

**WELLHEAD PROTECTION PLAN
FOR THE
CITY OF FRAZEE**



January 2024

Forward

This document presents the wellhead protection (WHP) plan for the City of Frazee 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
Well 6	613129	P
Well 7	847061	P

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Glossary of Terms and Acronyms

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 City of Frazee must manage the IWMZ to help protect it from sources of pathogen or chemical contamination that may cause an acute health effect.

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

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 City of Frazee 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 City of Frazee to prevent contamination of a public water supply, and approved by the Minnesota Department of Health under Minnesota Rules, parts 4720.5100 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.

Acronyms

DNR – Minnesota Department of Natural Resources

MDA - Minnesota Department of Agriculture

MDH – Minnesota Department of Health

MGS – Minnesota Geologic Survey

MPCA – Minnesota Pollution Control Agency

MRWA – Minnesota Rural Water Association

SWCD – Becker County Soil and Water Conservation District

US EPA – United States Environmental Protection Agency

Chapter 1 - Introduction

1.1 Background

The wellhead protection (WHP) plan for the City of Frazee was prepared in cooperation with the Minnesota Department of Health (MDH) and the Minnesota Rural Water Association. It contains specific actions that the city will take to fulfill WHP requirements that are specified under Minnesota Rules, part 4720.5100 to 4720.5590. Also, the support that Minnesota state agencies, federal agencies, Becker County, and others will provide is presented to identify their roles in protecting City of Frazee'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 8 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 documents and discussion regarding the data elements used for this plan.

Appendix III 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 IV 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 V contains supporting documents.

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 August 19, 2022 addressed the data elements that were needed to support the delineation of the WHPA, the DWSMA, and the well and DWSMA vulnerability assessments. The second scoping meeting, held on June 16, 2023, 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 II.

Each data element is required to be assessed for its impact on 1) the use of the public water supply well, 2) delineation of the WHPA, 3) the quality and quantity of water supplying the public water supply wells, and 4) land and groundwater uses within the DWSMA. Presented in Appendix II is information about the

availability of information regarding each data element and the results of assessing each data element relative to the overall impact each data element may have on the four items listed above.

The availability of the information relating to each data element that is used in this plan was assessed by the Minnesota Department of Health and the City of Frazee. During the assessment process the City of Frazee and Minnesota Department of Health 1) reviewed the completeness of the information available relating to each data element that is used in this plan and 2) determined if a data element is considered an issue, concern or opportunity that the City of Frazee can address in this plan.

The data elements specified by the MDH relating to the **physical environment** used in the development of the WHP plan are considered sufficient to provide an adequate assessment. No concerns or issues have been identified with these data elements. The assessment of the data elements specified by MDH relating to **land use** identified issues or concerns regarding the long-term management of the DWSMA. The following items summarize these land use issues that will be addressed in Chapter 9 of this WHP plan:

Becker county controls land uses outside the Frazee city limits. Therefore, the city and county will cooperate in managing land uses within the DWSMA to reduce the impact potential contaminant sources may have on the aquifer used by the city. Land use changes are not anticipated within the DWSMA.

Finally, the data elements specified by the MDH relating to **water quantity and quality** used in the development of the WHP plan are considered sufficient to provide an adequate assessment. Groundwater quantity information is used during the WHPA delineation process and assessed to determine the influence land uses may have on the city water well.

Actions that are needed to address identified issues, concerns or opportunities as a result of the data element assessment process are included in the plan of action (Chapter 9). 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.

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 Frazee requested that MDH do this work and it was performed by Luke Pickman, 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 Well 6 (613129) and Well 7 (847061). The WHPA for these water supply wells is shown in Figure 1. The City of Frazee does not have an emergency back up well.

The DWSMA boundaries were designated using the following criteria:

- Center-lines of highways, streets or roads,
- Public Land Survey coordinates and
- Political boundaries.

3.2 Well Vulnerability Assessment

Well construction and water quality information was obtained from the primary wells used by the City of Frazee and were evaluated to determine the well vulnerabilities. The items below are the results of evaluating the well construction records and water quality information.

Well construction meets current State Well Code specifications (Minnesota Rules, part 4725), meaning that the well itself should not provide a pathway for contaminants to enter the aquifer used by the public water supplier.

The geologic conditions at the well site include a cover of clay-rich geologic materials over the aquifer that is sufficient to retard or prevent the vertical movement of contaminants.

None of the human-caused contaminants regulated under the federal Safe Drinking Water Act have been detected at levels indicating that the well itself serves to draw contaminants into the aquifer as a result of pumping.

Water samples were collected from Wells 6 (613129) and 7 (847061) in 2022, and were analyzed for tritium, nitrate, chloride and bromide (Appendix I). No tritium or nitrate was detected in the sample, confirming the non-vulnerable nature of the wells. In addition, the chloride and bromide results confirm that the wells have not been impacted by land-use activities.

3.3 DWSMA Vulnerability Assessment

The low vulnerability assigned to the DWSMA (Figure 1) was determined using geologic maps and reports, soils information and groundwater chemistry information which indicate the wells do not pump water that contains human-caused contaminants.

Chapter 4 – Inventory of Potential Contamination Sources, 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 (Appendix II) was used to assess the types of potential contamination sources that may present a risk to the city's drinking water supply. The 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. Due to the low vulnerability and geological protection only wells 200 feet and deeper need to be inventoried.

Data on the location of existing wells and potential unused, unsealed wells was provided to the City by MDH. The Wellhead Protection Team conducted a table top exercise and assigned the various potential contaminant sources to the parcels for which they were associated. MDH Well Management staff was also

onsite to investigate the old municipal wells locations to determine if additional follow up was necessary for the city. The end product of these table top discussions and site visits can be found in Appendix III.

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 the well itself serves to draw contaminants into the aquifer as a result of pumping.

4.2 Inventory Results and Risk Assessment

A description of the types and locations of potential contamination sources is presented in Appendix III. A summary of the results for the IWMZ are listed in Table 1 and Table 2 presents the results from the IWMZ and 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 Frazee 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.

The WHP Team conducted the potential contaminant source inventory by gathering information from the various state and federal data sources. Once the potential contaminant sources/data was compiled and placed on a map. The WHP Team then assessed the locations and the associated data to make sure the locations/data were accurate. There are old municipal wells that need to be addressed, their locations and numbers are unknown.

Table 1 - Potential Contamination Sources and Assigned Risk for the IWMZ

Source Type	Total	Level of Risk
Sewer line	2	High
Public Supply Wells	2	Low

Table 2 - Potential Contamination Sources and Assigned Risk located within the DWSMA

Potential Source Type	Total Number	Level of Risk
Public Supply Wells	2	Low
Private Wells	11	High

* There are old municipal wells and test wells that are thought to exist. Their exact number and locations are unknown.

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

The city estimates that the following changes to the physical environment, land use, surface water, and groundwater may occur over the 10-year period that the WHP plan is in effect (Table 3). This is needed to determine whether new potential sources of contamination may be introduced in the future and to identify future actions for addressing these anticipated sources. Land and water use changes may introduce new contamination sources or result in changes to groundwater use and quality. The anticipated changes may occur within the jurisdictional authority of the city, although some may not. Table 3 describes the anticipated changes to the physical environment, land use, and surface water or groundwater in relationship to the 1) influence that existing governmental land and water programs and regulations may have on the anticipated change, and 2) administrative, technical, and financial considerations of the City of Frazee and property owners within the DWSMA.

Table 3 - 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 to the physical makeup (gravel mining etc...) of the aquifer used by the city is anticipated.	No changes, therefore, no impact.	No changes, therefore, existing programs or regulations are adequate.	Because there are no expected changes to the physical makeup of the aquifer no additional administrative, technical or financial considerations required.
Land Use: No change in current land use within the DWSMA is anticipated.	County land use planning that includes groundwater protection measures in the area surrounding the DWSMA can be of benefit to the city's source water.	Land use changes are not expected in the DWSMA in the near future and the county currently has no local ordinances in place to address groundwater usage near or within the DWSMA.	An updated county land use plan may provide additional measures to protect the city's source water in that portion of the DWSMA in the underlying township.
Land Use: 20 single family residential homes and an apartment building may be built.	Water demand will not be higher than what was used for this delineation. WHPA boundary should not change.	No changes, therefore, existing programs or regulations are adequate.	Because there are no expected changes to WHPA or DWSMA, no additional administrative, technical or financial considerations required.
Groundwater: The City of Frazee does not anticipate a significant increase in water use demand.	No change expected in demand, therefore, no impact.	No changes, therefore, existing programs or regulations are adequate.	Because there are no expected changes to groundwater usage or groundwater quality within the DWSMA no additional administrative, technical or financial considerations required.

Chapter 6 - Issues, Problems, and Opportunities

6.1 Identification of Issues, Problems and Opportunities

The City of Frazee has identified water and land use issues, 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 county'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 Table 4, 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.

Table 4 - 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
The City of Frazee has limited staff and financial resources to implement the wellhead protection plan.	DWSMA	With limited resources implementing the WHP plan will be a challenge for the City.	The City could partner with the county and state agencies that may have regulatory authority or programs to assist the city in WHP implementation.	The City has the ability to allocate resources towards wellhead efforts and can apply for grants via MDH to help fund action items.
New high capacity wells drilled within the DWSMA or 1 mile of the DWSMA may alter the WHPA boundary and provide a pathway for pollutants to enter the aquifer.	Aquifer, DWSMA and water well quantity and quality.	The City has no authority over construction or placement of new wells or pumping rates which may influence the capture area of the City of Frazee wells. A large capacity well could potentially impact the public water supply wells ability to supply water.	If a high capacity well is proposed within the DWSMA or 1.5 miles of the DWSMA boundary the DNR will notify MDH. Cooperate with MDH and DNR Hydrologists as requested to help assess any potential impacts and work cooperatively with the high capacity well owner, DNR and MDH Hydrologist resolve any potential negative impacts.	Current state law and rules are considered adequate insofar as requiring all wells to be constructed according to state well construction codes and setbacks. MN DNR will notify the city if a high capacity well is to be drilled within the DWSMA.
Class V wells within the DWSMA.	Aquifer, water well quality and DWSMA.	Auto/truck repair-related businesses within the DWSMA may have Class V drainage wells.	The EPA can provide public and owners of such businesses with educational materials regarding Class V wells.	The Environmental Protection Agency have controls in place to address Class V wells.
City of Frazee does not have any land use authority outside municipal boundaries.	DWSMA, potentially the aquifer.	All land uses within the DWSMA, but outside of city limits, are controlled by Becker County.	The City of Frazee can communicate with the county regarding any land use changes that may impact the City of Frazee’s DWSMA.	The City of Frazee is dependent on Becker county’s land use authority. Therefore, it is important to maintain a good working relationship with the county.
There are some private wells located within the DWSMA and some of them may be unused or poorly maintained.	Could potentially impact the aquifer the City of Frazee uses or private wells	Unused/unsealed or poorly maintained wells may provide a direct route for contaminants to reach the aquifer.	The City of Frazee can work with the MDH and Becker County SWCD to continue to inventory and prioritize wells within or near the DWSMA.	The City of Frazee doesn’t have any local controls to track existing wells, new wells or unused or abandoned wells, therefore will need

	& well water quality within the DWSMA.		The City of Frazee can apply for a MDH-SWP grant for assistance in sealing wells that are determined to be abandoned within the DWSMA.	to work with citizens, MDH and county to locate wells and promote proper sealing of any abandoned or unused wells.
Old municipal wells/test wells which have not been properly sealed.	Aquifer, Water Well Quality	Wells which have not been sealed according to MDH standards may provide a pathway for pollutants to enter into the aquifer.	With the assistance of MDH the city can locate, assess and seal the wells if they pose a threat to the city's drinking water supply.	MDH Well Management has the ability to require the city to properly address unused improperly sealed wells and a grant program to help seal wells. The city can also utilize the MDH WHP grant program to seal wells.

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. During WHP plan development the wellhead protection team discussed issues regarding the city's distribution system and other maintenance issues that are not directly related to source water protection. No comments were received during the plan development process or review period.

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

In addition to its own controls, the City of Frazee 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 Frazee

The City of Frazee does have the authority to adopt legal controls or programs to support the management of potential contamination sources within the DWSMA. The majority of the land in the DWSMA is zoned for agricultural usage with some single and two family residential and limited multiple-family residential. The City will issue conditional use permits necessary to protect the city's drinking water supply.

Table 5 - Controls and Programs of the City of Frazee

Type of Control	Program Description
Zoning Ordinance and Conditional Permits	Allows for controlled growth and proper land use planning and permits.
Connection to City Services (Water and Sewer)	City requires residents to connect to city water and sewer when feasible.
Cross Connection Ordinance	City requires that there are not cross connections with the City’s distribution system.

7.2 Local Government Controls and Programs

The following table lists departments or programs within Becker County may be able to assist the City of Frazee 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 6 - Local Agency Controls and Programs

Government Unit	Name of Control/Program	Program Description
Becker Co. SWCD	Water Planning	Develop and implement the county water plan and provide cost-share for sealing wells.
Becker County	Shoreland Ordinance	Becker County has setbacks for certain land uses along shoreland areas.

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 Frazee 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 of Frazee’s WHP plan was first approved by MDH.

Table 7- 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	Wellhead Protection Program	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. MDH administers SWP grant program.
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.
U.S. EPA	40 Code of Federal Regulations 144, Subpart G	Automatic closure of Class 5 automotive waste disposal wells in WHPA; inventory of all Class V wells.

7.4 Support Provided by Nonprofit Organizations

The City of Frazee will work with the Minnesota Rural Water Association and other established organizations to assist in the implementation of their 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 which meet all state and federal drinking water standards.

Increase awareness among public officials, land owners and the general public about the importance of WHP in protecting the public drinking water supply.

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). The initial result of this assessment process was to assign priority to the types of contamination sources that were inventoried (Table 2).

9.1 Objectives

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

- A. Educate the public to increase their awareness of WHP.
- B. Utilize community comprehensive planning to protect the city's drinking water.
- C. Properly manage wells owned or operated by the community.
- D. Provide guidance to private well owners to properly manage wells.
- E. Collect, monitor and evaluate data necessary to support WHP Plan implementation.
- F. Prepare the city to respond to emergencies which interfere with the city's ability to provide a potable water source/supply.

9.2 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.

9.3 WHP Measures and Action Plan

Based upon these 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:

- Education and Outreach
- Well and Contaminant Source Management
- Land Use Planning
- WHP Coordination, Evaluation and Reporting
- Monitoring, Data Collection and Assessment
- Contingency Planning

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. Unless otherwise specified, all efforts to implement identified measures listed in Table 8 must be summarized by the eighth year after WHP approval to coincide with the beginning of the formal process to amend this current version of the WHP plan.

Table 8 - WHP Plan of Action

Public Education and Outreach:

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame											
					2024	2025	2026	2027	2028	2029	2030	2031	2032	2033		
WHP Measure #1: Post WHP education information on the city website. Apply for MDH SWP implementation funding to update website design.	A, D	Medium	City of Frazee MDH MRWA	\$4000			X									
WHP Measure #2: Explore the opportunity of a tour of the city water treatment plant and educate students about their source of drinking water, what WHP is and steps the city is taking to protect the local water supply as requested.	A	Low	City of Frazee Local Schools	Staff Time	X	X	X	X	X	X	X	X	X	X	X	X
WHP Measure #3: Annually provide the MRWA Water Week educational materials to the local 4 th grade school teacher(s)	A	Low	City of Frazee MRWA Local Schools	Staff Time	X	X	X	X	X	X	X	X	X	X	X	X

WHP Measure #4: Put the MDH public service announcement about WHP and drinking water protection on local media such as the local cable channel.	A	Low	City of Frazee MDH	\$300		X						X			
WHP Measure #5: Provide information via newsletter or city bill 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.	A, D	Medium	City of Frazee	\$500	X			X				X			X

Monitoring, Data Collection, and Assessment:

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame										
					2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	
WHP Measure #6: Work cooperatively with MDH to sample for the standard assessment monitoring package for the public supply wells. MDH will conduct the sampling or mail the city sampling bottles and instructions.	E	High	MDH City of Frazee	Staff Time							X				

<p>WHP Measure #7: Update the well inventory every year. Review the status of existing wells and add wells identified in the DWSMA.</p>	<p>B, C</p>	<p>High</p>	<p>City of Frazee MDH Local Well Drillers</p>	<p>Staff Time</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>
<p>WHP Measure #8: Identify any new potential Class V wells in the DWSMA. If a Class V well is identified work with MDH planner to provide the property owner with management and/or permitting options.</p>	<p>D, E</p>	<p>Medium</p>	<p>City of Frazee MDH EPA</p>	<p>Staff Time</p>	<p>On Going</p>								
<p>WHP Measure #9: When planning for a new municipal well, contact MDH Hydrologist about the need to conduct an aquifer test plan. Work with MDH and the city's engineer to develop a work plan that identifies the steps to complete the aquifer test in accordance with WHP program rule requirements and parameters necessary for test pumping a new city well.</p>	<p>E</p>	<p>Medium</p>	<p>City of Frazee MDH</p>	<p>TBD</p>	<p>As Needed</p>								
<p>WHP Measure #10: Apply for MDH SWP grants to construct a new test well and conduct necessary sampling. Work cooperatively with MDH to conduct the required.</p>	<p>E</p>	<p>Medium</p>	<p>City of Frazee MDH</p>	<p>TBD</p>	<p>As Needed</p>								

<p>WHP Measure #11: Evaluate the needs for additional security at the water plant and tower. Apply for SWP funds to implement any needs identified.</p>	<p>B, C, F</p>	<p>Low</p>	<p>City of Frazee MRWA MDH</p>	<p>Staff Time \$5000</p>	<p>As needed</p>
<p>WHP Measure #12: If a state agency requires more accurate static water levels, secure technical and financial assistance to update existing equipment or install new equipment. Funds may be available via the MDH SWP grant program.</p>	<p>B, C, F</p>	<p>Low</p>	<p>City of Frazee MRWA MDH</p>	<p>TBD</p>	<p>As needed</p>

Well and Contaminant Source Management:

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame								
					2024	2025	2026	2027	2028	2029	2030	2031	2032
<p>WHP Measure #13: Review and update the IWMZ survey form for all wells in the system every 5 years.</p>	<p>E</p>	<p>High</p>	<p>City of Frazee MDH MRWA</p>	<p>Staff Time</p>						<p>X</p>			<p>X</p>

<p>WHP Measure #14: Monitor setbacks for all new potential sources of contamination within the IWMZ.</p>	<p>E</p>	<p>High</p>	<p>City of Frazee MDH</p>	<p>Staff Time</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>	<p>X</p>
<p>WHP Measure #15: The city will work with the DNR and MDH to determine the status of unused/unsealed old firehall observation well that is currently located inside a building. If this well needs to be sealed apply for a SWP grant to complete any necessary site prep prior to sealing the well. Unique Well 243484</p>	<p>E</p>	<p>High</p>	<p>City of Frazee DNR MDH</p>	<p>TBD</p>			<p>X</p>							
<p>WHP Measure #16: Apply for a MDH SWP grant to seal Well # 243484 located in the old firehall.</p>	<p>C</p>	<p>High</p>	<p>City of Frazee DNR MDH</p>	<p>TBD</p>			<p>X</p>							
<p>WHP Measure #17: Provide a map of the DWSMA to the local Fire Dept., County and/or State Highway Dept. and ask them to take this area into consideration when responding to accidents, spills and clean-up efforts near the PWS wells.</p>	<p>F</p>	<p>High</p>	<p>City of Frazee Becker County MNDOT</p>	<p>\$500</p>	<p>X</p>									

WHP Measure #18: Provide educational materials on the proper management and sealing of wells to landowners located in the DWSMA.	A, C	Medium	City of Frazee MRWA MDH	Staff Time	X												
WHP Measure #19: Apply for funds via MDH SWP grants and cost share programs available through Becker Co. SWCD to seal unused/unsealed private and old muni wells within the DWSMA.	C, D	High	City of Frazee Becker County SWCD MDH	TBD	As Needed												

Land Use Planning:

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame												
					2024	2025	2026	2027	2028	2029	2030	2031	2032	2033			
WHP Measure #20: Update the water supply plan and emergency response plan.	B	High	City of Frazee DNR MDH	Staff Time			X			X				X			

<p>WHP Measure #21: Send letter requesting the Becker County Water Plan Coordinator, Becker County and East Otter Tail Co. SWCDs include the DWSMA map and identified issues and implementation measures as high priorities when updates occur to the Becker County Water Plan and the Otter Tail One Watershed One Plan.</p>	<p>B</p>	<p>Medium</p>	<p>City of Frazee Becker County Becker and Otter Tail Co. SWCD</p>	<p>Staff Time</p>	<p>X</p>								
<p>WHP Measure #22: Send letter requesting all local units of government with land use or water resource planning authority incorporate a map of the DWSMA and aquifer and well vulnerability information contained in the WHP plan.</p>	<p>E, F</p>	<p>High</p>	<p>City of Frazee Becker County Becker SWCD Burlington Township</p>	<p>Staff Time</p>	<p>X</p>								
<p>WHP Measure #23: The city will send a letter to Becker County asking for the ability to comment on all zoning or building permits that are associated with a private well, within 1 mile of the city limits. City will provide comments if any private wells deem a threat to the city's drinking water source.</p>	<p>B</p>	<p>Medium</p>	<p>City of Frazee Becker County MDH</p>	<p>Staff Time</p>	<p>X</p>								
<p>WHP Measure #24: Develop a process so city staff take into consideration impacts to the drinking water source and specifically the emergency response area during zoning and permit reviews. For example, create a check list to ensure no new wells are constructed in city limits.</p>	<p>B</p>	<p>High</p>	<p>City of Frazee</p>	<p>\$3,000</p>			<p>X</p>						

WHP Measure #28: Complete an Evaluation report every 2.5 years that documents the progress of the WHP plan implementation measures.	E	High	City of Frazee MDH MRWA	Staff Time			X			X			X
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9.4 Commitments from Cooperators

The agencies listed in Table 9 have indicated they will support the City of Frazee with implementing the WHP measure(s) in which they are identified.

Table 9 - Cooperating Agencies List

Agency Name and Measure Number	Agency Name and Measure Number
MDH - 1,4,6,7,8,9,10,11,12,13,14,15,16,18,19,20,23,27,28	Becker Co. SWCD - 19, 21, 22
MRWA - 1,2,11,12,13,18,26,27,28	US EPA - 8
DNR - 15,19,22,23	Becker County - 17,19,23,23
Burlington Township -22	School - 2,3
Local Well Driller - 7	MNDOT - 17
East Ottertail Co. SWCD - 21	

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 5 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. 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;
2. 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 MRWA and presented in Appendix IV of this plan.

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Appendix II: Data Elements

Appendix III: Inventory of Potential Contamination Sources

Appendix IV: Contingency Strategy

Appendix V: Supporting Documentation

Appendix I: WHPA and DWSMA Delineation and Vulnerability Assessment

Wellhead Protection Plan

Part I

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

For

City of Frazee

January 2024

**Luke Pickman Hydrologist
Source Water Protection Unit**



Hydrogeologic Assessment of the Drinking Water Source and Wells for the City of Frazee

Delineations – Wellhead Protection area and drinking water supply management area

Vulnerability Assessments – Wells and drinking water supply management area

January 19, 2024

Hydrogeologic Assessment of the Drinking Water Source and Wells for
the City of Frazee

Public Water Supply ID: 1030014

City of Frazee
222 Main Avenue West
Frazee, Minnesota 56544
218-334-4991

<https://frazeecity.com/>

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

Signature: _____

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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 landmarks that reflects the scientifically calculated wellhead protection area boundaries as closely as possible (Minnesota Rules, part 4720.5100, subpart 13).

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

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

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

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

Wellhead Protection Area (WHPA). The surface and subsurface area surrounding a well or well field that supplies a public water system, through which contaminants are likely to move toward and reach the well or well field (Minnesota Statutes, section 1031.005, 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

MODFLOW - Three-Dimensional Finite-Difference Groundwater Model

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

Summary

Protection Areas - The recharge area for the wells is known as the wellhead protection area, or WHPA, and represents the area that contributes water to the city's wells within a 10-year time period. The area that contributes water within a one-year time period is known as the emergency response area, or ERA. Practical reasons require the designation of a management area that fully envelops the wellhead protection area, called the drinking water supply management area, or DWSMA. Each of these areas is shown in Figure 1.

Geology and Groundwater Flow – The city of Frazee has two primary wells screened in a sand and gravel aquifer that is buried beneath a layer of clay-rich sediment. Such aquifers are known generically as Quaternary Buried Artesian Aquifers (QBAA). Regionally, groundwater flow is to the southwest (Figure 2).

Table 1 - Water Supply Well Information

Local Well ID	Unique Number	Use/ Status	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed/ Reconstructed	Aquifer	Well Vulnerability
Well #6	613129	Primary	12	182	202	5/18/2000	QBAA	Not Vulnerable
Well #7	847061	Primary	12	185	205	3/19/2020	QBAA	Not Vulnerable

Well Vulnerability - The vulnerability of each well has been assessed based on 1) well construction details, especially conformance with standards required by the state well code, 2) the geologic sensitivity of the aquifer, and 3) past monitoring results. Both wells meet construction standards. Additionally, the wells draw from an aquifer that is geologically protected. Water samples from the wells lacked detectable tritium (detection indicates the presence of young water), so they are not considered vulnerable at this time (Table 2). This is reinforced by the low chloride/bromide ratios presented below.

Table 2 - Isotope and Water Quality Results (8/19/2022)

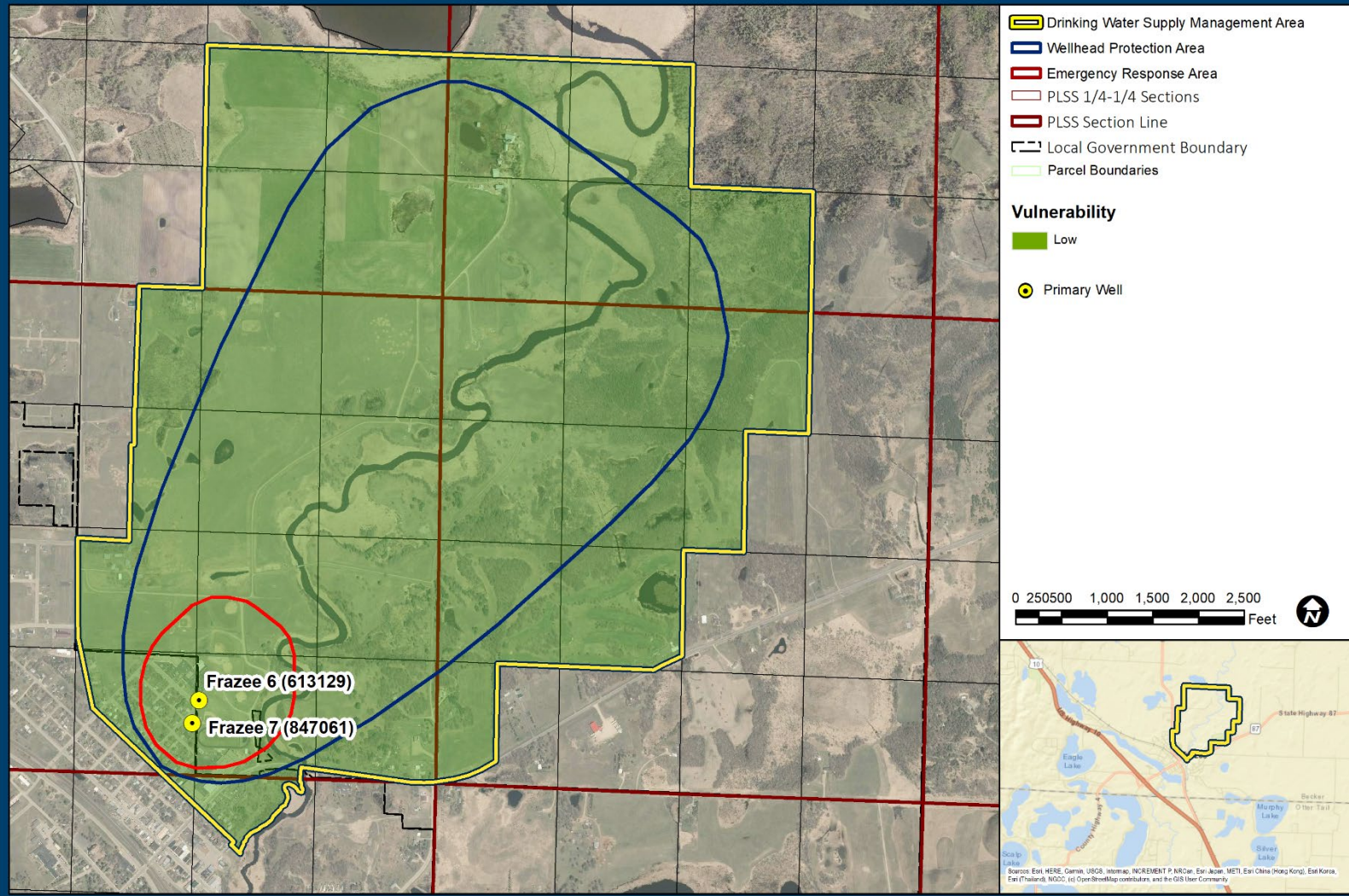
Well Name (Unique Number)	Tritium	Nitrate (mg/L)	Chloride (mg/L)	Bromide (mg/L)	Chloride/ Bromide Ratio	Arsenic (µg/L)
Fraze Well #6 (613129)	< 0.8	< 0.05	4.78	0.0246	194	1.74
Fraze Well #7 (847061)	< 0.8	< 0.05	4.76	0.0233	204	2.10

DWSMA Vulnerability -The vulnerability of the city's aquifer throughout the DWSMA is based on the geologic sensitivity ratings of wells and their monitoring data (Figure 7). Based on this information MDH has assigned a low vulnerability to the DWSMA. This suggests that the clay-rich sediments that overlie the city's aquifer prevent water and contaminants from moving quickly from the land surface into the city's aquifer and implies a time of travel of decades or longer. The principal threats to this aquifer are unsealed abandoned wells that penetrate through this clay layer. Such wells are 200 feet or greater in depth in the Frazee area.

Water Quality Concerns - At present, none of the contaminants for which the Safe Drinking Water Act has established health-based standards has been found above maximum allowable levels in the city's water supply, nor are any present at one-half of those levels. However, arsenic has been detected at low levels.

Recommendations - Recommendations have been generated to improve future delineations and vulnerability assessments and should be considered for inclusion as management strategies in the city's wellhead protection plan. These activities include well locating, water quality monitoring, and aquifer testing. Further details can be found in the Recommendations section of this report.

Figure 1
Drinking Water Supply Management Area and Vulnerability
City of Frazee



Technical Report

Discussion

This document describes the amendments to Part 1 of the wellhead protection (WHP) plan for Frazee (1030014). The purpose of the amendment is to address changes that have occurred within the 10 year period since the approval of the prior plan and update the WHP measures that are needed to protect public drinking water. The primary change noted in this part of the city's WHP plan is the increase in size of the wellhead protection area (WHPA) and drinking water supply management area (DWSMA) by 1.5x (Figure 8). This largely resulted from a projected increase in pumping at the Frazee city wells over the next five years, as well as differences in aquifer parameters and modeling approaches. The work was performed in accordance with the Minnesota Wellhead Protection Rule, parts 4720.5100 to 4720.5590.

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

In addition, this report documents the technical information required to prepare this portion of the WHP plan in accordance with the Minnesota Wellhead Protection Rule. Additional technical information is available from MDH.

Table 1 lists all the wells in the public water supply system. Only wells listed as primary are required to be included in the WHP plan.

Assessment of the Data Elements

MDH staff met with representatives of the city of Frazee on August 19, 2022, for a scoping meeting that identified the data elements required to prepare Part I of the WHP plan. Appendix A presents the assessment of these data elements relative to the present and future implications of planning items specified in Minnesota Rules, part 4720.5210.

General Descriptions

Description of the Water Supply System

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

Description of the Hydrogeologic Setting

The city of Frazee is located along U.S. Highway 10 in southwestern portion of Becker County. The surrounding area is covered by clay-rich till and glacial lake sediments associated with the Rainy Province (Bauer et al. 2016). The city of Frazee wells draws groundwater from a Quaternary Buried Artesian Aquifer (QBAA) composed of sand and gravel found approximately 200 feet below land surface. The buried aquifer is separated from the land surface by clay-rich sediments that act as natural geologic protection against surficial contaminants. The aquifer thickness is estimated to be approximately 23 feet at the well site but is spatially variable beneath the city of Frazee and surrounding area.

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

Table 3 - Description of the Local Hydrogeologic Setting

Attribute	Descriptor	Data Source
Aquifer Material	Sand and Gravel	CWI database
Porosity Type and Value	0.20	Fetter, 2001
Aquifer Thickness	Estimated 23 feet	Well #7 (847061)
Stratigraphic Top Elevation	Estimated 1222 feet AMSL	Well #7 (847061)
Stratigraphic Bottom Elevation	Estimated 1199 feet AMSL	Well #7 (847061)
Hydraulic Confinement	Confined	Well #7 (847061)

Attribute	Descriptor	Data Source
Transmissivity	Range of Values: 4,416 – 13,248 ft ² /day	A range of transmissivity values was used to reflect changes in aquifer composition and thickness as well as uncertainties related to the quality of existing aquifer test data. See Table 4 for the reference value.
Hydraulic Conductivity	Range of Values: 192 – 576 ft/day	The range of values was derived using specific capacity data obtained from well records and/or from additional aquifer test results listed in the “Selected References” section of this report.
Groundwater Flow Field	Locally, the dominant groundwater flow direction is southwesterly with an approximate compass direction of 217° and gradient of 0.00255 (Figure 2).	Defined by using static water level elevations from well records in the CWI database and documents listed in the “Selected References” section of this report.

The distribution of the aquifer and its stratigraphic relationships with adjacent geologic materials are shown in Figures 3, 4, and 5. They were prepared using well record data contained in the CWI database. The geological maps and studies used to further define local hydrogeologic conditions are provided in the “Selected References” section of this report.

Delineation of the Wellhead Protection Area

Delineation Criteria

The boundaries of the WHPA for the city of Frazee are shown in Figure 1. Table 4 describes how the delineation criteria specified under Minnesota Rules, part 4720.5510, were addressed.

Table 4 - Description of WHPA Delineation Criteria

Criterion	Description	How the Criterion was Addressed
Flow Boundary	None	There are no flow boundaries close enough to the public water supply wells that may have an impact on their capture areas.
Flow Boundary	Other High-Capacity Wells	Two high-capacity wells exist within one mile of the city of Frazee wells. Both were included in this model.
Daily Volume of Water Pumped	See Table 5	Pumping information was obtained from the DNR, Appropriations Permit Number 1975-1144, and was converted to a daily volume pumped by a well.
Groundwater Flow Field	See Table 3, 4	The groundwater flow field was determined from local well data.
Aquifer Transmissivity (T)	Reference Value: 8,830 ft ² /day	The aquifer test plan was approved on September 23, 2022, and T was determined from a pre-existing aquifer test. Uncertainty regarding aquifer transmissivity was addressed as described in Addressing Model Uncertainty section.
Time of Travel	10 years	The public water supplier selected a 10-year time of travel.

Pumping data was obtained from the DNR Permit and Reporting System (MPARS) for the public water supply's Appropriations Permit Number 1975-1144. These values, confirmed by the public water supplier, were used to identify the maximum volume of water pumped annually by

each well over the previous five-year period, as shown in Table 5. An estimate of the pumping for the next five years is also shown. 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	2016	2017	2018	2019	2020	5-Year Projection	Daily Volume (cubic meters)
Well #5	166292	24.995	23.952	28.199	26.266	8.22	Sealed	Sealed
Well# 6	613129	25.616	24.353	28.318	22.9	38.528	35.0	363
Well #7	847061	-	-	-	-	-	35.0	363
System Total		50.611	48.305	56.517	49.166	46.748	70.0	726

(Expressed in millions of gallons. **Bolding** indicates greatest annual pumping volume.)

Table 6 – Nearby High Capacity Wells

Well Name	Unique Number	DNR Permit Number	Depth (ft.)	Inside DWSMA	Distance from City Wells (mi.)	Daily Volume (cubic meters)
Fraze High School	738996	2006-0565	190	Yes	0.1	27
Fraze Golf Inc	445825	1990-1288	231	Yes	0.9	46
Schlauderaff Enterprises	790188	2013-0665	58	No	1.1	128

Method Used to Delineate the Wellhead Protection Area

The WHPA for the city of Frazee's wells was determined using a stochastic method. This method utilized a groundwater flow model created using the software code MODFLOW (McDonald and Harbaugh, 1988). The resulting WHPA boundary is a composite of the probable capture zones calculated using this approach (Figure 1).

MODFLOW was developed by the United States Geological Survey (USGS) and is publically available. A commercial graphical user interface, Groundwater Vistas (Environmental Simulations Inc, 2020) was used as a pre- and post- processor to facilitate the specific software code used for this delineation, MODFLOW-2005 (Harbaugh, 2005). The program has been thoroughly documented, is widely used by consultants, government agencies, and researchers and consistently accepted in regulatory proceedings. MODFLOW is also an extremely versatile program capable of simulating groundwater flow in up to three dimensions while offering a variety of boundary condition options, confined or unconfined aquifer conditions and allowing for vertical discretization through the use of layering.

A deterministic model typically uses a fixed set of parameters and boundary conditions to simulate a "best guess" at what is occurring in the groundwater flow system. However, deterministic models often fail to address uncertainty in parameter distributions and how much that uncertainty may affect predictions. Hydraulic conductivity, for example, is particularly prone to uncertainty as aquifers are typically not homogeneous and limited data on the subsurface in the form of specific capacity and aquifer tests is often spatially distant from one another and/or has uncertain data quality. One method for dealing with this uncertainty is using a stochastic method. A stochastic method, in this case known as a Monte Carlo approach, uses a range of feasible parameter values and generates possible "realizations" that are equally probable. Each realization is then used to make a prediction and estimate the probability of capture at any given well.

A groundwater model was constructed consisting of 191 rows, 172 columns and one layer, representing the city's aquifer. The model incorporates a variable areal grid spacing ranging from five meters near the city's well(s) and grading to 143 meters at the boundaries of the model domain. Layer 1 corresponds to the sand unit that Well #6 and Well #7 are screened in and is 23 feet thick. Constant head boundaries were input into the domain and represent the regional flow field. No flow boundaries are cells where flow cannot occur and are implicitly represented as the boundaries of the model domain, other than the constant head boundaries described above, and the bottom of Layer 1. For simplicity, and due to the thick clay cover over the aquifer and absence of young water based on tritium sampling, aquifer recharge was not used as an input parameter. Ranges of hydraulic conductivity values were first estimated from literature review and then refined with specific capacity data and/or aquifer tests within the model domain.

Due to the heterogeneity of the unconsolidated sand and the lack of contiguous lenses for discretization of hydraulic conductivity zones, site specific data within the model domain was interpolated using the Parameter Estimation (PEST) tool. PEST is a calibration tool developed by John Doherty of Watermark Computing and is most commonly used to estimate aquifer hydraulic conductivity (Doherty, 2010). Typical zonation of hydraulic conductivity introduces zones of different hydraulic conductivity in the model domain at locations where the modeler feels they would do the most good. The parameter zonation process would then be repeated until the fit between model outcomes and field observations was acceptable. Characterization of geologic heterogeneity in the model domain by zones of piecewise uniformity is not in harmony with the nature of the alluvial material, therefore any zonation pattern that is finally decided upon is only defensible on the basis that it is better to employ such a zonation scheme than to ignore geologic heterogeneity altogether. To overcome this problem the distribution of hydraulic conductivity within the model domain was described by a set of pilot points. The pilot point locations and range of values in the model domain were derived from specific capacity data and/or aquifer test data. These values go into the RANDom PARAmeter (RANDPAR) utility, which is used to generate the random parameter set realizations. The realizations and the values associated with them were then smoothed with the geostatistical method of kriging and input into the model runs.

To determine the WHPA, the many MODFLOW model realizations were used with a particle tracking program called MODPATH (Pollock, 2016). MODPATH was used to evaluate advective transport of simulated particles moving through the simulated flow system. A series of 360 particles were launched at each well. A porosity of 20 percent was used for the aquifers used by the city and one-year and 10-year reverse time of travel capture zones were calculated for each realization. Each of these potential capture zones was composited into a probability of capture based on the number of times any specific location is included in the capture areas generated, divided by the total number of realizations. The combined output of all model results within a 90% confidence interval were composited to create the final WHPA (Figure 1).

Results of Model Calibration and Sensitivity Analysis

Model calibration is a procedure that compares the results of a model based on estimated input values to measured or known values. This procedure can be used to define model validity over a range of input values, or it helps determine the level of confidence with which model results may be used. As a matter of practice, groundwater flow models are usually calibrated using water elevation or flux. Due to the simplicity of the MODFLOW modeling approach used for this project, it does not require calibration.

The Monte Carlo approach is used to address the possible range of hydraulic conductivity near the city well(s) by generating probable realizations for the ranges of values assigned to its input parameters. This helps to define the subset of values for which the delineation results are most likely to reflect local hydrogeologic conditions and, therefore, provide the best results.

Model sensitivity is the amount of change in model results caused by the variation of a particular input parameter. Because of the simplicity of the MODFLOW 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 within the capture zone, proportional to the porosity of the aquifer materials. However, the pumping rate is based on the results presented in Table 5 and, therefore, is not a variable factor that will influence the delineation of the WHPA.
- The direction of groundwater flow determines the orientation of the capture area. 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 the source of water to the well. The ambient groundwater flow field 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.
- A hydraulic gradient of zero produces a circular capture zone, centered on the well. As the hydraulic gradient increases, the capture zone changes into an elliptical shape, with the well centered on the down-gradient focal point. The hydraulic gradient was determined by using water level elevations that were taken from wells that have verified locations (Figure 2). Generally, the accuracy of the hydraulic gradient determination is directly proportional to the amount of available data that describes the distribution of hydraulic head in the aquifer.
- The aquifer thickness, hydraulic conductivity, and porosity influence the size and shape of the capture zone. A decrease in porosity causes a linear, proportional increase in the areal extent of the capture zone, whereas thickness and hydraulic conductivity each factor into the transmissivity, which defines the relative proportions of the capture zone width to length. A decrease in thickness or hydraulic conductivity decreases the length of the capture zone and increases the distance to the stagnation point, making the capture zone more circular in shape and centered around the well.

Addressing Model Uncertainty

Using computer models to simulate groundwater flow involves representing a complicated natural system in a simplified manner. Local geologic conditions may vary within the capture areas of the public water supply wells, but the amount of existing information needed to accurately define this degree of variability is often not available for portions of the WHPA. In addition, the current capabilities of groundwater flow models may not be sufficient to represent the natural flow system exactly. However, the results are valid within a range defined by the reasonable variation of input parameters for this delineation setting.

The steps employed for this delineation to address model uncertainty were:

1. Pumping Rate - For each well an engineering estimate of future pumping was used (Minnesota Rules, part 4720.5510, subpart 4).
2. Ambient Flow Field - A composite of capture zones created from angles of flow that are 10 degrees greater and 10 degrees lesser than the representative angle of ambient flow (Minnesota Rules, part 4720.5510, subpart 5, B (2)).
3. Probability Analysis – The Monte Carlo approach was used to estimate capture zone probability as well as variability in hydraulic conductivity.

Capture areas were developed for a range of hydraulic conductivities and times of travel of one and of 10 years (Figure 6). As the model code uses constant input values for each run, several runs were required to include all variations in input parameters. Table 7 documents the variables used to address MODFLOW uncertainty. The input files for all realizations and related information are available at MDH upon request.

Table 7 - Model Parameters Used in MODFLOW Base Case and Uncertainty Runs

Well Name	Folder Name	Discharge (cubic meters per day)	Hydraulic Conductivity Range (meters per day)	Gradient	Flow Angle	Porosity (%)	Aquifer Thickness (meters)
Well #6	Frazee_model	363	60 -121	0.00255	53	20	7.0
Well #7	Frazee_model	363	60 -121	0.00255	53	20	7.0

Delineation of the Drinking Water Supply Management Area

The boundaries of the Drinking Water Supply Management Area (DWSMA) were defined by the city of Frazee using the following features (Figure 1):

- Center-lines of streets
- Public Land Survey coordinates
- Parcel boundaries

Summary of Comparisons Between the Previous (2013) and Current WHPA and DWSMA Delineations

Overall, the new DWSMA is about 150 percent larger than the previous delineation. This is primary due to changes in the 10-year capture zone boundaries. With the previous delineation effort, a single layer analytic element groundwater model was used to determine the base case. A second approach used the stochastic analytical groundwater flow method Oneka to evaluate the uncertainty of the ten year capture area. This addressed uncertainty in hydraulic conductivity by frequency distribution around a known mean K value.

For the current delineation, a sophisticated single layer groundwater model was developed using MODFLOW. The Monte Carlo approach was employed to stochastically vary K in the model domain based on known changes in hydraulic gradient and aquifer K and T. In addition, the primary flow direction was augmented +/- 10° in uncertainty runs. A further description of the model can be found in "Method Used to Delineate the Wellhead Protection Area".

Vulnerability Assessments

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

Assessment of Well Vulnerability

The vulnerabilities for each well used by the city of Frazee are listed in Table 1 and are based upon the following conditions:

1. Well construction meets current State Well Code specifications (Minnesota Rules, part 4725), meaning that the wells themselves should 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 the wells themselves serve to draw contaminants into the aquifer as a result of pumping. The low-level arsenic detections are currently below half of the federally regulated Maximum Contaminant Level and represent a naturally-occurring contaminant.
4. Water samples were collected from Well #6 and Well #7 were analyzed for tritium, nitrate, chloride and bromide (Table 2). No tritium or nitrate was detected in the samples, resulting in a groundwater age classification of mostly pre-modern (DNR-MDH, 2020) and confirming the non-vulnerable nature of the wells (Alexander and Alexander, 1989). In addition, the low chloride and chloride/bromide values indicate a lack of human-impacted water quality (Mullaney et al., 2009).

Assessment of Drinking Water Supply Management Area Vulnerability

The DWSMA vulnerability is shown in Figure 1 and is based upon the following information:

1. Isotopic and water chemistry data from wells located within the DWSMA indicate that the aquifer contains water that is mostly pre-modern in age based on tritium and has no detectable levels of human-caused contamination.
2. Review of the geologic logs contained in the CWI database and geological maps and reports indicate that the aquifer exhibits a low geologic sensitivity throughout the DWSMA (Figure 7) and is largely isolated from the direct vertical recharge of surface water.
3. Arsenic, which is a naturally occurring contaminant, has been detected in the water from Well #6 (613129) and Well #7 (847061). The presence of a naturally occurring contaminant does not indicate that there is a direct pathway between the aquifer and potential contamination sources that occur at or near the land surface.

Therefore, given the information currently available, it is prudent to assign a low vulnerability rating to the DWSMA, in accordance with the Minnesota Wellhead Protection Rule (parts 4720.5100 to 4720.5590).

Recommendations

The following recommendations have been generated to inform the next amendment of the city of Frazee's Wellhead Protection Plan.

1. **Well Locating:** This delineation is based on very little well data. If wells are constructed within two miles of the city or one mile of the DWSMA, their locations should be verified. This information may allow a better understanding of the extent and thickness of the city's aquifer and the overlying clay confining units and result in a more refined WHPA in the future.
2. **Water Quality Monitoring:** The standard assessment monitoring package should be analyzed during year six, including whatever primary wells exist at the time, contingent on funding assistance from MDH for sampling and analysis. The city may need to collect the samples and ship them to MDH. Information generated by this sampling will be used to refine vulnerability assessments for the next amendment.

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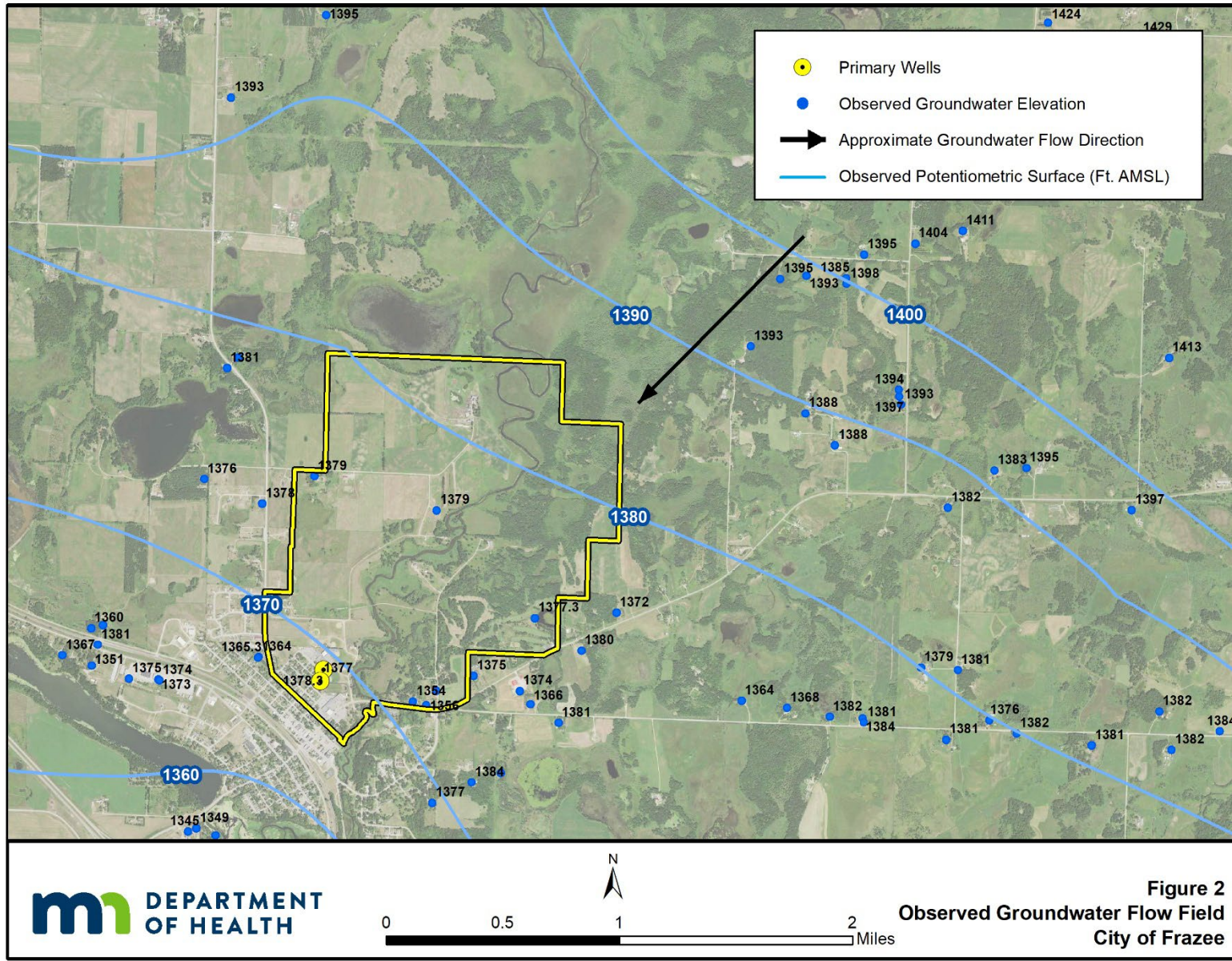
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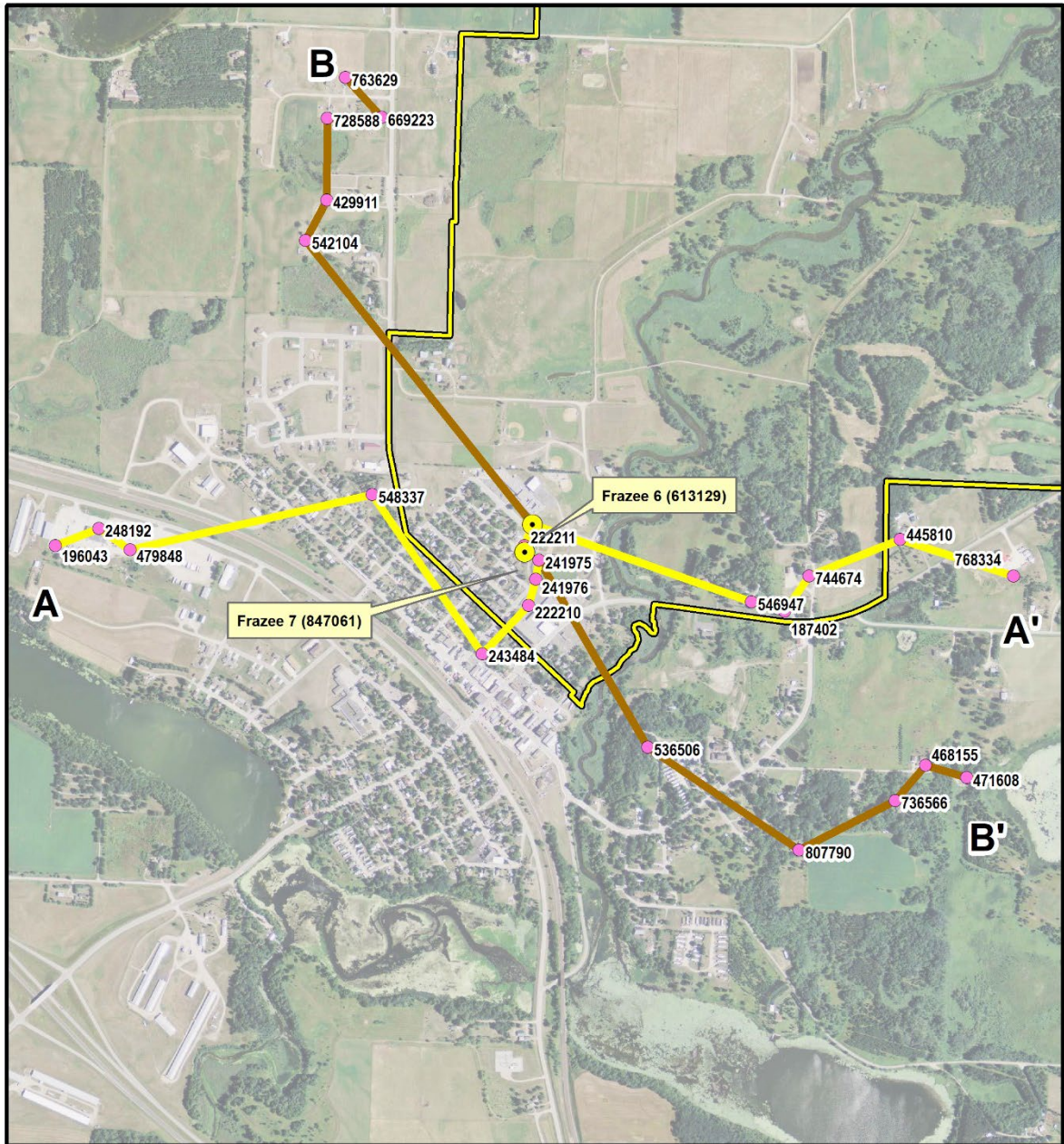
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Figures





- Drinking Water Supply Management Area
- Section Line A-A'
- Section Line B-B'
- Primary Well
- Cross-Section Wells

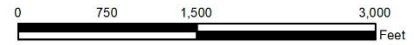
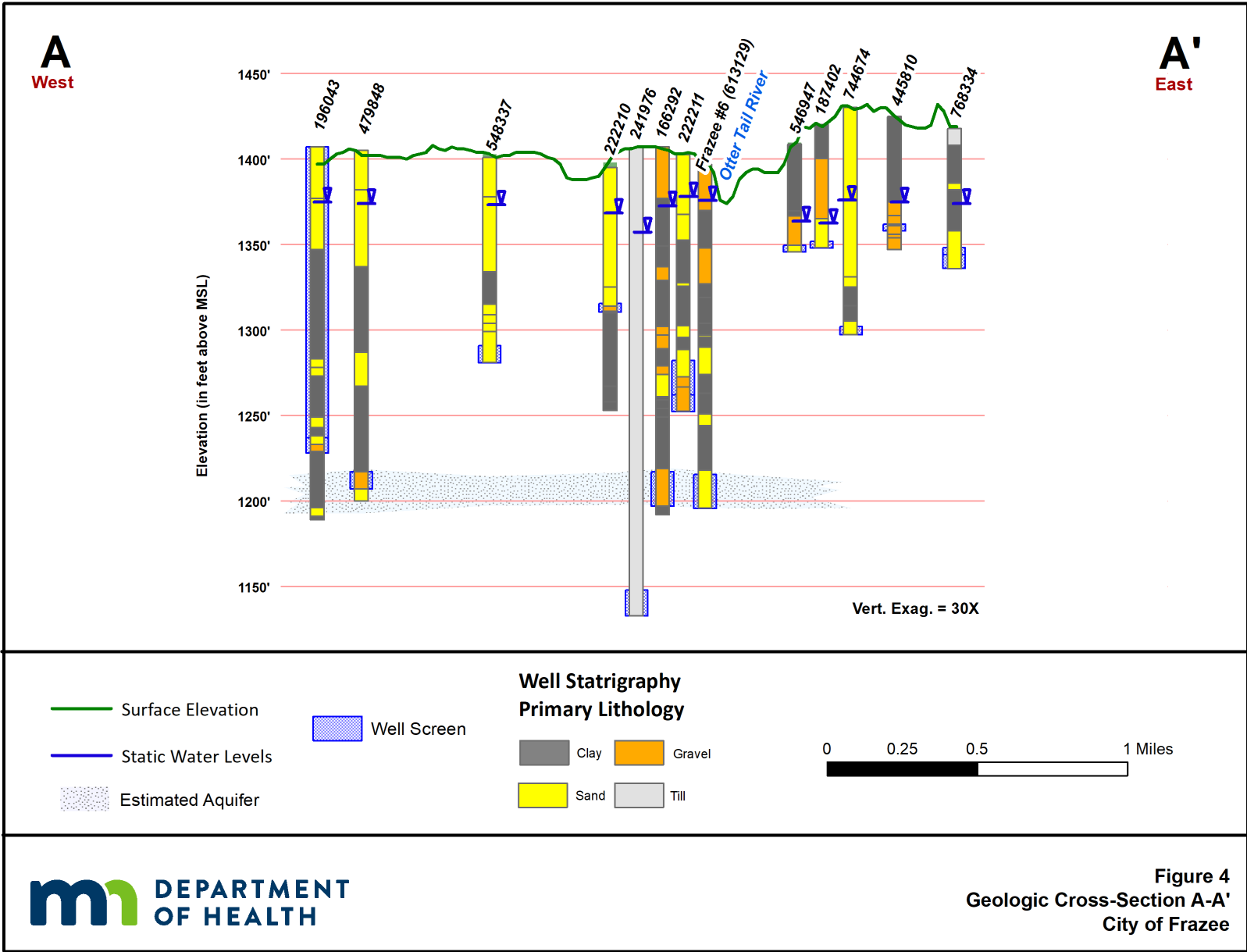


Figure 3
Trends of Geologic Cross-Sections
City of Frazier



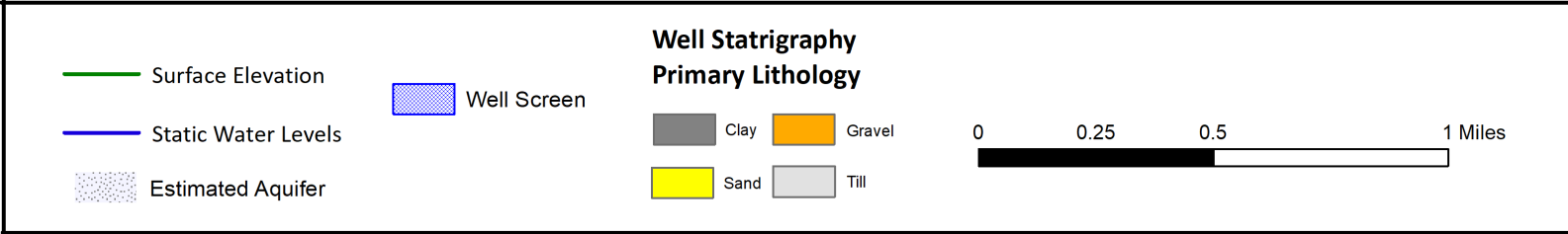
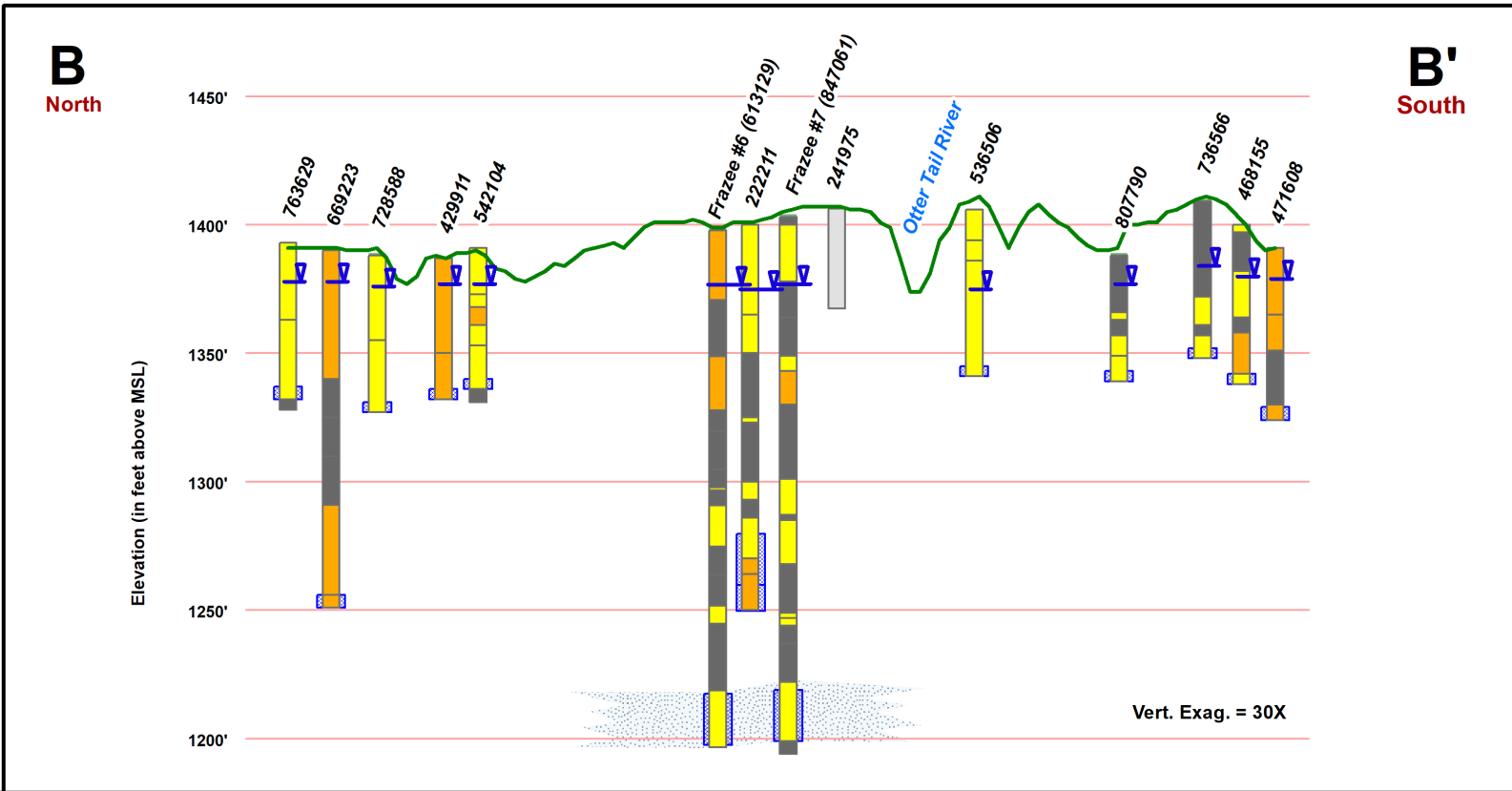


Figure 5
Geologic Cross-Section B-B'
City of Frazee

m DEPARTMENT OF HEALTH

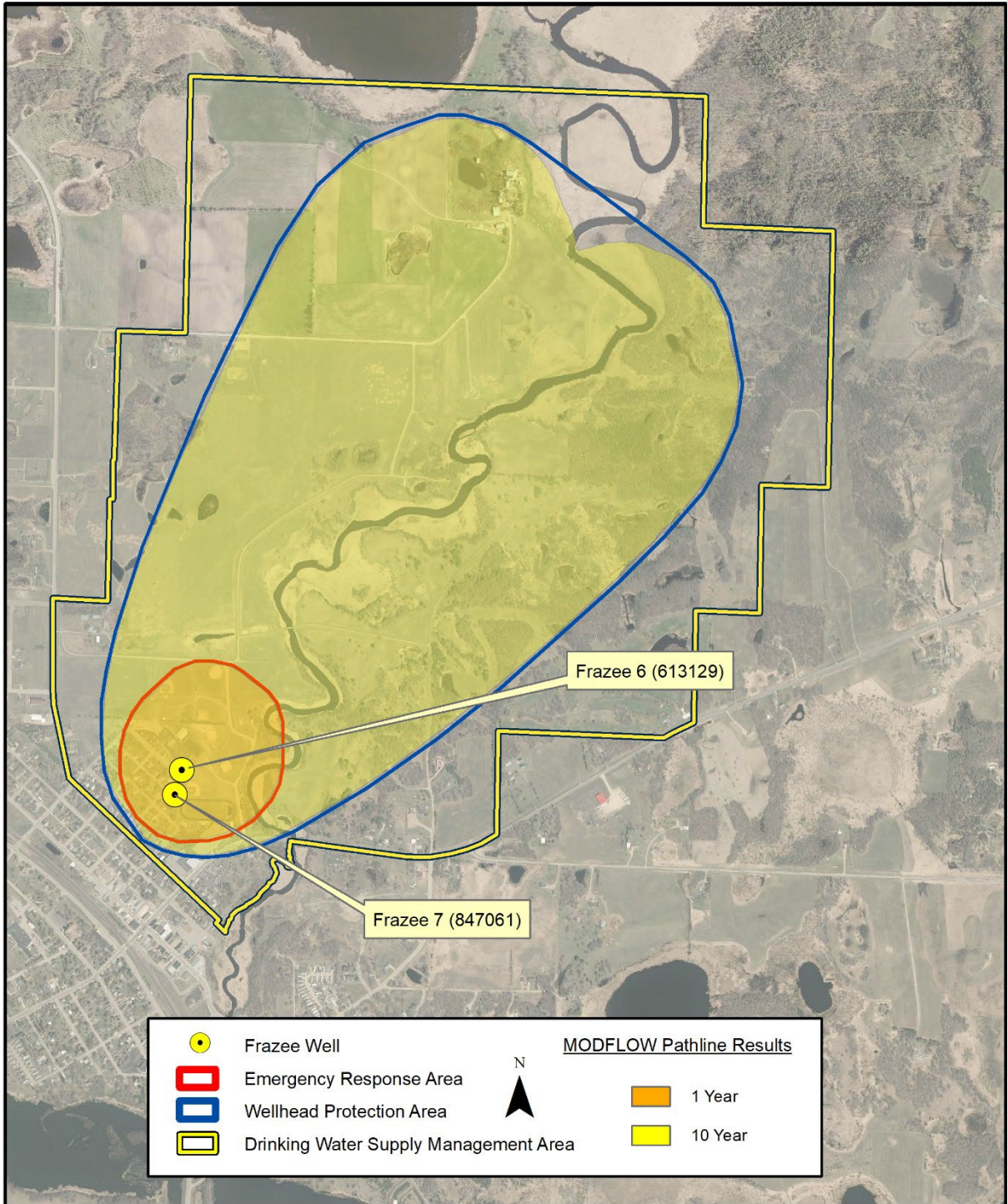


Figure 6
Groundwater Capture Zones
MODFLOW
City of Frazee

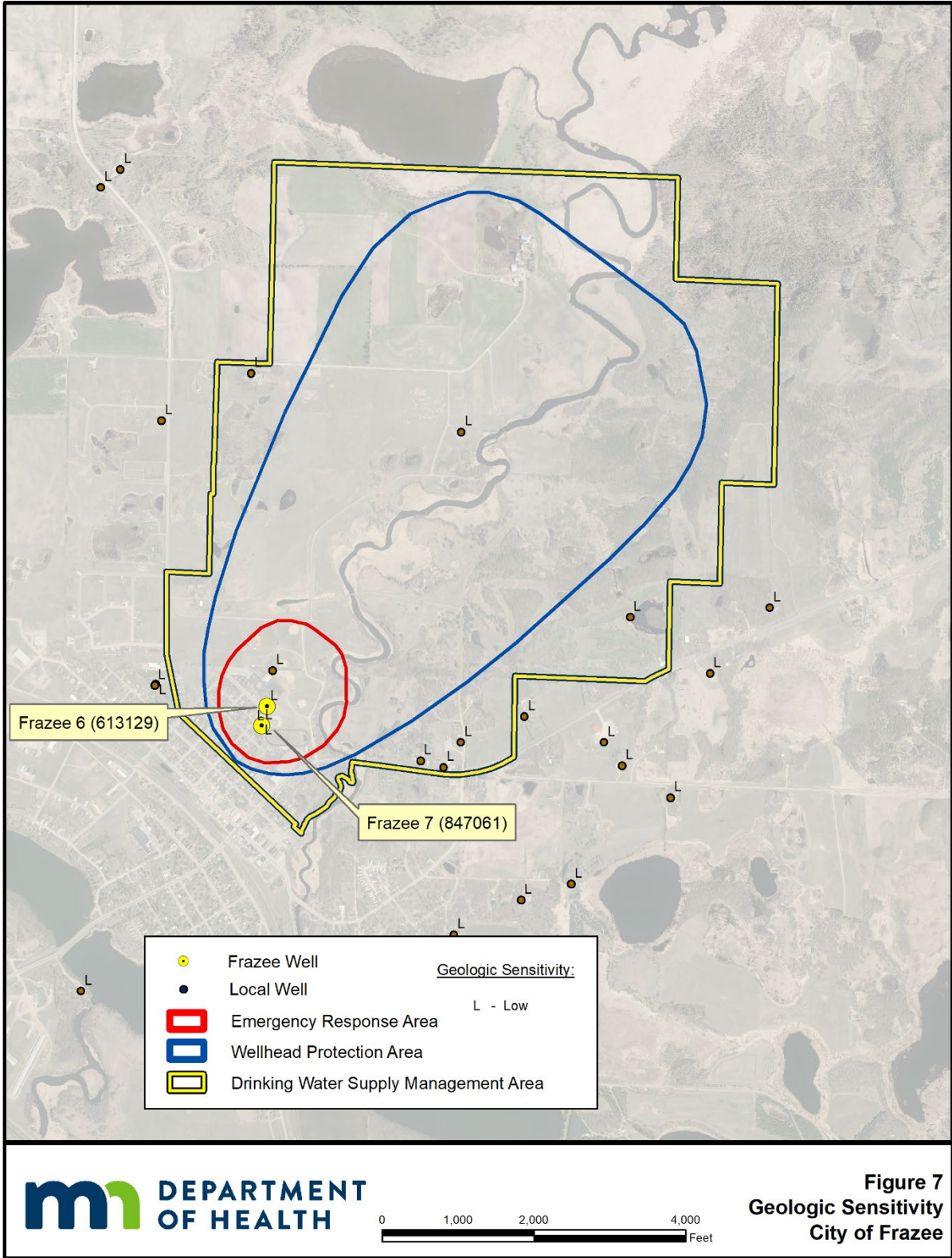
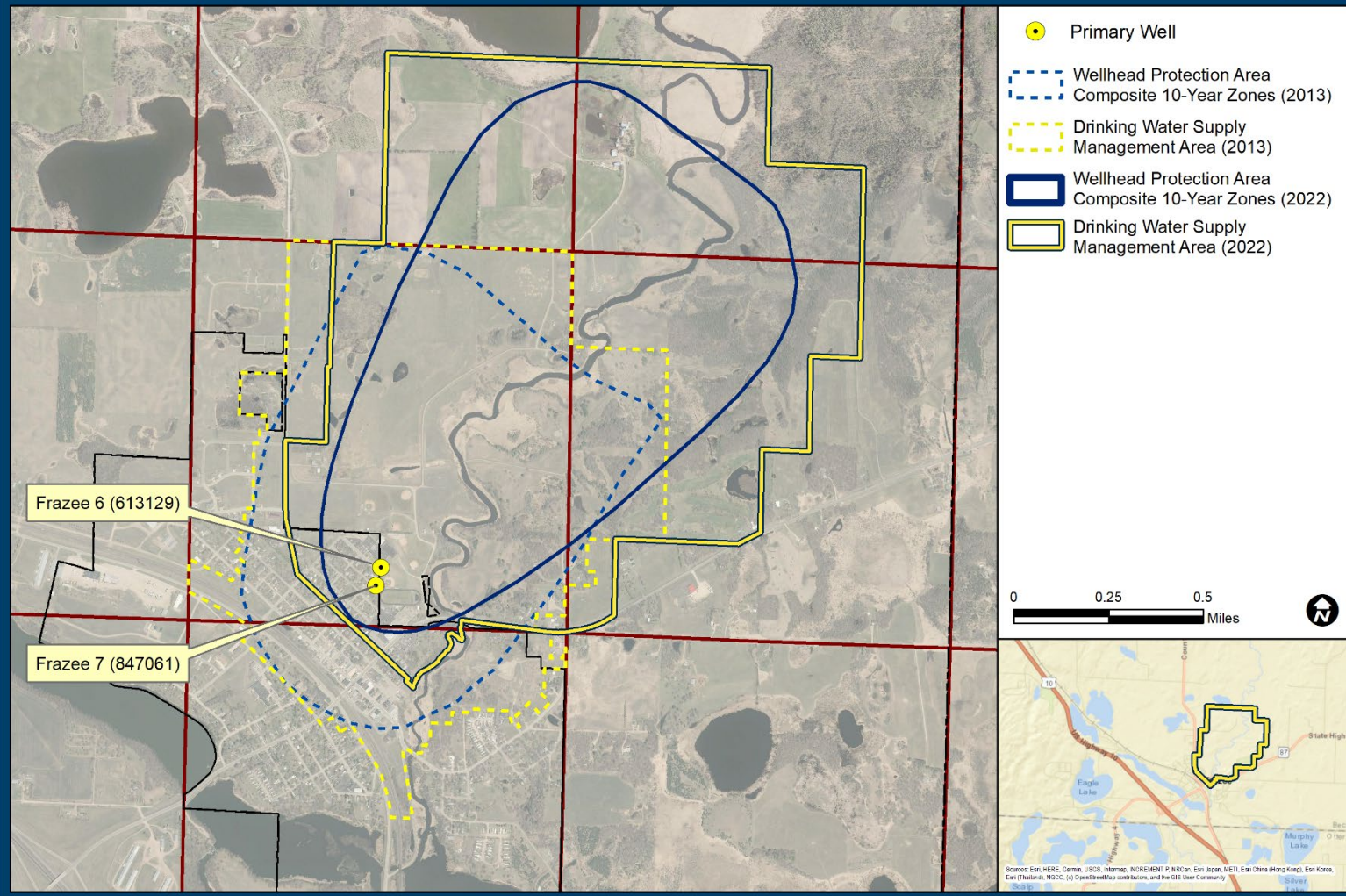


Figure 7
Geologic Sensitivity
City of Frazee

Figure 8
Amended and Prior Areas
City of Frazee



Appendix 2: Data Elements Assessment

Data Type	Data Element	Use of the Well(s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	Data Source
Climate	Precipitation					
Geology	Maps and geologic descriptions	M	H	H	H	MGS
Geology	Subsurface data	M	H	H	H	MGS, MDH
Geology	Borehole geophysics	M	H	H	H	No relevant data found
Geology	Surface geophysics	L	L	L	L	No relevant data found
Soils	Maps and soil descriptions					
Soils	Eroding lands					
Water Resources	Watershed units					
Water Resources	List of public waters					
Water Resources	Shoreland classifications					
Water Resources	Wetlands map					
Water Resources	Floodplain map					
Land Use	Parcel boundaries map	L	H	L	L	Becker County
Land Use	Political boundaries map	L	H	L	L	MnGEO
Land Use	Public Land Survey map	L	H	L	L	MnGEO
Land Use	Land use map and inventory					
Land Use	Comprehensive land use map					
Land Use	Zoning map					
Public Utility Services	Transportation routes and corridors	L	L	L	L	MnDOT, MnGEO
Public Utility Services	Storm/sanitary sewers and PWS system map					
Public Utility Services	Oil and gas pipelines map					
Public Utility Services	Public drainage systems map or list					
Public Utility Services	Records of well construction, maintenance, and use	H	H	H	H	City of Frazee, CWI, MDH
Surface Water Quantity	Stream flow data					
Surface Water Quantity	Ordinary high water mark data					
Surface Water Quantity	Permitted withdrawals					

Data Type	Data Element	Use of the Well(s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	Data Source
Surface Water Quantity	Protected levels/flows					
Surface Water Quantity	Water use conflicts					
Groundwater Quantity	Permitted withdrawals	H	H	H	H	DNR MPARS
Groundwater Quantity	Groundwater use conflicts	H	H	H	H	No relevant data found
Groundwater Quantity	Water Levels	H	H	H	H	MGS, MDH
Surface Water Quality	Stream and lake water quality management classifications					
Surface Water Quality	Monitoring data summary					
Groundwater Quality	Monitoring data	H	H	H	H	MDH
Groundwater Quality	Isotopic data	H	H	H	H	MDH
Groundwater Quality	Tracer studies	H	H	H	H	No relevant data found
Groundwater Quality	Contamination site data	M	M	M	M	No relevant data found
Groundwater Quality	Property audit data from contamination sites					
Groundwater Quality	MPCA and MDA spills/release reports	M	M	M	M	No relevant data found

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 this delineation

Acronyms used in this report are listed after the Glossary of Terms.

Appendix III: Inventory of Potential Contamination Sources

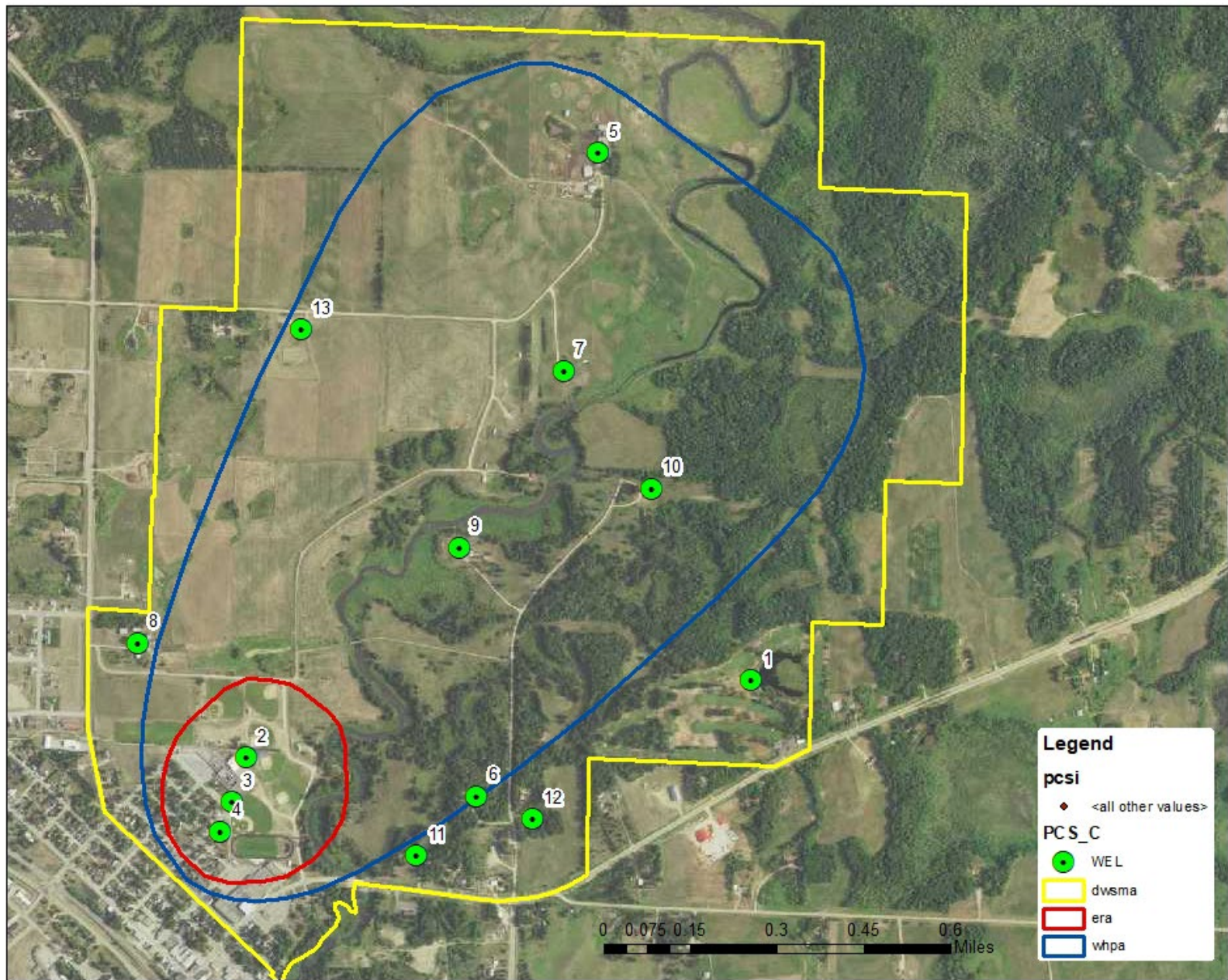
Explanation of how the potential contaminant source inventory was completed.

The WHP Team conducted the potential contaminant source inventory by gathering information from the various state and federal data sources as well as from local knowledge. Once the potential contaminant sources/data were compiled and placed on a map, the WHP Team assessed each location and associated data to make sure the locations/data were accurate.

Frazee DWSMA

Potential Contaminant Source Inventory

ID	PIN	NAME	ADDRESS	CITY	ZIP	PCSI	STATUS	PROGRAM ID	COMMENT
1	030225000	Frazee Golf Course	34482 ST HWY 87	Frazee	56544	Well	A	445825	238 ft deep
2	037027002	Frazee High School	305 LAKE ST. N	Frazee	56544	Well	A	738996	190 ft deep
3	507028001	City of Frazee	222 MAIN AVE W	Frazee	56544	Well	A	613129	Well #6 202 ft deep
4	507028001	City of Frazee	222 MAIN AVE W	Frazee	56544	Well	A	847061	Well #7 210 ft deep
5	030217000	Thomas Trieglaff	33928 120TH ST	Frazee	56544	Well	A		Unknown
6	030248000	BRANDON & ABBY WING	11285 CHILTON RD	Frazee	56544	Well	A		Unknown
7	030234001	TIMOTHY & JANICE TRIEGLAFF	33900 120TH ST	Frazee	56544	Well	A		Unknown
8	030237000	BRYAN & Brandi Latham	11447 CO HWY 29	Frazee	56544	Well	A		Unknown
9	030237001	CODY & STACIA L HEISLER	11298 CHILTON RD	Frazee	56544	Well	A		Unknown
10	030236003	JOSEPH & BETH STERNHAGGEN	11291 CHILTON RD	Frazee	56544	Well	A		Unknown
11	030246000	MATTHEW & ROXANNE RIEWER	33856 ST HWY 87	Frazee	56544	Well	A		Unknown
12	030227002	KRAIG & DANITA D KETTER	11248 CHILTON RD	Frazee	56544	Well	A		Unknown
13	030239003	SCOTT C REED	33783 120TH ST	Frazee	56544	Well	A		Unknown



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

PUBLIC WATER SYSTEM INFORMATION		
PWS ID	1030014	COMMUNITY
NAME	Frazee	
ADDRESS	Frazee Water Superintendent, City Hall, P.O. Box 387, 222 Main Avenue West, Frazee, MN 56544	
FACILITY (WELL) INFORMATION		
NAME	Well #6	IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE? <input type="checkbox"/> YES (Please attach a copy) <input type="checkbox"/> NO <input type="checkbox"/> UNDETERMINED
SAMPLE POINT ID	S04	
UNIQUE WELL NO.	613129	
COUNTY	Becker	

PWS ID / SAMPLE POINT ID	1030014 S04	UNIQUE WELL NO.	613129
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PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well'	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? (Class V well - illegal?)	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)?	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		

PWS ID / SAMPLE POINT ID	1030014 S04	UNIQUE WELL NO.	613129
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PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well ¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*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		
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		Y	60	N
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	197	N**
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	60	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		

PWS ID / SAMPLE POINT ID	1030014 S04	UNIQUE WELL NO.	613129
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SETBACK DISTANCES	All potential contaminant sources must be noted on sketch.
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Record the distance and approximate compass bearing of each potential contaminant source from the well, and identify the source using the "Source Code". Unlabeled points on the map are unsealed wells.



	Y	N	N/A
--	---	---	-----

Were the isolation distances maintained for the new sources of contamination?			
---	--	--	--

Is the system monitoring existing nonconforming sources of contamination?			
---	--	--	--

Reminder Question: Were the wellhead protection measure(s) implemented?			
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INSPECTOR	Leither, Jolene	DATE	8 - 8 - 2023
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PWS ID / SAMPLE POINT ID	1030014 S04	UNIQUE WELL NO.	613129
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RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Any sewer lines that are observed to be leaking, cracked, or deteriorated, should be replaced.		
Best management practices should be employed for outdoor chemical use, to prevent stormwater from moving chemical contaminants to surface waters or where wells could be impacted.		

COMMENTS
PCSI Type SBM (bearing = 0, distance = 200 inventory date: 7/18/1999): STORM SEWER9/7/2003 - Location for PCSI Type SBM (bearing = 0, distance = 200 , inventory date: 7/18/1999) could not be determined.

For further information, please contact:

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

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

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1030014	COMMUNITY
NAME	Frazee	
ADDRESS	Frazee Water Superintendent, City Hall, P.O. Box 387, 222 Main Avenue West, Frazee, MN 56544	

FACILITY (WELL) INFORMATION

NAME	Well #7	IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE? <input type="checkbox"/> YES (Please attach a copy) <input type="checkbox"/> NO <input type="checkbox"/> UNDETERMINED
SAMPLE POINT ID	S05	
UNIQUE WELL NO.	847061	
COUNTY	Becker	

PWS ID / SAMPLE POINT ID	1030014 S05	UNIQUE WELL NO.	847061
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PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well'	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 ²)	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		Y	75	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		

PWS ID / SAMPLE POINT ID		1030014	S05	UNIQUE WELL NO.		847061		
PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION		
		Minimum Distances		Sensitive Well'	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)	
		Community	Non-community					
*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			
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	90	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	70	N	
SWI	Storm water drainage well ² (Class V well - illegal) ²	50	50		N			
SM1	Storm water pond greater than 5000 gal.	50	35		N			
Wells and Borings								
*EB1	Elevator boring, not conforming to rule	50	50		N			
*EB2	Elevator boring, conforming to rule	20	20		N			
MON	Monitoring well	record dist.	record dist.		N			
WEL	Operating well	record dist.	record dist.		Y	57		
UUW	Unused, unsealed well or boring	50	50		N			
General								
*CR1	Cistem 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			

PWS ID / SAMPLE POINT ID

1030014 S05

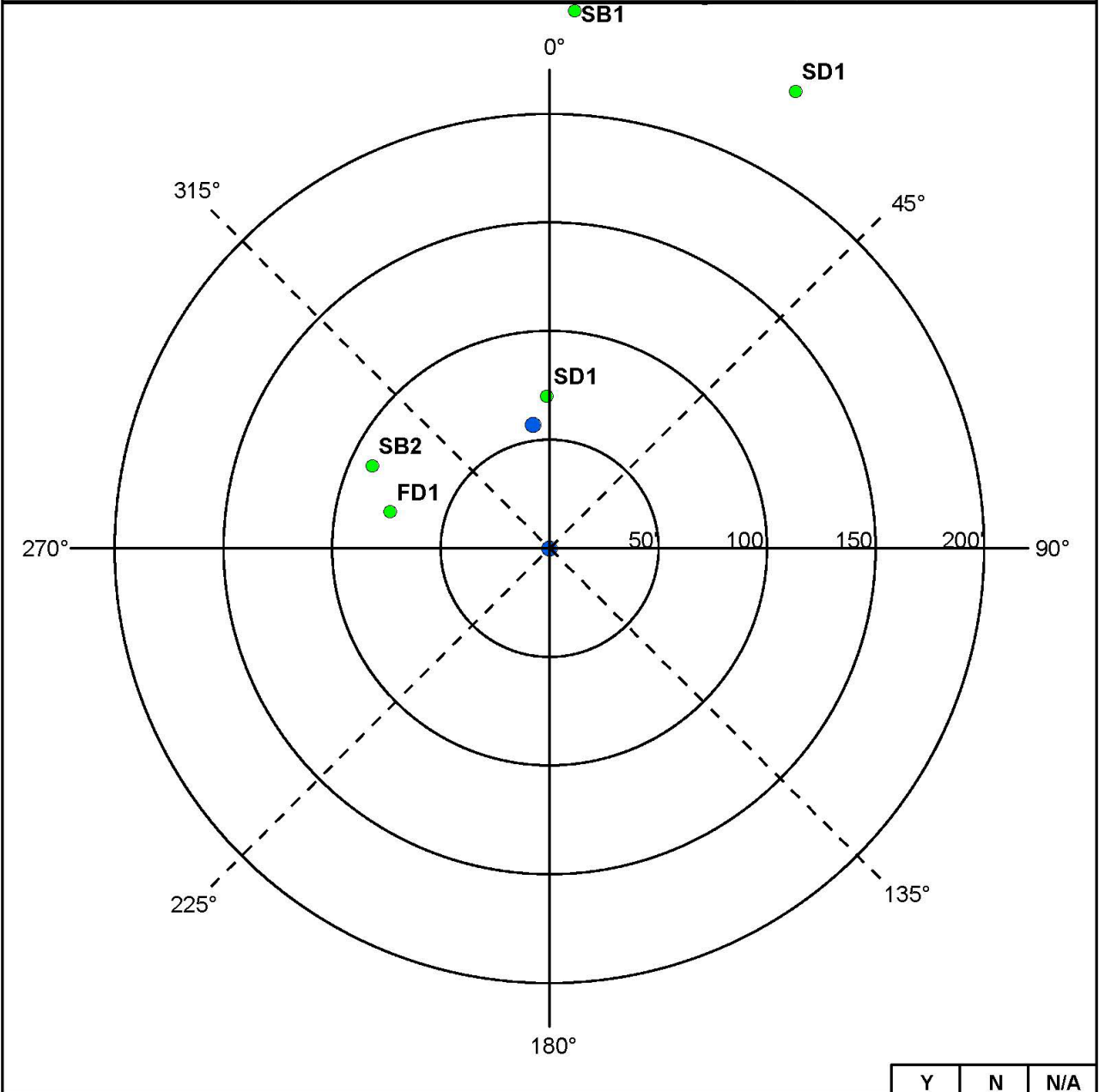
UNIQUE WELL NO.

847061

SETBACK DISTANCES

All potential contaminant sources must be noted on sketch.

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



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

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

INSPECTOR	Leither, Jolene	DATE	8 - 8 - 2023
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Aerial photo not used due to outdated imagery

PWS ID / SAMPLE POINT ID	1030014 S05	UNIQUE WELL NO.	847061
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RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Any sewer lines that are observed to be leaking, cracked, or deteriorated, should be replaced.		

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

Frazee Old Municipal Well Report



MDH Public Water Supply Sources Report

PWSID: 1030014
PWS Name: **Frazee**
PWS Type: **Community**
PWS Status: **Active**

Public Water Supply Sources: Information from MNDWIS and CWI (sorted by Sample Point ID)

Source Type Codes: GW = Ground water; SW = Surface water; GUI = Ground water under influence

Location Source: MGS = digitized by the MN Geological Survey; * indicates incomplete records

O* = duplicate in Old Municipal Well Data; R* = duplicate in MNDWIS PWS Sources Removed from Flow; S* = duplicate in MNDWIS PWS Sources in Flow;

MNDWIS PWS SOURCES IN FLOW														
Source Info							MNDWIS Data				CWI Data			
Sample Point ID	Name	Type	Availability	Status	Well No. (link to Well Log(s))	Location Info (link to Map)	Drill Year	Depth (in feet)	Case Depth (in feet)	Case Diam. (in inches)	Drill Date	Depth Completed (in feet)	Case Depth (in feet)	Case Diam. (in inches)
S04	Well #6	GW	Primary	Active	613129	8/31/2000(J. Walsh)	2000	202	182	12	05-18-2000	202	182	12
S05	Well #7	GW	Primary	Active	847061	3/11/2020(J. Grugel)	2020	205	185	12	03-19-2020	205	185	12

MNDWIS PWS SOURCES REMOVED FROM FLOW														
Source Info							MNDWIS Data				CWI Data			
Sample Point ID	Name	Type	Availability	Status	Well No. (link to Well Log(s))	Location Info (link to Map)	Drill Year	Depth (in feet)	Case Depth (in feet)	Case Diam. (in inches)	Drill Date	Depth Completed (in feet)	Case Depth (in feet)	Case Diam. (in inches)
S02	Well #5 H371054	GW	Sealed	Inactive	166292	7/20/1999(T. Johnson)	1980	210	190	10	08-19-1980	210	190	10
S03	Well #4	GW	Not in Use	Inactive	222211 O*	7/20/1999(T. Johnson)	1960	150	120	0	05-00-1960	150	120	10

MNDWIS and CWI data value discrepancies in preceding tables are shown in RED (0 or null values excepted).

Old Municipal Wells

The following tables show information on wells whose existence (or previous existence) has not yet been confirmed.

OLD MUNICIPAL Well Data

Well Search Reference	Name(s)	Unique Well Number	Drilled Depth (ft.)	Completed Depth (ft.)	Depth Cased (ft.)	Casing Diameter (in.)	Year Constructed	Construction Type	Year Out of Service	Sealing Record?	Year Sealed	Location Info	Comments
1	Well No.1	241975	39		39	92	1920	Dug	1978			*In a pumphouse on the Eastern side of the village; in the rear of the Fire Hall 1951: Abandoned and Disconnected 1954: Reconnected to system 1978: Disconnected from the system	
2	1956: Well No.1; 1957: Well No. 2	222210	88		78	16	1947	Rotary/Drilled	1959	Y		H0137886 At the Fire Hall	
3	Well No. 3	241976	274		259	12	1957	Rotary/Drilled	1979	Y		H0044790 Near School	
4	Well No. 4	222211 R*	151		119	10	1962	Rotary/Drilled		Y		H0137885	
5	Swift and Company Well								1972			Cross-connection. Used for city emergencies. Located at the turkey plant.	
6	Swift and Company Well								1972			Cross-connection. Used for city emergencies. Located at the turkey plant.	
7		H137886	180			12		Rotary/Drilled	2000	Y		H137886 T138, T40, Sect. 35 SW/NE/NW	
Databases Searched												Remarks	
MDH District Scanned Files; MDH DWP Microfiche; MDH DWP MNDWIS; MDH WELLS; MDH 1988-2002 Muni Well Inventory (1Suite); MGS Bulletin 22, 27, 31, or 32); Lakeswoods.com; Biennial Report of the MN State Dairy and Food Commissioner-1907; MNBrew.com or oldbreweries.com												FRAZEE, a city in Burlington Township on the Otter Tail River, sections 26 and 35, was first settled in 1870, platted in 1873, and incorporated in 1891; had a station of the Northern Pacific Railroad in section 35. The early settlement had one of the largest sawmills in the state. A creamery was also located in the city.	

Old Municipal Well Data Compiled By: **Geoffery Nash** Compiled Date: 5/2/2012

OLD MUNICIPAL Well Data - no RAW HYDRO data found.

Appendix IV: Contingency Strategy

A photograph of a white water tower with a spherical tank and a tall cylindrical neck, set against a clear blue sky with a few wispy clouds. The tower is positioned on the left side of the page. A solid green vertical bar runs along the right edge of the page. A dark blue horizontal banner is overlaid across the middle of the image, containing the title text in white serif font.

Water Emergency Response Plan

CITY OF FRAZEE
WATER EMERGENCY RESPONSE PLAN

Public Water System Name: City of Frazee

Public Water System I.D. No.:

1	0	3	0	0	1	4
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Address: P.O. Box 387 222 Main Avenue West
Frazee, MN 56544

Telephone No.: 218-334-4991

Municipality: Frazee

County: Becker

System Type: Community Nontransient Noncommunity

Population Served: 1400

Section 1 – City Contacts/Information

One or more of the following persons will be in charge of the water system during any type of emergency:

City Contacts				
Name	Position	Contact Numbers (include area code)		
		Cell:	Home:	Other:
Mark Flemmer	Mayor	701-351-7920		mflimmer@frazeeccity.com
Mike Sharp	Vice Mayor	320-220-1538		msharp@frazeeccity.com
Andrea Froeber	Council Member	612-709-7717		afroeber@frazeeccity.com
Mark Kemper	Council Member	218-850-0134		mkemper@frazeeccity.com
Jim Rader	Council Member	218-849-0228		jrader@frazeeccity.com
Larry Stephenson	Water Superintendent	218-849-6544		public.works@frazeeccity.com
Stephanie Poegel	City Administrator	218-334-4991		cityadmin@frazeeccity.com

Public Water Supply Characteristics

Local Well ID	Unique Number	Use/ Status	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed	Aquifer	Well Vulnerability
Well #6	613129	Primary	12	182	202	5/18/2000	QBAA	Not Vulnerable
Well# 7	847061	Primary	12	185	205	3/19/2020	QBAA	Not Vulnerable

Priority Group and Rank	Maximum daily use (gpd)	Minimum daily use (gpd)
Residential #1	200000	64000
Commercial #2	50000	16000
Unaccounted	50000	16,000

Treatment - The City of Frazee adds chlorine and fluoride at the well house when it pumps Well #6 and #7. Sodium permanganate is used to back wash the filters but does not enter into the distribution system.

Storage and Distribution - The City has one 300,000 gallon above ground storage tank which supplies all of the water for the town. The majority of the water distribution system is looped, with the exception of 3 dead ends in the system. The water system contains all other necessary valving and piping and is considered to be in good shape according to City staff.

Maps/Plans – Maps of the water distribution system and valving are on file at the city shop.

Section 2 – Communication Procedures and Contact Information

Communication Procedure: Depending on the emergency, contact the groups listed below in the order provided. The contact information and specific procedures are located in the tables on the following pages.

Scenario Communication Procedures											
Scenarios	Water Superintendent 218-849-6544	Customers	MDH District Engineer* 218-332-5147 (w) 218-770-0482 (c)	Becker County Emergency Mgmt. 218-846-7302	Fire Dept. Chief 911	MN Duty Officer 1-800-422-0798	County Sheriff 9-1-1	Mayor & Council	MPCA	MRWA	First Responders
Natural disaster that disrupts the supply of water	X	X	X	X		X	X	X		X	
Chemical spill	X	X	X	X	X		X	X	X		X
Unexpected loading of possible pathogens into the source water that significantly increases the potential for drinking water contamination	X	X					X	X	X		
Situation that causes a loss of positive water pressure.	X	X	X			X		X		X	
Lack of resources that adversely affect operations due to lengthy power outages	X	X						X		X	
Chemical overfeed	X	X	X			X		X			
Break in/terrorist acts	X	X	X			X	X	X	X		
Loss of One or More Sources of Supply	X	X	X		X			X	X	X	

Emergency Response Guidance for the Scenarios Listed Above

Intentional Events (Break in at facility which is connected to the distribution system or possible/actual contamination incident).

- (1) Call County Sheriff (911) and report situation
- (2) Call MDH Engineer (651-201-5386) and MDH District Engineer (218-332-5147).
- (3) Call State Duty Officer (800-422-0798)

Unintentional Event (Possible/actual contamination incident, chemical spill, significant chemical overfeed etc...)

- (1) Call State Duty Officer (800-422-0798)
- (2) Call County Sheriff (911) and report situation
- (3) Call MDH Engineer (651-201-5386) and MDH District Engineer (218-332-5147).

Event that may affect, or is affecting the functionality of your water system (loss of pressure, loss of supply wells etc...)

- (1) Call MDH Engineer (651-201-5386) and MDH District Engineer (218-332-5147).
- (2) Call State Duty Officer (800-422-0798)
- (3) Notify MNWARN and request assistance

Emergency Reference Table for Sensitive Water Users

Priority Water Users	
Name	Work Telephone
Frazee Care Center	281-334-4501
Essentia Health Clinic	218-334-7255
Frazee Public Schools	218-334-3181
MAHUBE-OTWA Daycare	218-334-3951

Agency Notification

Table 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 may 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.

Personnel	Name	Telephone	Additional Telephone
Water Superintendent	Larry Stephenson	218-849-6544	
Mayor/Board Chair	Mark Flemmer	701-351-7920	
Vice Mayor	Mike Sharp	320-220-1538	
Council Members	Andrea Froeber	612-709-7717	
Council Members	Mark Kemper	218-850-0134	
Council Members	Jim Rader	218-849-0228	
Response Coordinator	Larry Stephenson	218-849-6544	
Alt. Response Coordinator	Donnie Tate	218-841-1587	
State Incident Duty Officer	NA		800-422-0798
County Emergency Director	Adam Douglas	218-847-2661	
Fire Chief	Nathan Matejka	218-234-8333	
Sheriff	Todd Glander	218-847-5628	911
System Operator	Larry Stephenson	218-849-6544	
Alt. System Operator	Donnie Tate	218-841-1587	
Ambulance	Essentia Health St. Mary's	218-847-5611	911
Hospital	Essentia Health St. Mary's	218-847-5611	911
Power Company	Otter Tail Power Co. Lake Region Electric	800-257-4044 800-552-7658	
Co. Highway Department	Jim Olson	218-847-4463	
State Highway Department	MN DOT	911	218-850-1269
Telephone Company	Arvig Midco	888-221-0550 800-888-1300	
MWARN			218-367-6792
MPCA	n/a	n/a	800-657-3864
MRWA Technical Services	Ben Oseien	218-821-1647	800-367-6792
MDH District Engineer	Lucas Hoffman	218-332-5147	218-770-0482

Emergency Oversight Committee

The Emergency Oversight Committee was formed to assist and provide technical assistance to the Response Coordinator and the City of Frazee to help them determine the appropriate action or response during emergency situations.

Emergency Oversight Committee			
Title	Name	Telephone	Response Assignment
Response Coordinator	Larry Stephenson	218-849-6544	Coordinate actions to address emergency
Alternate Response Coordinator	Donnie Tate	218-841-1587	Coordinate actions to address emergency
Water Operator	Larry Stephenson	218-334-4991	Direct or contact individuals and businesses to resolve issue
Primary Spokesperson	Mark Flemmer	701-351-7920	Contact media to inform citizens/businesses of emergency
Alternate Public Relations	Mike Sharp	320-220-1538	Contact media to inform citizens/businesses of emergency
Public Health/Medical	Essentia Health	911	Assist City as needed to address emergency
Alternate Public Health/Medical	Perham	911	Assist City as needed to address emergency
MNWARN	NA	800-367-6792	Assist City as needed to address emergency
MRWA Technical Services	Ben Oseien	218-821-1647	Assist City as needed to address emergency
MDH District Engineer	Lucas Hoffman	218-332-5147 (w) 218-770-0482 (c)	Assist City as needed to address emergency

INVENTORY OF AVAILABLE EMERGENCY EQUIPMENT AND MATERIALS

The Table below contains a list of services, equipment and supplies that are available to the public water supply system to respond to a disruption in the water system. It is believed that the items contained in the Table would be adequate to respond to most water system emergencies.

Description	Owner	Telephone	Location	Acquisition Time
Well Repair	Thein well	800-450-8000	Spicer, MN	3 hours
Pump Repair	Thein well	800-450-8000	Spicer, MN	3 hours
Electrician	Fraze Electric	218-334-2382	278 901 Red Willow Dr, Frazee	30min
Plumber	Feldts Plumbing	218-847-5390	51591 W Wymer Lake Rd, Frazee	30min
Backhoe/Excavator	Feldts Plumbing	218-847-5390	51591 W Wymer Lake Rd, Frazee	30min
Chemical Feed	Hawkins	701-293-9618	2001 Great Northern Fargo, ND	2hrs
Generator	On-site		City of Frazee	
Valves	Core & Main	701-219-7480	4900 19 th Ave Fargo, ND	2hrs
Pipe & fittings	Core & Main	701-219-7480	4900 19 th Ave Fargo, ND	2hrs

Media Contacts

The list was formed to assist the Response Coordinator and the City of Frazee to help them inform the public of appropriate action or response during emergency situations.

Media	Name	Telephone	Address
Newspaper	Frazee Forum	218-334-3566	Frazee, MN
Television	WDAY	701-237-6500	Fargo, ND
Radio	KRCQ	218-847-5624	Detroit Lakes, MN

The city will use Code Red messaging and the city website (frazeecity.com) to deliver any important messages to consumers.

Section 3- City Public Emergency Relations

City Emergency Public Relations			
Title	Name	Telephone	Response Assignment
Primary Spokesperson	Acting Mayor	218-334-4991	Contact media to inform citizens/businesses of emergency
Alternate Spokesperson	Acting Vice Mayor	218-334-4991	Contact media to inform citizens/businesses of emergency

The Responsibilities of the Primary Spokesperson are to:

1. Give public statements that have been prepared by the city regarding the water supply emergency;
2. Coordinate and compile information submitted by responders to the water supply emergency;
3. Schedule official meetings between the city and members of the media; and
4. Coordinate efforts to keep the public informed about the water supply emergency.

Public Information Center Location during Emergency:

Location: Event Center

Times Available: 24hours

Alternate Information Center Location Site: Fire Hall

Information Checklist to be conveyed to the Public and Media:

1. Name of the Water System;
2. Nature of the water supply emergency;
3. Steps being taken to replace the water supply;
4. *If applicable*- Contaminant(s) of concern & date first detected;
5. *If applicable* - Source(s) of contamination;
6. *If applicable* - Public health impacts of the contamination or water supply interruption;
7. Steps the public should be taking;
8. Other responders who are cooperating with the city; and
9. Steps being taken to eliminate the source of contamination mechanical failure.

Section 4 - Alternative Water Supply Options:

1. Catastrophic Event:

The Minnesota National Guard may be able to supply water trucks to bring water to Frazee from surrounding communities. The following procedure is recommended:

- Contact the County Sheriff (218) 847-5628 or 911 to request assistance from the Minnesota National Guard.
- Sheriff contacts the MN Nat'l Guard; Division of Emergency Management, State Duty Officer (800) 422-0798; and Community Support Group at (651) 282-4013 to request assistance for the City.
- The MN National Guard can provide a portable "ROWPU" (Reverse Osmosis Water Purification System) capable of supplying 900 gph or 15gpm.
- MN/WARN Response Network may offer assistance through the networking of other municipal utilities who are willing to offer assistance.

2. Bottled water supplies, delivery and distribution:

Large quantities of bottled water or distributors in the Frazee area include:

- | | | |
|-------------------|-------------------|--------------|
| a. Viking Coke | Fergus Falls, MN | 218-736-5661 |
| b. Wal-Mart | Detroit Lakes, MN | 218-847-1126 |
| c. Central Market | Detroit Lakes, MN | 218-844-3663 |

d. American Bottling Company Fergus Falls, MN 701-219-0257

3. System interconnects with other water supplies. No interconnects exist.
4. New well. No other new wells are planned at this time.
5. Emergency or backup wells: The city has two wells they can pump from as needed.
6. Emergency treatment of water system. City has a generator connected to the water plant.
7. Source Management.
Currently, the City of Frazee Water Treatment Plant alternates pumping between Wells #6 and #7.
8. Other.
No other water supply alternatives have been identified by the City of Frazee at this time

Section 5 - Mitigation and Conservation:

MITIGATION

- (1) Infrastructure maintenance/upgrades/maps:
The water system is flushed 1 time a year. The deadends are flushed 3-4 times a year or as needed to maintain chlorine residuals. Infrastructure maintenance and upgrades are performed as needed.
- (2) Regular inspection of tower, well, pump house:
All of these items are inspected daily. The well house and chemical rooms have keyed entries and are locked. The water tower is inspected annually.
- (3) Staff emergency training:
Staff receive training annually through Minnesota Rural Water Association.
- (4) System security analysis:
All facilities are locked and have keyed entries.
- (5) Site new backup well: No new well is planned at this time.
- (6) System valving to isolate problems:
The water system is valved to isolate problems.
- (7) Sanitation procedures for construction/repairs:
Shock chlorination is done when needed. All disinfection procedures are performed per State specifications.

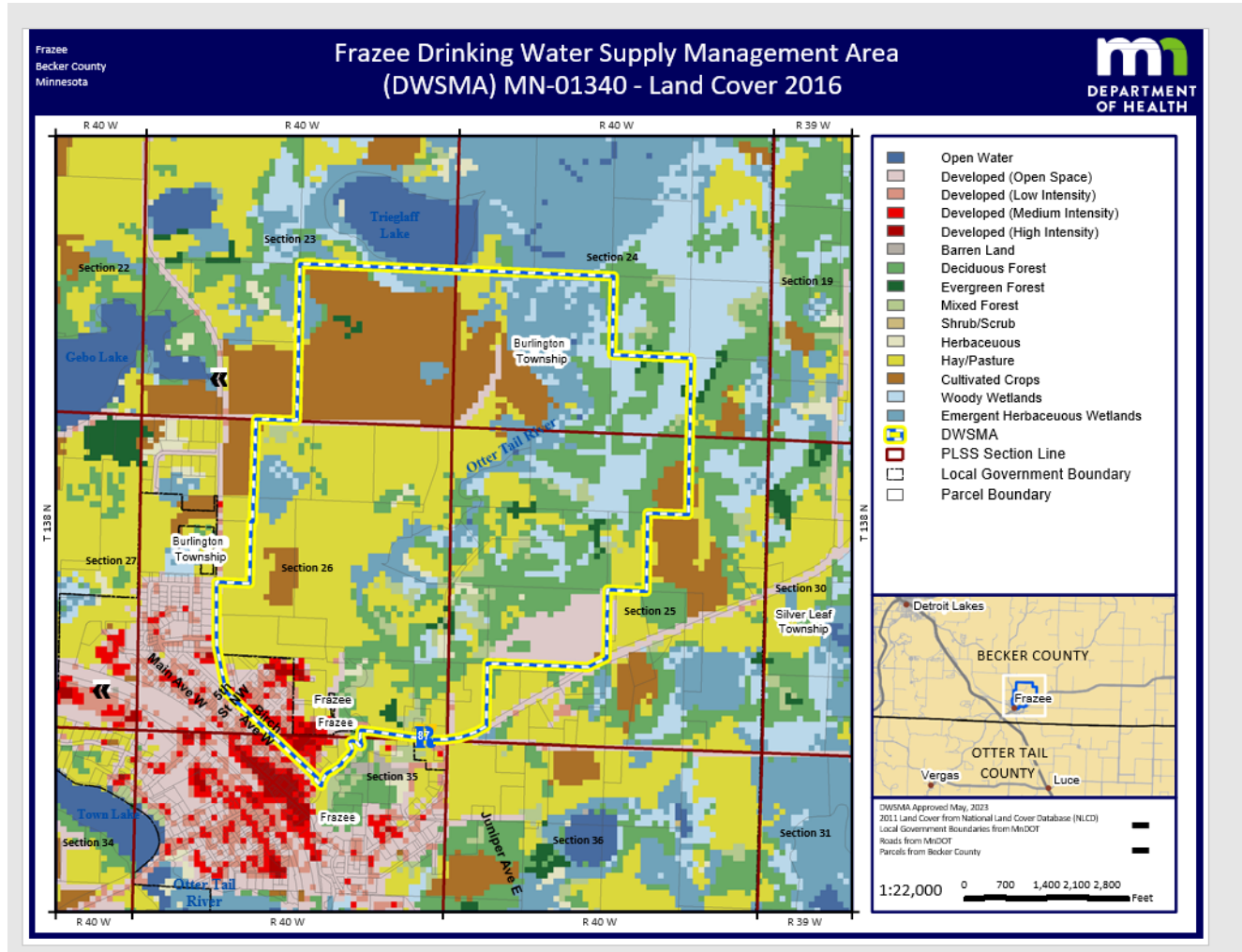
CONSERVATION

1. Water Meters:
The City of Frazee has water meters install on all users.

2. Public Education:

The City of Frazee has educational information on the City's website and in the monthly newsletter.

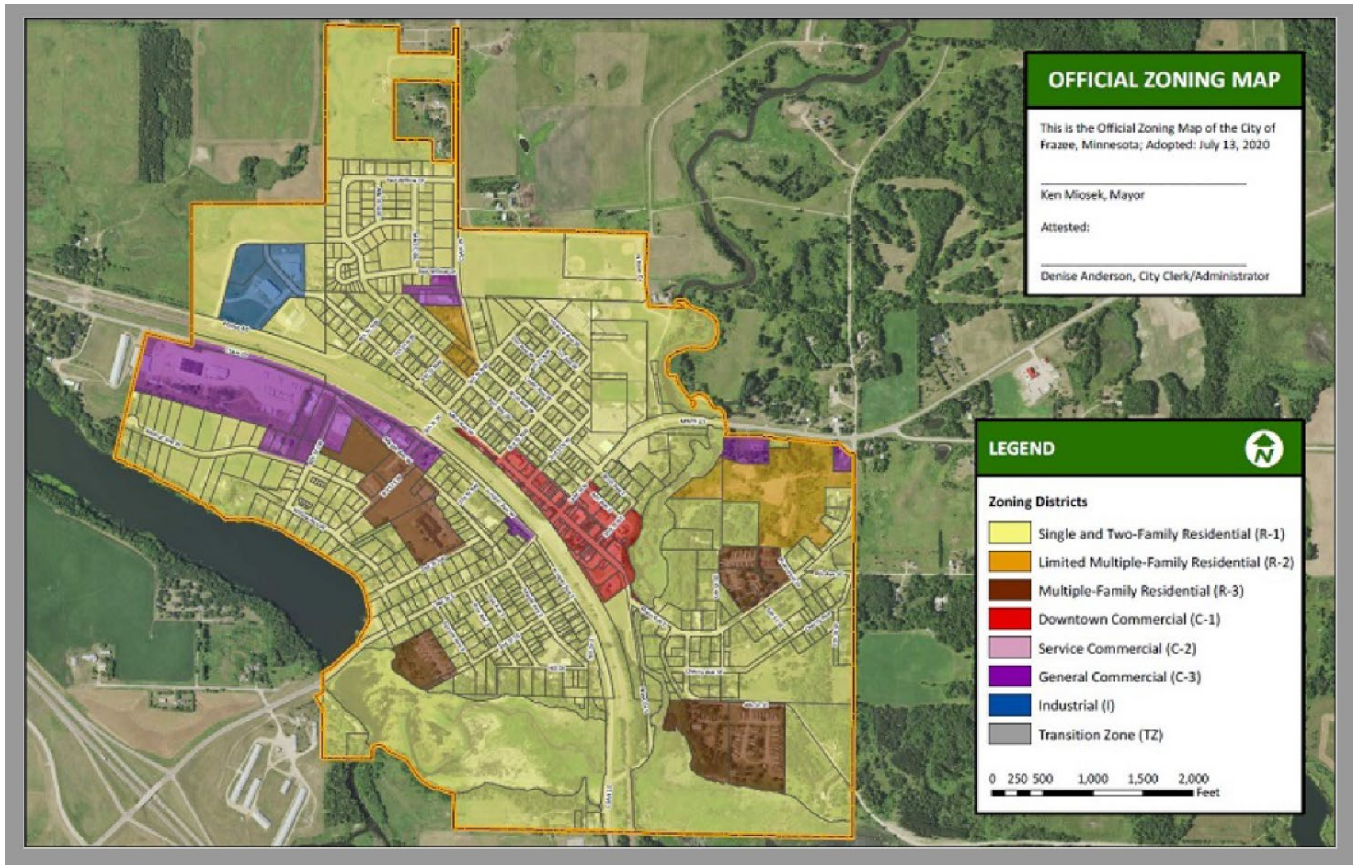
Appendix V: Supporting Documentation



Frazee DWMSA Land Cover Map (2016)

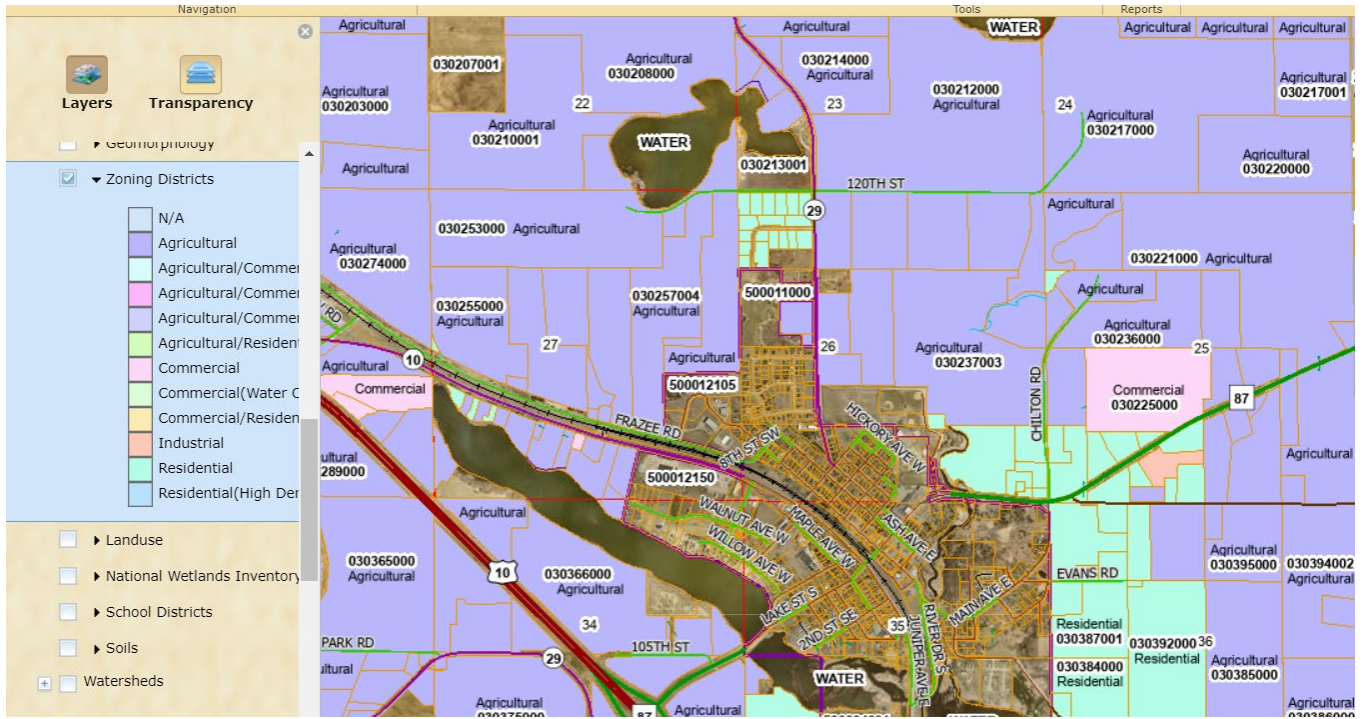
LAND_COVER	ACRES	PERCENT	YEAR
Open Water	1.33	0.12	2016
Developed, Open Space	67.60	5.94	2016
Developed, Low Intensity	13.16	1.16	2016
Developed, Medium Intensity	16.28	1.43	2016
Developed, High Intensity	5.58	0.49	2016
Deciduous Forest	199.66	17.56	2016
Evergreen Forest	12.05	1.06	2016
Mixed Forest	30.34	2.67	2016
Grassland/Herbaceous	7.80	0.69	2016
Pasture/Hay	357.83	31.46	2016
Cultivated Crops	195.21	17.16	2016
Woody Wetlands	103.73	9.12	2016
Emergent Herbaceous Wetlands	126.71	11.14	2016

City Zoning Map



The City researched the FEMA maps and the wells are not located within the flood plain. City staff have no concerns of flooding near their wells.

Becker County Zoning Map



Source: Becker County