WELLHEAD PROTECTION PLAN
FOR THE

City of Shafer, MN

Nonvulnerable Setting

This plan is in effect from:
November 20, 2015

November 2015

Forward

This document presents the wellhead protection (WHP) plan for the City of Shafer that will help provide for an adequate and safe drinking water supply for community residents. It contains the following components:

- Assessment of the data elements used to prepare the plan;
- Delineation of the wellhead protection area;
- Delineation of the drinking water supply management area;
- Assessments of well and drinking water supply management area vulnerability;
- Impact of land and water use changes on the public water supply well(s) used by the water supplier;
- Issues, problems, and opportunities affecting the well(s), well water, and the drinking water supply management area;
- Wellhead protection goals for this plan;
- Objectives and plan of action for achieving the wellhead protection goals;
- Evaluation program for assessing the effectiveness of this plan; and
- Contingency strategy to address an interruption of the water supply.

Water Supply Wells Included in This Plan

Unique Number	Well Name or Number	Use/Status[1]
217905	**Well No. 1**	**P**
559343	**Well No. 2**	**P**
737040	**Well No. 3**	**P**

[1]P = Primary Water Supply Well, E = Emergency Backup Well, S = Seasonal Well

Public Water Supply Profile

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DOCUMENTATION LIST

Step	Date Performed
Scoping II Meeting	December 10, 2013
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Plan Submitted To Local Units of Government	August 24, 2015
Comments Received From Local Units of Government	October 24, 2015
Comments Reviewed	October 30, 2015
Public Hearing	November, 2015
Part II Wellhead Protection Plan Submitted To MDH	November, 2015

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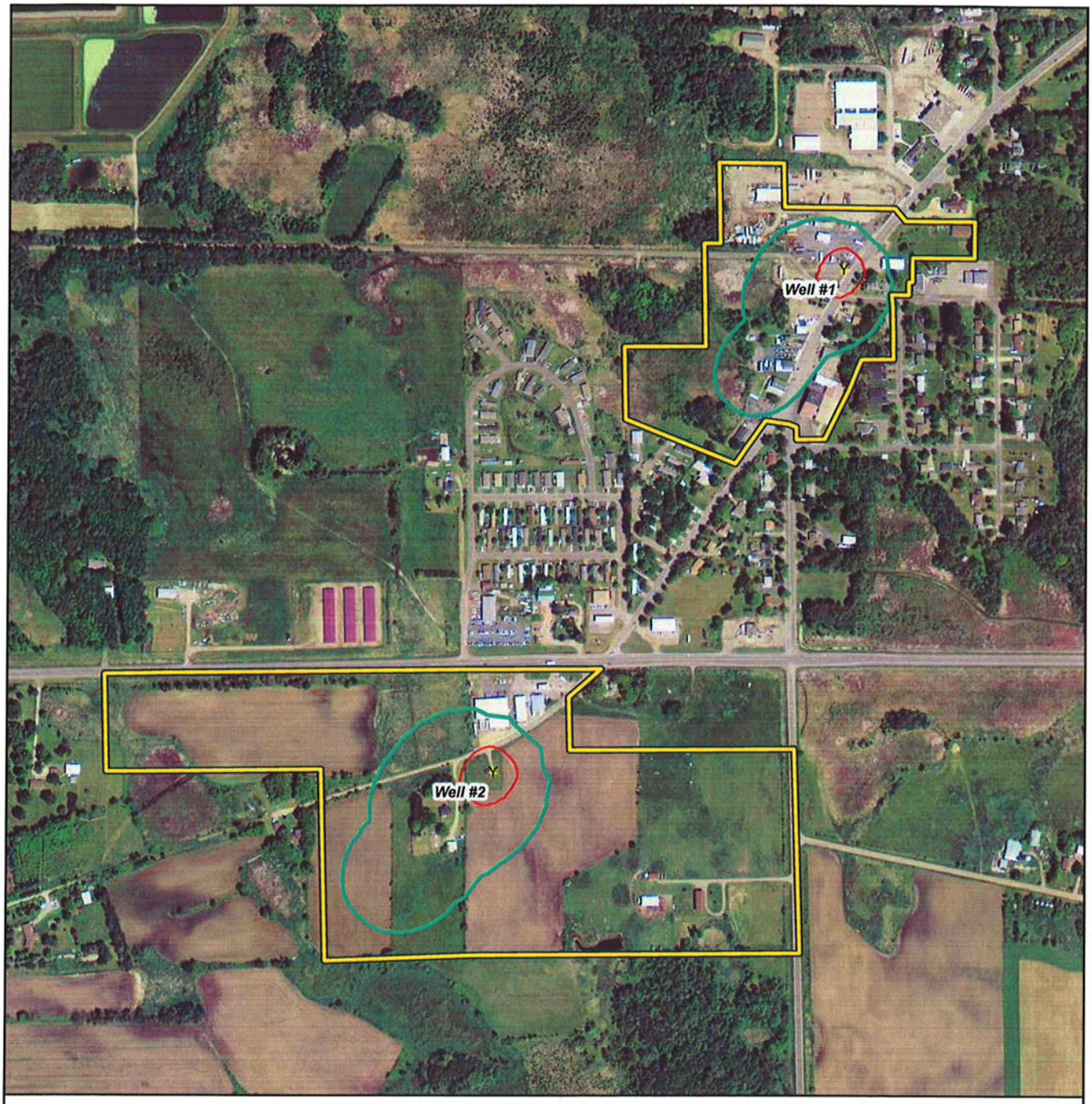


Y **Primary Well**

Drinking Water Supply Management Area

Emergency Response Area

Wellhead Protection Area

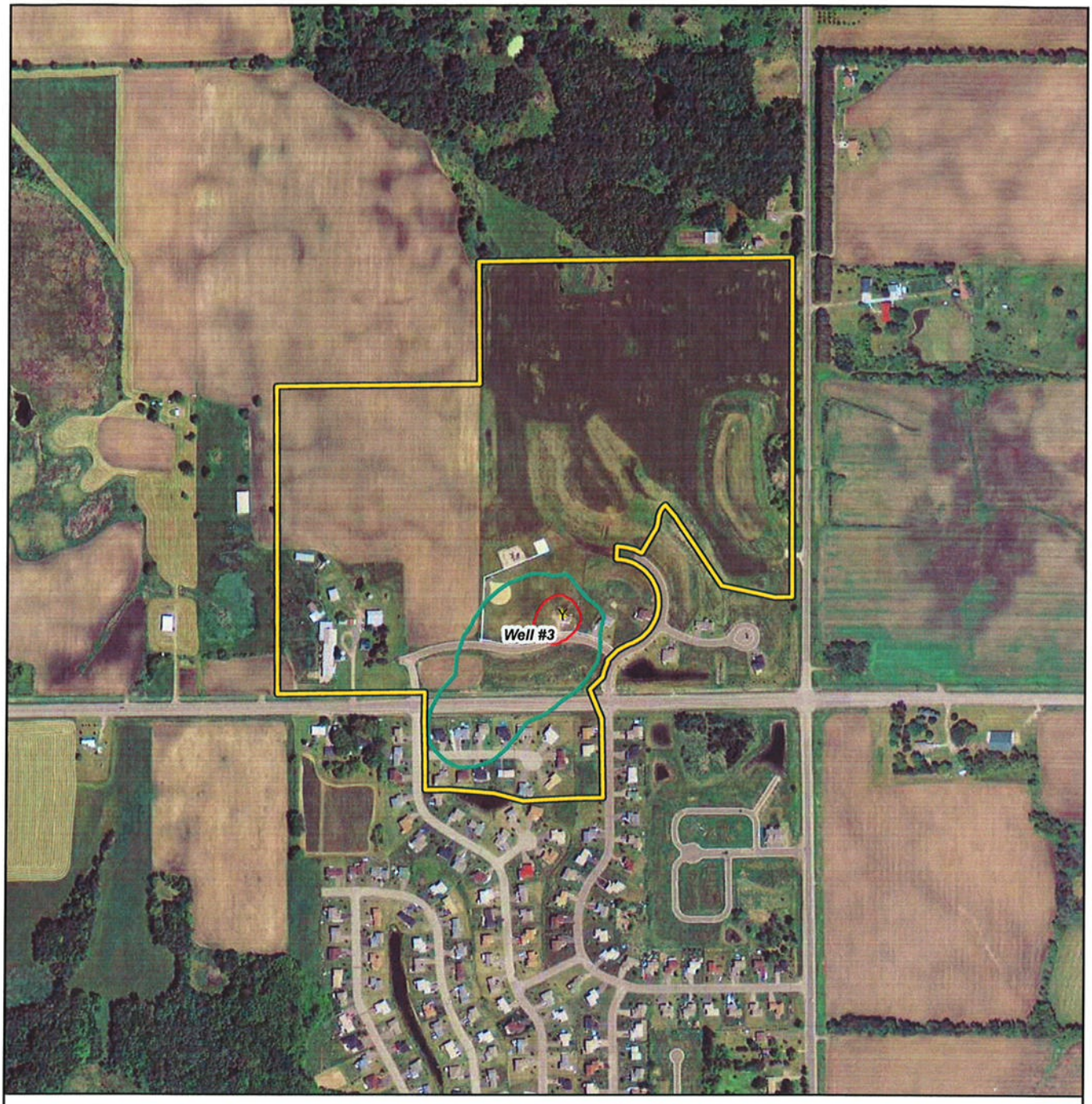
Scale: 1:6,500

0 375 750 1,500

Feet

MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 1a
Wellhead Protection and Drinking Water Supply Management Area
Wells 1 and 2
Shafer, MN



Y **Primary Well**

Drinking Water Supply Management Area

Emergency Response Area

Wellhead Protection Area

Scale: 1:6,500

0 375 750 1,500

Feet

MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 1b
Wellhead Protection and Drinking Water Supply Management Area
Well 3
Shafer, MN

Chapter 1 - Introduction

1.1 Background

The wellhead protection (WHP) plan for the City of Shafer was prepared in cooperation with the Minnesota Department of Health (MDH). It contains specific actions that the city will take to fulfill WHP requirements that are specified under Minnesota Rules, part 4720.5510 to 4720.5590. Also, the support that Minnesota state agencies, federal agencies, Chisago County, and others will provide is presented to identify their roles in protecting the city's drinking water supply. The plan is effective for 10 years after the approval date specified by MDH and the city is responsible for implementing its WHP plan of action, as described in Table 9 of this report. Furthermore, the city will evaluate the status of plan implementation at least every two-and-one-half years to identify whether its WHP plan is being implemented on schedule.

1.2 Plan Appendices

Much of the technical information that was used to prepare this plan is contained in the appendices but is summarized in the main body of this plan. In particular:

- Appendix I contains the first part of the plan, consisting of the delineation of the wellhead protection area (WHPA), the drinking water supply management area (DWSMA), and the vulnerability assessments for the public water supply well(s) and the DWSMA. This part of the plan is summarized in Chapter 3.
- Appendix II contains the inventory of potential contamination sources. This inventory is discussed in Chapter 4 in terms of assigning risk to the city's water supply and is also discussed in Chapter 6, relating to issues, problems or opportunities.
- Appendix III contains the contingency strategy to provide for an alternate water supply if there is a disruption caused by contamination or mechanical failure. This information is discussed in Chapter 11.
- Appendix IV contains copies of the Scoping Decision Letters I and II from the Minnesota Department of Health (MDH) outline the requirements for the Wellhead Protection Plan.
- Appendix V: Minnesota Department of Health (MDH) Inner Well Management Zone Inventories for Shafer's three wells.

Chapter 2 - Identification and Assessment of the Data Elements Used to Prepare the Plan

The data elements that are included in this plan were used to 1) delineate the WHPA and the DWSMA and to assess DWSMA and well vulnerability and 2) document the need for the WHP measures that will be implemented to help protect the city's water supply from potential sources of contamination. The city met with representatives from MDH on two occasions to discuss data elements that are specified in Minnesota Rules, part 4720.5400, for preparing a WHP plan.

The first scoping meeting, held on March 12, 2012 addressed the data elements that were needed to support the delineation of the WHPA, the DWSMA, and the well(s) and DWSMA vulnerability assessments. The second scoping meeting, held on December 10, 2013, discussed the data elements required to 1) identify potential risks to the public water supply and 2) develop effective management strategies to protect the public water supply in relation to well and DWSMA vulnerability. The results of each meeting were communicated to the city by MDH through a formal scoping decision notice and are presented in Appendix IV. Not all of the data elements listed in the WHP rule had to be addressed in the WHP plan because of the nonvulnerable nature of the city's source of drinking water.

The following table (Table 1) presents the data element assessment results relative to the overall impact that each data element has on the four items listed.

Table 1 is the assessment of the present and future implications of the data elements on the four planning activities. The data elements that are marked high (H) are considered to have a direct implication or impact on the activity. Data elements that have an indirect or marginal impact on an activity are shown as moderate (M). A data element that has little if any impact is shown as low (L). The source of the data is shown under "Data Source." The "Availability of Data" is "Yes" if planning needs are met and "No" if they are not.

Table 1 - Assessment Results for the Data Elements

Data Element	Present and Future Implications				Data Source
	Use of the Well (s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Geology					
Maps and geologic descriptions	M	H	M	H	MGS, DNR, USGS, Consultant Reports
Subsurface data	H	H	H	H	MGS, MDH, MPCA, DNR, MDA
Borehole geophysics	H	H	L	H	MGS, Consultant Reports
Surface geophysics	M	M	L	M	DNR, MPCA, Consultant Reports
Land Use					
Parcel boundaries map	L	H	L	H	County
Political boundaries map	L	H	L	L	County Metro Council
PLS map	L	H	L	L	City, MGEO
Land use map and inventory	H	L	H	H	Sanborn Fire Maps, Historical Society, City Records, County
Comprehensive land use map	M	L	H	H	City, County
Zoning map	M	L	H	H	City, County
Public Utility Services					
Records of well construction, maintenance, and use	H	H	H	M	City, CWI, MDH files
Groundwater Quantity					
Permitted withdrawals	H	H	H	H	DNR
Groundwater use conflicts	M	M	H	H	DNR
Water levels	H	H	H	M	DNR, MPCA, MDA, MDH, City
Groundwater Quality					
Monitoring data	H	H	H	H	MPCA, MDH
Isotopic data	M	M	M	M	MDH
Tracer studies	M	M	M	M	Not Available

Chapter 3 - Delineation of the Wellhead Protection Area, Drinking Water Supply Management Area and Vulnerability Assessments

A detailed description of the process used for 1) delineating the WHPA and the DWSMA, and 2) preparing the vulnerability assessments of the city water supply well(s) and DWSMA is presented in Appendix I. The City of Shafer requested that MDH do this work and it was performed by Amal Djerrari, who is licensed as a geoscientist by the State of Minnesota.

3.1 WHPA and DWSMA Delineation

Figure 1 shows the boundaries of the WHPA and the DWSMA. The WHPA was delineated using computer simulations of groundwater movement to generate the underground capture zones for city Wells 1 (Unique No. 217905), 2 (Unique No. 559343), 3 (Unique No. 737040). The WHPA for these water supply wells is shown in Figure 1.

The DWSMA boundaries were designated using the following criteria:

- Center-lines of highways, streets, roads, or railroad rights-of-ways;
- Property or fence lines;

3.2 Well Vulnerability Assessment

The construction and water quality obtained from each primary and emergency backup well used by the City of Shafer is included in the assessment of well vulnerability. The vulnerability of the city wells is considered low because they are constructed so that each well is adequately sealed into the borehole and does not pump water that contains human-caused contaminants.

3.3 DWSMA Vulnerability Assessment

The low vulnerability assigned to the DWSMA (Figure 1) was determined using geologic, soils, and groundwater chemistry information and indicates that at least 10 feet of clay-rich geological material covers the source water aquifer. The very low vulnerability assigned to the DWSMA was determined using geologic, soils, and groundwater chemistry information and indicates that the source water aquifer is covered by at least 50 continuous feet of clay-rich geological material.

Chapter 4 - Establishing Priorities and Assigning Risk to Potential Contamination Sources

The types of potential contamination sources that may exist within the DWSMA were derived from the information collected to satisfy the data element requirements (Chapter 2). The impact assigned to each data element as part of the assessment process (Table 1) was used to assess the types of potential contamination sources that may present a risk to the city's drinking water supply. The low and very low vulnerability assessment for the DWSMA indicates that, generally, only wells, other types of boreholes, excavations that may reach the aquifer, and certain types of Environmental Protection Agency Class V Wells are likely to impact the city wells.

4.1 Contaminants of Concern

None of the human-caused contaminants regulated under the federal Safe Drinking Water Act have been detected at levels indicating that any well itself serves to draw contaminants into the aquifer as a result of pumping. The following naturally occurring contaminants have been detected in the city wells at low levels that do not exceed state or Federal guidelines for safe drinking water:

Contaminant	Typical Source of Contaminant
Arsenic	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes.
Fluoride	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.
TTHM (Total trihalomethanes)	By-product of drinking water disinfection.
Chlorine	Water additive used to control microbes
Copper	Corrosion of household plumbing systems; Erosion of natural deposits
Lead	Corrosion of household plumbing systems; Erosion of natural deposits.

Their presence indicates that the aquifer receives recharge over a long time period and is not likely to be directly impacted by land uses.

4.2 Inventory Results and Risk Assessment

A description of the locations of potential contamination sources is presented in Appendix II. A summary of the results for the IWMZ is listed in Table 2 and Table 3 presents these results for the remainder of the DWSMA. The priority assigned to each type of potential contamination source addresses 1) the number inventoried, 2) its proximity to a city well, 3) the capability of local geologic conditions to absorb a contaminant, 4) the effectiveness of existing regulatory controls, 5) the time required for the City of Shafer to obtain cooperation from governmental agencies that regulate it, and 6) the administrative, legal, technical, and financial resources needed. A **high (H)** risk potential implies that the potential source type has the greatest likelihood to negatively impact the city's water supply and should receive highest priority for management. A **low (L)** risk potential implies that a lower priority for implementing management measures is assigned.

Table 2 - Potential Contamination Sources and Assigned Risk for the IWMZ

Source Type	Total	Level of Risk
Domestic Well	1	L
High-Capacity Well (not a city well)	0	H

Table 3 - Potential Contamination Sources and Assigned Risk for the Rest of the DWSMA

Potential Source Type	Total Number	Number Within Emergency Response Area and Level of Risk		Number Within Remainder of the DWSMA and Level of Risk	
Domestic Well	1	0	-	1	L

Chapter 5 - Impact of Land and Water Use Changes on the Public Water Supply Well(s)

The city estimates that the City of Shafer will undergo very few changes to the physical environment, land use, surface water, and groundwater-over the 10-year period that the WHP plan is in effect (Table 4). Future predictions of growth and change are needed to determine whether new potential sources of contamination may be introduced in the future and to identify future actions for addressing these anticipated sources. Land and water use changes may introduce new contamination sources or result in changes to groundwater use and quality. The Cities growth rate has stabilized over the past five decreasing from a population of 1,045 in 2010 to 1,043 in 2014. The majority of the City's economy is a mix of light industrial, commercial and agricultural businesses. The vast majority of the commercial space in the City is currently occupied with no expansion or growth planned in the short or long-term future. The City also does not expect any industrial growth. There is a residential area zoned near well No. 3, however, there are no short or long term plans to develop the area due to the stagnant population growth rate.

While the City does not anticipate any significant changes to the current mix of residential, industrial, commercial and agricultural land within the City, a sudden, unexpected change may occur, such as the relocation of a major industry to town. Should such an event occur, it is recommended that the impacts of land and water use change be reexamined at that time.

Table 4 describes the anticipated changes to the physical environment, land use, and groundwater in relationship to the 1) influence that existing governmental land and water programs and regulations may have on the anticipated change, and 2) administrative, technical, and financial considerations of the City of Shafer and property owners within the DWSMA.

Table 4 - Expected Land and Water Use Changes

Expected Change (Physical Environment, Land Use, Surface Water, Groundwater)	**Impact of the Expected Change On the Source Water Aquifer**	**Influence of Existing Government Programs and Regulations on the Expected Change**	**Administrative, Technical, and Financial Considerations Due to the Expected Change**
Physical Environment: No change is anticipated.	Does not apply	Does not apply	Does not apply
Land Use: No change is anticipated.	Does not apply	Does not apply	Does not apply
Groundwater: No change is anticipated.	Does not apply	Does not apply	Does not apply

Chapter 6 - Issues, Problems, and Opportunities

6.1 Identification of Issues, Problems and Opportunities

The City of Shafer has identified water and land use issues and problems and opportunities related to 1) the aquifer used by the city water supply wells, 2) the quality of the well water, or 3) land or water use within the DWSMA. The city assessed 1) input from public meetings and written comments it received, 2) the data elements identified by MDH during the scoping meetings, and 3) the status and adequacy of the city's official controls and plans on land and water uses, in addition to those of local, state, and federal government programs. The results of this effort are presented in the following Table No. 5, which defines the nature and magnitude of contaminant source management issues in the city's DWSMA. Identifying issues, problems and opportunities, including resource needs, enables the city to 1) take advantage of opportunities that may be available to make effective use of existing resources, 2) set meaningful priorities for source management and 3) solicit support for implementing specific source management strategies.

6.2 Comments Received

There have been several occasions for local governments, state agencies, and the general public to identify issues and comment on the city's WHP plan. At the beginning of the planning process, local units of government were notified that the city was going to develop its WHP plan and were given the opportunity to identify issues and comment. A public information meeting was held to review the results of the delineation of the wellhead protection area, DWSMA, and the vulnerability assessments. The meetings of the city's wellhead protection team were open to the public. Also, a public hearing was held before the completed WHP plan was sent to MDH for state agency review and approval. There were no comments received during the review period and thus no additional issues were identified.

Note: List all of the issues that were received and summarize them in Table 5.

Table 5 - Issues, Problems, and Opportunities

Issue Identified	Impacted Feature	Problem Associated with the Identified Issue	Opportunity Associated with the Identified Issue	Adequacy of Existing Controls to Address the Issue
There is one unused and unsealed well on a commercial property.	Aquifer Well water quality DWSMA	The city needs to assess if the well presents a threat to the aquifer based upon depth, construction, and state of repair.	The city can partner with Chisago County to help the property owner pay for the costs of properly sealing the unused well.	The city does not have authority to require that unused wells be properly sealed. The MDH has authority to require well sealing.

Chapter 7 - Existing Authority and Support Provided by Local, State, and Federal Governments

In addition to its own controls, the City of Shafer will rely upon partnerships formed with local units of government, state agencies, and federal agencies with regulatory controls or resource management programs in place to help implement its WHP plan. The level of support that a local, state, and federal agency can provide depends on its legal authority, as well as the resources available to local governments.

7.1 Existing Controls and Programs of the City of Shafer

Table 6 shows the legal controls and/or programs that the city has identified to support the management of potential contamination sources within the DWSMA.

Table 6 - Controls and Programs of the City of Shafer

Type of Control	Program Description
Building Permits	Provides an opportunity to require performance standards to offset potential risk posed by a land use.
Ordinance Requiring Hookup to City Services	Reduces the likelihood that the pumping of other wells will impact contaminant movement to the city wells.
City land use and zoning ordinances	Establishes City wide goals and restrictions for growth and protects against unwanted and potentially environmentally hazardous development in sensitive areas.

7.2 Local Government Controls and Programs

The following departments or programs within Chisago County may be able to assist the city with issues relating to potential contamination sources that 1) have been inventoried or 2) may result from changes in land and water use within the DWSMA:

Table 7 - Local Agency Controls and Programs

Government Unit	Name of Control/Program	Program Description
Chisago County Soil and Water Conservation District	1) Agricultural BMPs 2) Storm Water Management 3) Wetland Management 4) Feedlots 5) Residential BMPs 6) Well Sealing Cost Share	Chisago County Soil and Water Conservation District promotes the protection of water and soil resources in the County through educational programs, cost-sharing and collaboration with other local, state and federal agencies. Chisago County can be contacted for potential well sealing cost sharing.

7.3 State Agency and Federal Agency Support

MDH will serve as the contact for enlisting the support of other state agencies on a case-by-case basis regarding technical or regulatory support that may be applied to the management of potential contamination sources. Participation by other state agencies and the federal government is based on legal authority granted to them and resource availability. Furthermore, MDH 1) administers state regulations that affect specific potential sources of contamination and 2) can provide technical assistance to property owners to comply with these regulations.

The following table identifies the specific regulatory programs or technical assistance that state and federal agencies may provide to the City of Shafer to support implementation of the WHP plan. It is likely that other opportunities for assistance may be available over the 10-year period that the plan is in effect due to changes in legal authority or increases in funding granted to state and federal agencies. Therefore, the table references opportunities available when the city's WHP plan was first approved by MDH.

Table 8 - State and Federal Agency Controls and Programs

Government Unit	Type of Program	Program Description
MDH	State Well Code (Minnesota Rules, Chapter 4725)	MDH has authority over the construction of new wells and the sealing of wells. MDH staff in the Well Management Program offer technical assistance for enforcing well construction codes, maintaining setback distances for certain contamination sources, and well sealing.
MDH	WHP	MDH has staff that will help the city identify technical or financial support that other governmental agencies can provide to assist with managing potential contamination sources.
DNR	Water appropriation permitting (Minnesota Rules, Chapter 6115)	DNR can require that anyone requesting an increase in existing permitted appropriations, or to pump groundwater, must address concerns regarding the impacts to drinking water if these concerns are included in a WHP plan.

Chapter 8 - Goals

Goals define the overall purpose for the WHP plan, as well as the end points for implementing objectives and their corresponding actions. The WHP team identified the following goals after considering the impacts that 1) changing land and water uses have presented to drinking water quality over time and 2) future changes that need to be addressed to protect the community's drinking water:

- Maintain a safe and adequate drinking water supply for community residents;
- Prevent contaminants from reaching levels that present a risk to people's health.
- Provide area residents with educational materials and other resources to assist with drinking water protection issues:
    - Private well use, maintenance and sealing assistance;
    - Continuing data collection;
    - Scheduled WHP Plan evaluation

Chapter 9 - Objectives and Plan of Action

Objectives provide the focus for ensuring that the goals of the WHP plan are met and that priority is given to specific actions that support multiple outcomes of plan implementation.

Both the objectives and the wellhead protection measures (actions) that support them are based on assessing 1) the data elements (Chapter 2), 2) the potential contaminant source inventory (Chapter 4), 3) the impacts that changes in land and water use present (Chapter 5) and 4) issues, problems, and opportunities referenced to administrative, financial, and technical considerations (Chapter 6).

9.1 Objectives

The following objectives have been identified to support the goals of the WHP plan for the City of Shafer:

1. Create public awareness and general knowledge about the importance of WHP for maintaining an adequate and safe drinking water supply.
2. Collect additional data to substantiate information contained within this Plan, and to provide more detail for future Plan amendments.
3. Provide landowners with best management practices and other information to assist with management of private property located within the DWSMA.
4. Provide direction to City and local planning bodies regarding future land use and development of property within the DWSMA.
5. Provide emergency response coordination for any impact to, or endangerment of, the water supply system.
6. Conduct regular evaluations of Plan implementation and effectiveness.

9.2 WHP Measures and Action Plan

Based upon the factors, the WHP team has identified WHP measures that will be implemented by the city over the 10-year period that its WHP plan is in effect. The objective that each measure supports is noted as well as 1) the lead party and any cooperators, 2) the anticipated cost for implementing the measure and 3) the year or years in which it will be implemented.

The following categories are used to further clarify the focus that each WHP measure provides, in addition to helping organize the measures listed in the action plan:

Category 1: **Monitoring, Data Collection and Assessment**

1. Groundwater Quality and Quantity Monitoring
2. Municipal Well Construction Review
3. Well Inventory & Prioritization update

Category 2: **Well & Contaminant Source Management**

1. Municipal Well Management Practices
2. Old Muni Wells
3. Municipal Well Security Issues
4. Private Well Management
5. Class V Wells
6. High Capacity Well Management

Category 3: **Education & Outreach**

1. WHP and Drinking Water Protection Education
2. Well Education

Category 4: **Land Use Planning**

1. Water Management
2. County Water Management Planning
3. General Land Use & Water Resource Planning
4. Comprehensive Land Use Planning
5. Zoning Controls

Category 5: **WHP Coordination, Reporting and Evaluation**

1. WHP Coordination
2. Annual Implementation, Tracking and Reporting Activities
3. WHP Program Evaluation Plan Reporting

9.3 Establishing Priorities

WHP measures reflect the administrative, financial, and technical requirements needed to address the risk to water quality or quantity presented by each type of potential contamination source. Not all of these measures can be implemented at the same time, so the WHP team assigned a priority to each. A number of factors must be considered when WHP action items are selected and prioritized (part 4720.5250, subpart 3):

- Contamination of the public water supply wells by substances that exceed federal drinking water standards.
- Quantifiable levels of contamination resulting from human activity.

- The location of potential contaminant sources relative to the wells.
- The number of each potential contaminant source identified and the nature of the potential contaminant associated with each source.
- The capability of the geologic material to absorb a contaminant.
- The effectiveness of existing controls.
- The time needed to acquire cooperation from other agencies and cooperators.
- The resources needed, i.e., staff, money, time, legal, and technical resources.

The City of Shafer defines a priority for implementing a WHP measure as prioritizing those potential contaminant sources that pose the highest amount of risk to human health. The following table lists each measure that will be implemented over the 10-year period that the city's WHP plan is in effect, including the priority assigned to each measure.

Table 9 - WHP Plan of Action

Category 1: Monitoring, Data Collection and Assessment:

Description	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
				2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
WHP Measure (1): Update the well inventory on an ongoing basis as new information becomes available. Review the status of existing wells and add new wells identified in the DWSMA.	Very High	WHP Mgr. City Utility Staff	Staff Time	X	X	X	X	X	X	X	X	X	X
WHP Measure (2): Update information about any known or suspected Class V wells in the DWSMA on an ongoing basis as new information becomes available. Contact MDH Planner for assistance working with a suspected owner of a Class V well.	High	WHP Mgr. City Utility Staff MDH	Staff Time	X	X	X	X	X	X	X	X	X	X
WHP Measure (3): Contact MDH Hydrologist to evaluate options and develop a plan to complete an aquifer test (pump test) to better determine aquifer transmissivity (ability of water to move through the aquifer).	Medium	WHP Mgr. City Utility Staff MDH	Staff Time						X				

Table 9 - WHP Plan of Action - Continued

Category 2: Well & Contaminant Source Management

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
WHP Measure (4): Manage the Inner Wellhead Management Zone (IWMZ): 1. Measure: Review and update the IWMZ survey form for all wells in the system every 2.5 years. 2. Measure: Monitor setbacks for all new potential sources of contamination within the IWMZ. 3. Measure: Monitor any non-conforming potential contaminant sources identified in the IWMZ.	Well Management	High	WHP Mgr. City Utility Staff	Staff Time			X			X			X	
WHP Measure (5): Measure: Provide a map of the DWSMA to the local Fire Dept., Street Dept., County and / or State Highway Dept. as applicable pointing out the specific location of city wells. Request their awareness and prompt response to accidents, spills and clean-up efforts near the PWS wells.	Well Management	Medium	WHP Mgr. City Utility Staff Fire Department MNDOT	Staff Time	X									
WHP Measure (6): Measure: Provide information on the proper management and sealing of wells to landowners located in the DWSMA and why this is important. Provide well management and sealing information on the city website.	Private Well Management	High	WHP Mgr. City Utility Staff	Staff Time	X									

WHP Measure (7): Contact the County SWCD for information on the availability of well sealing cost share funds and provide this information to landowners in the DWSMA.	Private Well Management	High	WHP Mgr. City Utility Staff Chisago County SWCD	Staff Time	X								
WHP Measure (8): On an ongoing basis, if a Class V Well is identified, work with MDH Planner to provide the property owner with management or and permitting options.	Class V Wells	High	WHP Mgr. City Utility Staff MDH	Staff Time	X	X	X	X	X	X	X	X	X	X
WHP Measure (9): On an ongoing basis, identify any new high-capacity wells that are proposed for construction in or within one mile of the DWSMA.	High Capacity Well Management	High	WHP Mgr. City Utility Staff	Staff Time	X	X	X	X	X	X	X	X	X	X
WHP Measure (10): On an ongoing basis, If a new high capacity well is identified, contact MDH Hydrologist to evaluate the effect that proposed pumping may have on the boundaries of the delineated WHPA or DWSMA.	High Capacity Well Management	High	WHP Mgr. City Utility Staff MDH	Staff Time	X	X	X	X	X	X	X	X	X	X

Table 9 - WHP Plan of Action - Continued

Category 3: **Education & Outreach**

Description	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
				2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
WHP Measure (11): Distribute via the City Website, the MN Rural Water Association's "Where Does My Drinking Water Come From?" and other informational material on WHP to landowners in the DWSMA.	Medium	WHP Mgr. City Utility Staff MDH, MWRA	Staff Time	X									
WHP Measure (12): Annually select wellhead protection education items from the MN Rural Water Association source water protection website to use to educate the public about WHP in your community via the community newsletter.	Medium	WHP Mgr. City Utility Staff MDH, MWRA	Staff Time	X	X	X	X	X	X	X	X	X	X
WHP Measure (13): Provide information in the form of a letter to property owners about the hazards of unused wells and options for correctly managing them by having them properly sealed or returning them to operating condition.	Medium	WHP Mgr. City Utility Staff MDH, MWRA	Staff Time		X								
WHP Measure (14): Brief the mayor and city council about the potential for unused wells in the DWSMA and status of well sealing efforts.	Medium	WHP Mgr. City Utility Staff	Staff Time	X									

Category 4: **Land Use Planning**

Description	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
				2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
WHP Measure (15): Should ground water quantity become a concern to the City, initiate discussion with other high capacity water users in or within two miles of the DWSMA to discuss existing and future groundwater quantity and quality issues.	Medium	WHP Mgr. City Utility Staff	Staff Time										
WHP Measure (16): Every 2.5 years, review and update the Emergency / Contingency Strategy Plan portion of the city's WHP plan to ensure that it reflects current personnel information and any changes in the water supply system.	Medium	WHP Mgr. City Utility Staff	Staff Time			X			X			X	
WHP Measure (17): Request the County Water Plan Coordinator includes the DWSMA Map and identifies local WHP issues and activities when the County Water Management Plan is updated.	Medium	WHP Mgr. City Utility Staff Chisago County SWCD	Staff Time		X								

Category 5: **WHP Coordination, Reporting and Evaluation**

Description	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
				2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
WHP Measure (18): Annually, check in with WHP goals to make sure the past year's goals and achievements were accomplished.	Medium	WHP Mgr. City Utility Staff	Staff Time	X	X	X	X	X	X	X	X	X	X
WHP Measure (19): On an ongoing basis, maintain a "WHP folder" that contains documentation of WHP activities you have completed and a date that it was done	Medium	WHP Mgr. City Utility Staff	Staff Time			X			X			X	
WHP Measure (20): Complete an Evaluation Report every 2.5 years that evaluates the "progress of plan of action and the impact of a (any) contaminant release on the aquifer supplying the public water supply well" MN WHP Rule 4720.5270.	Medium	WHP Mgr. City Utility Staff	Staff Time			X			X			X	

9.4 Commitments From Cooperators

The agencies listed in Table 10 have indicated they will support the City of Shafer with implementing the WHP measure(s) in which they are identified.

Table 10 - Cooperating Agencies List

Agency	Measure	Actions Agency Will Take
Chisago County SWCD	7, 17	Provide technical assistance for implementing activities
MDH	2, 3, 8, 10, 11, 12, 13	Provide technical assistance for implementing activities
MRWA	11, 12, 13	Provide technical assistance for implementing activities
MNDOT	5	Supports Activities

Chapter 10 - Evaluation Program

Evaluation is used to support plan implementation and is required under Minnesota Rules, part 4720.5270, prior to amending the city's WHP plan. Plan evaluation is specified under Objective 7 and provides the mechanism for determining whether WHP action items are achieving the intended result or whether they need to be modified to address changing administrative, technical, or financial resource conditions within the DWSMA. The city has identified the following procedures that it will use to evaluate the success with implementing its WHP plan:

1. An annual briefing to the city council will provide the basis for documenting whether each action step for that year was implemented.
2. The WHP team will meet, at a minimum, every two-and-one-half years to assess the status of plan implementation and to identify issues that impact the implementation of action steps throughout the DWSMA;
3. The city will assess the results of each action item that has been taken annually to determine whether the action item has accomplished its purpose or whether modification is needed. Assessment results will be presented in the annual report to the city council.
4. The city will prepare a written report that documents how it has assessed plan implementation and the action items that were carried out. The report will be presented to MDH at the first scoping meeting held with the city to begin amending the WHP plan.

Chapter 11 - Contingency Strategy

The WHP plan includes a contingency strategy that addresses disruption of the water supply caused by either contamination or mechanical failure. The city prepared this strategy using a template provided by MDH and presented in Appendix III of this plan. A copy of this plan is available for public review during regular business hours at the city offices and is referenced in this section.

Chapter 12 - 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 surface and subsurface areas surrounding a public water supply well, including the wellhead protection area, that must be managed by the entity identified in the wellhead protection plan. (Minnesota Rules, part 4720.5100, subpart 13). This area is delineated using identifiable landmarks that reflect the scientifically calculated wellhead protection area boundaries as closely as possible.

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.

Emergency Standby Well. A well that is pumped by a public water supply system only during emergencies, such as when an adequate water supply cannot be achieved because one or more primary or seasonal water supply wells cannot be used.

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.

Nonpoint Source Contamination. Refers to contamination of the drinking water aquifer that is caused by polluted runoff or pollution sources that cannot be attributed to a specifically defined origin, e.g., runoff from agricultural fields, feedlots, or urban areas.

Point Source Contamination. Refers to contamination of the drinking water aquifer that is attributed to pollution arising from a specifically defined origin, such as discharge from a leaking fuel tank, a solid waste disposal site, or an improperly constructed or sealed well.

Primary Water Supply Well. A well that is regularly pumped by a public water supply system to provide drinking water.

Seasonal Water Supply Well. A well that is only used to provide drinking water during certain times of the year, either when pumping demand cannot be met by the primary water supply well(s) or for a facility, such as a resort, that is closed to the public on a seasonal basis.

Vulnerability. Refers to the likelihood that one or more contaminants of human origin may enter either 1) a water supply well that is used by the public water supplier or 2) an aquifer that is a source of public drinking water.

WHP 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).

WHP Plan Goal. An overall outcome of implementing the WHP plan, e.g., providing for a safe and adequate drinking water supply.

WHP Measure. A method adopted and implemented by a public water supplier to prevent contamination of a public water supply, and approved by the Minnesota Department of Health under Minnesota Rules, parts 4720.5110 to 4720.5590.

WHP Plan Objective. A capability needed to achieve one or more WHP goals, e.g., implementing WHP measures to address high priority potential contamination sources within 5 years.

Chapter 13 - List of Acronyms

CWI	County Well Index
DNR	Minnesota Department of Natural Resources
DWSMA	Drinking Water Supply Management Area ()
EPA	United States Environmental Protection Agency
ERA	Emergency Response Area ().
FSA	Farm Security Administration
IWMZ	Inner Wellhead Management Zone ().
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MGS	Minnesota Geological Survey
MnDOT	Minnesota Department of Transportation
MnGEO	Minnesota Geospatial Information Office
MPCA	Minnesota Pollution Control Agency
NRCS	Natural Resource Conservation Service
SWCD	Soil and Water Conservation District
UMN	University of Minnesota
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WHPA	Wellhead Protection Area

Chapter 14 – References

MN Rural Water Association (MRWA) website:
http://www.mrwa.com/

MN Department of Health (MDH) Source Water Protection website
http://www.health.state.mn.us/divs/eh/water/swp/index.htm

MN Department of Health (MDH) Drinking Water Protection website:
http://www.health.state.mn.us/divs/eh/water/

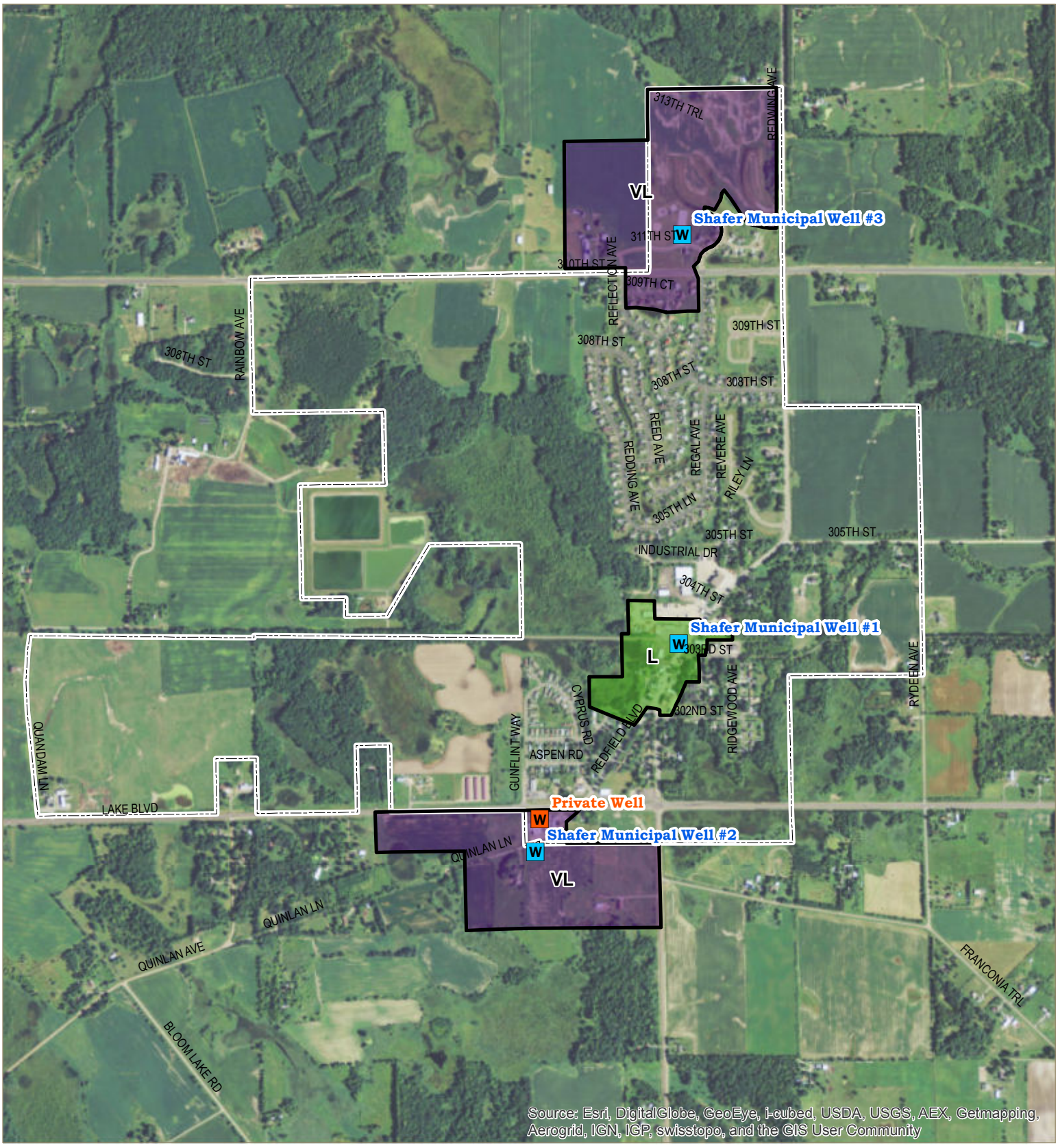
MN Pollution Control Agency (MPCA) website: http://www.pca.state.mn.us/

MN Department of Natural Resources (MN DNR) Water Management website:
http://www.dnr.state.mn.us/waters/watermgmt_section/index.html

MN Department of Agriculture (MDA) Protecting Our Lands & Waters website:
http://www.mda.state.mn.us/protecting.aspx

US Environmental Protection Agency (EPA) Source Water protection website:
http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/index.cfm

Chapter 15 - FIGURES



PCSI DATA - WELLS

CITY OF SHAFER
CHISAGO COUNTY, MINNESOTA

LEGEND

- W Municipal Well
- W Private Well
- DWSMA Boundary

Aquifer Vulnerability

- Low
- Very Low
- City Boundary

0 650 1,300 Feet

N

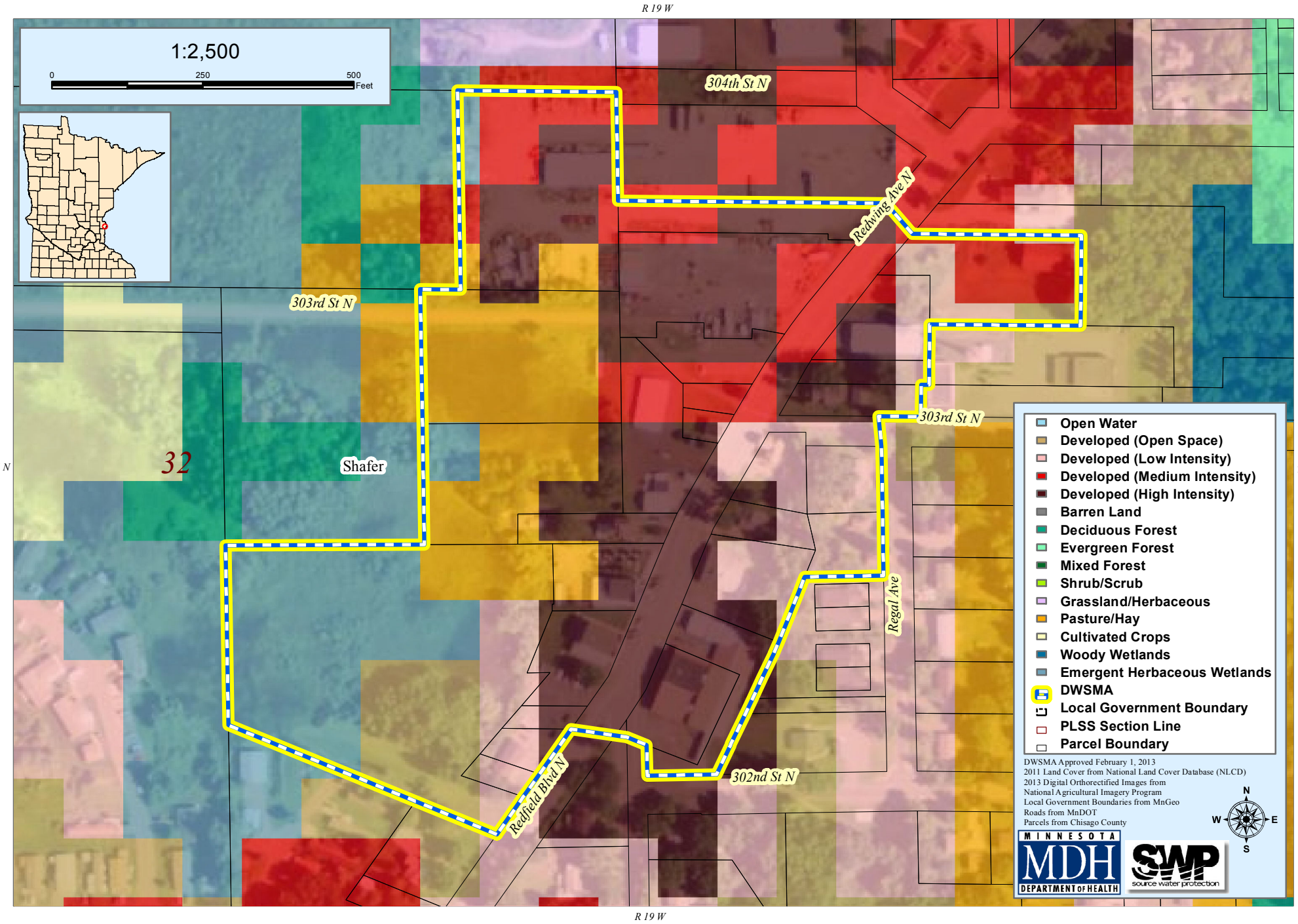
MSA PROFESSIONAL SERVICES

BASE DATA PROVIDED BY XXX. AERIAL IMAGERY PROVIDED BY ESRI.

Shafer
Chisago County
Minnesota

Shafer 1 Drinking Water Supply Management Area (DWSMA) MN-00650 - Land Cover 2011

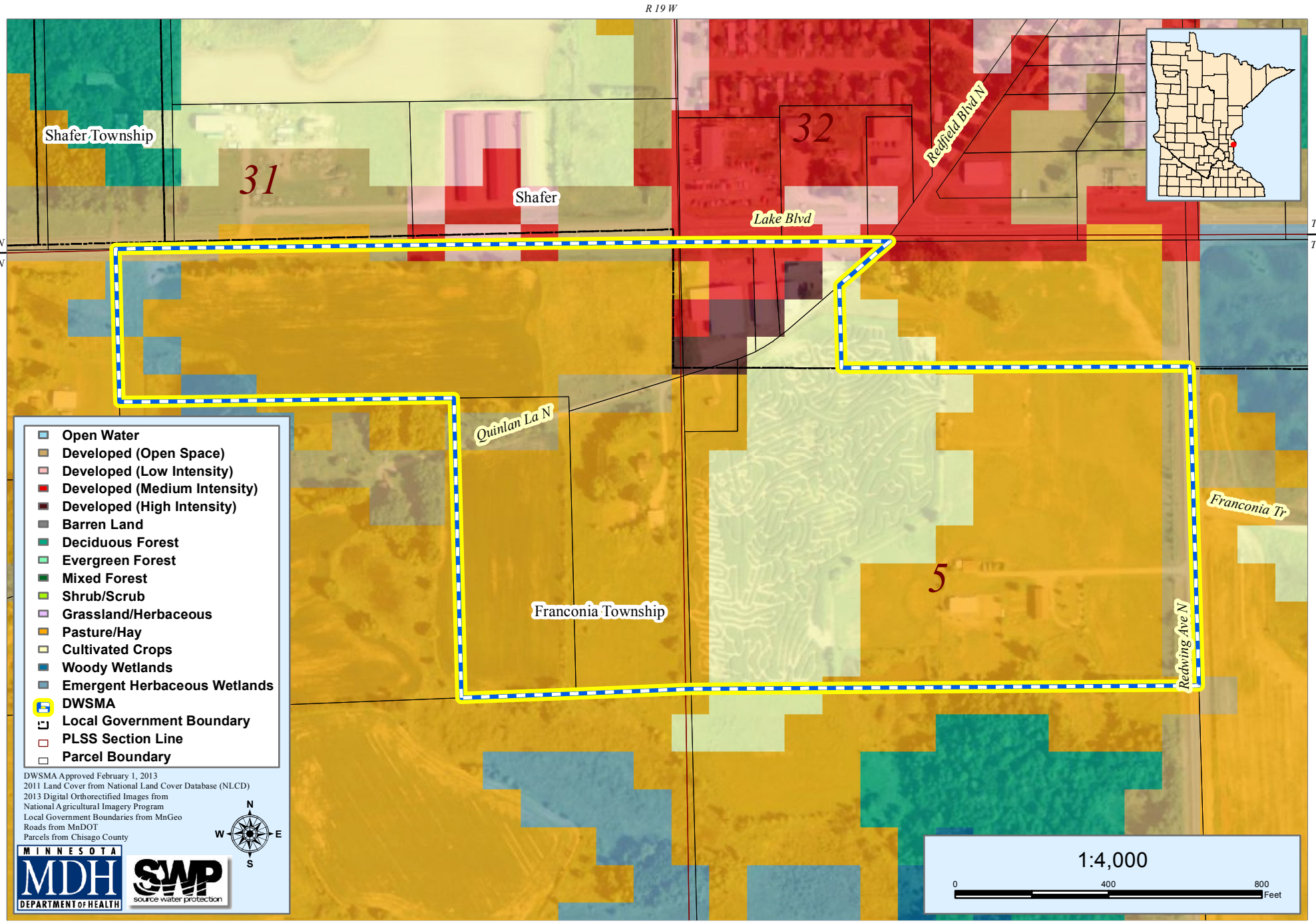
Minnesota Department of Health
Environmental Health
Source Water Protection Unit



Shafer
Chisago County
Minnesota

Shafer 2 Drinking Water Supply Management Area (DWSMA) MN-00651 - Land Cover 2011

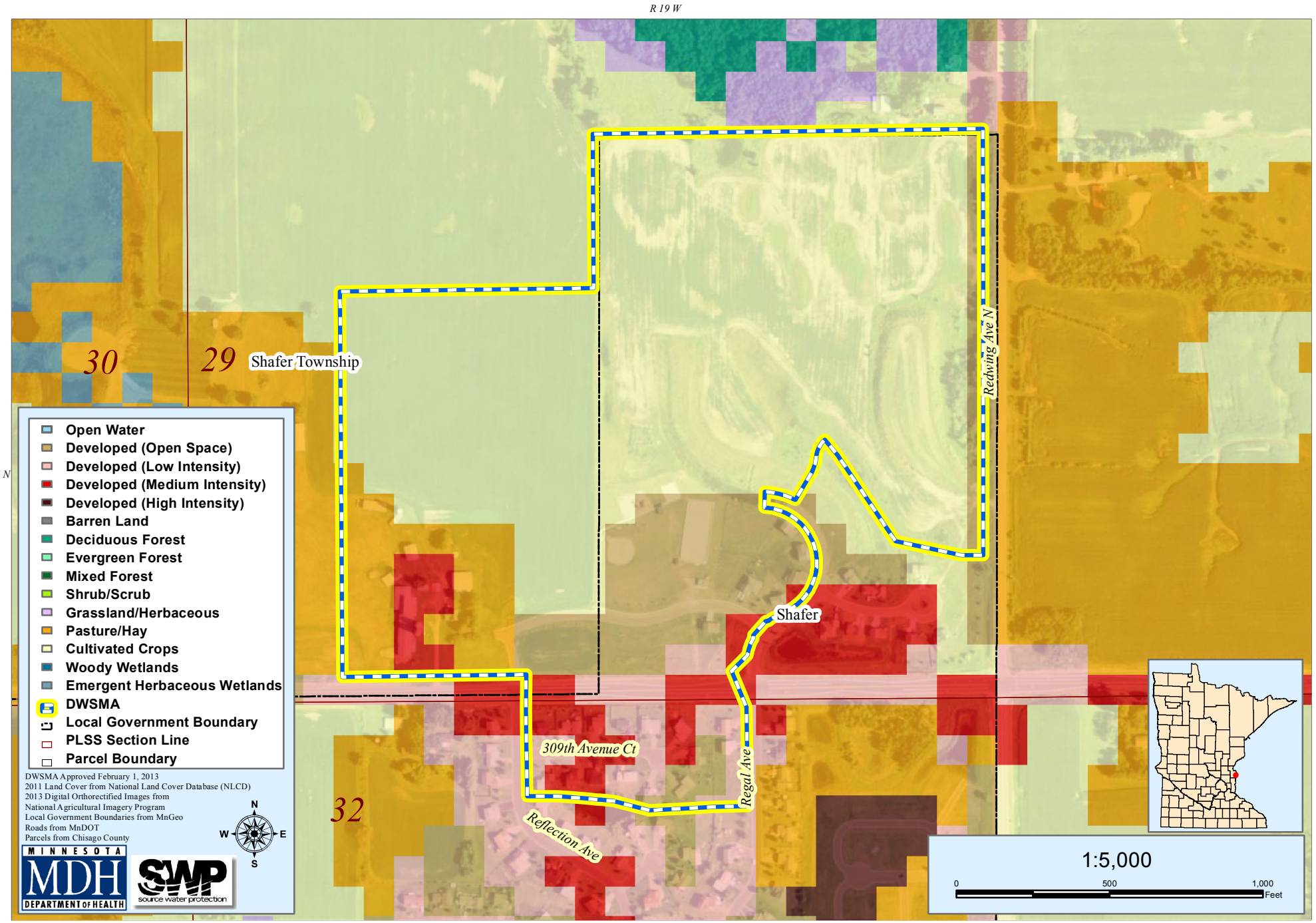
Minnesota Department of Health
Environmental Health
Source Water Protection Unit



Shafer
Chisago County
Minnesota

Shafer 3 Drinking Water Supply Management Area (DWSMA) MN-00652 - Land Cover 2011

Minnesota Department of Health
Environmental Health
Source Water Protection Unit



APPENDIX I:
MDH WHP PLAN PART 1: WHPA AND DWSMA DELINEATIONS AND VULNERABILITY ASSESSMENTS CITY OF SHAFER

Wellhead Protection Plan

Part I

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

Prepared for

The City of Shafer

August 2012

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

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Glossary of Terms

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

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

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

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

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

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

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

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

Acronyms

CWI - County Well Index

DNR - Minnesota Department of Natural Resources

EPA - United States Environmental Protection Agency

FSA - Farm Security Administration

MDA - Minnesota Department of Agriculture

MDH - Minnesota Department of Health

MGS - Minnesota Geological Survey

MnDOT - Minnesota Department of Transportation

MnGEO - Minnesota Geospatial Information Office

MPCA - Minnesota Pollution Control Agency

NRCS - Natural Resource Conservation Service

SWCD - Soil and Water Conservation District

UMN - University of Minnesota

USDA - United States Department of Agriculture

USGS - United States Geological Survey

1. Introduction

The Minnesota Department of Health (MDH) developed Part I of the wellhead protection (WHP) plan at the request of the city of Shafer (public water supply identification number 1130014). The work was performed in accordance with the Minnesota Wellhead Protection Rule, parts 4720.5100 to 4720.5590.

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

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

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

Table 1 - Water Supply Well Information
City of Shafer

Local Well Name	Unique Number	Type	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed	Well Vulnerability	Aquifer
Well 1	217905	Primary	8	375	550	1967	Not Vulnerable	Ironton - Mt. Simon
Well 2	559343	Primary	8x14	445	560	1995	Not Vulnerable	Mt. Simon
Well 3	737040	Primary	12x18x24	438	617	2006	Not Vulnerable	Mt. Simon

2. Assessment of the Data Elements

MDH staff met with representatives of the public water supplier on March 12, 2012, for a scoping meeting that identified the data elements required to prepare Part I of the WHP plan. Table 2 presents the assessment of these data elements relative to the present and future implications of planning items that are specified in Minnesota Rules, part 4720.5210.

Table 2 - Assessment of Data Elements

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

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

Definitions Used for Assessing Data Elements:

High (H) - the data element has a direct impact

Moderate (M) - the data element has an indirect or marginal impact

Low (L) - the data element has little if any impact

Shaded - the data element was not required by MDH for preparing the WHP plan

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

3. General Descriptions

3.1 Description of the Water Supply System

The city of Shafer obtains its drinking water supply from three primary wells. Table 1 summarizes information regarding them.

3.2 Description of the Hydrogeologic Setting

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

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

Table 3 - Description of the Hydrogeologic Setting at Shafer Wells

Aquifer	Attribute	Descriptor	Data Source
Mt. Simon Sandstone (CMTS)	Aquifer Material	Sandstone	Well logs
	Primary Porosity	0.20	Estimated and porosity values used in the Metro Model.
	Aquifer Thickness	187 feet	Well 3 well log (737040)
	Stratigraphic Top Elevation	527 feet MSL	Well 3 well log (737040)
	Stratigraphic Bottom Elevation	340 feet MSL	Well 3 well log (737040)
	Hydraulic Confinement	Confined	Well 3 well log (737040)
	Transmissivity (T)	Reference Value/Range (CMTS): 2,490 ft^2/day (2,040 - 7,500 ft^2/day)	The aquifer test plan was approved on May 29, 2012, and the reference value for the transmissivity of the Mt. Simon Aquifer was determined from a step drawdown test conducted at Well 3 well log (737040). The range of transmissivities was obtained from specific capacities conducted at Mt. Simon wells in the area.
	Hydraulic Conductivity (K)	Reference Value/Range (CMTS): 13.3 ft/day (10.9 – 40.1 ft/day)	The reference values for the hydraulic conductivity of the Mt. Simon Aquifer were calculated from the transmissivity and the thickness of the formation at Well 3 well log (737040).
	Groundwater Flow Field	Flow to the northeast Hydraulic Gradient: 9.2×10^{-4} ft/foot	Modeled groundwater flow field

4. Delineation of the Wellhead Protection Area

4.1 Delineation Criteria

The boundaries of the WHPA for the city of Shafer are shown in Figures 1a and 1b. Table 4 describes how the delineation criteria that are specified under Minnesota Rules, part 4720.5510, were addressed.

Table 4 - Description of WHPA Delineation Criteria

Criterion	Descriptor	How the Criterion was Addressed
Flow Boundary	St. Croix and Rum Rivers	The rivers provided boundary conditions to the model that extended to these natural boundaries. They were included in the model and set the regional groundwater flow.
Flow Boundary	Other High-Capacity Wells (Table 6)	Six wells (Table 6), located within two miles of the Shafer wells and screened in the same aquifer as the Shafer wells, were included in the delineation. Other Franconia-Ironton-Galesville, Mt. Simon wells and Quaternary Buried Aquifer wells, located more than two miles away, were included in the groundwater model as well. The pumping amounts for these wells were determined based on the averaged 2000-2009 pumped volumes.
Daily Volume of Water Pumped	See Table 5	Pumping information was obtained from DNR Appropriations Permit 1985-3255. The annual pumped volumes were converted to a daily volume pumped by a well.
Groundwater Flow Field	See Figure 2	The model calibration process addressed the relationship between the calculated versus observed groundwater flow field.
Aquifer Hydraulic Transmissivity	Reference Value (CMTS): 2,490 ft^2/day	The aquifer test plan was approved on May 29, 2012, and the reference value for the transmissivity of the Mt. Simon Aquifer was determined from a step drawdown test conducted at Well 3 well log (737040).
Time of Travel	10 years	The public water supplier selected a 10-year time of travel.

Information provided by the city of Shafer was used to identify the maximum volume of water pumped annually by each well over the previous five-year period, as shown in Table 5. No changes in pumping volume are expected in the next five years. Previous pumping values have been reported to the DNR, as required by Groundwater Appropriation Permit 1985-3255. The maximum daily volume of discharge used as an input parameter in the model was calculated by dividing the greatest annual pumping volume by 365 days.

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

Well Name	Unique Number	Total Annual Withdrawal (gallons/year)				
		2007	2008	2009	2010	2011
1	217905	**8,374,000**	7,216,100	5,816,100	7,109,700	5,309,000
2	559343	**10,004,000**	7,242,600	7,873,200	6,104,814	7,429,000
3	737040	2,548,000	4,637,000	5,492,000	5,589,696	**6,784,000**
Totals		20,926,000	19,095,700	19,181,300	18,804,210	19,522,000

Source: City and DNR State Water Use Database System Permit No. 1985-3255.
Bolding indicates greatest annual pumping volume.

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

Unique Number	Well Name	Permittee	DNR Permit Number	Aquifer	Use	Average Withdrawal (2001 - 2010) gallons/year
706812	6	HAZELDEN FOUNDATION	1977-3092	CFIG	Commercial and Institutional	11,000,000
217895	2	HAZELDEN FOUNDATION	1977-3092	CIGL	Private waterworks	4,500,000
107129	3	HAZELDEN FOUNDATION	1977-3092	CFRNCIGL	Private waterworks	0
228343	1	HAZELDEN FOUNDATION	1977-3092	CFRNCIGL	Private waterworks	3,400,000
753659	4	TAYLORS FALLS, CITY OF	1961-0666	CFIG	Municipal	4,400,000
217904	3	TAYLORS FALLS, CITY OF	1961-0666	PMCV	Municipal	25,500,000

4.2 Method Used to Delineate the Wellhead Protection Area

The WHPA for the city of Shafer was determined using a regional MODFLOW Model that was specially developed for this project. MODFLOW is a 3D, cell-centered, finite difference, saturated flow model developed by the U.S. Geological Survey (McDonald and Harbaugh, 1988; Harbaugh et al., 2000).

The MDH Chisago County Model (Djerrari, 2012) consists of four layers that represent the major aquifers and aquitards within the Chisago-Anoka Counties area. These layers generally represent, from top to bottom, the following units: (1) surficial aquifer of glacial deposits; (2) Franconia-Ironton-Galesville Aquifer, (3) Eau Claire Formation (aquitard); and (4) Mt. Simon Sandstone.

The model was constructed using information from the Chisago County Atlas by the Minnesota Geological Survey (Setterholm, 2010), bedrock formation elevations developed by the MGS in support of groundwater management for the northwestern Twin Cities Metropolitan Area (Runkel et al., 2003), as well as bedrock formation elevations developed by the Metro Council for Isanti County and reviewed by the MGS (Lanya Ross, personal communication).

The faults and the St. Croix Horst in the Shafer area were accounted for in the model using impermeable walls with low conductance. The St. Croix River was represented by head-specified cells. The different creeks and lakes within the active area of the model were represented by river conductance cells. Recharge was applied to the model using different recharge zones. Pumping wells from the SWUDS database were incorporated in the model using their locations from the CWI database. The average pumping rates for the period 2000 - 2009 were used.

The model grid was refined around the city of Shafer wells. Variable grid spacing was used, ranging from ten meters near the city of Shafer wells to 250 meters at the edge of the grid. This refinement was required for an accurate computation of the particle flow paths for determining the WHPA delineation. The model was manually calibrated to water levels. Further details on the model construction can be found in the MDH Technical Memorandum (Djerrari, 2012)

Prior to their use in the delineations, the following modifications were incorporated in the refined models:

- A local area of modified horizontal conductivity was included in the model to reflect the transmissivities in the Shafer area.
- The pumping rates to be used in the WHPA were assigned to the city of Shafer wells.

The delineation using the particle tracking MODPATH Code. A series of 50 particles were launched at each well. A was performed by backtracking particles from the well to a 10-year time of travel porosity of 20 percent was used for the Franconia Formation, Ironton-Galesville Sandstones, and Mt. Simon Sandstone. A porosity of 40 percent was used for the Eau Claire confining unit.

4.3 Calibration and Sensitivity

Model quality is commonly evaluated by three different measures: calibration, sensitivity, and uncertainty analyses. Model calibration is a procedure that compares the results of a model based on estimated input values to measured or "known" values. This procedure is used to define model validity over a range of input values. The result of calibration is an assessment of the general quality of the model and the confidence that may be placed in the model results. As a matter of practice, groundwater flow models usually are calibrated using groundwater elevation and flow (if available). Sensitivity analysis quantifies the differences in model results produced by the natural variability of a particular parameter. Uncertainty analysis addresses the

effects of poor data quality (lack of local detailed information or deficiencies in the data) on the model results. Together, sensitivity and uncertainty analyses are commonly used to evaluate the effects that natural variability and uncertainties in the hydrogeologic data have on the size and shape of the capture zones. In regards to the WHPA delineation, these analyses are used to document that the delineation is optimal, conservative, and protective of public health based on existing information.

4.3.1. Calibration

The MDH Chisago County Model was calibrated to the CWI database water level targets (Djerrari, 2012). The regional Model was calibrated to the CWI database water level targets. The calibration was performed by applying an automated calibration procedure using PEST, a parameter estimation code that automatically adjusts the recharge rates and hydraulic conductivity values and compares modeled piezometric heads against measured values at observation well locations until a satisfactory fit is obtained. For the calibrated model, the standard deviation of the model prediction error represented less than 10 percent of the total change in measured heads across the model domain, which is within an acceptable range for a calibrated model.

4.3.2. Sensitivity Analysis

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

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

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

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

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

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

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

The **horizontal hydraulic conductivity** influences the size and shape of the capture zone. In the base-case scenario, the hydraulic conductivity was estimated from step drawdown tests conducted at the Shafer wells. These values were used in the groundwater model to delineate the 10-year time of travel

capture zones for the Base Case scenario. Because no pumping test was conducted on the Shafer well, the uncertainty of the hydraulic conductivity can be great. Several runs were performed for the range of transmissivities derived from specific capacity tests conducted at Mt. Simon wells in the area. The ranges of transmissivity considered in the sensitivity analysis runs are given in Table 3.

Results - A high transmissivity value elongates the capture zone while reducing its width. A lower value of the transmissivity yields a wider and more circular capture zone (Figure 5).

The **vertical hydraulic conductivity of the Eau Claire Formation** could influence the size and shape of the capture zone. In the base-case scenario, a relatively large value for the vertical hydraulic conductivity (i.e., 6×10^{-4} cm/s) was used for the Eau Claire Formation. To assess the impact of the uncertainty on this parameter, another run was performed with a value 100 times smaller.

Results – Decreasing the vertical hydraulic conductivity of the Eau Claire formation increases the width of the capture zone (Figure 5).

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

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

The WHPA for the city of the Shafer wells in Figures 1a and 1b consist of a composite of the porous media aquifer delineations for the different input parameters used in the sensitivity analysis. The input files for all models are available upon request at MDH.

4.4 Addressing Model Uncertainty

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

Traditional numerical groundwater models were used to delineate the capture zone for the porous media aquifer that contributes water to the public water supply well. The steps employed for this delineation to address model uncertainty were:

- Pumping Rate - For each well, a maximum historical (five-year) pumping rate or an engineering estimate of future pumping, whichever is greater (Minnesota Rules, part 4720.5510, subpart 4).
- Transmissivity - The WHPA for the Shafer wells consists of a composite of the porous media aquifer delineations for the different input parameters used in the sensitivity analysis (Table 3).

Capture areas were developed for a range of aquifer permeabilities, hydraulic gradient, and a time of travel of 10 years (Figure 5). As the model code uses constant input values for each run, several runs were required to include all variations in input parameters. The WHPA for the city of Shafer wells consists of a composite of the porous media aquifer delineations for the different input parameters used in the sensitivity analysis. This provides a conservative approach to addressing model uncertainty and produces a WHPA that will likely be most protective of public health.

5. Delineation of the Drinking Water Supply Management Area

The boundaries of the DWSMA were defined by the public water supplier using the following features (Figures 1a and 1b):

- Center-lines of highways, streets, roads, or railroad rights-of-ways; and
- Property or fence lines.

6. Vulnerability Assessments

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

6.1 Assessment of Well Vulnerability

The vulnerability assessment for each well used by the public water supplier is listed in Table 1 and is based upon the following conditions:

1) Grouting information is not known at the city of Shafer Well 1 (217905), and the well may not be up to code. However, based on water quality results, the borehole integrity does not appear to be compromised. Well 2 (559375) and Well 3 (737040) construction meets current State Well Code specifications (Minnesota Rules, part 4725) and the wells themselves do not provide a pathway for contaminants to enter the aquifer used by the public water supplier.
2) The geologic conditions at the well sites include a cover of clay-rich geologic materials over the aquifer that is sufficient to retard or prevent the vertical movement of contaminants.
3) None of the human-caused contaminants regulated under the federal Safe Drinking Water Act have been detected at levels indicating that either well serves to draw contaminants into the aquifer as a result of pumping.
4) A water samples was collected from Well 1 (217905) in May 2012, and is being analyzed for tritium to confirm the vulnerability status.

6.2 Assessment of the Drinking Water Supply Management Area Vulnerability

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

1) Water chemistry data from wells located within the DWSMA indicate no detectable levels of human-caused contamination; and
2) Review of the geologic logs contained in the CWI database and geological maps and reports indicate that the aquifer exhibits a very low geologic sensitivity throughout the DWSMA. The L-scores from wells within or close to the DWSMA vary from 1 to 7, indicating that 10 to 70 feet of clayey material or shale overlies the Mt. Simon aquifer (Figure 6). The Mt. Simon Aquifer near Shafer is, therefore, isolated from the direct vertical recharge of surface water.

7. Selected References

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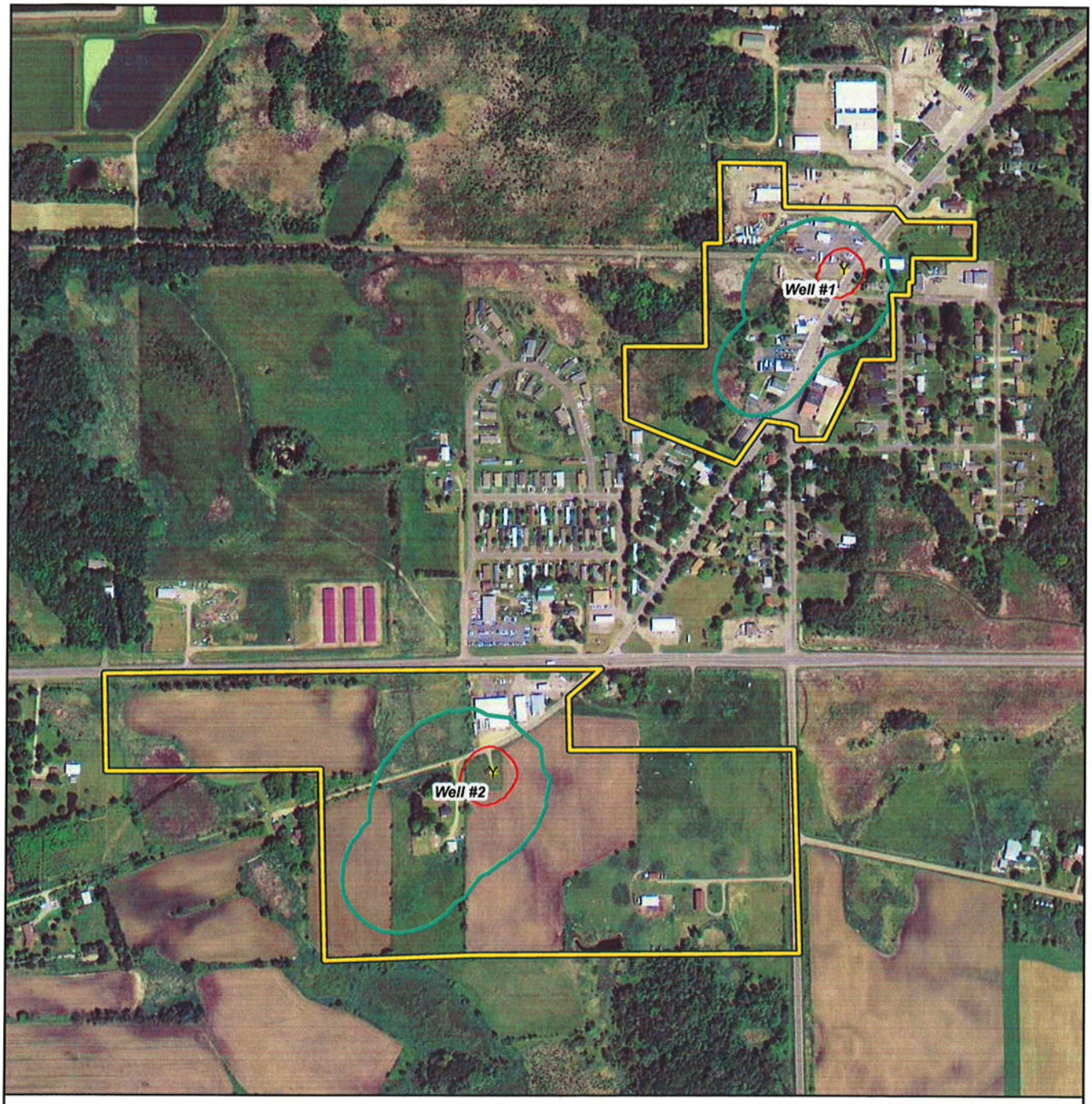


Y **Primary Well**

Drinking Water Supply Management Area

Emergency Response Area

Wellhead Protection Area

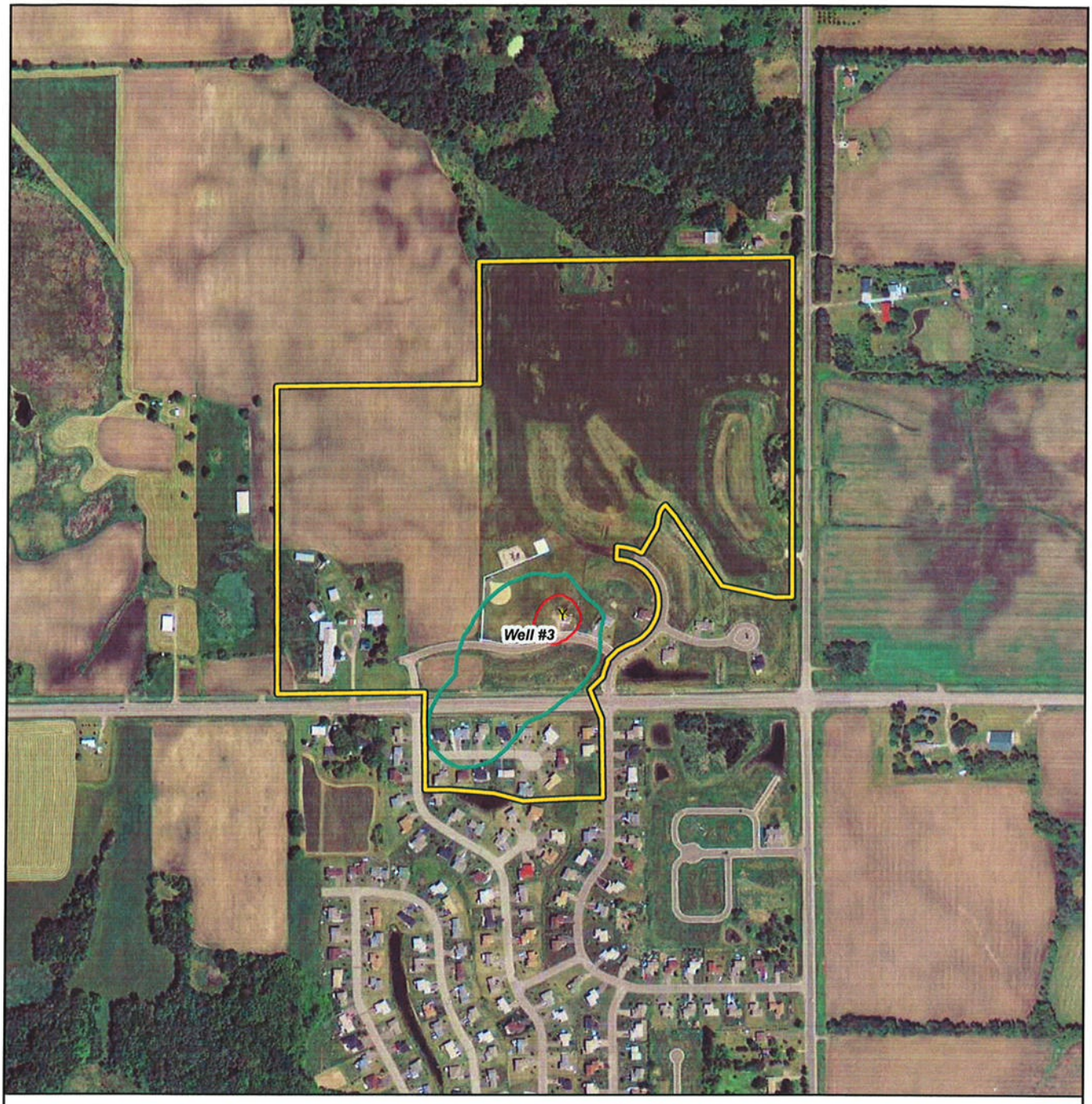
Scale: 1:6,500

0 375 750 1,500

Feet

MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 1a
Wellhead Protection and Drinking Water Supply Management Area
Wells 1 and 2
Shafer, MN



Y **Primary Well**

Drinking Water Supply Management Area

Emergency Response Area

Wellhead Protection Area

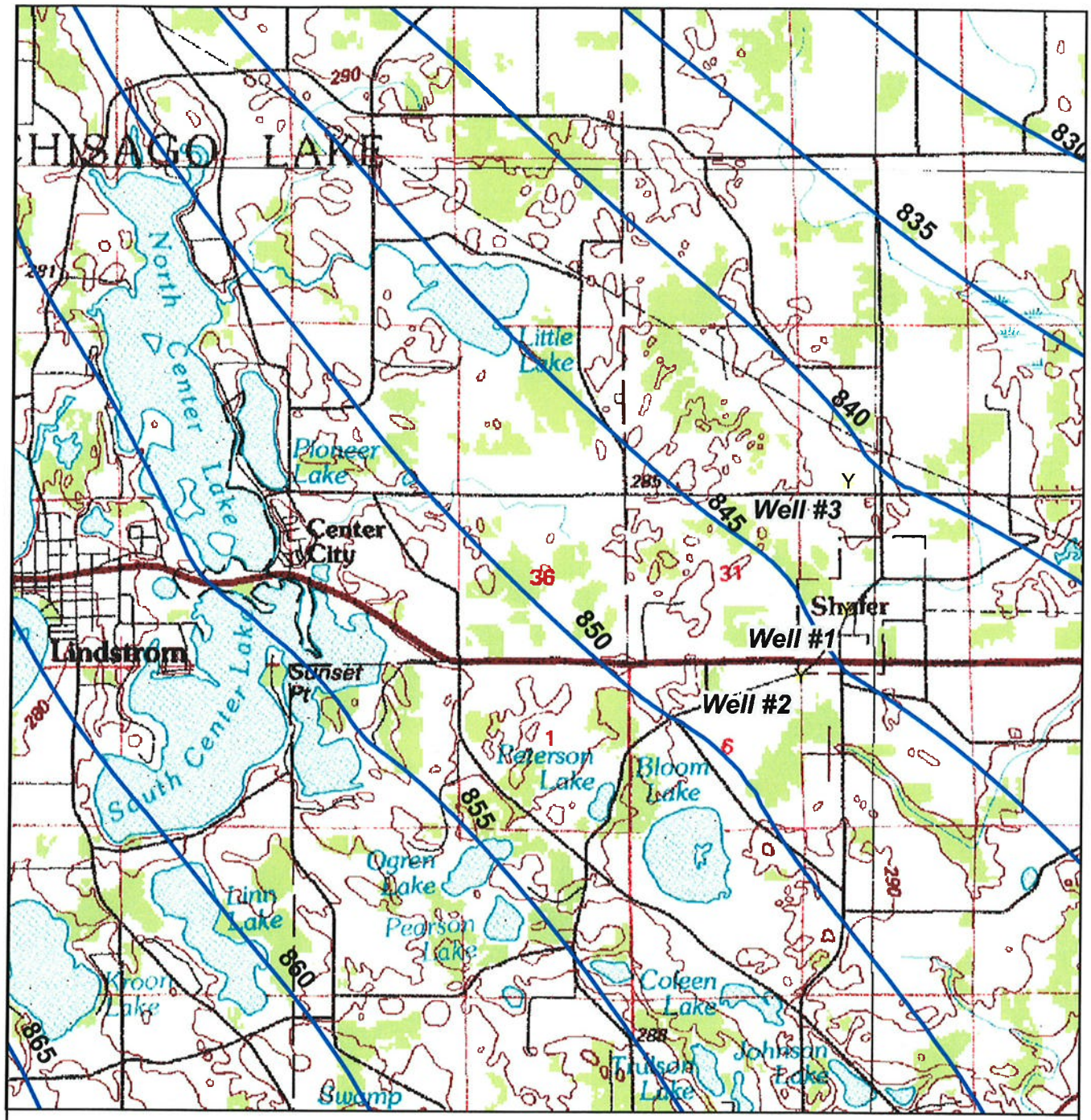
Scale: 1:6,500

0 375 750 1,500

Feet

MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 1b
Wellhead Protection and Drinking Water Supply Management Area
Well 3
Shafer, MN



Y **Primary Well**

Hydraulic Head Contours (ft)

Scale: 1:50,000

0 2,500 5,000 10,000 Feet

MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 2
Modeled Groundwater Flow Field - Mt. Simon Aquifer
Shafer, MN

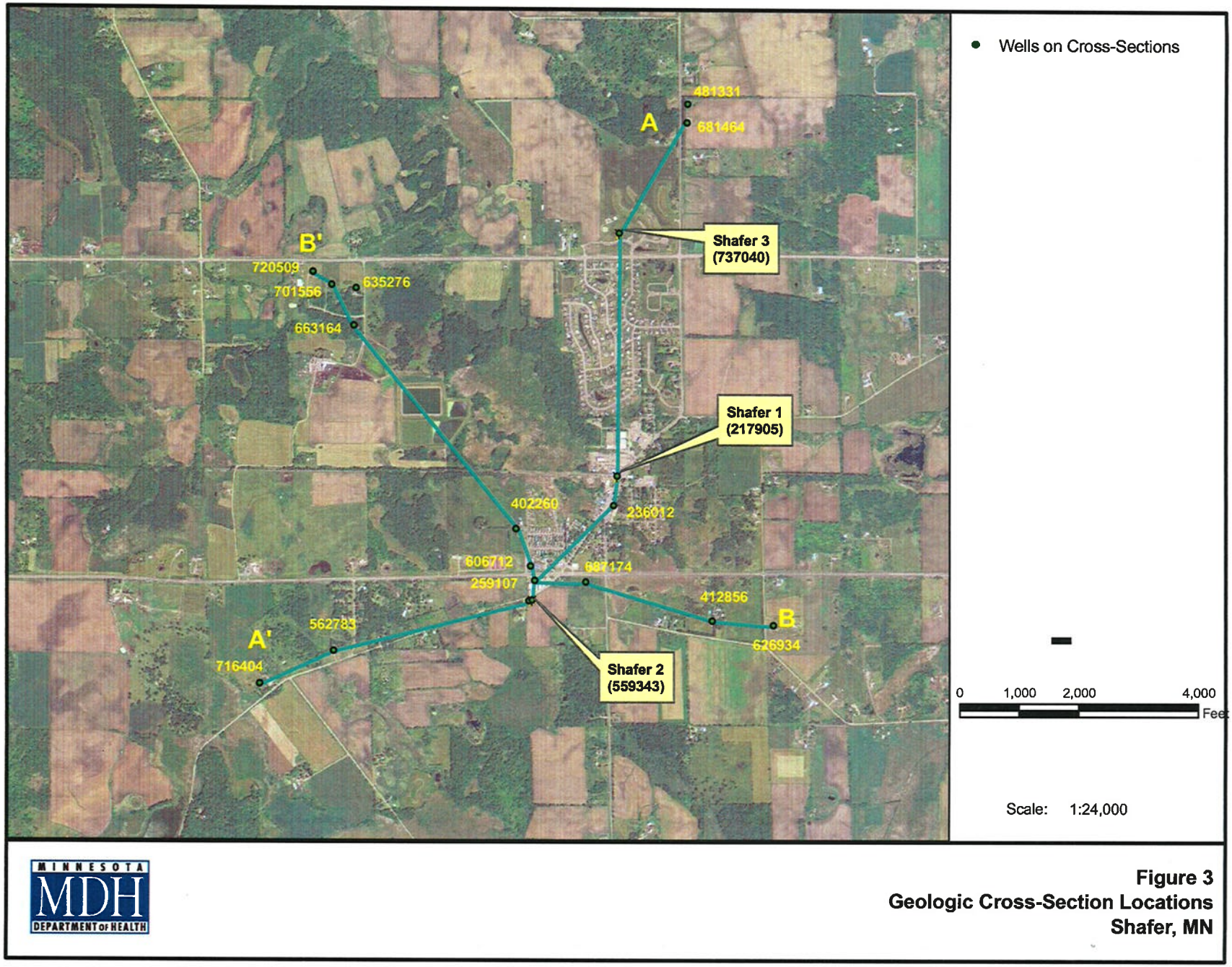
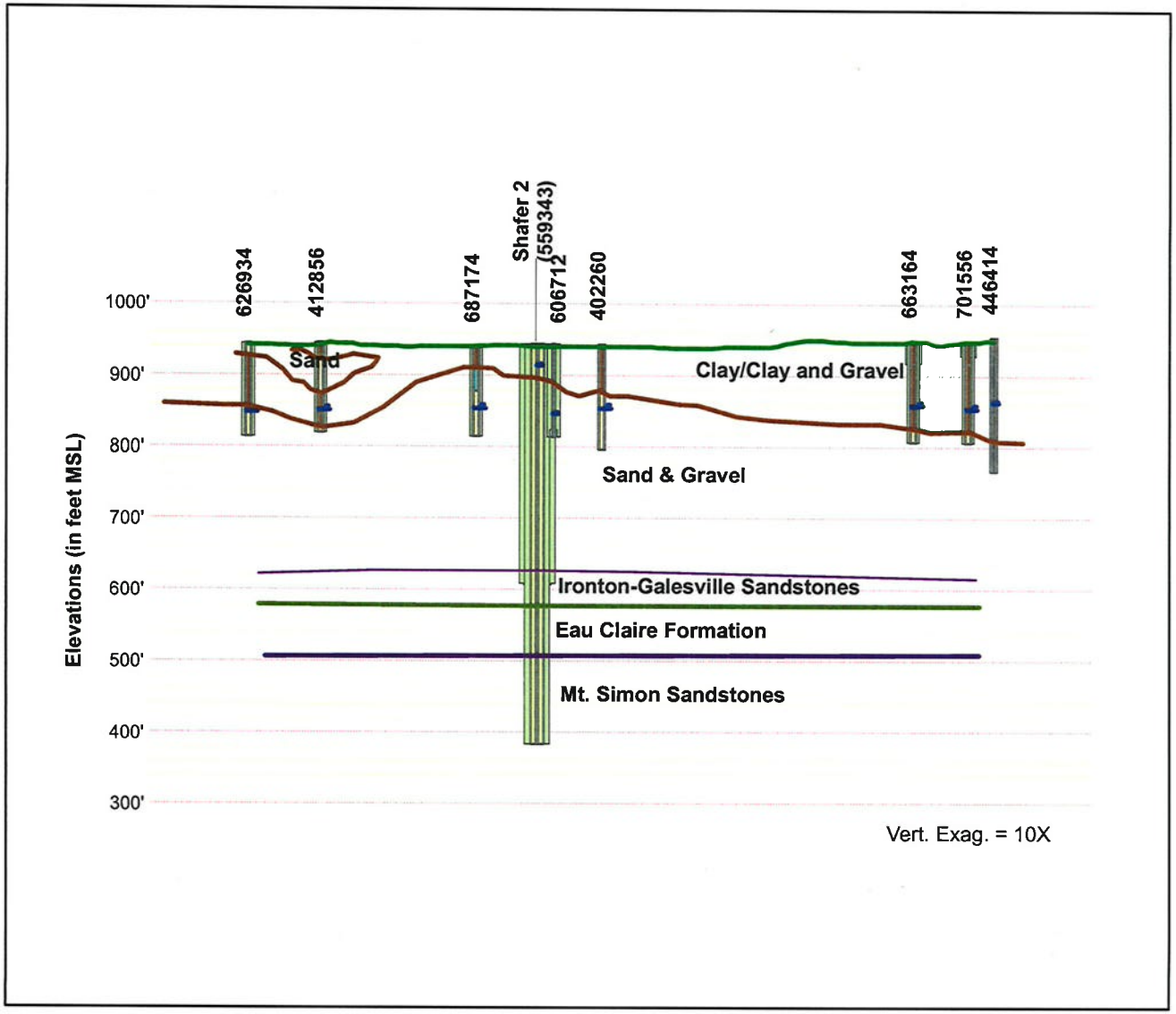


Figure 3
Geologic Cross-Section Locations
Shafer, MN



Stratigraphy

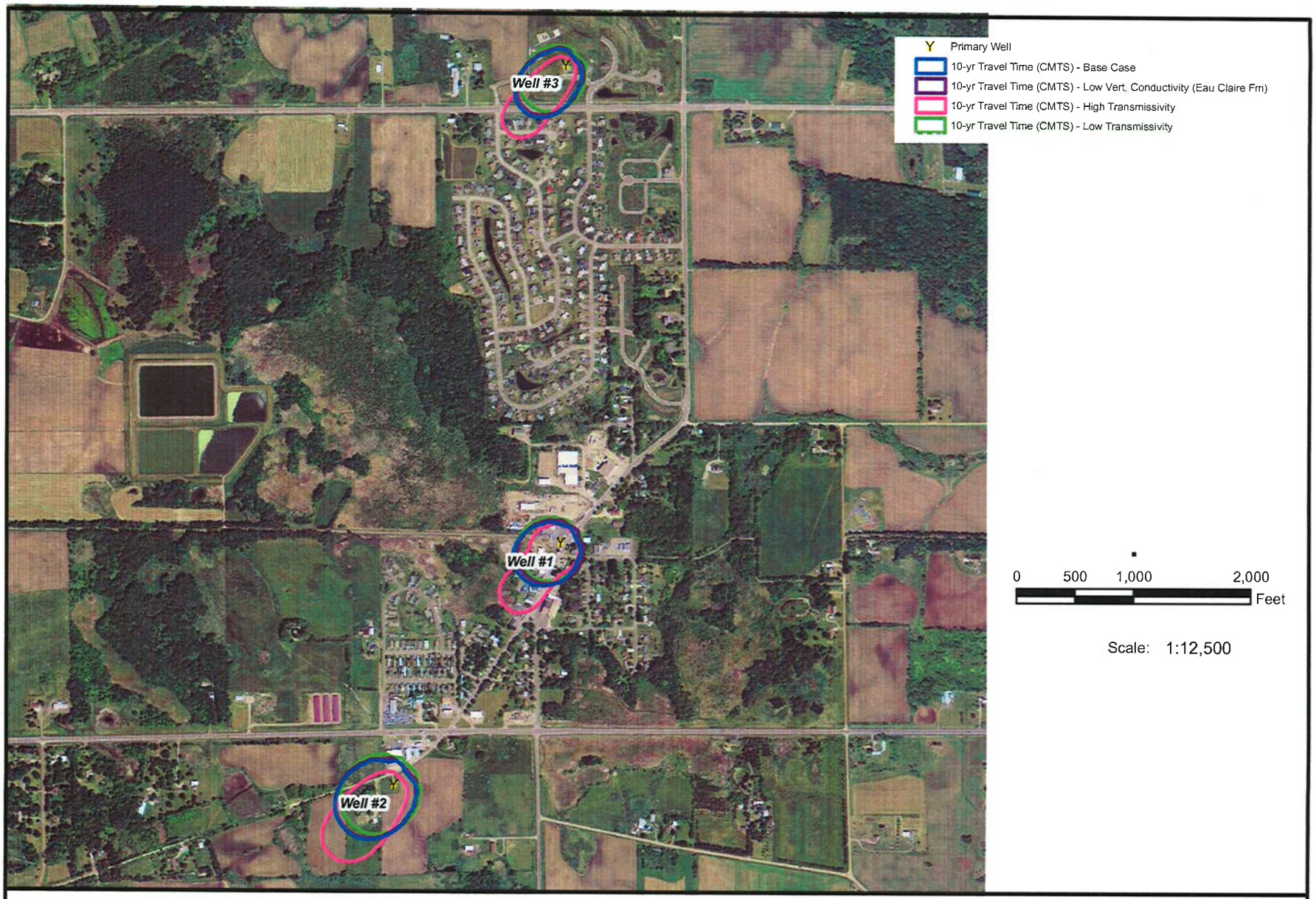
Lithology

- Basalt
- Clay
- Cobble
- Drift
- Gravel
- Sand
- Shale
- Sandstone
- Soil

0 750 1,500 3,000 Feet

MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 4b
Geologic Cross-Section B-B'
Shafer, MN



MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 5
Sensitivity of the 10-yr Capture Zone to the Transmissivity and Leakage
Shafer, MN

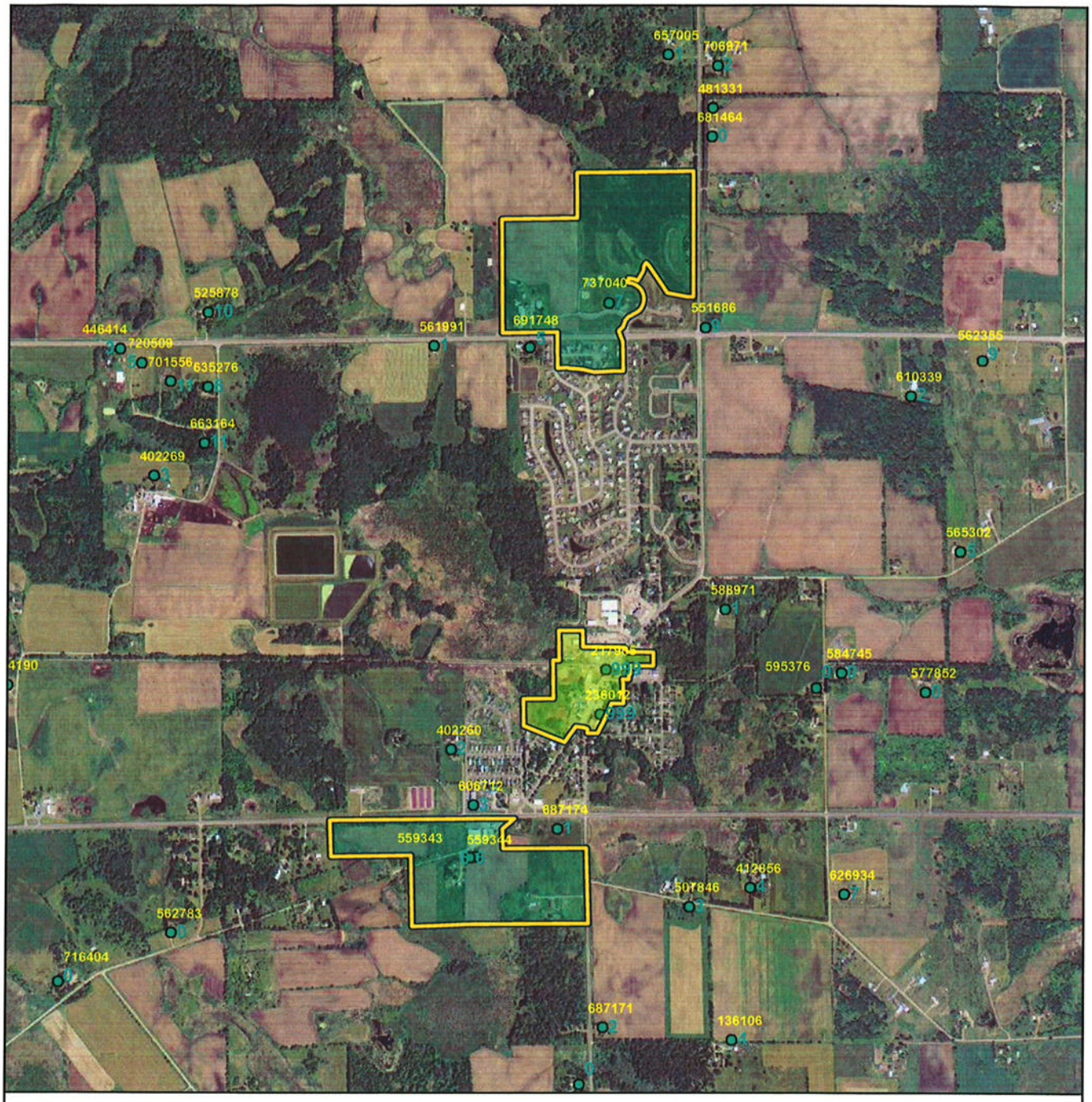


Figure 6
Drinking Water Supply Management Area Vulnerability
Shafer, MN

APPENDIX II:
INVENTORY OF POTENTIAL CONTAMINATION SOURCES

OBJE	PCSI_I	FAC_NAME	FAC_C	FAC_TYPE	ADDRESS	CITY	STATE	ZIP	CNTYC	PIN	INV	INV_STAT	MAT_C	MATERIAL	PSYS_A	PSYS_ID	COMMENT	PRIORIT	DWS_ID	UNQ No
1	1	Shafer Municipal Well #1	4334	Public water supplier	17656 303rd Street	Shafer	MN	55074	25	180003500	WELL	Active	X100	Water	CWI	1130014	Municipal well #1	NA	650	
2	2	Shafer Municipal Well #2	4334	Public water supplier	17656 303rd Street	Shafer	MN	55074	25	180003500	WELL	Active	X100	Water	CWI	1130014	Municipal well #2	NA	651	
3	3	Shafer Municipal Well #3	4334	Public water supplier	17656 303rd Street	Shafer	MN	55074	25	180003500	WELL	Active	X100	Water	CWI	1130014	Municipal well #3	NA	652	
4	4	Revolutionary Science	3360	Electrical/electronic products manufacturing	17319 Lake Blvd	Shafer	MN	55074	25	180000300	WELL	Active	X100	Water	CWI	259107	Well elevation 938 ft; Unused	L		259107

APPENDIX III:
CONTINGENCY STRATEGY

Alternative Water Supply; Contingency Strategy (4720.5280)
City of Shafer

Index

A. Purpose
B. Public Water Supply Characteristics
    1. Current Supply Source
    2. Treatment
    3. Storage and Distribution
C. Priority of Water Users During Water Supply Emergency
D. Alternative Water Supply Options
    1. Surface Water Sources and Treatment
    2. Bottled Water
    3. System Interconnects
    4. Other Alternative Water Resources
E. Inventory of Available Emergency Equipment and Materials
F. Emergency Identification Procedures
G. Notification Procedures
    1. Agency Contact List
    2. Critical Response Personnel
    3. Public Information Plan
H. Mitigation and Conservation Plan
    1. Mitigation
    2. Conservation

A. Purpose

The purpose of this Contingency Plan is to establish, provide, and keep updated certain emergency response procedures and information for the City of Shafer, MN which may become vital in the event of a partial or total loss of public water supply services.

B. Public Water Supply Characteristics

a. Current Supply Source:

The City of Shafer provides drinking water to its residents from a groundwater source: three wells ranging from 550 to 617 feet deep that draw water from the Wonewoc-Mt.Simon and Mt. Simon aquifers.

b. Treatment

The City of Shafer treats its raw with chlorine and fluoride.

c. Storage and Distribution

The City of Shafer currently has one elevated storage tank with a capacity of approximately 70,000 gallons. Presently, the water distribution system serves 400 connections.

II. Priority of Water Users During Water Supply Emergency

Type of Use	Maximum Daily Use (gpd)	Minimum Daily Use (gpd)
Residential (1)	276,395	62,580
Institutional (2)	13,250	3,000
Commercial (3)	26,500	6,000
Industrial (4)	N/A	N/A
Irrigation (5)	N/A	N/A
Unaccounted (6)	N/A	N/A
Wholesale (7)	N/A	N/A

III. Alternative Water Supply

A. Surface Water Sources and Treatment Needs - Bloom Lake and the St Croix River are within 5 miles of the City of Shafer. Due to the complexity of treatment necessary to use surface water as a City wide water supply backup, these sources are not deemed feasible.

The MN National Guard has the ability to provide the emergency treatment of surface waters for human consumption. The MN National Guard has the ability to provide Reverse Osmosis Water Purification Units capable of supplying 1500 gph or 25 gpm of potable water.

The following procedure is recommended for contacting the MN National Guard:

1. Contact the Chisago County Sheriff 651-213-6300 or 911 to request assistance from the MN National Guard.

2. Sheriff contacts the MN National Guard; Division of Emergency Management, State Duty Officer (800) 422-0798; and Community Support Group at (651) 282-4013 to request assistance needed for the city.

C. Bottled Water Supplies, Delivery, and Distribution

Walmart Super Center
200 12th Street Southwest,
Forest Lake, MN 55025

Ph. (651) 464-9740

Walmart Super Center
2212 Glacier Drive,
Saint Croix Falls, WI 54024

Ph. (715) 483-1399

D. System Interconnects

The nearest Cities to Shafer are Center City and Taylor Falls. Neither of which extends its public water supply near enough to make a system interconnect an economically feasible back up.

E. Other Water Supply Alternatives

New well – in the event of an emergency where the three primary wells the City currently relies upon for City water are down, a new well could be sited and constructed. See below for the contact details for a well driller that has worked for the City in the past:

E H Renner and Sons, Inc.
15688 Jarvis St NW
Elk River, MN 55330

Ph. (763) 427-6100

Additionally, in the event of a major disruption, the City of Shafer may request tanks to haul water from another city water supply (such as Center City or Taylor Falls) to a distribution point or facility in an emergency for the City of Shafer.

IV. Inventory of Available Emergency Equipment and Materials

Description	Owner	Telephone	Location	Acquisition Time
Well Repair	E H Renner and Sons, Inc.	(763) 427-6100	Elk River MN	1 day
Pump Repair	E H Renner and Sons, Inc.	(763) 427-6100	Elk River MN	1 day
Electrician	NEI Electric	(715) 483-3854	St Croix Falls, WI	1day
Plumber	Colin's Excavating & Plumbing	(651) 257-6094	Center City MN	1 day
Backhoe	Colin's Excavating & Plumbing	(651) 257-6094	Center City MN	1 day
Chemical Feed	Hawkins Inc	715-392-5152	Superior WI	2 day
Meter Repair	Hawkins Inc	715-392-5152	Superior WI	2 day
Valves	USA Bluebook	800-548-1234	Midwest	2 day
Pipe & Fittings	USA Bluebook	800-548-1234	Midwest	2 day

F. EMERGENCY IDENTIFICATION PROCEDURES

Table F-1 Procedural Operations

Emergency Response Coordinator

Name: Allen Anderson, Public Works Director
Address:
Cell Phone:
Work Phone: 651-257-4726, ext. 14
E-mail contact: cityofshaferpw@frontier.com

Alternate

Name: Lynn Jawish, City Clerk
Address:
Cell Phone:
Work Phone:
E-mail contact:

The duties of the response coordinator or the alternate are listed in the following Table 1.

Table 1: Duties of the Emergency Response Coordinator or the Alternate	
Incident	**Response Procedure & Comments**
Identify Disruption **(Mechanical Failure or Contamination)**	Identifies the nature of the water supply disruption and communicates this information to the city government, the alternate response coordinator, and members of the emergency oversight committee.
Notify Response Personnel	Notifies city staff and others who will be responding to the water supply emergency about the disruption and coordinates their efforts to correct it.
Incident Direction and Control	Identifies the actions that are needed to correct the water supply emergency and directs responders to implement corrective actions.
Internal Communication	Communicates the status of response efforts to the primary spokesperson and the emergency oversight committee as needed to keep these parties informed of progress.
Assess Incident Response on Continual Basis	Assesses the efforts to correct the water supply disruption on a continual basis so that the emergency oversight committee can take additional corrective actions and the city government and public are updated on issues and progress.
Define the Extent of a Contamination Disruption	Coordinates efforts to define the extent and level of the contamination with local, state, and federal agencies. This may continue after initial corrective actions have been implemented.
Define the Extent of a Mechanical Disruption	Coordinates efforts to define the cause(s) of the mechanical failure and the equipment, data, and expertise that are needed to correct it. Identifies measures for reducing the likelihood that a similar mechanical failure will not occur in the future.
Identify Need for an Alternate Water Supply	Evaluates the need to obtain an alternate water supply, the time period it is needed before the water supply emergency is corrected, and the actions that are needed to achieve it.

V. Notification Procedures

The Table 2 below contains the names and telephone numbers for contacts at various local and state agencies that may be notified in the event of a public water supply system emergency. Based on the nature of the emergency and the information available, various representatives from this listing will be selected by the response coordinator to be part of the ***emergency oversight committee,*** which will then meet throughout the duration of the emergency to aid in decision-making and positive outcomes.

Table 2: Emergency Contact Listing

Contact	Phone	Address	Email
Allen Anderson, Water System Personnel	W: 651-257-4726, ext. 14	17656 303rd Street Shafer, Minnesota, 55074	cityofshaferpw@frontier.com
Brian Miller, City Engineer	W: 612-548-3120 C: 612-384-0322	60 Plato Blvd East, Suite 140 St Paul, MN 55107	bmiller@msa-ps.com
Jon Herdegen, City Engineer	W: 612-548-3125 C: 651-233-8286	60 Plato Blvd East, Suite 140 St Paul, MN 55107	jherdegen@msa-ps.com
Dan Vogel, Mayor/Board Chair	C: 651-257-6228	17656 303rd Street Shafer, Minnesota, 55074	danv@shafermn.com
Patty Mattson, Board/Council Members	C: 612-865-6876	17656 303rd Street Shafer, Minnesota, 55074	pattym@shafermn.com
Bob Nash, Board/Council Members	C: 612-369-2736	17656 303rd Street Shafer, Minnesota, 55074	bobn@shafermn.com
Tim O'Connor, Board/Council Members	C: 651-213-6182	17656 303rd Street Shafer, Minnesota, 55074	timo@shafermn.com
Jeff Behnke, Board/Council Members	C: 612-270-7604	17656 303rd Street Shafer, Minnesota, 55074	jeffb@shafermn.com
State Incident Duty Officer	651-649-5451 1-800-422-0798	NA	NA
Scott Sellman, County Emergency Director	Main Phone: (651) 213-6313 Dispatch Phone: (651) 257-4100	313 N Main St, Sheriff's Office, Rm 100 Center City, MN 55012	srsellm@co.chisago.mn.us
Gary Peterson, Region 6 (METRO) Program Coordinator:	(763) 441-2896	313 N Main St, Sheriff's Office, Rm 100 Center City, MN 55012	gpeterson@co.chisago.mn.us

Ron Elfstrom, Fire Chief	651-257-4753 651-497-7950	17656 303rd Ln, Shafer, MN 55074	SHAFERFIRE5100@GMAIL.COM
Deputy Chief Schlumbohm	1-651-257-0622	13292 Sylvan Ave, Lindstrom, MN 55045	depchief@lakesareapd.com
Chief Stenson, Police Chief	1-651-257-0622	13292 Sylvan Ave, Lindstrom, MN 55045	chief@lakesareapd.com

V. Notification Procedures - Continued

Table 3: Other Emergency Contacts

Contact	Work Phone	Address	Email
Joe Thimm, Chisago Lakes Schools Superintendent	651-213-2000	13750 Lake Boulevard Lindstrom, Minnesota 55045	jthimm@isd2144.org
Lakes Region EMS Ambulance	651-277-4911	40245 Fletcher Ave North Branch, Minnesota 55056	
St. Croix Regional Medical Center, Hospital	715-483-3261 800-642-1336	13185 Saint Croix Avenue, Lindstrom, MN 55045	
Xcel Energy, Power Company	1-800-895-1999	River Rd, St Croix Falls, WI 54024	
MNDOT, Highway Department	651-234-7500	1500 West CO RD B-2 Roseville, MN 55113	
City of Taylor Falls, Neighboring Water System	651-465-5133	637 First Street Taylors Falls, MN 55084	tfclerk@frontiernet.net
City of Center City, Neighboring Water System	651-257-5284	335 Burns Avenue PO Box 245 Center City, MN 55012	info@centercitymn.us
Sharon Kroening, MPCA Groundwater	651.757.2507	520 Lafayette Rd, St Paul, MN 55155	sharon.kroening@state.mn.us
MRWA Technical Services	(218) 685-5197	217 12th Ave SE, Elbow Lake, MN 56531	mrwa@mrwa.com
John Frietag, MDH Contact	(651) 201-5000	625 Robert St N, St Paul, MN 55164	john.freitag@state.mn.us

B. Incident Assessment Team

Contact	Phone	Address
Allen Anderson, Water System Personnel	W: 651-257-4726, ext. 14	17656 303rd Street Shafer, Minnesota, 55074
Brian Miller, City Engineer	W: 612-548-3120 C: 612-384-0322	60 Plato Blvd East, Suite 140 St Paul, MN 55107
Jon Herdegen, City Engineer	W: 612-548-3125 C: 651-233-8286	60 Plato Blvd East, Suite 140 St Paul, MN 55107
Dan Vogel, Mayor/Board Chair	C: 651-257-6228	17656 303rd Street Shafer, Minnesota, 55074
Patty Mattson, Board/Council Members	C: 612-865-6876	17656 303rd Street Shafer, Minnesota, 55074
Bob Nash, Board/Council Members	C: 612-369-2736	17656 303rd Street Shafer, Minnesota, 55074
Tim O'Connor, Board/Council Members	C: 651-213-6182	17656 303rd Street Shafer, Minnesota, 55074
Jeff Behnke, Board/Council Members	C: 612-270-7604	17656 303rd Street Shafer, Minnesota, 55074
State Incident Duty Officer	651-649-5451 1-800-422-0798	NA
Scott Sellman, County Emergency Director	Main Phone: (651) 213-6313 Dispatch Phone: (651) 257-4100	313 N Main St, Sheriff's Office, Rm 100 Center City, MN 55012
Gary Peterson, Region 6 (METRO) Program Coordinator:	(763) 441-2896	313 N Main St, Sheriff's Office, Rm 100 Center City, MN 55012

B. Public Information Plan

In the event of an emergency Shafer City Hall will be used as the public relations center for distribution of information to the public. The City Clerk will be charged as being the responsible agent for distributing information to the public and the media via the below media contacts.

Media Contacts

Media	Name	Telephone	Address
Newspaper	Crosby Ironton Courier	218-546-5029	12 Main Street Crosby MN 56441
Television	KSTP- 5	651-646-5555	3415 University Ave St. Paul MN
Television	KAWB	218-855-0022	422 NW 3rd St Brainerd MN 56401
Television	KARE- 11	763-593-1111	8811 Olson Memorial Hwy. Minneapolis, MN 55427
Radio	WPCA	(715) 268-9722	130 Riverside Blvd, Amery, WI 54001
Radio	KLBB	651-439-5006	104 North Main St. Stillwater, MN 55082

Radio	WLMX	715-268-7185	328 100th Street Amery, WI 54001
Radio	Minnesota Public Radio	218-829-1072	501 W College Drive

VI. Mitigation and Conservation Plan

A. Information identifying ways to reduce the vulnerability of the water supply system to disruption and improve the response capabilities – The City has prepared a document – the Wellhead Protection Plan Part II which identifies the strategies for decreasing the vulnerability of the Cities wells and improving the safety of the Cities drinking water supply. Copies of this report are kept at City Hall.

B. Information regarding efforts to reduce the amount of water used by residents, businesses and industry:

1. Water meters - all service connections are metered with information distributed to users on their use numbers.

2. Public education - education materials on best practices for water conservation are made available on the Cities website.

3. Rate structure - in the event of a water shortage, the City has the ability to increase the rate structure and limit water usage.

APPENDIX IV:
MINNESOTA DEPARTMENT OF HEALTH (MDH) SCOPING DECISION LETTERS I AND II

MINNESOTA MDH DEPARTMENT OF HEALTH

Protecting, maintaining and improving the health of all Minnesotans

March 30, 2012

Mr. Allen Anderson
Public Works Director - City of Shafer
17656 - 303rd Street
Shafer, Minnesota 55074

Dear Mr. Anderson:

Subject: Scoping Decision Notice No. 1 for the City of Shafer, PWSID 1130014

This letter provides notice of the results of the Scoping 1 meeting that John Freitag and I (Minnesota Department of Health) held with you, Gaylon Riley (city of Shafer), and Jon Herdegen (BDM Consulting Engineers and Surveyors) on March 12, 2012, regarding wellhead protection planning. During the meeting, we discussed the preparation of Part I of a Wellhead Protection Plan that will document the 1) delineation of a wellhead protection area, 2) delineation of a drinking water supply management area, and 3) assessments of well and aquifer vulnerability related to these areas for the primary water supply wells used by the city of Shafer.

According to the state wellhead protection rule, the city will have until March 15, 2015, to complete its entire Wellhead Protection Plan, Part I and Part II. As we discussed, the rule describes the criteria used for determining the time period for completion of the Wellhead Protection Plan (Minnesota Rules, part 4720.5130). The Minnesota Department of Health (MDH) highly recommends that half of the time allotted be dedicated to completing Part II of the plan.

At our meeting, we discussed rule requirements and the types of information needed for the Part I report. The Wellhead Protection Plan must be prepared in accordance with Minnesota Rules, parts 4720.5100 to 4720.5590. General wellhead protection requirements and criteria for delineating the wellhead protection area and data reporting are presented in Minnesota Rules, parts 4720.5500 to 4720.5510.

It is our understanding that MDH will assist the city with the preparation of its Part I report. There will be no cost to the city for any involvement by MDH staff with this work. It will be the responsibility of the city to assist with the data collection to aid in the delineation and vulnerability assessments.

The enclosed Scoping Decision Notice No. 1 formally identifies the information the city must provide to MDH to meet rule requirements for preparing Part I of the Wellhead Protection Plan. The wellhead rule refers to the existing information required for wellhead planning as data elements. Much of this information is available in the public domain, as described in the Scoping Decision Notice No. 1 form. You only need to provide the information that is not in the public domain and, therefore, not available to MDH. The Scoping Decision Notice No. 1 form also 1) lists the Minnesota unique well number and

well construction for each well that will be included in the Wellhead Protection Plan [Table 1], 2) lists the pumping volumes for each well [Table 2], 3) lists high-capacity wells [Table 3], and 4) includes a map of the well locations. A summary of the information that the city needs to provide is included at the end of the Scoping Decision Notice No. 1 form.

It is our understanding that you will serve officially as the wellhead protection manager on behalf of the city. You are responsible for providing written notice to local units of government of the city's intent to develop the Wellhead Protection Plan, as required by the wellhead protection rule (part 4720.5300, subpart 3). A copy of this notice should be forwarded to MDH and must include a list of the city wells, identified by the unique well numbers, and contact information for you as wellhead protection manager. John Freitag, your Source Water Protection Unit Planner, can provide you with some examples of the notification of intent that other communities have used. Please contact him at 651/201-4669.

In closing, we look forward to working with you on your Wellhead Protection Plan. If you have any questions regarding our comments, please contact me at 651/201-4577 or at amal.djerrari@state.mn.us.

Sincerely,

Amal Djerrari, Hydrologist
Source Water Protection Unit
Environmental Health Division
P.O. Box 64975
St. Paul, Minnesota 55164-0975

AMD:kmc
Enclosures: Scoping Decision Notice No. 1, Summary of Data Requested, Table 1 - Water Supply Well Information, Table 2 - Annual Volume of Water Pumped From Wells, Table 3 - Permitted High-Capacity Wells Within 3 Miles, Well Location Map
cc: John Freitag, Planner, Source Water Protection Unit, Metro District Office
Jon Herdegen, BDM Consulting Engineers and Surveyors, St. Paul

MINNESOTA MDH DEPARTMENT OF HEALTH

Protecting, maintaining and improving the health of all Minnesotans

January 10, 2014

Mr. Jon Herdegen, City Engineer
MSA Professional Services
60 Plato Boulevard East, Suite 140
St. Paul, Minnesota 55107

Dear Mr. Herdegen:

Subject: **Second Scoping Decision Notice – City of Shafer – PWSID 1130014**

This letter provides notice of the results of a scoping meeting held with you and Mark Lundgren, MSA City Engineer, Allen Anderson, Public Works Director, (city of Shafer), and me on December 10, 2013, at the Shafer City Hall regarding wellhead protection (WHP) planning. During the meeting, we discussed the data elements that must be included and used to prepare the part of the WHP plan related to the management of potential contaminants in the approved drinking water supply management area. The enclosed Scoping 2 Decision Notice lists the data elements that were discussed at the meeting.

The city of Shafer has met the requirements to distribute copies of the first part of the WHP plan to local units of government and hold an informational meeting for the public. The city of Shafer will have until September 15, 2015, to complete its WHP plan. The city was given additional time due to Minnesota Rules, part 4720.5130, subpart 4, item D.

If a data element is marked on the enclosed notice as a data element that must be used and it does not exist, it is helpful if your plan notes this. MSA Professional Services will be working with you to develop a draft of the remainder of the WHP plan. I will be contacting you to review the progress of the development of Part II of your plan. If you have any questions regarding the enclosed notice, contact me by email at john.freitag@state.mn.us or by phone at (651) 201-4669.

Sincerely,

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

JF:erw
Enclosures
cc: Lucas Martin, MDH Engineer, St. Paul District Office
Allen Anderson, Public Works Director, City of Shafer
Ron Struss, Minnesota Department of Agriculture

SCOPING 2 DECISION NOTICE

Low and Very Low Vulnerability

Remainder of the Wellhead Protection Plan

Name of Public Water Supply:		**Date:**
City of Shafer **PWSID 1130014**		January 10, 2014
Name of the Wellhead Protection Manager:		
Jon Herdegen – MSA City Engineer		
Address:	**City:**	**Zip:**
60 Plato Boulevard East , Suite 140	St. Paul	55107
Unique Well Numbers:		**Phone:**
217905 (Well 1), 559343 (Well 2), 737040 (Well 3)		(612) 548-3124

Instructions for Completing the Scoping 2 Form

N	R	S	
X			**N = Not required.** If this box is checked, this data element is **NOT** necessary for your wellhead protection plan because it is not needed or it has been included in the first scoping decision notice. **Please go to the next data element.**

N	R	S	
	X		**R = Required for the remainder of the plan.** If this box is checked, this data **MUST** be used for the "**remainder of the plan.**"

N	R	S	
		X	**S = Submit to MDH.** If this box is checked, this data element **MUST** be included in your **wellhead protection plan and submitted to MDH.** If there is **NO** check mark in the **"S"** box but there is an **"X"** in the **"R"** box, this data element **MUST** be included in your plan, but should **NOT be submitted to MDH**. This box will only be checked if MDH does not have

Note: Any data elements required in the first scoping decision notice must also be used to complete the remainder of the wellhead protection plan.

DATA ELEMENTS ABOUT THE PHYSICAL ENVIRONMENT

PRECIPITATION			
N	R	S	An existing map or list of local precipitation gauging stations.
X			
Technical Assistance Comments:			
N	R	S	An existing table showing the average monthly and annual precipitation in inches for the preceding five years.
X			
Technical Assistance Comments:			
GEOLOGY			
N	R	S	An existing geologic map and a description of the geology, including aquifers, confining layers, recharge areas, discharge areas, sensitive areas as defined in Minnesota Statutes, section 103H.005, subdivision 13, and groundwater flow characteristics.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			
N	R	S	Existing records of the geologic materials penetrated by wells, borings, exploration test holes, or excavations, including those submitted to the department.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			
N	R	S	Existing borehole geophysical records from wells, borings, and exploration test holes.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			
N	R	S	Existing surface geophysical studies.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			
SOILS			
N	R	S	Existing maps of the soils and a description of soil infiltration characteristics.
X			
Technical Assistance Comments:			
N	R	S	A description or an existing map of known eroding lands that are causing sedimentation problems.
X			
Technical Assistance Comments:			

WATER RESOURCES			
N	R	S	An existing map of the boundaries and flow directions of major watershed units and minor watershed units.
X			
Technical Assistance Comments:			
N	R	S	An existing map and a list of public waters as defined in Minnesota Statutes, section 103G.005, subdivision 15, and public drainage ditches.
X			
Technical Assistance Comments:			
N	R	S	The shoreland classifications of the public waters listed under subitem (2), pursuant to part 6120.3000 and Minnesota Statutes, sections 103F.201 to 103F.221.
X			
Technical Assistance Comments:			
N	R	S	An existing map of wetlands regulated under chapter 8420 and Minnesota Statutes, section 103G.221 to 103G.2373.
X			
Technical Assistance Comments:			
N	R	S	An existing map showing those areas delineated as floodplain by existing local ordinances.
X			
Technical Assistance Comments:			

DATA ELEMENTS ABOUT THE LAND USE

LAND USE			
N	R	S	An existing map of parcel boundaries.
	X	X	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing map of political boundaries.
	X	X	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing map of public land surveys including township, range, and section.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

N	R	S	
	X	X	A map and an inventory of the current and historical agricultural, residential, commercial, industrial, recreational, and institutional land uses and potential contaminant sources

Technical Assistance Comments: The inventory, mapping, and management of land uses and potential sources of contamination for all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements, as follows:

Low Vulnerability
1) All potential contaminant sources and facility designations as listed on the attachment [inventory wells: A) 80 feet in depth and deeper for Well No. 1; B) 250 feet in depth and deeper for Wells Nos. 2 and 3; and C) wells of undocumented or unknown depths for the potential contaminant source inventory].
2) A land use/land cover map and table.
3) An inventory of the Inner Wellhead Management Zone (IWMZ).

As a starting point, MDH will provide a 2006 land cover map and table from federal data bases. This data set must be used unless an alternative electronic data set that is more current and detailed is available.

Management strategies must be developed for all land uses and potential sources of contamination.

N	R	S	
	X	X	An existing comprehensive land-use map.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element. Include any urban fringe planning areas.

N	R	S	
	X	X	Existing zoning map.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

PUBLIC UTILITY SERVICES

N	R	S	
X			An existing map of transportation routes or corridors.

Technical Assistance Comments:

N	R	S	
X			An existing map of storm sewers, sanitary sewers, and public water supply systems.

Technical Assistance Comments:

N	R	S	
X			An existing map of the gas and oil pipelines used by gas and oil suppliers.

Technical Assistance Comments:

N	R	S	
X			An existing map or list of public drainage systems.

Technical Assistance Comments:

N	R	S	
	X		An existing record of construction, maintenance, and use of the public water supply well(s) and other wells within the drinking water supply management area.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.

DATA ELEMENTS ABOUT WATER QUANTITY

SURFACE WATER QUANTITY			
N	**R**	**S**	An existing description of high, mean, and low flows on streams.
X			
Technical Assistance Comments:			
N	**R**	**S**	An existing list of lakes where the state has established ordinary high water marks.
X			
Technical Assistance Comments:			
N	**R**	**S**	An existing list of permitted withdrawals from lakes and streams, including source, use, and amounts withdrawn.
X			
Technical Assistance Comments:			
N	**R**	**S**	An existing list of lakes and streams for which state protected levels or flows have been established.
X			
Technical Assistance Comments:			
N	**R**	**S**	An existing description of known water-use conflicts, including those caused by groundwater pumping.
X			
Technical Assistance Comments:			
GROUNDWATER QUANTITY			
N	**R**	**S**	An existing list of wells covered by state appropriation permits, including amounts of water appropriated, type of use, and aquifer source.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			
N	**R**	**S**	An existing description of known well interference problems and water use conflicts.
	X	**X**	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			
N	**R**	**S**	An existing list of state environmental bore holes, including unique well number, aquifer measured, years of record, and average monthly levels.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

DATA ELEMENTS ABOUT WATER QUALITY

SURFACE WATER QUALITY			
N	**R**	**S**	An existing map or list of the state water quality management classification for each stream and lake.
X			
Technical Assistance Comments:			
N	**R**	**S**	An existing summary of lake and stream water quality monitoring data, including: 1. bacteriological contamination indicators; 4. sedimentation; 2. inorganic chemicals; 5. dissolved oxygen; and 3. organic chemicals; 6. excessive growth or deficiency of aquatic plants.
X			
Technical Assistance Comments:			
GROUNDWATER QUALITY			
N	**R**	**S**	An existing summary of water quality data, including: 1. bacteriological contamination indicators; 2. inorganic chemicals; and 3. organic chemicals.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			
N	**R**	**S**	An existing list of water chemistry and isotopic data from wells, springs, or other groundwater sampling points.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			
N	**R**	**S**	An existing report of groundwater tracer studies.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	**R**	**S**	An existing site study and well water analysis of known areas of groundwater contamination.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			
N	**R**	**S**	An existing property audit identifying contamination.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	**R**	**S**	An existing report to the Minnesota Department of Agriculture and the Minnesota Pollution Control Agency of contaminant spills and releases.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

APPENDIX V:

Minnesota Department of Health (MDH) Inner Well Management Zone Inventories Shafer Wells 1, 2, and 3

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	1130014 **COMMUNITY**
NAME	Shafer
ADDRESS	Shafer Water Superintendent, Shafer City Hall, 17656 - 303rd Street, Shafer, MN 550740205

FACILITY (WELL) INFORMATION

NAME	Well #1
FACILITY ID	S01
UNIQUE WELL NO.	217905
COUNTY	Chisago

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / FACILITY ID	1130014 S01	**UNIQUE WELL NO.**	217905

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	1130014 S01	UNIQUE WELL NO.	217905

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		Y	99	N
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		Y	50	N
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		Y	60	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		

PWS ID / FACILITY ID	1130014 S01	UNIQUE WELL NO.	217905

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.

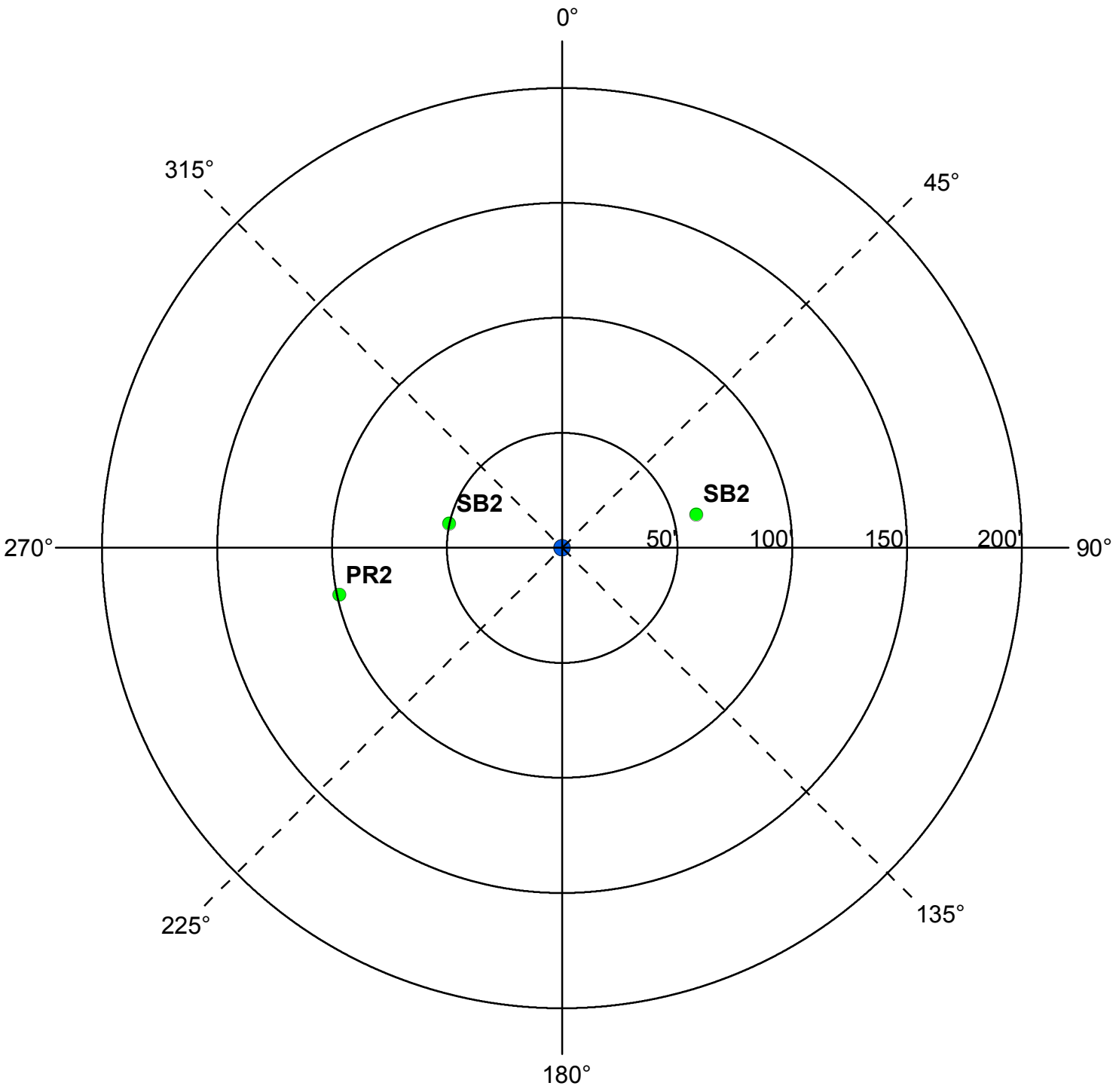
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1130014 S01	UNIQUE WELL NO.	217905

SETBACK DISTANCES	All potential contaminant sources must be noted on sketch.

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



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

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

INSPECTOR	Freitag, John	DATE	7 - 26 - 2012

PWS ID / FACILITY ID	1130014 S01	UNIQUE WELL NO.	217905

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	1130014 **COMMUNITY**
NAME	Shafer
ADDRESS	Shafer Water Superintendent, Shafer City Hall, 17656 - 303rd Street, Shafer, MN 550740205

FACILITY (WELL) INFORMATION

NAME	Well #2
FACILITY ID	S02
UNIQUE WELL NO.	559343
COUNTY	Chisago

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / FACILITY ID	1130014 S02	**UNIQUE WELL NO.**	559343

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	1130014 S02	UNIQUE WELL NO.	559343

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		Y	100	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	30	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	1130014 S02	UNIQUE WELL NO.	559343

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.

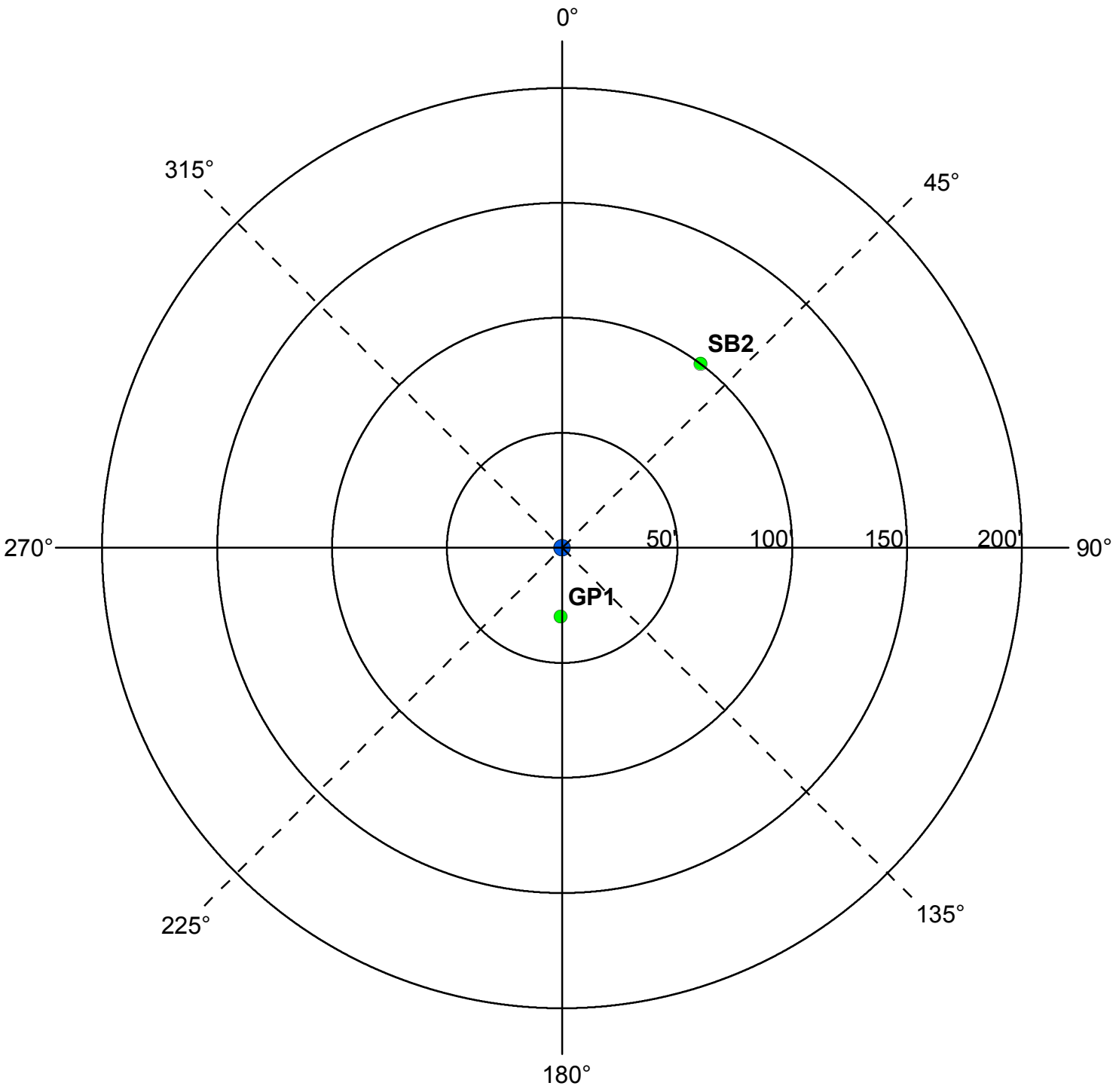
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1130014 S02	UNIQUE WELL NO.	559343

SETBACK DISTANCES	All potential contaminant sources must be noted on sketch.

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



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

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

INSPECTOR	Freitag, John	DATE	7 - 26 - 2012

PWS ID / FACILITY ID	1130014 S02	UNIQUE WELL NO.	559343

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	1130014 **COMMUNITY**
NAME	Shafer
ADDRESS	Shafer Water Superintendent, Shafer City Hall, 17656 - 303rd Street, Shafer, MN 550740205

FACILITY (WELL) INFORMATION

NAME	Well #3
FACILITY ID	S03
UNIQUE WELL NO.	737040
COUNTY	Chisago

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / FACILITY ID	1130014 S03	**UNIQUE WELL NO.**	737040

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	1130014 S03	UNIQUE WELL NO.	737040

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		Y	78	N
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		Y	102	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	68	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	58	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	1130014 S03	UNIQUE WELL NO.	737040

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.

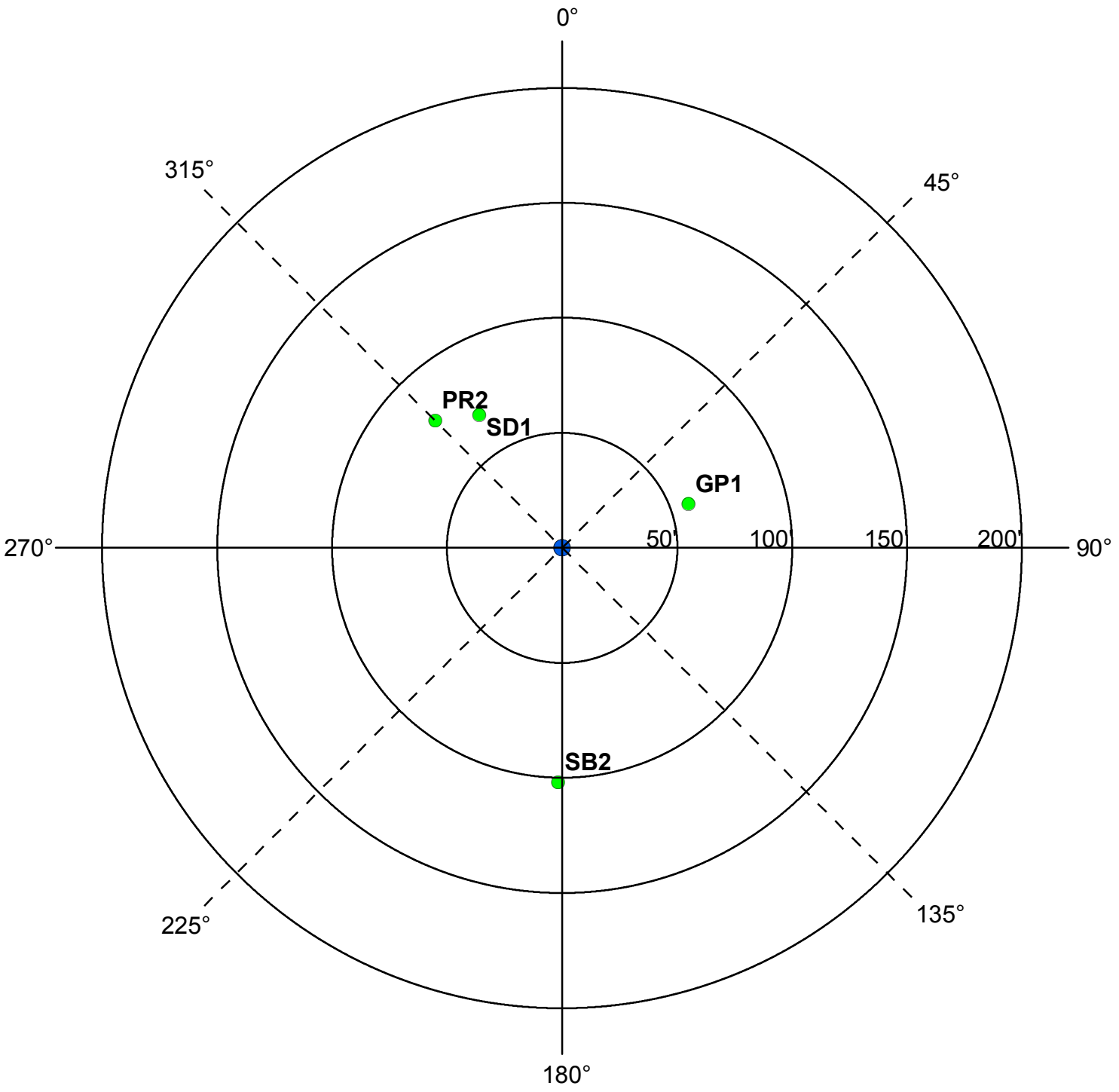
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1130014 S03	UNIQUE WELL NO.	737040

SETBACK DISTANCES	All potential contaminant sources must be noted on sketch.

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



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

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

INSPECTOR	Freitag, John	DATE	2 - 26 - 2012

PWS ID / FACILITY ID	1130014 S03	UNIQUE WELL NO.	737040

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