CMFL	1968-0166	Major Crop Irrigation	18.56
217952	HAYES, DEL NO.1	CMTS	1966-0295	Major Crop Irrigation	14.78
217953	SANFORD, PETE NO.1	CMTS	1970-0028	Major Crop Irrigation	15
217955	ENWING, GERALD NO.1	CMTS	1984-3196	Major Crop Irrigation	16.54
217956	SANFORD & SONS NO.2	CEMS	1992-3077	Major Crop Irrigation	18.12
217957	DECHENE, LEONARD NO.1	CMTS	1968-0376	Major Crop Irrigation	34.02
217958	MCHUGH, JAMES NO.2	CMTS	1957-0410	Major Crop Irrigation	16.14
217959	BOHANON, HOWARD	CMRC	1963-0428	Major Crop Irrigation	12.92
217961	PETERSON BROS. FARMS 1	CMRC	1964-0985	Major Crop Irrigation	29.14
217962	SANFORD, TRUMAN NO. 1	MTPL	1989-3395	Major Crop Irrigation	25.44
217977	ST. PAUL SAND & GRAVEL C	PMHN	1991-3086	Industrial Processing	13.1
218032	MONTICELLO 1	QBAA	1964-1059	Waterworks	138.46
221155	HAYES, DEL NO.1	CEMS	1958-0229	Major Crop Irrigation	15.34
221157	PANAYOTOFF, GEORGE NO.1	CMTS	1969-0540	Major Crop Irrigation	6.88
221159	SANFORD, TRUMAN	CMTS	1961-0234	Major Crop Irrigation	18.16
221160	DECHENE, LEONARD NO.2	CMFL	1962-0062	Major Crop Irrigation	9.54

Unique Number	Well Name	Aquifer	DNR Permit Number	Use	Average Withdrawal (2007-2011) MGY
221161	SPRINGBROOK FARM NO.1	CMRC	1978-3181	Major Crop Irrigation	21.94
221165	ZIMMERMAN, LES	CMFL	1992-3078	Major Crop Irrigation	22.42
221166	SANFORD & SONS NO.1	CEMS	1992-3077	Major Crop Irrigation	16.96
221168	NADEAU, LAWRENCE NO.1	MTPL	1965-0147	Major Crop Irrigation	59.08
221170	DECHENE, LEONARD NO.2	CEMS	1968-0376	Major Crop Irrigation	3.46
221172	SANFORD, TRUMAN NO.2	PMSU	1989-3396	Major Crop Irrigation	17.66
221176	ELK RIVER 3	CMTS	1975-3215	Waterworks	131.38
225752	TOM HAMMER WELL NO.2	QBAA	1972-0135	Major Crop Irrigation	15.08
225847	DECHENE, LEONARD NO.1	PMSU	1966-0219	Industrial Processing	0.64
225848	DECHENE, LEONARD NO.2	MTPL	1966-0219	Industrial Processing	0.36
225849	HILLER, EARL	PMSU	1970-0490	Major Crop Irrigation	11.62
225850	LAURENZ, DAVE	PMSU	1977-3207	Major Crop Irrigation	11.64
225855	SCHMIDT, BILL	QBAA	1975-3219	Major Crop Irrigation	43.9
225856	OLSON, MALCOLM & STEVE	MTPL	1964-0703	Major Crop Irrigation	46.84
225857	OLSON, MALCOLM & STEVE	QBAA	1971-0423	Major Crop Irrigation	13.7
225862	DEL HAYES WELL NO.1	QBAA	1963-0251	Major Crop Irrigation	28.58
226051	KASOWSKI, FRANK	QWTA	1978-3251	Major Crop Irrigation	9.46
229488	DECHENE FARMS NO.1	CMFL	1977-3382	Major Crop Irrigation	25.06
229489	DECHENE FARMS	CMFL	1977-3383	Major Crop Irrigation	9.92
229642	BAHANON, CHARLES	QWTA	1978-3268	Major Crop Irrigation	8.96
232380	PANAYATOFF VEG. NO.1	QWTA	1981-3252	Non-Crop Irrigation	17.2
232440	RIVER TERRACE TRAILOR PARK 1	QBAA	1977-3451	Waterworks	2
236578	MONTICELLO 2	QBAA	1964-1059	Waterworks	144.56
242210	MONTICELLO COUNTRY CLUB	INDT	1988-3272	Non-Crop Irrigation	11.06
242333	MCHUGH, JAMES NO.1	INDT	1957-0410	Major Crop Irrigation	11.34
242347	OFFUTT FARMS	INDT	1976-3482	Major Crop Irrigation	32.56
244999	SANFORD, JAMES	INDT	1992-3075	Major Crop Irrigation	28.18
247251	OLSON, FLOYD/EWING, JIM	QUUU	1992-3264	Major Crop Irrigation	8.6
247598	KJELLBERG'S EAST 2	QUUU	1993-3050	Waterworks	5.4
247599	KJELLBERG'S PARK 2	QWTA	1993-3050	Waterworks	1.18
247600	KJELLBERG'S WEST 1	INDT	1993-3161	Waterworks	4.92
247601	KJELLBERG'S WEST 2	INDT	1993-3161	Waterworks	6.32
247616	SANFORD & SONS NO.1	INDT	1993-3177	Major Crop Irrigation	4.04
247618	ELK RIVER COUNTRY CLUB	INDT	1961-0483	Non-Crop Irrigation	11.04
247638	OLSON FARMS	QUUU	1993-3175	Major Crop Irrigation	37.74
247947	DECHENE, JAMES		1984-3222	Major Crop Irrigation	33.66
247948	DECHENE, JAMES		1984-3223	Major Crop Irrigation	37.24
270228	PETERSON, DUANE	QUUU	1977-3617	Major Crop Irrigation	28.3

Unique Number	Well Name	Aquifer	DNR Permit Number	Use	Average Withdrawal (2007-2011) MGY
401369	HAMMER, TOM	QBAA	1984-3274	Major Crop Irrigation	8.36
401384	SANFORD,TRUMAN 1	QWTA	1984-3331	Major Crop Irrigation	2.28
401385	SANFORD,TRUMAN 2	QWTA	1984-3331	Major Crop Irrigation	2.28
401394	SANFORD,TRUMAN 4	QWTA	1984-3331	Major Crop Irrigation	2.28
401395	SANFORD,TRUMAN 3	QWTA	1984-3331	Major Crop Irrigation	2.28
405857	T.J. FARMS	QWTA	1985-3156	Major Crop Irrigation	20.22
415954	PINEWOOD GOLF COURS	CEMS	2007-0506	Water Level Maintenance	1.82
435967	MONTICELLO COUNTRY CLUB	QWTA	1988-3272	Non-Crop Irrigation	17.48
439866	MONTICELLO 3	CMRC	1964-1059	Waterworks	63.02
449182	MONTICELLO 4	QBAA	1964-1059	Waterworks	121.66
453167	CAREFREE CTRY CLUB	QBAA	1982-3104	Non-Crop Irrigation	11.78
455993	HOLTHAUS, JOE	QBUA	1989-3388	Major Crop Irrigation	41.36
456067	HAMMER, TOM	QWTA	1990-3273	Major Crop Irrigation	8.36
456936	FULLER, RAY	CMFL	1990-3396	Major Crop Irrigation	15.84
457011	OLSON, CLARENCE	QWTA	1990-3098	Major Crop Irrigation	0.86
457024	SANFORD, TRUMAN	QBAA	1975-3204	Major Crop Irrigation	17.26
457845	EWING, JIM NO.1	CMFL	1981-3130	Major Crop Irrigation	38.54
457846	DANIELSON, LLOYD	QWTA	1998-3011	Major Crop Irrigation	13.52
457856	ASSEMBLY OF GOD CHURCH	CMFL	1990-3123	Air Conditioning	3.6
458538	SANFORD, JIM	QWTA	1990-3242	Major Crop Irrigation	8.04
458550	SANFORD & SONS	QWTA	1990-3242	Major Crop Irrigation	7.26
458622	SANFORD, JIM	CMTS	1990-3428	Major Crop Irrigation	11.28
458623	SANFORD, JIM	CMTS	1990-3427	Major Crop Irrigation	13.9
478742	OLSON, FLOYD	QWTA	1992-3265	Major Crop Irrigation	16.1
481259	KLATT, ROGER J.	QBAA	1997-3155	Major Crop Irrigation	12.2
481260	AHRENS, PETER	MTPL	1993-3128	Major Crop Irrigation	24.84
481794	ELK RIVER 4	CMTS	1975-3215	Waterworks	102.86
490075	I.S.D. #728	QWTA	1994-3200	Non-Crop Irrigation	2.98
490888	PETERSON, ART	QBAA	1974-5108	Major Crop Irrigation	31.96
497392	MW-107	CMSH	1994-3198	Non-Crop Irrigation	2.68
501461	URWIN, LARRY NO.1	MTPL	1989-3547	Major Crop Irrigation	19.62
501480	AHRENS, PETER NO.1	MTPL	1989-3546	Major Crop Irrigation	31.88
502520	BECK, ORVILLE NO.1	MTPL	1990-3270	Major Crop Irrigation	7.92
504330	EWING, JAMES NO.1	QBAA	1990-3276	Major Crop Irrigation	17.82
504337	BECK, ORVILLE	CEMS	1990-3269	Major Crop Irrigation	5.8
505683	HAAG, GLYNN	QBAA	1990-3403	Non-Crop Irrigation	4.06
528421	GRAND, DOUG	QBAA	1974-5136	Major Crop Irrigation	27.1
541766	ZIMMERMAN 2	CMTS	1980-3036	Waterworks	58.6

Unique Number	Well Name	Aquifer	DNR Permit Number	Use	Average Withdrawal (2007-2011) MGY
580320	ELK RIVER 6	CMTS	1975-3215	Waterworks	107.48
598602	KJELLBERG'S EAST 4	QBAA	1993-3050	Waterworks	6.46
622715	OTSEGO 2	CIGL	2005-3146	Waterworks	9.42
626766	RIDGES OF RICE LAKE 1	QBAA	2002-3042	Waterworks	16
631431	VINTAGE GOLF COURSE	QBAA	2000-3032	Non-Crop Irrigation	1.36
633168	CAREFREE COUNTRY CLUB	QBAA	2003-3038	Waterworks	13.04
633193	KJELLBERG'S WEST 4	QBAA	1993-3161	Waterworks	5.28
661057	EWING FARMS, INC.	CMTS	2003-3106	Industrial Processing	1.4
676447	ZIMMERMAN ELEM. SCHOOL	CMRC	2009-0399	Non-Crop Irrigation	2.5
693362	ROBERTSON, DOUG	QBAA	2004-3214	Non-Crop Irrigation	1.24
694202	MONTICELLO 5	QBAA	1964-1059	Waterworks	164.8
694484	CITY OF ZIMMERMAN	CMFL	1980-3036	Waterworks	113.54
696888	OTSEGO 4	CMTS	2005-3146	Waterworks	32.72
696889	OTSEGO 5	CMSH	2005-3146	Waterworks	89.4
706924	RIVERWOOD NATIONAL GOLF	CIGL	2005-3103	Non-Crop Irrigation	26.38
709269	OTSEGO 6	CMTS	2005-3146	Waterworks	80.5
721803	KJELLBERG'S CAMPGROUND	QBAA	1993-3161	Waterworks	0.98
725147	AGGREGATE INDUSTRIES, INC	QBAA	1988-3054	Industrial Processing	11.44
731126	SHORES OF EAGLE LAKE	QBAA	2007-0288	Waterworks	0.4
765467	EWING FARMS	QWTA	1990-3298	Major Crop Irrigation	3.72
768273	EWING FARMS	QWTA	2010-0311	Major Crop Irrigation	5.74
768280	OLSON FARMS	QWTA	2009-0466	Major Crop Irrigation	11.72
770418	PETERSON, DUANE	QBAA	2009-0484	Major Crop Irrigation	11.56
770430	EWING FARMS	QBAA	2010-0312	Major Crop Irrigation	5.34
771777	TOM HAMMER FARMS	QBAA	1972-0135	Major Crop Irrigation	4.42
774331	EWING FARMS	QBAA	2010-0313	Major Crop Irrigation	3.98
774332	EWING FARMS	QWTA	2010-0314	Major Crop Irrigation	6.28
783649	EDLING, JEFF	QBAA	2011-0604	Major Crop Irrigation	1.16

Appendix B

Chemistry Data

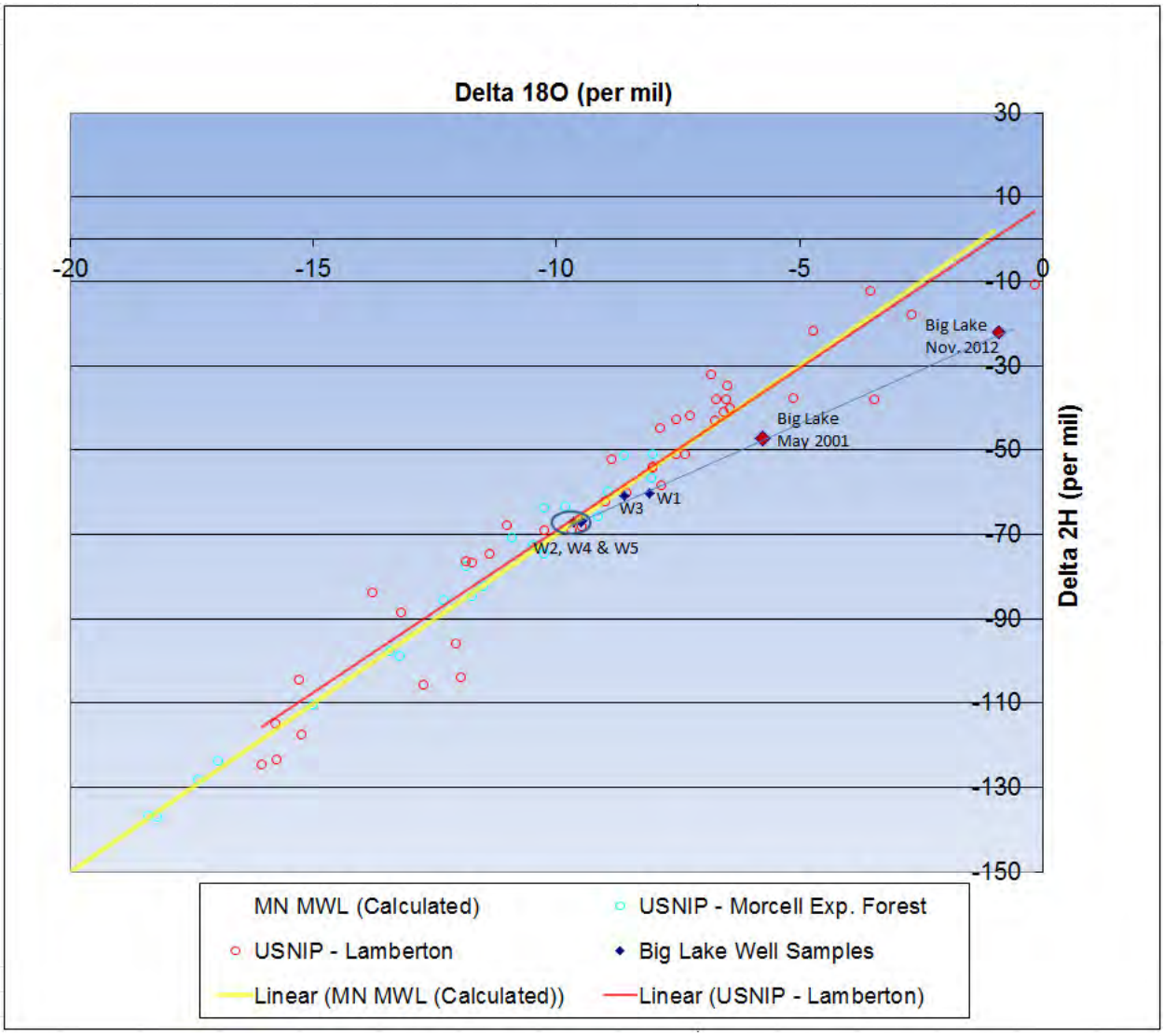
City of Big Lake

Summary of Cl/Br, TOC and Isotope Results

Name	Chloride (mg/l)		Bromide (mg/l)		Chloride/ Bromide (Cl/Br) Ratio		Total Organic Carbon (TOC) (mg/l)		Nitrate (mg/l)		Sulfate (mg/l)	Tritium (TU)	
Well 1 (220959)	20.6 (2011)	22.1 (2013)	0.0412 (2011)	0.0431 (2013)	500 (2011)	513 (2013)	1.2 (2011)	1.5 (2013)	<0.05 (2005 and previous)		17.3 (2013)	20 (2001)	6.1 (2013)
Well 2 (217948)	24.6 (2011)	48.4 (2013)	0.0466 (2011)	0.0841 (2013)	528 (2011)	575 (2013)	<1.0 (2011)	1.0 (2013)	<0.05 - 0.22 (2005 and previous)		35 (2013)	1.3 (2001)	2.9 (2013)
Well 3 (163648)	37.3 (2007)	55.3 (2013)	0.0362 (2007)	0.052 (2013)	1030 (2007)	1064 (2013)	<1.0 (2013)		1.4 - 5.8 (2008 to present)		30.8 (2013)	6.3 (2001)	4.6 (2013)
Well 4 (523954)	21.1 (2011)		0.0393 (2011)		537 (2011)		<1.0 (2011)		1.4 - 2.4 (2005 and previous)		19.8 (2011)	6 (2001)	6.2 (2013)
Well 5 (659386)	24.9 (2011)		0.0338 (2011)		737 (2011)		1.2 (2011)		2.0 (2011)		36.4 (2011)	5.1 (2011)	
Well 6 (705488)	9.37 (2011)	11.0 (2013)	0.0285 (2011)	0.0275 (2013)	329 (2011)	400 (2013)	<1.0 (2011; 2013)		5.2 (2011)	4.2 (2013)	16.1 (2011)	3.2 (2011)	
Well 7 (763778)	0.561 (2011)		0.0088 (2011)		64 (2011)				0.13 (2011)		3.9 (2011)	<0.8 (2011)	
Big Lake	39.9 (2012)		0.0129 (2012)		3093 (2012)		4.5 (2012)		<0.05 (2012)		4.37 (2012)		

MDH ***revised October 22, 2013***; ***March 25, 2013***

Big Lake
Stable Isotope Results
(2012 - 2013)



DEPARTMENT : HEALTH

STATE OF MINNESOTA

Office Memorandum

DATE : December 19, 2001

TO : Chuck Schwartz & Glen Evavold, RLK Kuusisto
Michael Goebel, City of Big Lake

FROM : Gail Haglund
Drinking Water Protection Section

PHONE : 651-215-0801

SUBJECT : Tritium & Stable Isotope Results

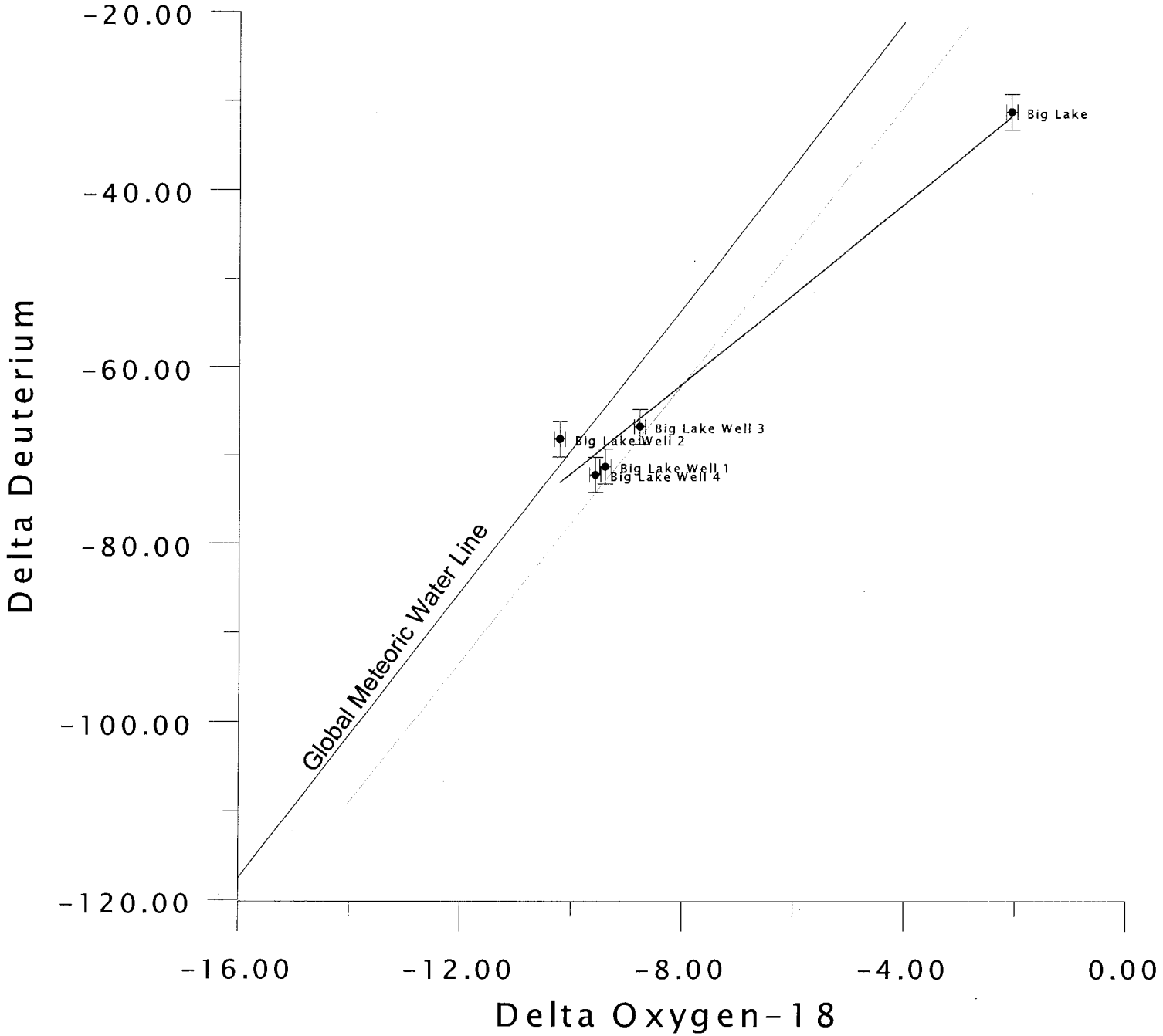
I am attaching a summary graph showing the stable isotope analytical results from samples taken on May 29, 2001. Wells Nos. 1, 2 and 4 seem to be entirely recharged by groundwater (and thereby are determined not to be receiving a surface water contribution from Big Lake). The result from Well No. 3 (163648) was less conclusive; there may be a small contribution from Big Lake. Repeated sampling of Well No. 3 and the lake over a period of a year may help to yield more definitive results. The additional sampling is something that you may want to consider as an action step as part of your wellhead protection plan, but it does not need to be a barrier to completing the delineation of your wellhead protection areas.

Tritium was detected in all of the water samples confirming the vulnerable nature of your city wells. The low amount of tritium reported from Well No. 2 (217948) seems to indicate that this source may be receiving a mix of "old and young" water. .

Well Number	Unique Well No.	Tritium Result
Well No. 1	220959	20 TU
Well No. 2	217948	1.3 TU
Well No. 3	163648	6.3 TU
Well No. 4	523954	6.0 TU

I will be on extended leave beginning January 1, 2002. If you have any questions on these results, please contact Jim Walsh at 651-215-0806. -Gail

Big Lake Stable Isotope Results
May 29, 2001



Appendix D – Inner Wellhead Management Zone

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	1710002
NAME	Big Lake
ADDRESS	Big Lake Water Superintendent, City Hall, 160 Lake Street North, Big Lake, MN 55309

COMMUNITY

FACILITY (WELL) INFORMATION

NAME	Well #1
FACILITY ID	S01
UNIQUE WELL NO.	220959
COUNTY	Sherburne

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / FACILITY ID	1710002 S01	UNIQUE WELL NO.	220959

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	1710002 S01	UNIQUE WELL NO.	220959

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		Y	99	Y
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		Y	72	Y
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		Y	126	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	112	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	139	Y
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		Y	114	Y
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		

PWS ID / FACILITY ID	1710002 S01	UNIQUE WELL NO.	220959

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				
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		
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							
	none found within 200' of this well.						

* 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.

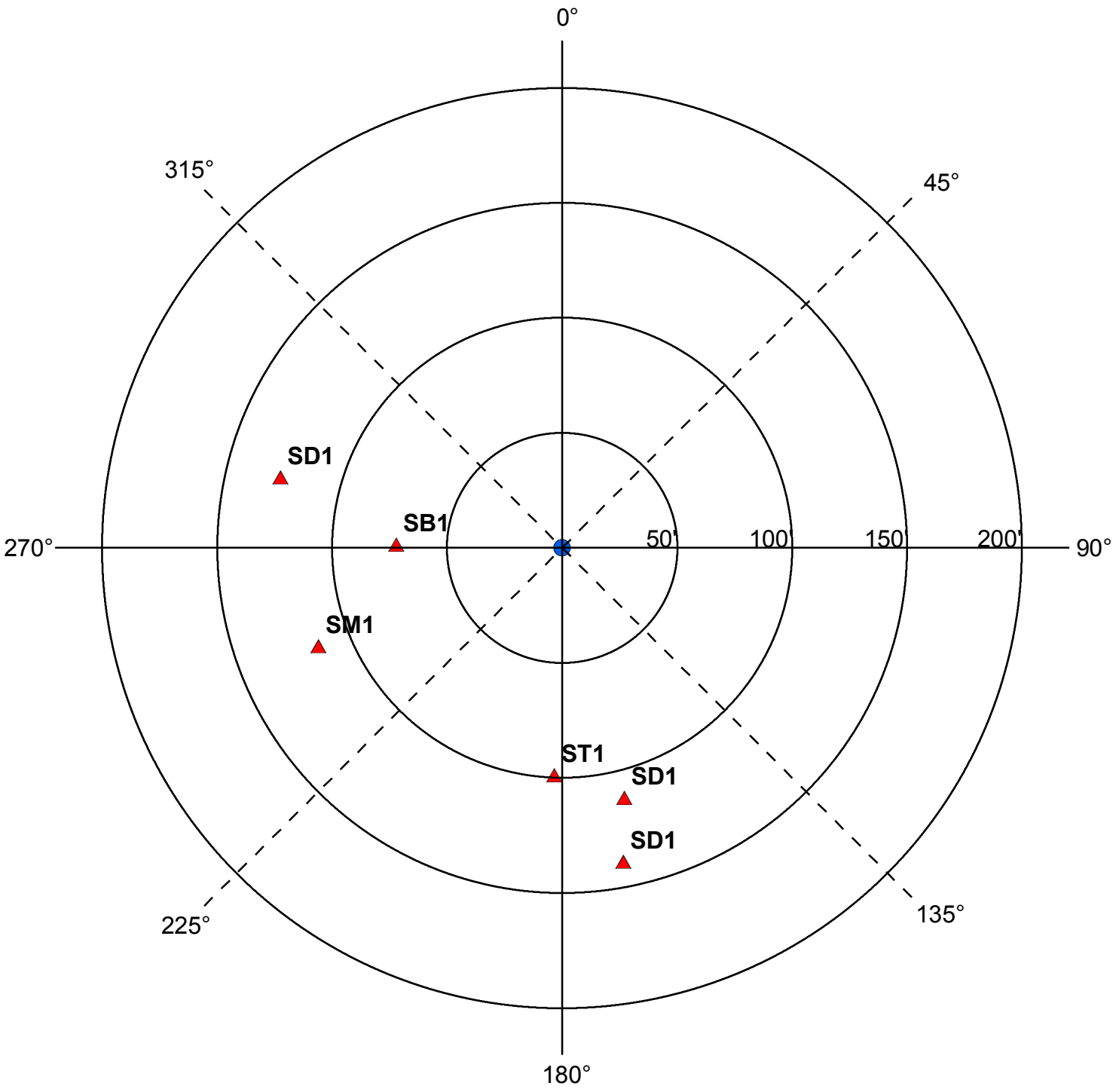
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1710002 S01	UNIQUE WELL NO.	220959

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?			

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

INSPECTOR	Minerich, George	DATE	5 - 4 - 2015

PWS ID / FACILITY ID	1710002 S01	UNIQUE WELL NO.	220959

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

COMMENTS

9/7/2003 - Location for PCSI Type SBM (bearing = 0, distance = 81 , inventory date: 12/16/1998) 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	1710002
NAME	Big Lake
ADDRESS	Big Lake Water Superintendent, City Hall, 160 Lake Street North, Big Lake, MN 55309

COMMUNITY

FACILITY (WELL) INFORMATION

NAME	Well #2
FACILITY ID	S02
UNIQUE WELL NO.	217948
COUNTY	Sherburne

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / FACILITY ID	1710002 S02	**UNIQUE WELL NO.**	217948

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	1710002 S02	UNIQUE WELL NO.	217948

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		Y	110	Y
*ST1	Sewage treatment device, watertight	50	50		Y	120	Y
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		Y	90	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	120	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	108	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	154	Y
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		

PWS ID / FACILITY ID	1710002 S02	UNIQUE WELL NO.	217948

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				
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		
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							
	none found within 200' of this well.						

* 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.

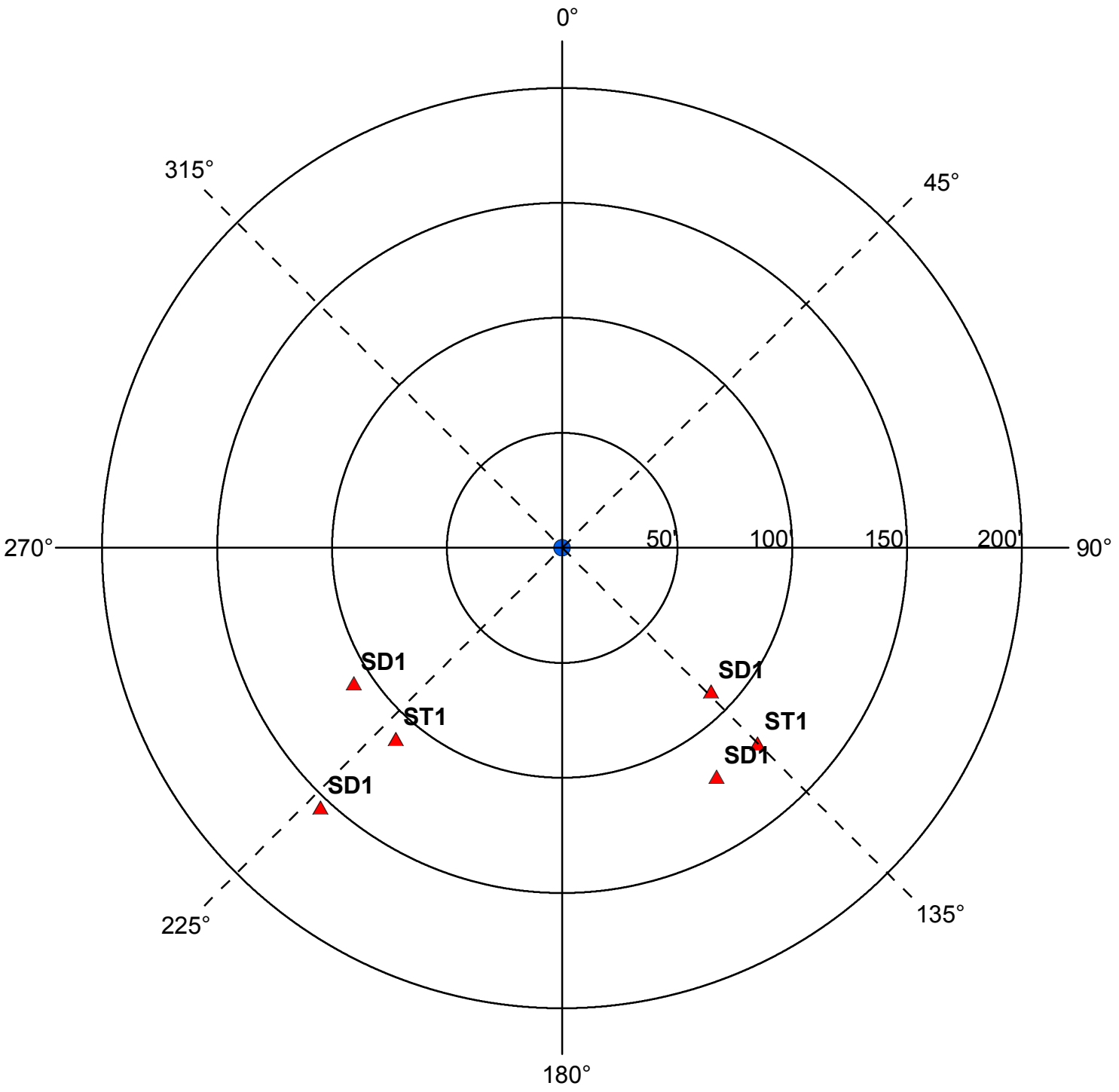
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1710002 S02	UNIQUE WELL NO.	217948

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?			

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

INSPECTOR	Minerich, George	DATE	5 - 4 - 2015

PWS ID / FACILITY ID	1710002 S02	UNIQUE WELL NO.	217948

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

COMMENTS

9/7/2003 - Location for PCSI Type SBM (bearing = 0, distance = 70 , inventory date: 12/16/1998) 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

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	1710002
NAME	Big Lake
ADDRESS	Big Lake Water Superintendent, City Hall, 160 Lake Street North, Big Lake, MN 55309

COMMUNITY

FACILITY (WELL) INFORMATION

NAME	Well #3
FACILITY ID	S03
UNIQUE WELL NO.	163648
COUNTY	Sherburne

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / FACILITY ID	1710002 S03	**UNIQUE WELL NO.**	163648

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	1710002 S03	UNIQUE WELL NO.	163648

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		Y	155	Y
*ST1	Sewage treatment device, watertight	50	50		Y	175	Y
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		Y	196	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	40	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	150	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	128	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	115	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	160	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	90	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	85	Y
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	3	
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		

PWS ID / FACILITY ID	1710002 S03	UNIQUE WELL NO.	163648

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				
*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		
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							
PSP	Petroleum storage or prep. area, > 25 gals., or 100 lbs. dry weight	150	150		Y	40	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.

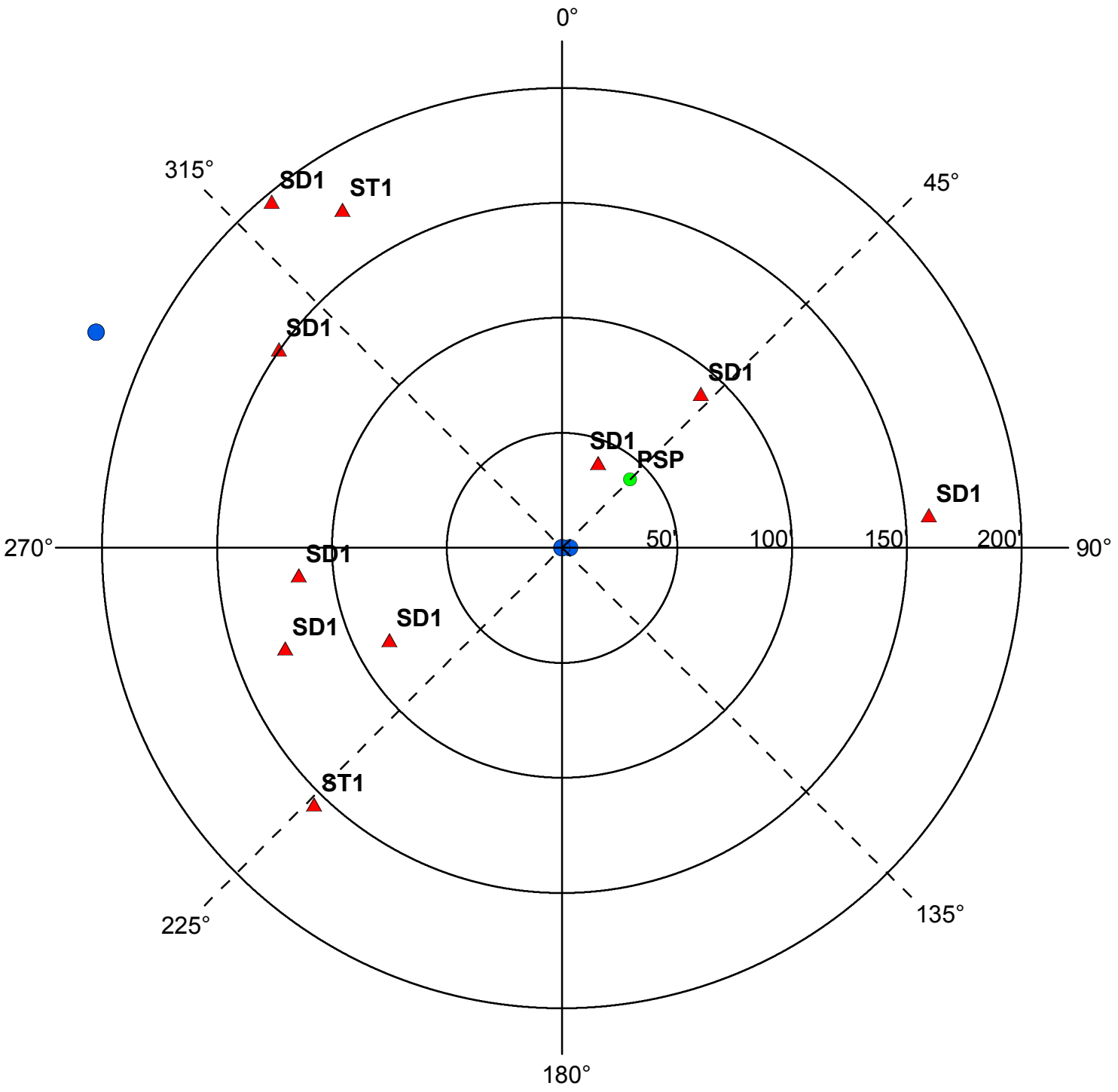
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1710002 S03	UNIQUE WELL NO.	163648

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?			
Is the system monitoring existing nonconforming sources of contamination?			

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

INSPECTOR	Minerich, George	DATE	5 - 4 - 2015

PWS ID / FACILITY ID	1710002 S03	UNIQUE WELL NO.	163648

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

COMMENTS

9/7/2003 - Location for PCSI Type RSS (bearing = 0, distance = 62 , inventory date: 12/16/1998) could not be determined.
9/7/2003 - Location for PCSI Type SBM (bearing = 0, distance = 92 , inventory date: 12/16/1998) could not be determined.
9/7/2003 - Location for PCSI Type GPR (bearing = 0, distance = 40 , inventory date: 12/16/1998) 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

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	1710002
NAME	Big Lake
ADDRESS	Big Lake Water Superintendent, City Hall, 160 Lake Street North, Big Lake, MN 55309

COMMUNITY

FACILITY (WELL) INFORMATION

NAME	Well #4
FACILITY ID	S04
UNIQUE WELL NO.	523954
COUNTY	Sherburne

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / FACILITY ID	1710002 S04	**UNIQUE WELL NO.**	523954

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	1710002 S04	UNIQUE WELL NO.	523954

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		Y	60	Y
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		Y	110	Y
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		Y	70	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	144	
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	1710002 S04	UNIQUE WELL NO.	523954

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							
	none found within 200' of this well.						

* 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.

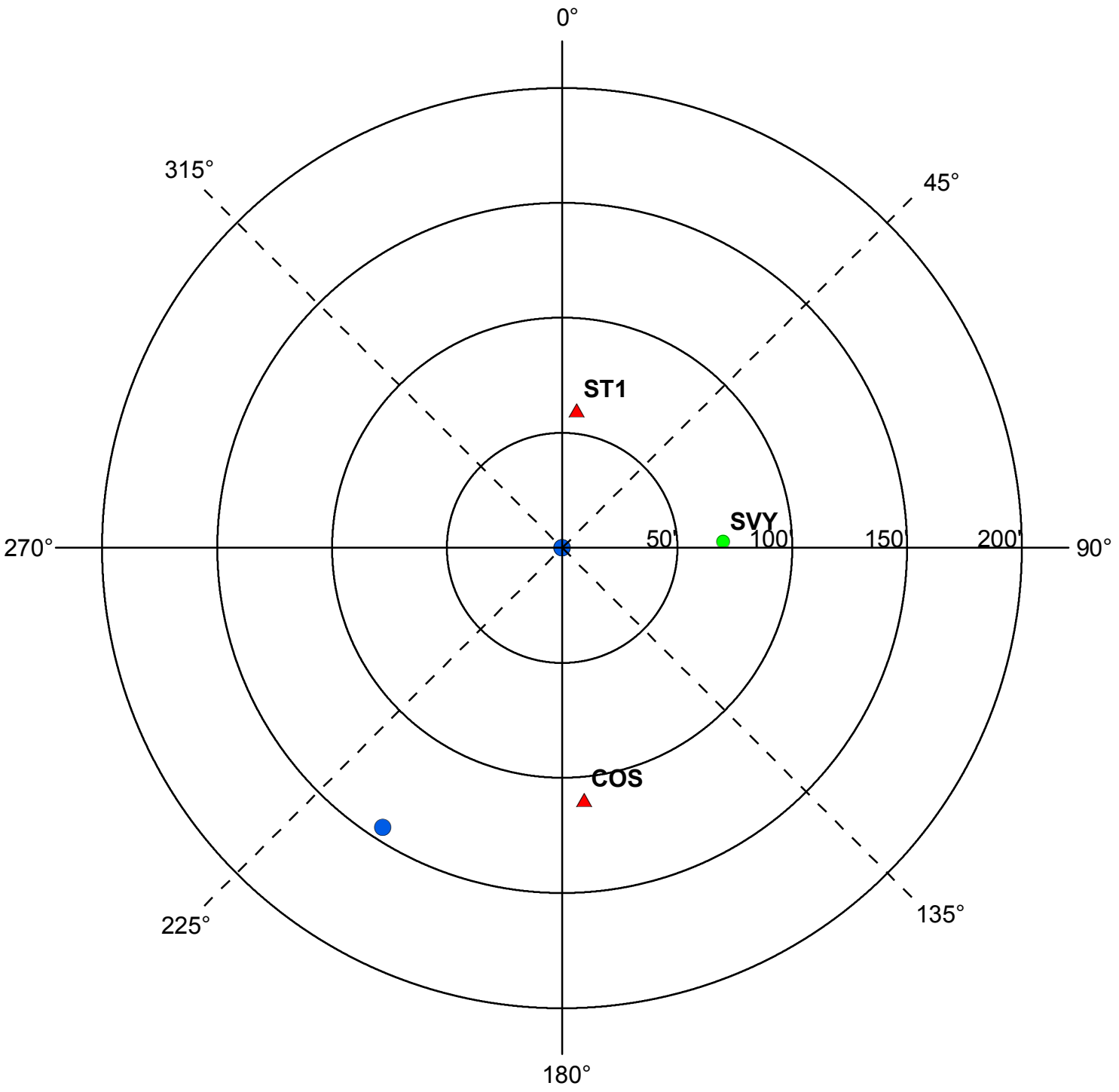
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1710002 S04	UNIQUE WELL NO.	523954

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?			

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

INSPECTOR	Minerich, George	DATE	5 - 4 - 2015

PWS ID / FACILITY ID	1710002 S04	UNIQUE WELL NO.	523954

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

COMMENTS

9/7/2003 - Location for PCSI Type SBP (bearing = 0, distance = 42 , inventory date: 12/16/1998) 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

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	1710002
NAME	Big Lake
ADDRESS	Big Lake Water Superintendent, City Hall, 160 Lake Street North, Big Lake, MN 55309

COMMUNITY

FACILITY (WELL) INFORMATION

NAME	Well #5
FACILITY ID	S05
UNIQUE WELL NO.	659386
COUNTY	Sherburne

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / FACILITY ID	1710002 S05	UNIQUE WELL NO.	659386

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	1710002 S05	UNIQUE WELL NO.	659386

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		Y	90	Y
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		Y	60	Y
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		Y	36	Y
*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	1710002 S05	UNIQUE WELL NO.	659386

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							
	none found within 200' of this well.						

* 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.

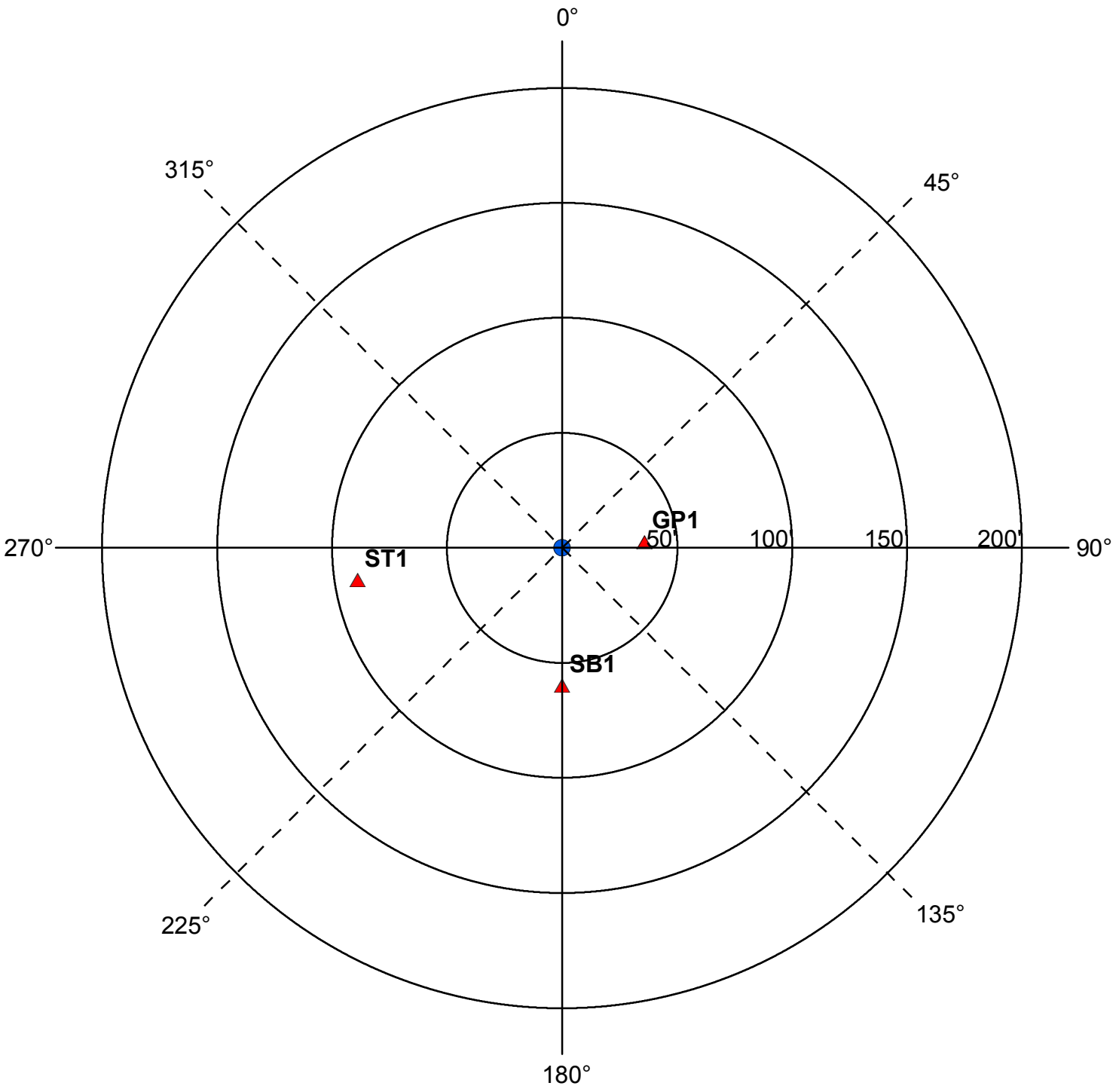
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1710002 S05	UNIQUE WELL NO.	659386

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?			

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

INSPECTOR	Minerich, George	DATE	5 - 4 - 2015

PWS ID / FACILITY ID	1710002 S05	UNIQUE WELL NO.	659386

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	1710002
NAME	Big Lake
ADDRESS	Big Lake Water Superintendent, City Hall, 160 Lake Street North, Big Lake, MN 55309

COMMUNITY

FACILITY (WELL) INFORMATION

NAME	Well #6
FACILITY ID	S06
UNIQUE WELL NO.	705488
COUNTY	Sherburne

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / FACILITY ID	1710002 S06	**UNIQUE WELL NO.**	705488

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	1710002 S06	UNIQUE WELL NO.	705488

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		Y	100	Y
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		Y	60	Y
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		Y	150	N
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	192	N
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	130	Y
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	99	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		

PWS ID / FACILITY ID	1710002 S06	UNIQUE WELL NO.	705488

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				
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		
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							
	none found within 200' of this well.						

* 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.

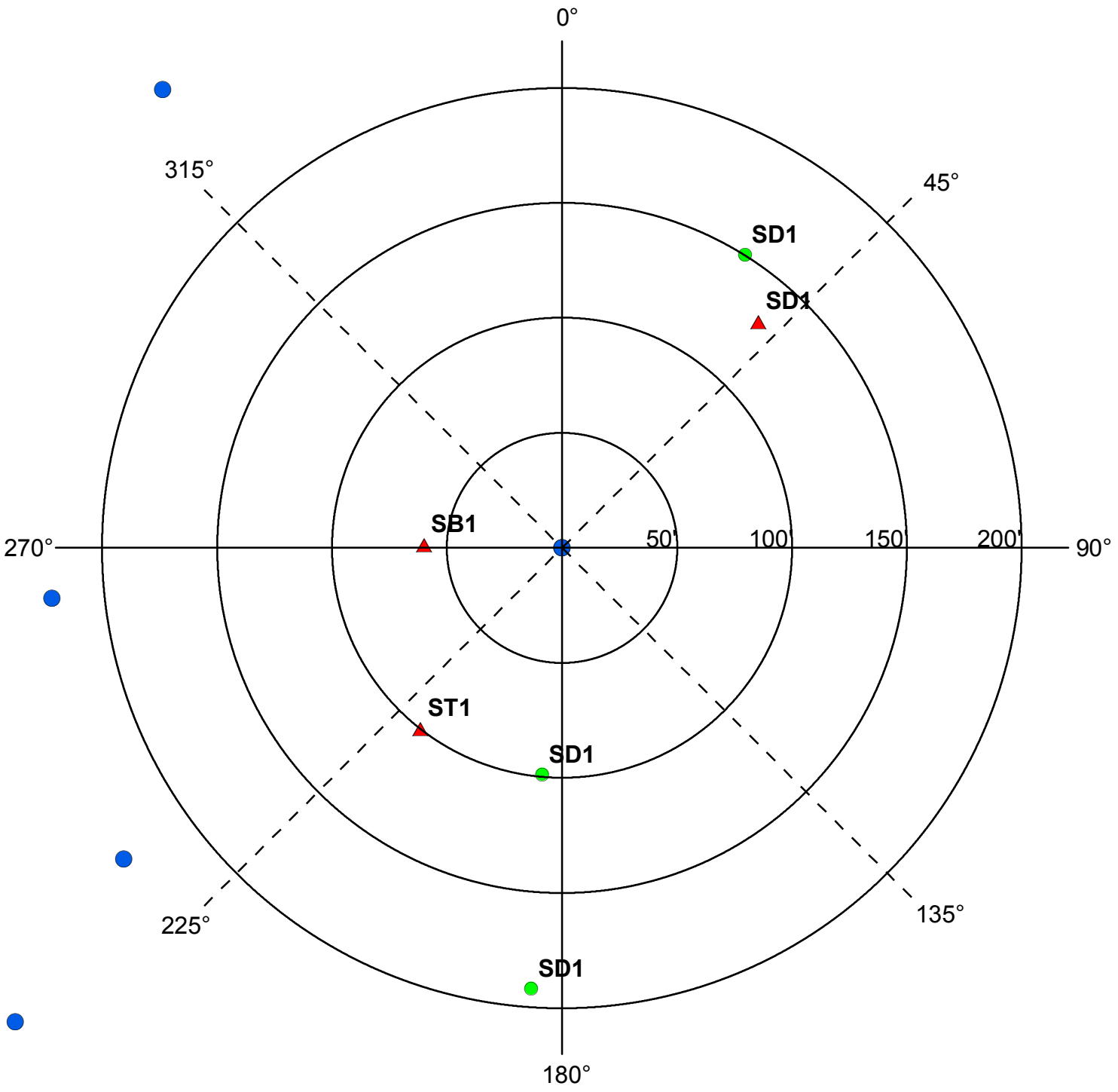
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1710002 S06	UNIQUE WELL NO.	705488

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?			

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

INSPECTOR	Minerich, George	DATE	5 - 4 - 2015

PWS ID / FACILITY ID	1710002 S06	UNIQUE WELL NO.	705488

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

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	1710002
NAME	Big Lake
ADDRESS	Big Lake Water Superintendent, City Hall, 160 Lake Street North, Big Lake, MN 55309

COMMUNITY

FACILITY (WELL) INFORMATION

NAME	Well #7
FACILITY ID	S07
UNIQUE WELL NO.	763778
COUNTY	Sherburne

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / FACILITY ID	1710002 S07	**UNIQUE WELL NO.**	763778

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	1710002 S07	UNIQUE WELL NO.	763778

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	1710002 S07	UNIQUE WELL NO.	763778

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							
	none found within 200' of this well.						

* 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.

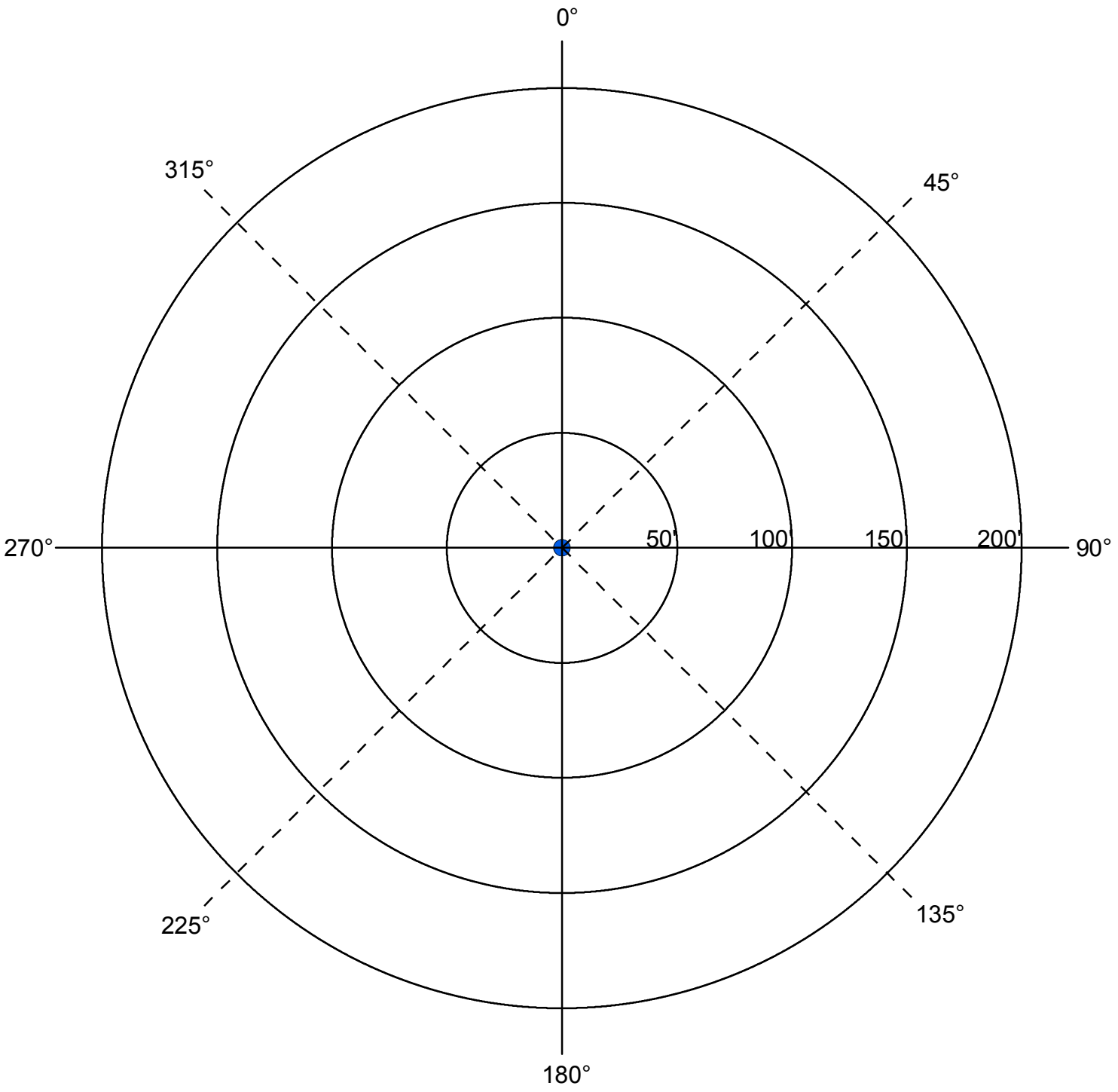
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1710002 S07	UNIQUE WELL NO.	763778

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?			
Is the system monitoring existing nonconforming sources of contamination?			

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

INSPECTOR	Minerich, George	DATE	5 - 4 - 2015

PWS ID / FACILITY ID	1710002 S07	UNIQUE WELL NO.	763778

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

Appendix E – 2014 Consumer Confidence Report

CONSUMER CONFIDENCE REPORT

PWSID: 1710002

City of Big Lake

2014 Drinking Water Report

The City of Big Lake is issuing the results of monitoring done on its drinking water for the period from January 1 to December 31, 2014. The purpose of this report is to advance consumers' understanding of drinking water and heighten awareness of the need to protect precious water resources.

Source of Water

The City of Big Lake provides drinking water to its residents from a groundwater source: six wells ranging from 178 to 230 feet deep, that draw water from the Mt.Simon-Fond Du Lac, Mt. Simon, Mt.Simon-Red Clastics, and Mt. Simon-Hinckley aquifers.

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

Call Big Lake Public Works Department 763-263-2268 if you have questions about the City of Big Lake drinking water or would like information about opportunities for public participation in decisions that may affect the quality of the water.

Results of Monitoring

No contaminants were detected at levels that violated federal drinking water standards. However, some contaminants were detected in trace amounts that were below legal limits. The table that follows shows the contaminants that were detected in trace amounts last year. (Some contaminants are sampled less frequently than once a year; as a result, not all contaminants were sampled for in 2014. If any of these contaminants were detected the last time they were sampled for, they are included in the table along with the date that the detection occurred.)

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

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

MRDL—Maximum Residual Disinfectant Level.

CONSUMER CONFIDENCE REPORT

PWSID: 1710002

MRDLG—Maximum Residual Disinfectant Level Goal.

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

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

pCi/l—PicoCuries per liter (a measure of radioactivity).

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

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

N/A—Not Applicable (does not apply).

Contaminant (units)	MCLG	MCL	Level Found		Typical Source of Contaminant
			Range (2014)	Average/ Result*	
Alpha Emitters (pCi/l) (04/16/2013)	0	15.4	N/A	4.9	Erosion of natural deposits.
Barium (ppm) (04/06/2011)	2	2	N/A	.07	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.
Fluoride (ppm)	4	4	1-1.2	1.13	State of Minnesota requires all municipal water systems to add fluoride to the drinking water to promote strong teeth; Erosion of natural deposits; Discharge from fertilizer and aluminum factories.
Haloacetic Acids (HAA5) (ppb)	0	60	4.4-5.3	5.3	By-product of drinking water disinfection.
Nitrate (as Nitrogen) (ppm)	10.4	10.4	3.6-5.8	5.8	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.

CONSUMER CONFIDENCE REPORT

PWSID: 1710002

Contaminant (units)	MCLG	MCL	Level Found		Typical Source of Contaminant
			Range (2014)	Average/ Result*	
TTHM (Total trihalomethanes) (ppb)	0	80	12.9-15.4	15.4	By-product of drinking water disinfection.

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

Nitrate in drinking water at levels above 10 parts per million is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant, you should ask advice from your health care provider.

Contaminant (units)	MRDLG	MRDL	****	*****	Typical Source of Contaminant
Chlorine (ppm)	4	4	.1-.7	.63	Water additive used to control microbes.

****Highest and Lowest Monthly Average.

*****Highest Quarterly Average.

Contaminant (units)	MCLG	AL	90% Level	# sites over AL	Typical Source of Contaminant
Copper (ppm) (07/25/2013)	1.3	1.3	.37	0 out of 20	Corrosion of household plumbing systems; Erosion of natural deposits.
Lead (ppb) (07/25/2013)	0	15	1	0 out of 20	Corrosion of household plumbing systems; Erosion of natural deposits.

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

PWSID: 1710002

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

Monitoring for unregulated contaminants as required by U.S. Environmental Protection Agency rules (40 CFR 141.40) was conducted in 2014. Results of the unregulated contaminant monitoring are available upon request from Cindy Swanson, Minnesota Department of Health, at 651/201-4656.

Compliance with National Primary Drinking Water Regulations

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

Contaminants that may be present in source water include:

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

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

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

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

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

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

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

CONSUMER CONFIDENCE REPORT

PWSID: 1710002

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

Appendix F – Water Emergency and Conservation Plan

Minnesota Department of Natural Resources

500 Lafayette Road
St. Paul, Minnesota 55155-4032

February 23, 1998

City of Big Lake
Michael Goebel, Public Works Director
P.O. Box 250
Big Lake, MN 55309

Dear Mr. Goebel:

WATER EMERGENCY AND CONSERVATION PLAN

The Department has received the February 18, 1998 addendum to the City of Big Lake "Emergency and Conservation Plan" which addressed our comments on the original plan. Therefore, the plan is hereby approved. Water emergency and conservation plans must be updated every ten years, but should be reviewed each year to address the items included in the implementation schedule and to assess the effectiveness of conservation efforts.

Thank you for your cooperation. If you have any questions, please contact Travis Germundson at (612) 296-0512.

Sincerely,
DNR WATERS

James Japs, Manager
Water Appropriation Permit Program

enclosure

cc: Travis Germundson, Permits Unit
Larry Kramka, Area Hydrologist

Minnesota Department of Natural Resources

500 Lafayette Road
St. Paul, Minnesota 55155-4032

December 1, 1997

City of Big Lake
Michael Goebel, Public Works Director
P.O. Box 25
160 Lake Street South
Big Lake, MN 55309

Dear Mr. Goebel:

WATER EMERGENCY AND CONSERVATION PLAN

The Department has completed its review of the City of Big Lake "Emergency and Conservation Plan." Attached are comments on the plan along with some recommendations for current and future revisions to the plan. Several sections of the plan have been approved, however, before the entire plan is approved those sections identified at the end of the comment section need to be amended. Also not that an Implementation Schedule (see attached example) needs to be developed to address items that will be evaluated or implemented by the City of Big Lake during the next 10 years. Please forward this information to the Department after decisions are made by the city.

Thank you for your cooperation. If you have any questions, please contact Travis Germundson at (612) 296-0512.

Sincerely,
DNR WATERS

James Japs, Manager
Water Appropriation Permit Program

enclosure

cc: Travis Germundson, Permits Unit
Larry Kramka, Area Hydrologist