CITY OF BROWERVILLE
WELLHEAD PROTECTION PLAN AMENDMENT PART II

POTENTIAL CONTAMINANT SOURCE MANAGEMENT STRATEGY

October 2023 – October 2033

DEPARTMENT OF HEALTH

MN RURAL WATER ASSOCIATION

WC ENVIRONMENTAL LLC

TABLE OF CONTENTS

PUBLIC WATER SUPPLY PROFILE

PUBLIC WATER SUPPLY	
NAME	City of Browerville
ADDRESS	544 Main Street South P.O. Box 247 Browerville MN 56369
TELEPHONE NUMBER	320-594-2201
E-MAIL	ctybrow@browervillemn.com

WELLHEAD PROTECTION MANAGERS	
NAME	Bobbi Jo Freie & Chuck Buhl
ADDRESS	544 Main Street South P.O. Box 247 Browerville MN 56369
TELEPHONE NUMBER	320-594-2201 & 320-594-6234
E-MAIL	ctybrow@browervillemn.com publicworks@browervillemn.com

CONSULTANT	
NAME	Wayne Cymbaluk WC Environmental LLC
ADDRESS	13031 Bolero Drive Grey Eagle, MN 56336
TELEPHONE NUMBER	320-241-4742
E-MAIL	wcymbaluk@yahoo.com

GENERAL INFORMATION	
UNIQUE WELL NUMBERS	00752299 (Well #7) Active 00764941 (Well #8) Active 00198646 (Well #4) Emergency
POPULATION SERVED:	839 (2020 US Census Data)
CONNECTIONS:	300
COUNTY:	Todd

DOCUMENTATION LIST

STEP	DATE PERFORMED
Scoping Meeting 2 Held (4720.5340, subp. 1)	July 19, 2022
Scoping 2 Letter Received (4720.5340, subp. 2)	July 28, 2022
Remaining Portion of Plan Submitted to Local Units of Government (LGUs) (4720.5350)	
Review Received from Local Units of Government (4720.5350, subp. 2)	
Review Comments Considered (4720.5350, subp. 3)	
Public Hearing Conducted (4720.5350, subp.4)	
Remaining Portion WHP Plan Submitted (4720.5360, subp. 1)	
Final WHP Plan Review Received (4720.5360, subp. 4)	

Members of the Wellhead Protection Team

NAME	REPRESENTING
Bobbi Jo Freie	Administrator, City of Browerville (Wellhead Manager)
Chuck Buhl	Public Works, City of Browerville (Wellhead Manager)
Wayne Cymbaluk	WC Environmental LLC
Katie Breth	Minnesota Rural Water Association - Planner
Chad Anderson	Minnesota Department of Health – Principal Planner

Abbreviations

BMP Best Management Practices
BWSR Board of Water and Soil Resources
DNR MN Department of Natural Resources
DWSMA Drinking Water Supply Management Area
EPA Environmental Protection Agency
GIS Geographic Information Systems
IWMZ Inner Wellhead Management Zone
LGU Local Government Unit
LUST Leaking Underground Storage Tanks
MDA MN Department of Agriculture
MDH MN Department of Health
MGY Million Gallons per year
MN Minnesota
MNDOT MN Department of Transportation
MPCA MN Pollution Control Agency
MRWA MN Rural Water Association
NRCS Natural Resources Conservation Services
NWI National Wetlands Inventory
OBWEL Observation Well
PCSI Potential Contaminant Source Inventory
PWS Public Water Supply
RST Registered Storage Tank
SWCD Todd County Soil & Water Conservation District
SSTS Subsurface Sewage Treatment System
ST Storage Tank
TOT Time-of-travel
UST Underground Storage Tank
WHP Wellhead Protection
WHPA Wellhead Protection Area
WHPP Wellhead Protection Plan

EXECUTIVE SUMMARY

Part Two of the City of Browerville's Wellhead Protection Plan Amendment speaks to sections 4720.5220 through 4720.5290 of MN Rules. This portion of the plan is based on the requirements outlined in the scoping document found in **Appendix I** of this plan. It addresses:

- Data elements and their assessments;
- Impacts of changes on the public water supply well;
- Issues, problems and opportunities;
- Wellhead protection goals, objectives and action plans;
- Program evaluation; and
- Alternative water supply/contingency strategy.

Part One of the WHP presented the 1) delineation of the wellhead protection area (WHPA) and the drinking water supply management area (DWSMA) and 2) the vulnerability assessments for the system's wells and the aquifer within the DWSMA. Part One was submitted and approved by the Minnesota Department of Health (MDH). The boundaries of the WHPA and DWSMA are shown in Figure 1.

The vulnerability assessment for the aquifer within the DWSMA was performed using available information and indicates that the aquifer used by the system is all moderately vulnerable. Moderately vulnerable, aquifers are most susceptible to contaminants that may penetrate the clay-rich cap over the aquifer, such as chemical storage tanks, and abandoned wells which can provide conduits for contaminants to quickly reach the city's aquifer. Consequently, the principal potential sources of contamination to the aquifer are other wells that reach or penetrate it, shallow disposal-type (Class V) wells and storage tanks. This information was presented to the WHP Team during the Second Scoping meeting held with the Minnesota Department of Health (MDH). The information to be included in Part 2 was also outlined and discussed in detail.

The vulnerability assessment for the public water supply system's wells indicates that the wells are vulnerable to contamination based on the well construction, because the wells themselves do provide a pathway for contaminants to enter the aquifer used by the public water supplier.

The information and data contained in Chapters 1-4 of this part of the WHP Plan support the approaches taken to address potential contamination sources that have been identified as potentially affecting the aquifer used by the public water supply. The reader is encouraged to concentrate attention on Chapters 1-4 to better understand why a particular management strategy is included in Chapter 5.

In Chapter 1, the required data elements indicated by MDH in the Scoping 2 Decision Notice are addressed, as well as the assessment of data elements. Pertinent data elements include information about geology, water quality, water quantity, land use, and the public utility services. The data elements and information supplied in Part One of the

WHP Plan are based on the assessment that the aquifer providing drinking water for this system moderately vulnerable to contamination from land uses, such as other wells that penetrate the same aquifer and land uses that either store liquids in tanks or dispose of liquids below the land surface.

Chapter 2 addresses the possible impacts that changes in the physical environment, land use, and water resources have on the public water supply. Only very small changes in land use are expected and likely will not have significant impacts on the aquifer. Neither surface water nor groundwater changes are expected to impact the aquifer. The City of Browerville has evaluated the support necessary to implement its WHP. Limited resources do pose a challenge due to the size of the Community. The city will focus efforts on building partnerships with local and state resource agencies to cooperate and collaborate on drinking water protection efforts.

The problems and opportunities concerning land use issues relating to the aquifer, well water, and the DWSMA, and those issues identified at public meetings are addressed in Chapter 3. The moderately vulnerable status of the aquifer and the good quality of water currently produced by the system's wells leaves three major concerns to be addressed by this plan: 1) other wells located within the DWSMA that could become pathways for contamination to enter the aquifer; 2) the pumping effects of high-capacity wells that may alter the boundaries of the delineated WHPA, reduce the hydraulic head in the aquifer, or cause the movement of contamination toward the public water supply wells; and 3) underground or above-ground storage tanks that may release contaminants into groundwater One underground storage tank, eleven private wells, and three test holes were identified in the DWSMA.

The drinking water protection goals that the city would like to achieve with this plan are listed in Chapter 4. In essence, the city would like to, "Promote public health, economic development and community infrastructure by maintaining a potable public drinking water supply for the community."

The objectives and action items for managing potential sources of contamination are contained in Chapter 5. Actions aimed toward educating the public about groundwater and drinking water protection issues, proper well management, and collecting data relevant to wellhead protection planning are the general focus.

Chapter 6 contains a guide to evaluate the implementation of the identified management strategies of Chapter 5. The wellhead protection program implementation efforts for the City of Browerville will be evaluated by the city at a minimum of every 2 ½ years.

An emergency/contingency plan is included to address the possibility that the water supply system is interrupted due to disruption caused by contamination or mechanical failure. Chapter 7 contains details about the water supply distribution system, emergency contact numbers, equipment listings as well as other information to assist the system in responding quickly and effectively in emergency situations.

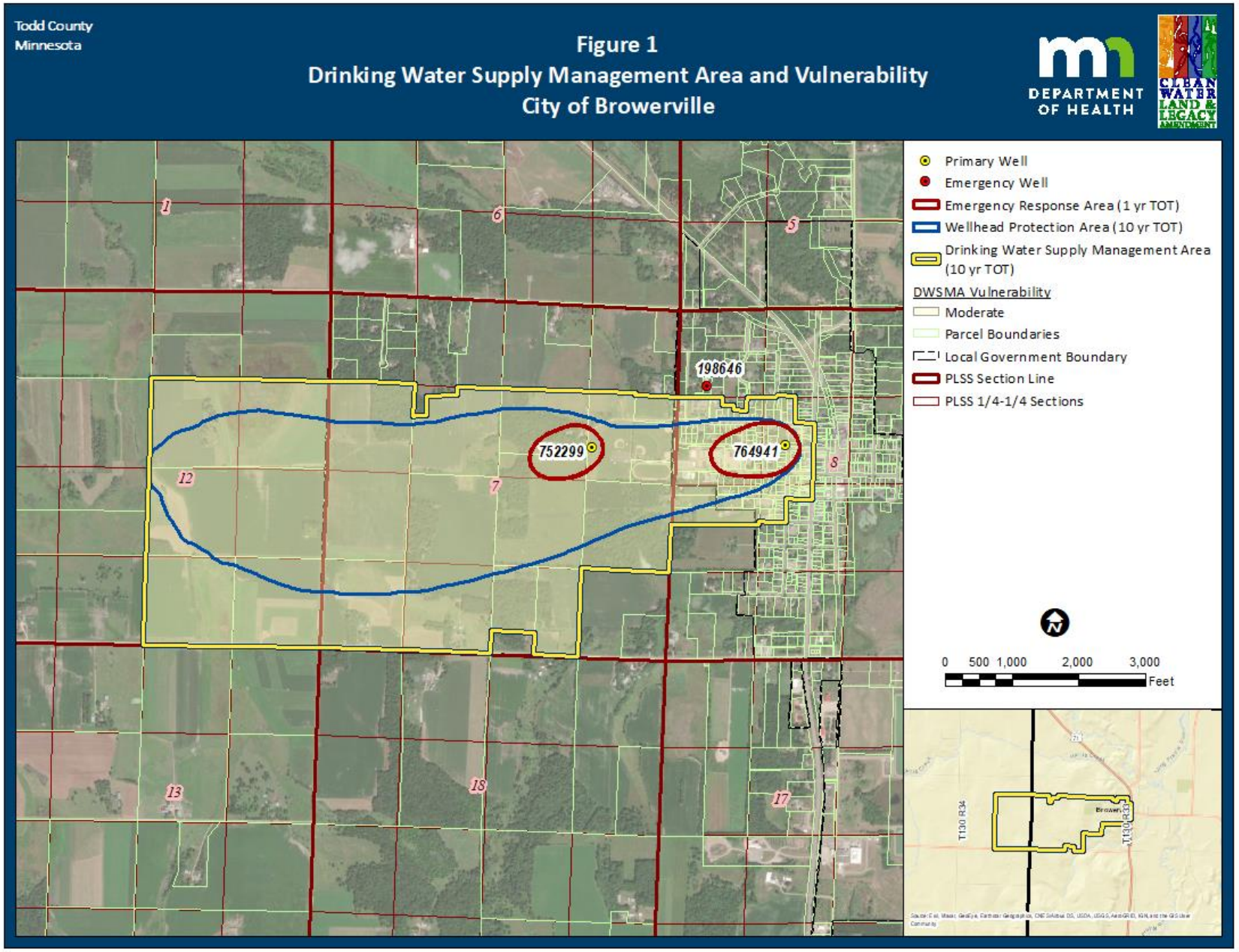


Figure 1: Drinking Water Supply Management Area and Vulnerability

CHAPTER ONE

DATA ELEMENTS/ASSESSMENT

Minnesota Rules 4720.5200

I. DATA ELEMENTS

A. PHYSICAL ENVIRONMENT DATA ELEMENTS

1. Precipitation

This data element does not apply because there is not a direct hydraulic connection between the land surface and surface waters and the aquifer serving this water supply system.

2. Geology

This data element is required and is presented in detail in the first part of the WHP Plan and thus is only summarized here. The water supply for the city of Browerville is obtained from two primary wells. The geologic condition includes a cover of clay-rich geologic materials over the top of the buried sand and gravel layers that the city wells are screened into. This is referred to as a Quaternary Buried Artesian Aquifer (QBAA). The aquifer appears to be continuous through much of the city and the DWSMA (Peterson, 2010). Well #7 (752299) is cased through 48 feet of alternating layers of sandy clay and clay-rich till; the casing also extends through the top 13 feet of the buried sand and gravel aquifer. The screen is set between 61 to 86 feet. The aquifer thickness is 40 feet at the location of Well #7. The geology at the location of Well #8 (764941) is similar, where the thickness of the clay-rich till is 49 feet, and the buried sand is at least 31 feet thick. Well #8 has 60 feet of casing and a 20-foot screen. Near the city wells, the general direction of groundwater flow is from west to east.

Water from the aquifer is relatively young based on tritium analysis. Part 1 reviewed and considered other existing records of wells and geophysical boreholes. The WHP Team is unaware of any existing surface geophysical studies or new test holes/borings since the development of Part I. Additional information is included in Part 1 and included in this Plan as **Appendix I.**

3. Soils

This data element does not apply because there is not a direct hydraulic connection between the land surface and the aquifer due to the thick layers of clay/till between the land surface and the aquifer. below the land surface.

4. Water Resources

This data element, as defined by the state wellhead rule, does not apply because there is not a known direct hydraulic connection between the land surface and the aquifer serving this water supply system. The City of Browerville, MN DWSMA lies in two Watershed areas:

- Long Prairie (Mississippi River – Headwaters) (07010108) HUC 8 Sub-Basin, Spruce Creek-Long Prairie River (0701010802) HUC10 Watershed and Drayer Creek-Long Prairie River (070101080207) HUC12 Watershed (Watershed area with Wells SE and SW DWSMA)

- Long Prairie (Mississippi River – Headwaters) (07010108) HUC 8 Sub-Basin, Eagle Creek (0701010803) HUC10 Watershed and the Harris Creek (070101080302) HUC12 Watershed (Watershed area with Wells SE and SW DWSMA)

The City's wellfields are located on the west side of town between Harris and Dryer Creeks which both flow in a general easterly direction (Figure 2).

According to maps available on FEMA Flood Map Service Center website, https://msc.fema.gov/portal/home, the City of Browerville wells are not located in a 100-year flood zone (Figure 3). City staff do not feel flooding would create an issue for the water quality. As such, no floodplain management issues need to be evaluated at this time.

B. Land Use Data Elements

1. Land Use

These data elements include information about parcel boundaries, political boundaries, potential contaminant sources, land use maps and zoning maps. A map showing the political boundaries and land survey map is included as Figure 1. A majority of the DWSMA boundary extends west beyond city limits into Hartford and Iona Townships. The city does have zoning authority, however outside city limits this is not the case. The Townships do not have zoning authority, however Todd County does. The city does have a 2011 comprehensive land use map located at city hall. The current DWSMA zoning map can be found in Figure 4.

The parcel boundaries map shows the parcels for the properties located within the DWSMA which is included in Figures 5a and 5b. Additional parcel information can also be found on the Todd County GIS website.

Land use within the DWSMA is a mixture of urban, grassland, forest, wetland, row crop agriculture, and pasture. A generalized land cover map is shown in Figure 6 and broken down in Table 1.

2. Inner Wellhead Management Zone (IWMZ)

The IWMZ is a fixed two-hundred-foot radius around each of the city wells. The public water supplier is responsible for managing all potential contaminant sources identified within that area. The IWMZ was inventoried for potential contaminant sources for this planning process and no significant issues or potential contaminants were identified.

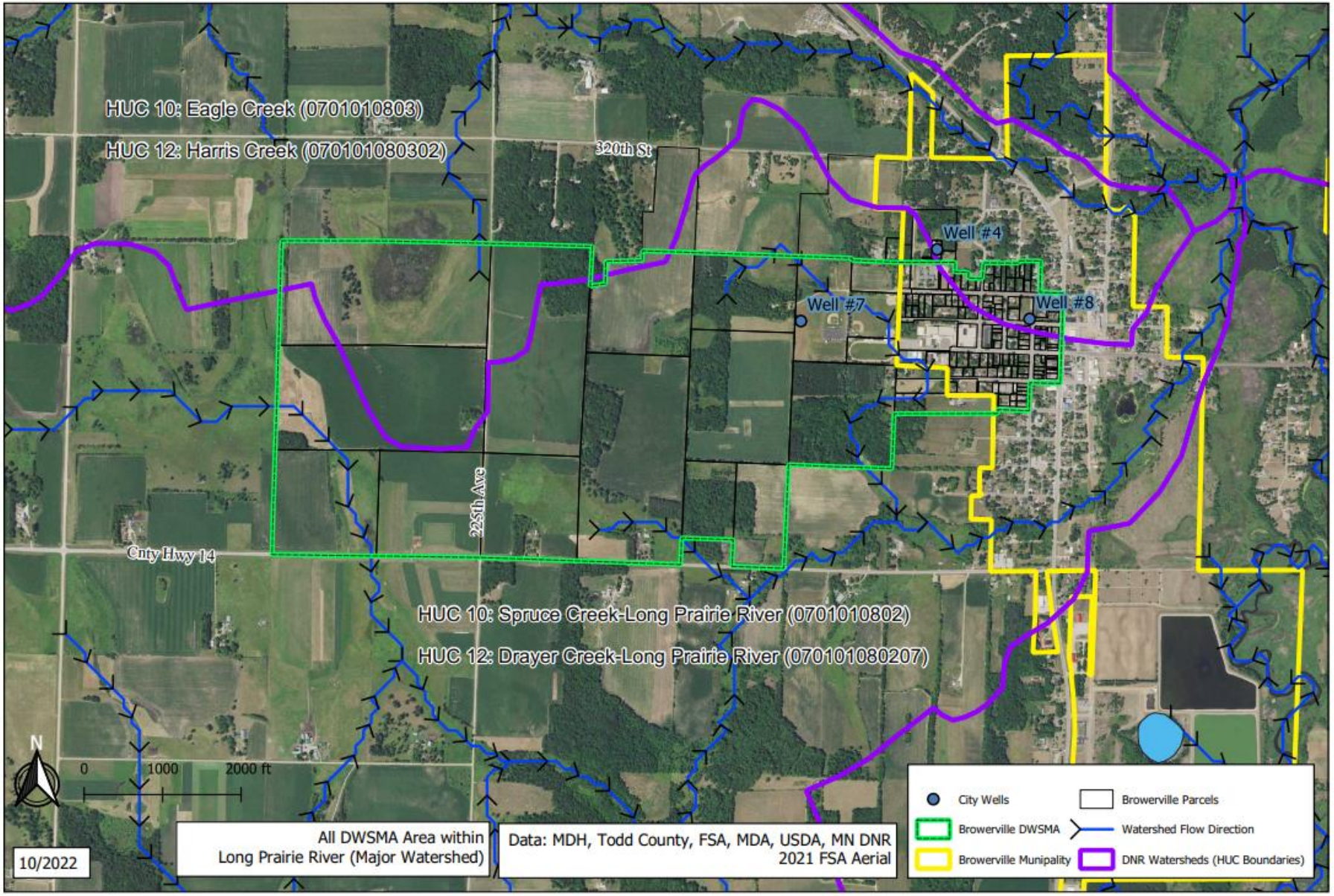


Figure 2. Watersheds and General Water Flow Map

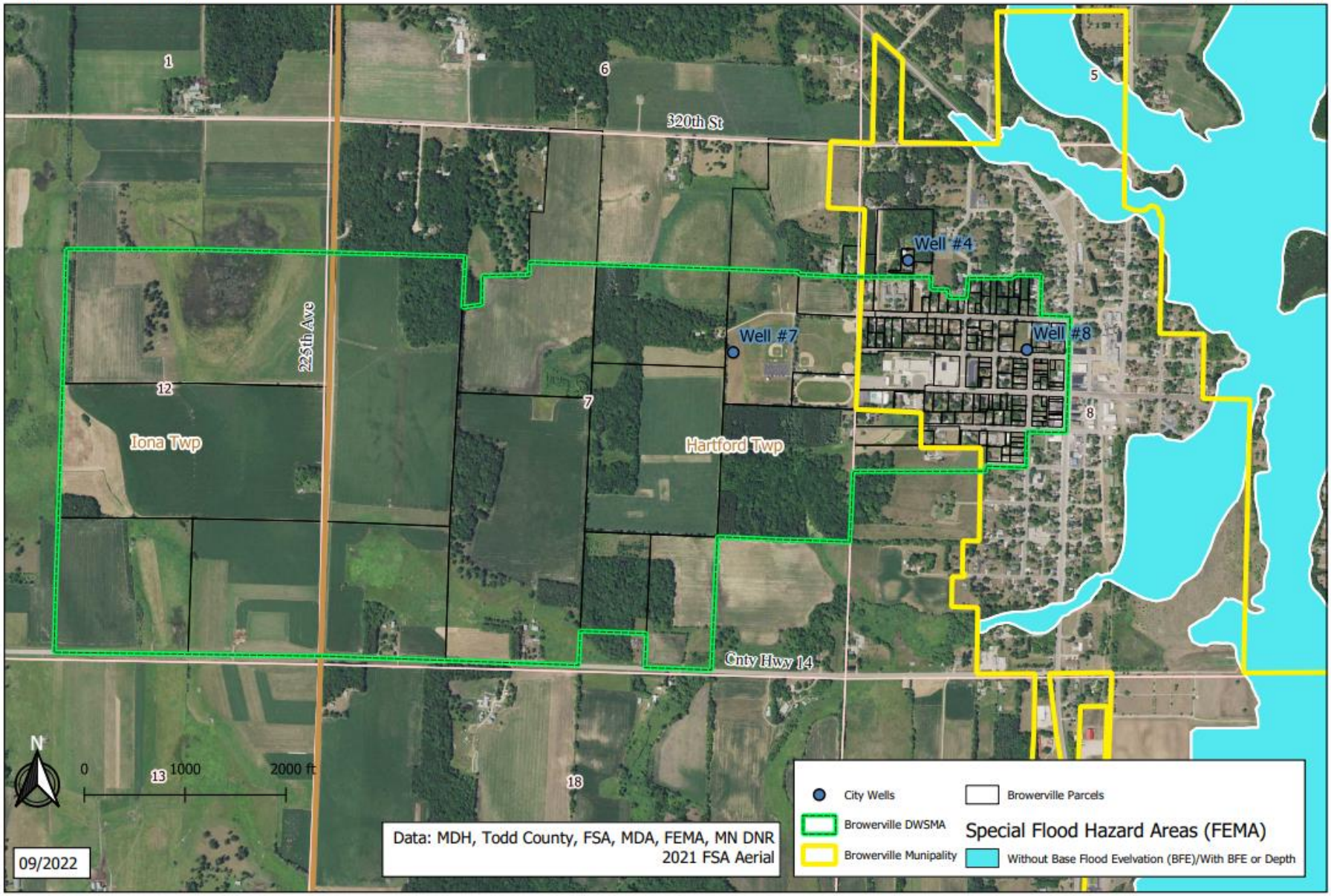


Figure 3. FEMA Floodplain Map

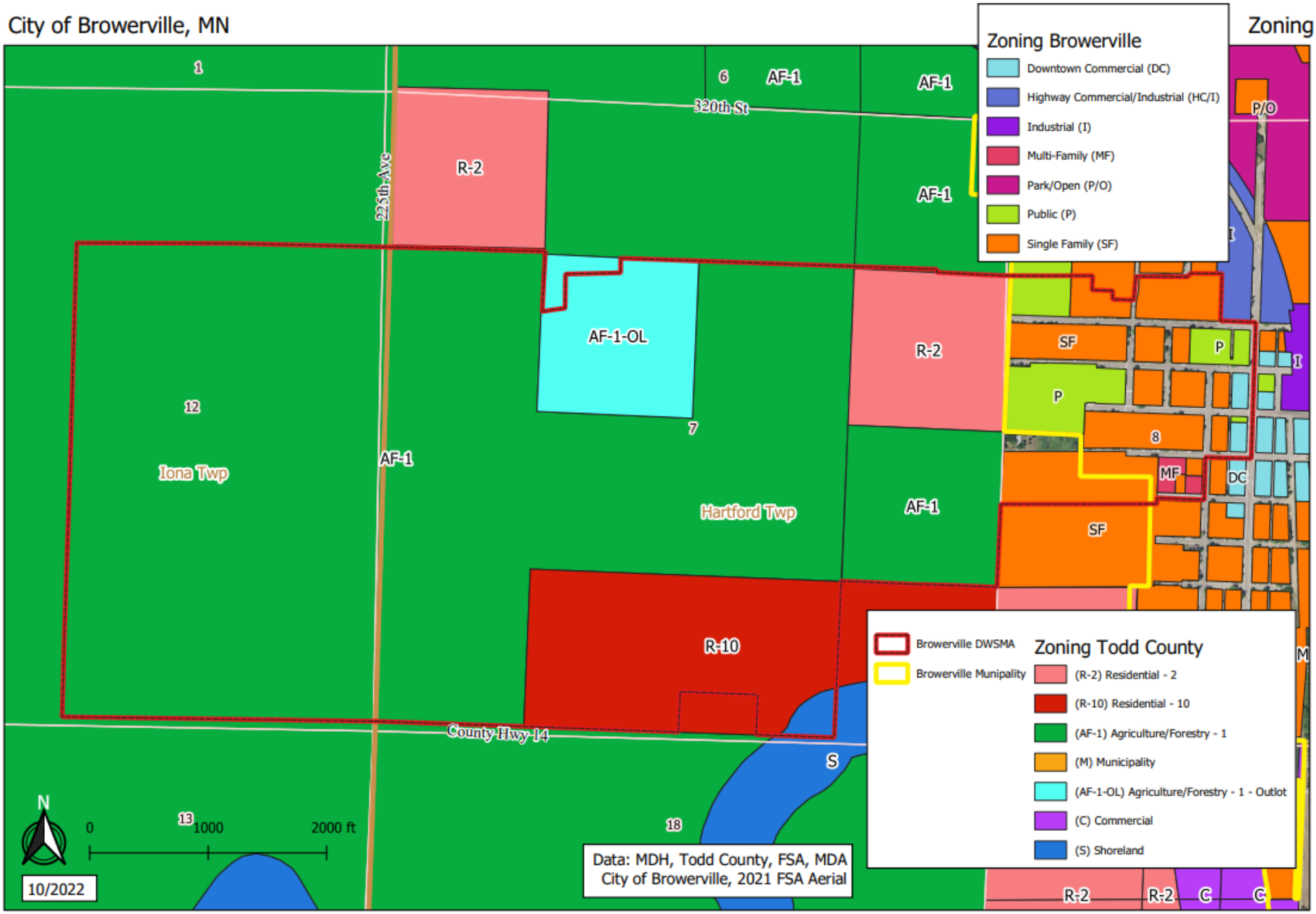


Figure 4. Zoning within the DWSMA Map

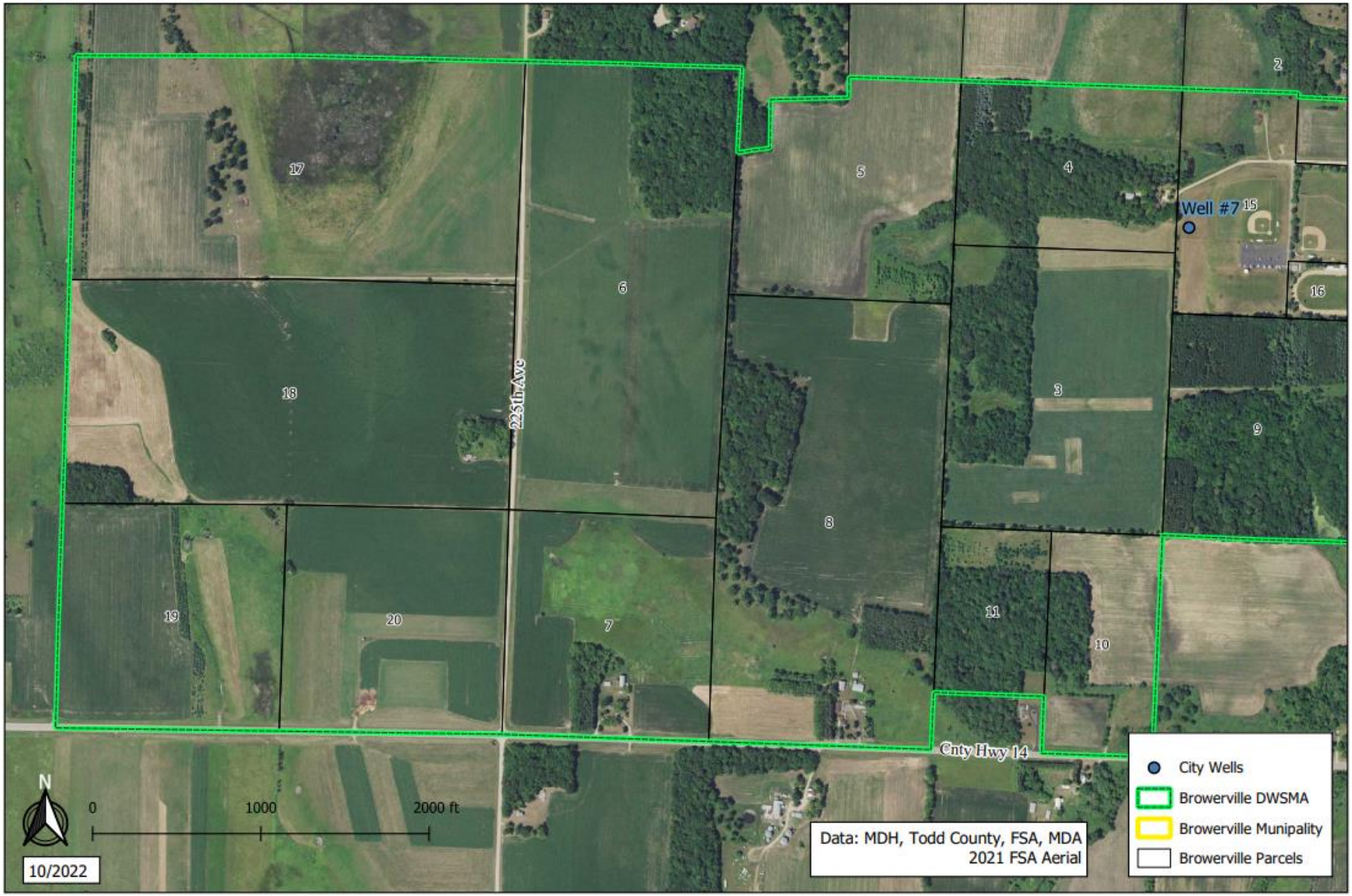


Figure 5a. DWSMA Parcels West. Additional parcel information can be found on the Todd County Website.

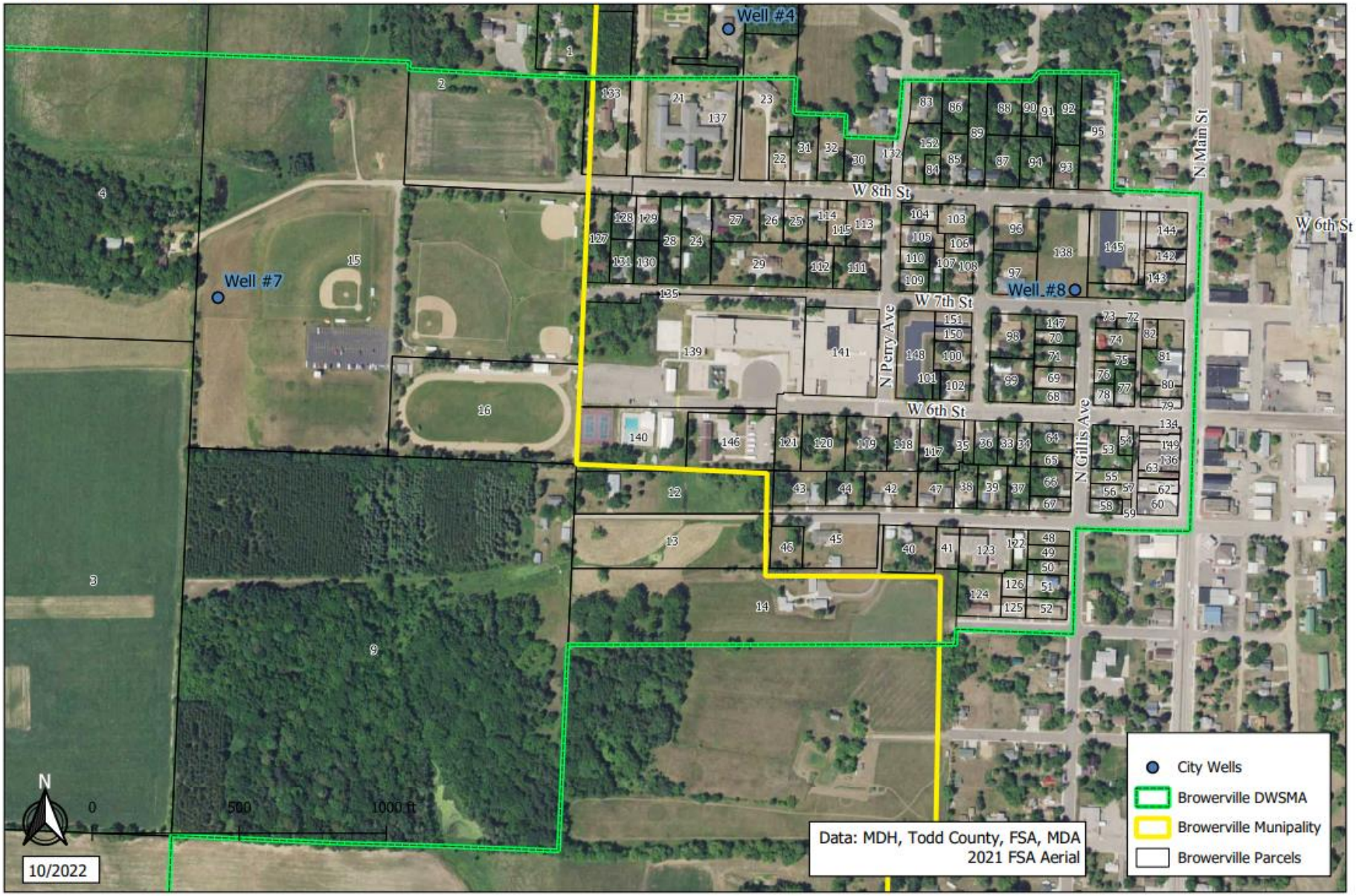


Figure 5b. DWSMA Parcels East. Additional parcel information can be found on the Todd County Website.

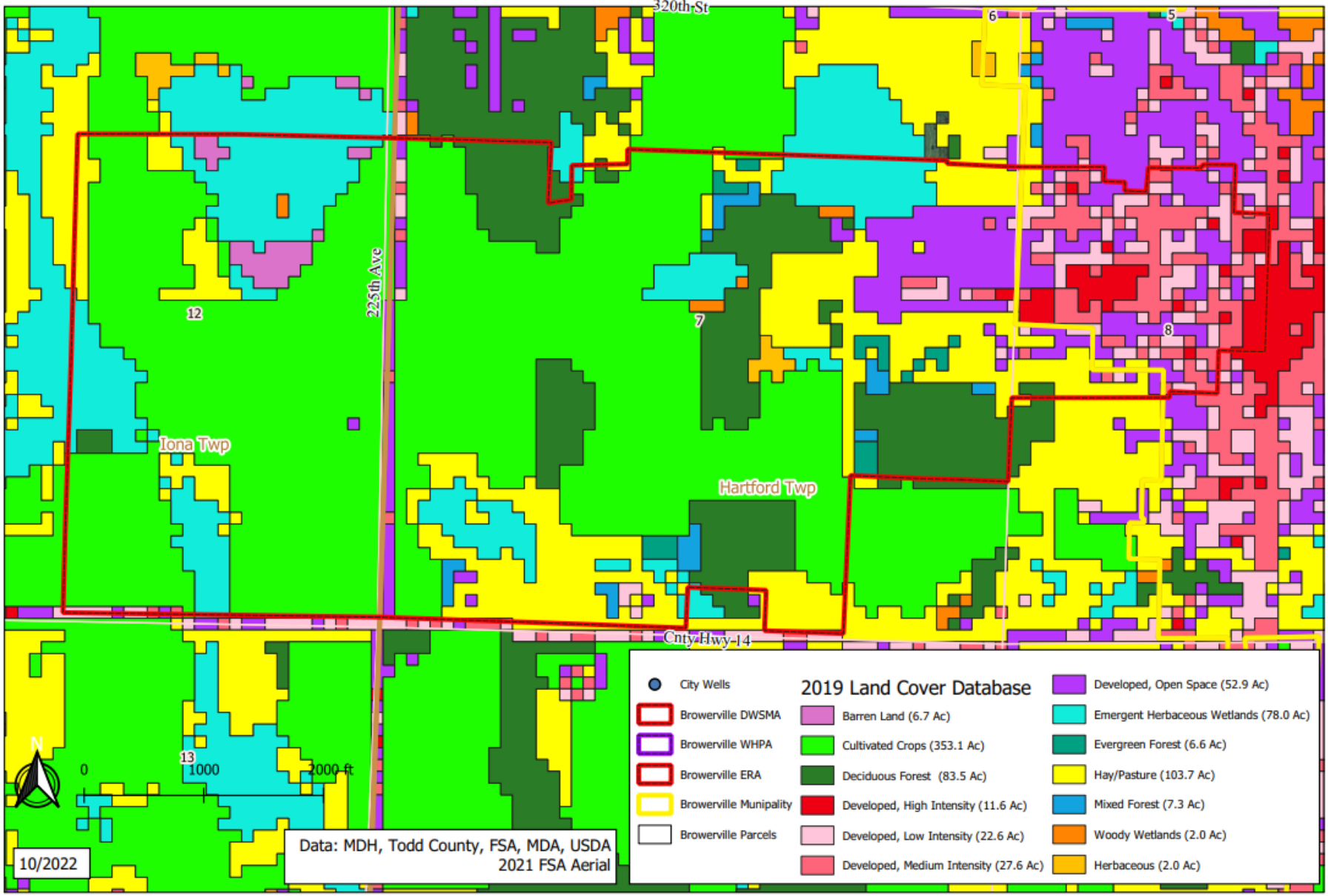


Figure 6. 2019 National Landcover Database Map

Table 1 – DWSMA 2019 National Landcover

2019 NLCD Land Classification	DWSMA Acres	% of Total
Cultivated Crops	353.1	46.6
Hay/Pasture	103.7	13.7
Deciduous Forest	83.5	11.0
Emergent Herbaceous Wetlands	78.0	10.3
Developed, Open Space	52.9	7.0
Developed, Medium Intensity	27.6	3.6
Developed, Low Intensity	22.6	3.0
Developed, High Intensity	11.6	1.5
Mixed Forest	7.3	1.0
Barren Land	6.7	0.9
Evergreen Forest	6.6	0.9
Woody Wetlands	2.0	0.3
Herbaceous	2.0	0.3
Total	**757.7**	**100**

Determined during the Part I WHP planning process, Browerville's DWSMA is composed of all moderate vulnerability (Figure 7). This DWSMA designation requires an inventory of other wells, storage tanks, and other potential contaminant sources located within the DWSMA as identified in the Scoping 2 Decision Notice. A listing of potential contaminants inventoried within the DWSMA is found in Appendix III and a map showing their locations is included in Figure 8.

A copy of the IWMZ forms and measures that have been identified are included in Appendix IV of this plan. Any broken or cracked sewer lines need to be replaced. Several recommended measures were outlined in the document. The city will implement these recommended measures as feasible. The WHP team discussed the importance of on-going monitoring for land use changes and potential contaminants near the public water supply wells and awareness of State Well Code isolation distances and need to maintain these setback requirements.

The information in Table 2 and was reviewed and considered by the WHP team during the development of this plan. The team identified land use issues and related potential contaminants which may have the most immediate impact upon the public water supply wells.

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

Source Type	Well 7	Risk	Well 8	Risk
AA3 – Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	X	L		
SB1 – Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences			X	L
SB2 – Sewer, buried collector, municipal, serving a facility handling infectious or pathological waste, open jointed or unapproved materials.			X	L

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

Potential Source Type	Total Number	Number Within Emergency Response Area and Level of Risk		Number Within Remainder of the DWSMA and Level of Risk	
City Well(s)	2	2	L	0	NA
Browerville City Pool Well Transient/Non Community Well	1	0	NA	1	L
Domestic Wells	9	0	NA	9	M
Below Ground Storage Tank	1	0	NA	1	L
Test Holes	3	1	L	2	L

3. Public Utility Services

a. Records of well construction and maintenance are used to support the development of Chapter 7 of this plan, which details an emergency plan for this system. These records are kept by city staff at city hall.

b. US Highway 71 defines the easterly most border of the DWSMA (Figure 9) and is about a city block away from Well #8. Even though this is a major transportation route, if a spill was to occur, the drainage would be away from the city wells and the DWSMA. In assessing the distance from the wells and time of travel, the WHP Team was not concerned about travel on US HWY 71. CSAH 14 defines the southern DWSMA border. The traffic on the road is made up of similar traffic as Highway 71 just with significantly less traffic volume. The DWSMA also contains many city streets and a township road. The traffic on these roads is mostly local and of minimal concern.

c. The city regularly maintains its sanitary sewer and public water supply system. The city does have sanitary sewer and public water supply system maps in GIS format but are of size and format which doesn't allow for easy inclusion into the plan. The data can be viewed at city hall.

d. There are no gas or oil pipelines located or any public drainage systems within the DWSMA.

e. As necessary, the city hires a licensed well driller to perform standard maintenance on the city wells. The city has copies of applicable documents at city hall.

4. Water Quantity

At this time, there appears to be sufficient groundwater quantity, based upon the existing pumping capacity of well(s) completed in the aquifer used by the system. This data element applies as it relates to future groundwater uses that may influence the ability of the aquifer to yield water to the city. Increased water use may result in a reduction in aquifer yield or increase the likelihood that contaminants of human or natural origin may affect the quality of drinking water.

a. Surface Water Quantity – This data element does not apply because there is no known direct hydraulic connection between surface waters and the aquifer serving this water supply system.

b. Groundwater Quantity – Groundwater levels are adequate for water that the City of Browerville is permitted for under the groundwater appropriations program that is administered by the Minnesota Department of Natural Resources (DNR). Information and discussion regarding the volumes appropriated, the type of use, and aquifer source can be found in Part 1. There is currently one high capacity well within the DWSMA at the school for which no well interference complaints or water use conflicts are known to exist. The WHP Team is aware that there are three environmental bore holes in the DWSMA.

Any new proposed high-capacity wells will be evaluated by the city and MDH to determine the impact on the public water supply. If a new well is needed by the city, they will work with the MDH to determine placement. There are no known well interferences or water use conflicts within two miles of the DWSMA.

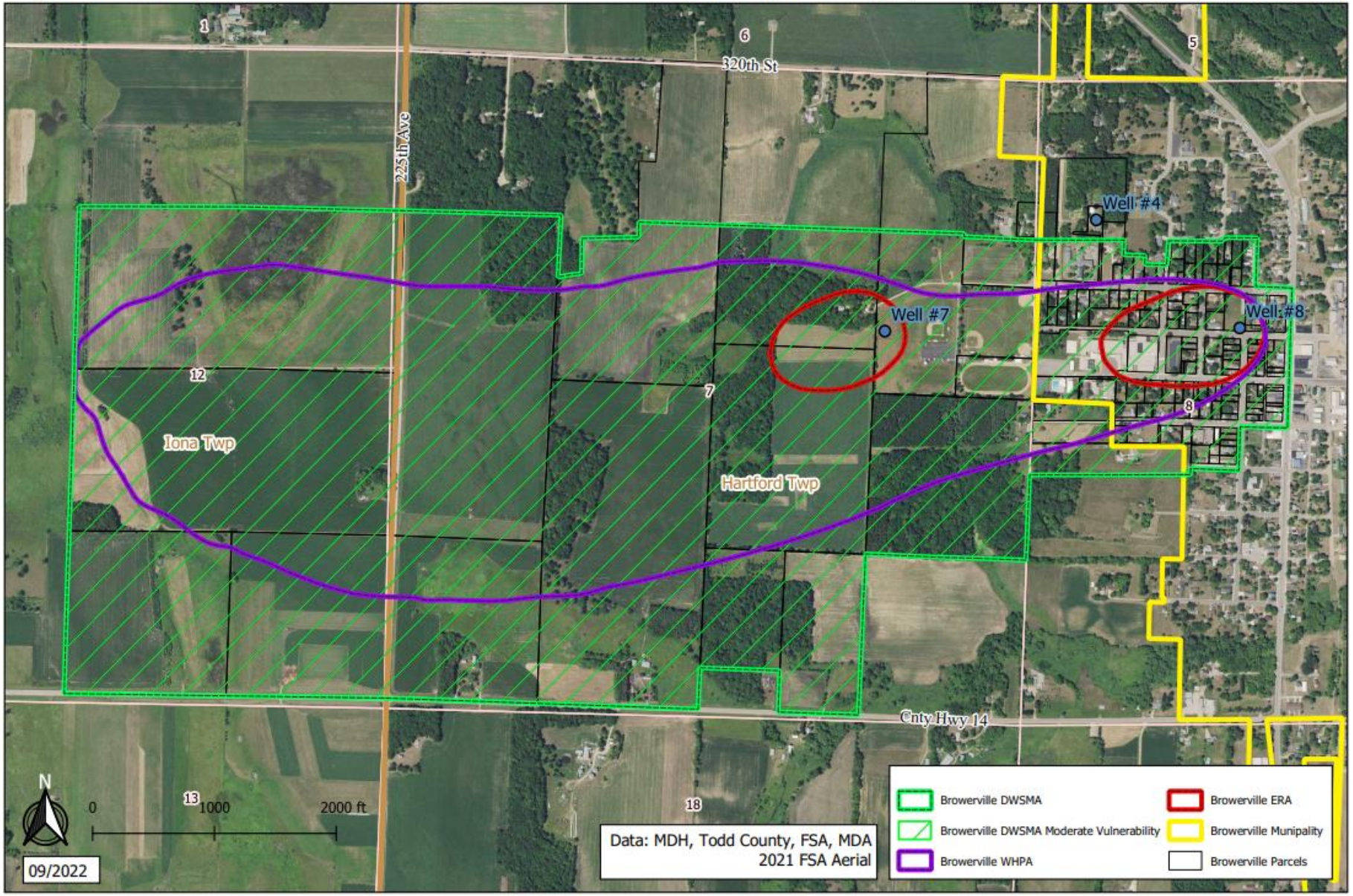


Figure 7. Drinking Supply Water Management Area – Moderate Vulnerability

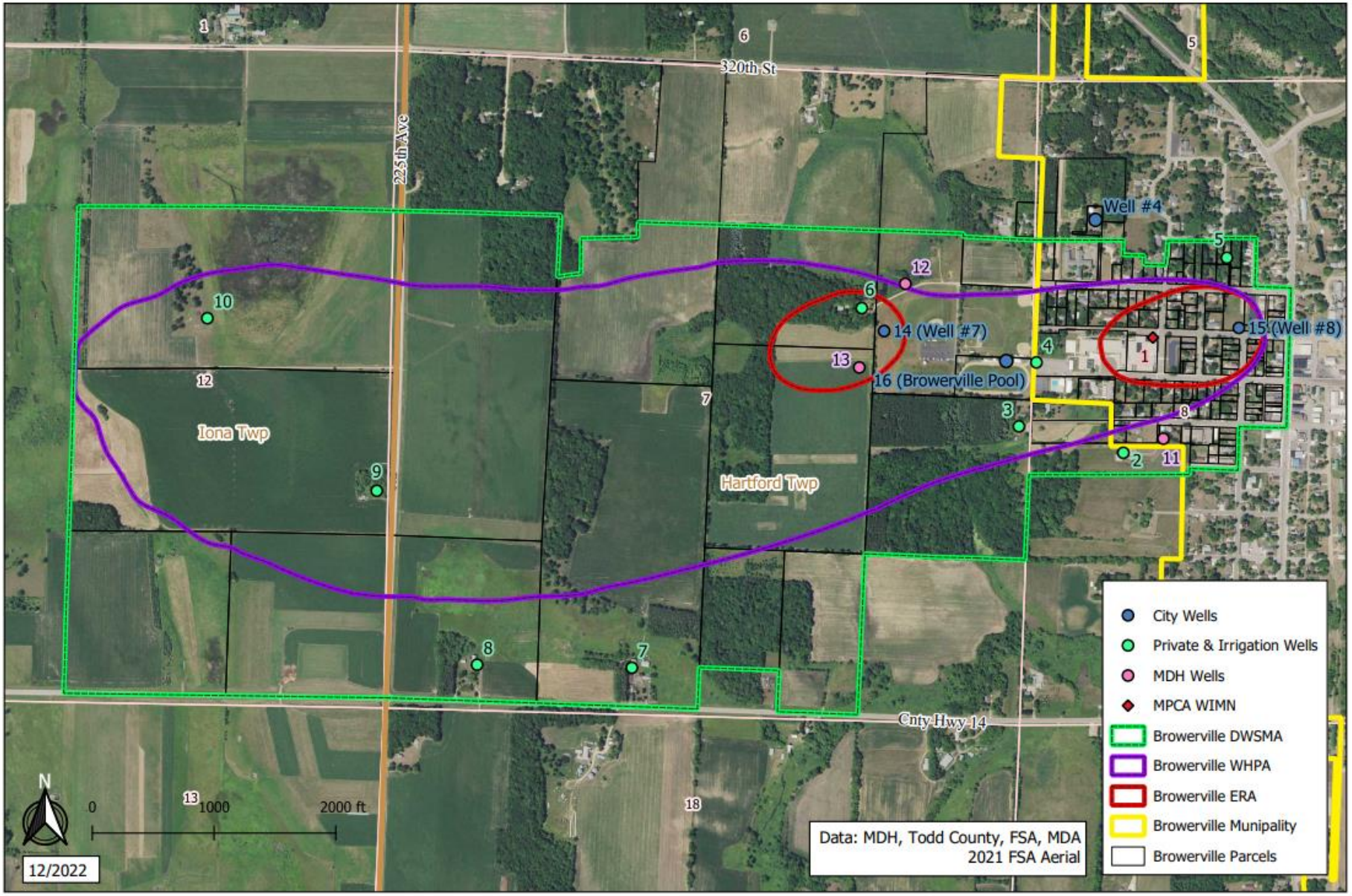


Figure 8. Potential Contaminant Source Inventory Map.

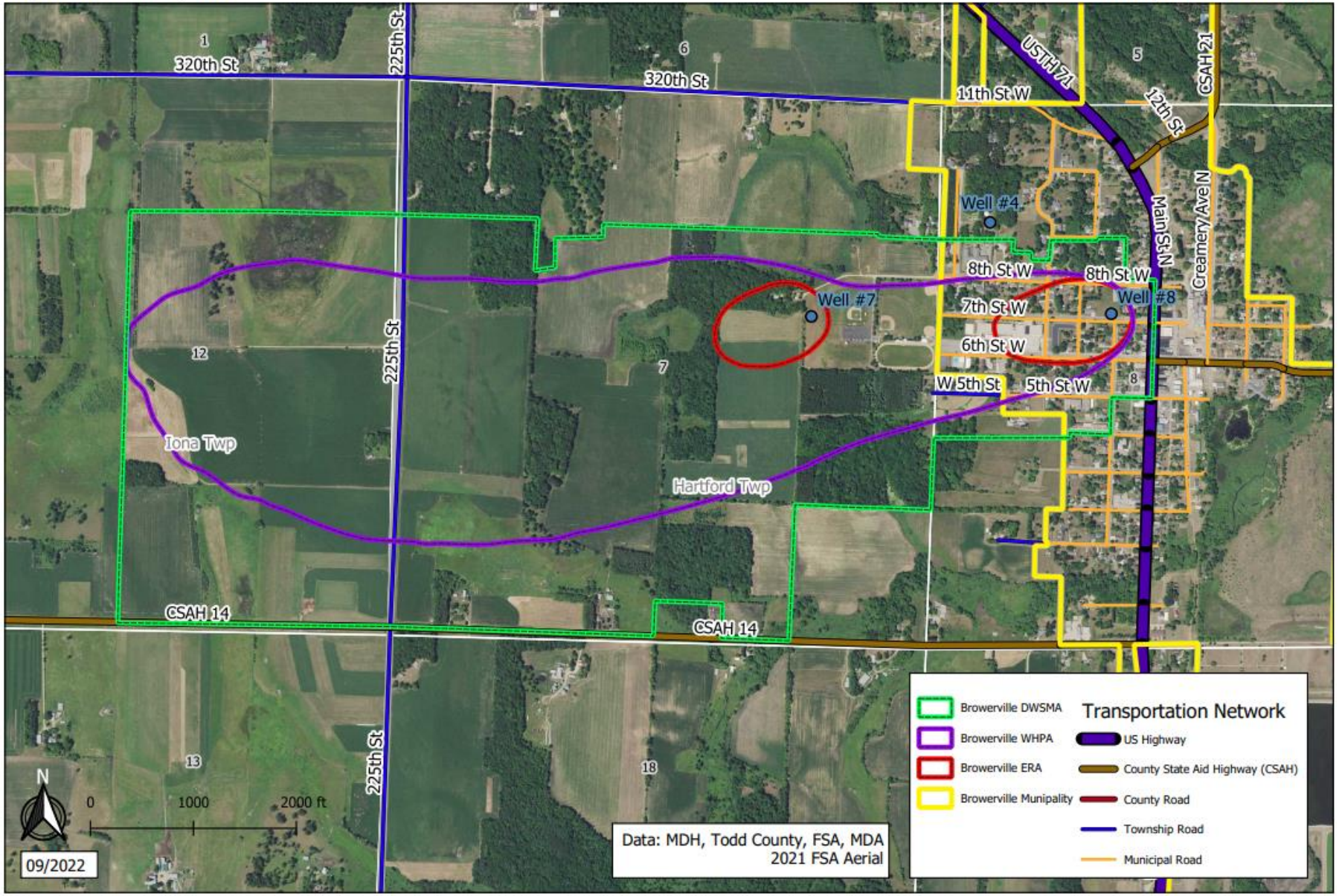


Figure 9. Transportation Corridors

5. Water Quality

A general overview of water quality data can be found in the city's Consumer Confidence Report (Appendix V) which is provided to residents yearly. 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. Nitrate levels are low in the city wells.

a. Surface Water Quality – This data element does not apply because there is no known direct hydraulic connection between surface waters and the aquifer serving this water supply system.

b. Groundwater Quality – Groundwater quality is outlined in Part 1 that can be found in Appendix I. These data elements include information about the overall water quality of the aquifer the City of Browerville is using as well as other groundwater quality information generated from groundwater contamination studies.

Tritium is a radioactive isotope of hydrogen that was released into the atmosphere during testing of hydrogen bombs. When Tritium is found in groundwater in amounts greater than one tritium unit, it is an indicator that recharge due to rainfall has occurred in the United States. Results of the Tritium testing for the city wells were greater than one tritium unit, showing water in the aquifer is "young" in these wells. It has leached from the surface since 1953.

II. ASSESSMENT OF DATA ELEMENTS

A. Use of the Wells

The city currently uses Well #7 (752299) and Well #8 (764941) as the primary public water supply wells. Well #4 is currently being used as the emergency backup well. The city plans to keep this arrangement into the future except for Well #4. The plan is to seal well #4 when grant funding becomes available.

The City of Browerville utilizes two wells, varying in depth from 80 to 86-feet deep. A 5-year average of 56.951-MGY is pumped from their wells. Usage, as shown in Table 4, has varied between a low of 54.497 MGY in 2020 and a high of 59.484 MGY in 2018.

Table 4 – Annual Well Pumping Amounts

ANNUAL WELL PUMPING AMOUNTS (IN MILLIONS OF GALLONS)				
YEAR	**WELL 7**	**WELL 8**	**WELL 4**	**TOTAL**
2017	29.088	27.310	0	56.398
2018	31.997	27.487	0	59.484
2019*	34.408	39.68	0	74.088
2020	29.502	24.995	0	54.497
2021	30.24	27.186	0	57.426

The city pumps an average of 156,000 gallons per day and has one elevated storage tank that holds a total of 300,000 gallons. The city water system provides drinking water to 300 metered service connections through appurtenant distribution mains, lines, and services. Water use is expected to slightly increase due to expected growth. A State licensed operator currently manages the water system.

*The water volumes for 2019 were excluded from the assessment because they are unrepresentative of normal annual water use. In 2019, extra flushing was needed during repair projects and to keep the pressure in the system while the water tower was being painted.

B. Wellhead Protection Area Delineation Criteria

See the Part 1 WHP Plan for a detailed discussion regarding how the delineation criteria were applied to determine the boundaries of the WHPA. The Part 1 WHP Plan is included as Appendix 1.

The Part I WHP Plan also discusses in detail an assessment of the data elements used for delineation purposes. The MDH Hydrologist also proposes a couple recommendations to improve the data set for future delineation efforts. These recommendations are included as management strategies in Chapter 5 of this plan.

C. Quality and Quantity of Water Supplying the Public Water Supply Wells

At present, none of the contaminants for which the Safe Drinking Water Act has established health-based standards are found above maximum allowable levels in the city's water supply, nor are any present at one-half of those levels. The city of Browerville is currently enjoying water quality that meets the standards set forth in the Federal Safe Drinking Water Act.

There are eleven high-capacity wells identified within 1.5 miles of the DWSMA during the Part I WHP planning process. At the present time it is expected that the aquifer will continue to yield sufficient water quantities for the City of Browerville over the life of this plan.

D. The Land and Groundwater Uses in the DWSMA

The Proactive management of existing wells, sealing of unsealed or unused wells, and storage tanks are of concern in the moderately vulnerable aquifer. The management strategies selected and documented in Chapter 5 of this Plan will focus on activities that have the most potential to impact the aquifer the city is using for its drinking water supply.

The city will work with the Todd County Planning and Zoning Division, Todd County SWCD, and MRWA in providing both education and incentives for proper well management, well sealing, and storage tank management. Other topics may include residential and agricultural land use practices, stormwater, and SSTS management.

The intent of this WHPP is to heighten awareness regarding the impact of land use activities on groundwater quality. Through awareness, it is hoped that citizens will voluntarily take the necessary steps, which will maintain the quality of groundwater and drinking water produced by the city.

CHAPTER TWO

IMPACT OF CHANGES ON PUBLIC WATER SUPPLY WELL

Minnesota Rules 4720.5220

I. CHANGES IDENTIFIED IN:

A. PHYSICAL ENVIRONMENT

The City of Browerville does not anticipate any large-scale changes in the physical environment within the DWSMA during the 10-year period that the WHP Plan is in effect.

B. LAND USE

Land uses that result in additional water wells in the DWSMA are unlikely, although if one would be drilled, they would have little impact on the aquifer unless water demand is increased to the point that 1) additional loss in hydraulic head occurs within the aquifer used by the city, or 2) pumping changes the boundaries of the WHPA. Constructing additional wells into the aquifer may increase the points of entry, alter the WHPA, or draw naturally occurring or human-caused contaminants towards the city wells. The city foresees only a few single-family residential homes and maybe a commercial business or two to be constructed within the DWSMA.

Land use inside the Inner Wellhead Management Zone: The land within the 200-foot radius consists primarily of cultivated cropland and lightly developed urban lands. Large scale land use changes are not expected to occur during the next 10 years within the IWMZs. Changes in land uses should be closely monitored due to the susceptibility of the aquifer to contamination from some types of activities at the land surface.

C. SURFACE WATER

There appears to be either no direct, or a limited, hydraulic connection between surface water and the aquifer used by the public water supply system as a drinking water source. Therefore, any changes to the conditions of surface waters will have little or no impact on the quality or quantity of the public water supply.

D. GROUNDWATER

The city wells have historically provided groundwater of acceptable quality and quantity. As of the date of Plan approval, the City does not anticipate a large increase in water use or is not aware of any such water use expansions in the DWSMA or immediate adjacent area.

II. IMPACT OF CHANGES

A. EXPECTED CHANGES IN WATER USE

The city anticipates very little to no growth over the next 10 years, but there is a possibility of a few new homes or small commercial businesses within the DWSMA, but significant impacts on the aquifer are not expected. Neither surface water nor groundwater changes are expected to impact the aquifer.

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

Several local and state programs exist that may provide assistance and benefits in managing potential contaminant sources identified in the DWSMA. The following is a brief description of the major programs that have drinking water protection interactions.

The MDH regulates well construction through the Minnesota well code. Code requirements include minimum isolation distances as well as construction criteria designed to protect the well and aquifer. The MDH has a Source Water Protection grant program to assist in covering costs associated in the protection of source water. The Minnesota Pollution Control Agency (MPCA) has a tank storage program and has developed Best Management Practices (BMPs) for tank owners to help ensure proper and safe tank operation and maintenance. The Todd County Soil and Water Conservation District administers cost share dollars for well sealing. The Todd County Comprehensive Water Management Plan has identified the protection of the quality and management of the quantity of groundwater resources. Counties are moving away from County Water Management Plans and moving towards a process called the One Watershed One Plan. The WHP Team will coordinate with the County when the One Watershed One Plan process moves forward in this watershed.

There may be existing land use ordinances by local governments that could be revised in the future to address new private wells and storage tanks within the DWSMA. However, there is no discussion or intention at this time of requiring additional regulation related to managing wells or storage tanks within the system's DWSMA. The city requires homes and businesses to be connected to city sewer and water where the services are provided. The County enforces a zoning ordinance that provides oversight and control to make sure orderly and environmentally appropriate growth occurs around the city limits.

C. ADMINISTRATIVE, TECHNICAL, AND FINANCIAL CONSIDERATIONS

The City of Browerville assembled a Wellhead Protection Team early in the process of developing this Plan. Many of the activities during the planning process have been accomplished through the efforts of this group, with assistance from studies provided by other units of government. For the WHP Plan to be effective:

1. The City will need to raise public awareness of the issues affecting the quality or quantity of its drinking water supply through public educational programs.

2. Administrative duties will remain with the Wellhead Protection Managers who will report to the governing authority, coordinate implementation of wellhead protection management implementation measures, and conduct regular meetings.

3. The City has limited funds available for new programs and the implementation of wellhead protection activities. The city plans to utilize other sources of funding or in-kind services to help achieve the goals set forth in this Plan's Chapter 4 and include:

    a. The Todd County SWCD and their well sealing cost-share program.
    b. The MDH grant program.
    c. The MRWA providing technical assistance during the wellhead protection implementation phase.

CHAPTER THREE

ISSUES, PROBLEMS, AND OPPORTUNITES

Minnesota Rules 4720.5230

I. LAND USE ISSUES, PROBLEMS, AND OPPORTUNITIES

The City of Browerville has identified water and land use issues, problems and opportunities related to A) the aquifer used by the city water supply wells, B) the quality of the well water, or C) land or water use within the DWSMA.

A. THE AQUIFER

The aquifer providing the City's public water supply has been determined to be influenced by land use based on the geologic setting and the existence of Tritium in city wells. The city will work with the MDH to conduct their standard assessment monitoring package of water tests.

B. THE WELL WATER

The City of Browerville has adequate water for the projected use in the next ten years. The City will explore the feasibility of adding a new well and request assistance from MDH to locate a new well site if feasible. Adding any high capacity well by the city may affect the WHPA and DWSMA and may require a new delineation. They will work with the MDH and DNR to assist with the location and construction of any proposed new high-capacity wells. Education is one of the main strategies in protection of drinking water supplies.

C. THE DRINKING WATER SUPPLY MANAGEMENT AREA

The land use within the DWSMA hasn't really changed over the recent years.

The city assessed 1) input from public meetings and written comments that it received, 2) the data elements identified by MDH during the scoping meetings, and 3) and the status and adequacy of the city's official controls and plans on land use and water uses, as well as those of local, state, and federal government programs.

The results of this effort are presented in Table 5 which defines the nature and magnitude of contaminant source management issues in the city's DWSMA. Identifying the issues, problems and opportunities as well as 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.

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, as well as to

comment. A public information meeting was held to review the results of the delineation of the WHP area, DWSMA, and the vulnerability assessments; meetings of the WHP 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.

II. IDENTIFICATION OF:

A. PROBLEMS AND OPPORTUNITIES DISCLOSED AT PUBLIC MEETINGS AND IN WRITTEN COMMENT

While no comments from the public were presented at any of the public meetings held in conjunction with this plan, the following Table 5 depicts issues, problems and opportunities identified by the wellhead team.

B. DATA ELEMENTS

The State's Wellhead Protection Rule requires that existing information be utilized in developing the initial Wellhead Protection Plan. Much of the data collected and utilized to delineate the City of Browerville's WHPA and DWSMA and to determine vulnerability of the aquifer to possible contamination comes from regional sources on a large scale. While much regional information and data is being used as supplied by MDH, the city has initiated verification of many of the contaminant sites to further protect public drinking water supplies.

The City will continue to compile data collected by all entities regarding groundwater. This plan will be updated on ten-year intervals as required by the State of Minnesota. Updated data will be utilized at that time.

C. STATUS AND ADEQUACY OF OFFICIAL CONTROLS, PLANS, AND OTHER LOCAL, STATE, AND FEDERAL PROGRAMS ON WATER USE AND LAND USE

The WHP committee feels adequate protection of the DWSMA is available through existing land use ordinances and permitting within the City of Browerville, Todd County, and the MN DNR groundwater appropriation permit process.

Existing education programs promoting Best Management Practices (BMPs) and working with local landowners on issues is the approach proposed by the City.

The MDH and Minnesota Rural Water Association (MRWA) will continue to provide technical assistance towards the successful implementation of this Plan. Other State agencies including the DNR, MDA, MPCA, and BWSR are available to help as needed.

Table 5 - Issues, Problems, and Opportunities

Issue Identified	Impacted Feature	Problem Associated with the Identified Issue	Opportunity Associated with the Identified Issue	Adequacy of Existing Controls to Address the Issue
Mismanaged wells and storage tank(s) may contaminate the drinking water.	Aquifer, Well Water Quality	If these potential contaminant sources are mismanaged, they may pollute the city's aquifer.	The city can educate the owners of these potential contaminate sources on how to manage them to prevent contamination of the drinking water. City can apply for grant funding to help install needed corrective actions.	MDH, Todd County, and MPCA have controls in place to help manage these potential contaminate sources. Funding is available through local and state agencies for corrective actions.
Limited well logs (geological information) are available in the Browerville area.	Aquifer, Well Water Quality, DWSMA	Groundwater in the DWSMA is not well understood and thus the delineation was completed on limited data.	The city working in cooperation with MDH will identify wells within 1 mile of the DWSMA boundary and particularly the high priority wells identified by the MDH Hydrologist. Can drill some monitoring wells in priority locations.	The MDH can provide valuable financial and technical assistance in locating wells and assisting in gathering geological information.
The City of Browerville has limited resources and funds to implement the wellhead protection plan.	Aquifer, Well Water Quality, DWSMA	With limited resources implementing the WHP plan will be a challenge for the City of Browerville.	Form partnerships with the Township, County and State agencies who have controls in the DWSMA so they can help with implementation.	Not applicable

Continued on Next Page

Table 5 - Issues, Problems, and Opportunities (continued)

Issue Identified	Impacted Feature	Problem Associated with the Identified Issue	Opportunity Associated with the Identified Issue	Adequacy of Existing Controls to Address the Issue
Majority of the DWSMA is outside the city limits.	Aquifer, Well Water Quality, DWSMA	Water is recharging the city's aquifer from lands outside the city limits. The city has no land use controls or authority over these areas.	The city will need to work cooperatively with the County and Townships to ensure smart land use decisions are made outside city limits.	City has no zoning or land use authority outside city limits.
Spill response equipment/expertise is not readily available.	Aquifer, Well Water Quality	The city and first responders are not prepared to adequately respond to a spill within their DWSMA. Potential spills within the road right-of- ways are a threat to the aquifer.	The city and first responders can work cooperatively with local and state government to develop and implement a spill response plan to handle issues which may arise within the DWMSA. The city can apply for MDH grant funds to purchase sorbent materials to have available for spill response.	The city has the local fire department for emergency management. MNDOT has spill response protocol.
The city may have old municipal wells which have not been properly sealed.	Aquifer, Well Water Quality	Wells which have not been sealed according to MDH standards may provide a pathway for pollutants to enter 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 can require the city to properly address unused improperly sealed wells. The city can utilize the MDH WHP and MDH Well Mgmt. grant programs to help offset the cost to seal the wells.

Continued on Next Page

Table 5 - Issues, Problems, and Opportunities (continued)

Issue Identified	Impacted Feature	Problem Associated with the Identified Issue	Opportunity Associated with the Identified Issue	Adequacy of Existing Controls to Address the Issue
New high-capacity wells drilled within the DWSMA or 1.0 mile of the DWSMA may alter the WHPA boundary and provide a pathway for pollutants to enter the aquifer.	Aquifer, DWSMA, Well water quantity and quality.	The City has no authority over construction or placement of new wells or pumping rates which may influence the capture area for the City's wells.	If a high capacity well is proposed within the DWSMA or 1.0 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.
Potential need for new well site.	Aquifer, Well water quality, DWSMA	The city may need assistance finding appropriate well sites.	The city can request assistance from MDH and/or consultant to find well site locations including test well drilling.	MDH has regulatory authority over wells.
Lack of adequate information - Monitoring	Aquifer, Well water quality, DWSMA	The city will work with the MDH to establish and implement a monitoring plan.	The city can partner with the MDH to complete and interpret monitoring.	The city can complete the collection of samples for testing. The MDH can complete the tests.

Continued on Next Page

Table 5 - Issues, Problems, and Opportunities (continued)

Issue Identified	Impacted Feature	Problem Associated with the Identified Issue	Opportunity Associated with the Identified Issue	Adequacy of Existing Controls to Address the Issue
There are test holes with unknown locations located on parcels within the DWSMA.	Aquifer, Well water quality, DWSMA	The city does not have regulatory jurisdiction over the properties containing the test holes.	The city can request assistance from MDH in trying to find the test holes.	MDH has regulatory authority over the test holes.
Chloride/Bromide ratios measured from Wells 7 and 8 are elevated.	Aquifer, Well water quality	The Chloride/Bromide ratios indicate possible influence of chloride to the drinking water supply aquifer.	Work cooperatively with MN DOT, County Highway Department, and City Street Department to implement BMPS for salting winter roads.	Each LGU manages road salt application on the roads within their jurisdictions.
Ordinances	Aquifer, Well water quality	There may be additional ordinances to better protect the drinking water resource.	The city can review existing ordinances and evaluate to determine needs. They can apply for funding if a need is determined.	The city has regulatory authority over land use ordinances within the city limits of Browerville.
Website	Well water quality Well water quantity	The city website does not currently have information for water conservation and wellhead protection education.	The city can apply for MDH SWP funding to create the water conservation, quality, frequently-asked- questions, and wellhead protection portion of the website.	The city currently manages their website.

Existing Controls and Programs of the City of Browerville

The city has identified the following legal controls and/or programs that it has in-place that can be used to support the management of potential contamination sources within the DWSMA.

Table 6 – Existing Controls and Programs of the City of Browerville

Type of Control	Program Description
Zoning and Conditional Use Permits	Sets standards and orderly growth for land uses within City limits and allows the City to apply permit conditions to land uses they deem necessary.
Water & Sewer Ordinance	Regulates the connection to the city water or sanitary sewer system.

Local Government Controls and Programs

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

Table 7 - Local Agency Controls and Programs

Government Unit	Name of Control/Program	Program Description
Todd County	Countywide Zoning Ordinance	County wide comprehensive land use planning and zoning that covers all un-incorporated areas in the county.
	Household Hazardous Waste Collection.	Provides education to landowners and a collection program for disposing of household hazardous waste.
Todd County Emergency Management Dept.	Transportation accidents causing contaminant spills	Directs the response and the extent of initial clean-up of fuel, chemical, or other hazardous substances that are released due to transportation accidents.
Todd County Soil and Water Conservation District	Water Planning	Establishes countywide goals and priorities towards protecting water resources.
	Well Sealing	The SWCD promotes the protection of water and soil resources in the county through educational programs, cost-sharing and collaboration with other local, state, and federal agencies.

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 for property owners to comply with these regulations.

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

Table 7 - State and Federal Agency Controls and Programs

Government Unit	Type of Program	Program Description
MN Dept. of Health	State Well Code (MR Chapter 4725)	MDH has authority over the construction of new wells and sealing of wells. MDH staff in the Well Management Program offers technical assistance for enforcing well construction, maintaining setback distances for certain contamination sources, and well sealing.
MN. Dept. of Health	Wellhead Protection	MDH can provide technical and financial assistance to the city for WHP activities and can help identify technical and financial support that other governmental agencies can provide to assist with managing potential contamination sources.
MN Dept. of Natural Resources	Water Appropriation Permitting (MR Chapter 6115)	DNR can require that anyone requesting an increase in existing permitted appropriations or to pump groundwater must address concerns of the impacts to drinking water if these concerns are included in a WHP plan.
MN Pollution Control Agency (MPCA)	Registered Storage Tank Program	MPCA administers the programs dealing with storage tank regulations.

MN Duty Officer	Emergency Response	Program provides a single answering point for local and state agencies to request state-level assistance for emergencies, serious accidents or incidents, or for reporting hazardous materials and petroleum spills.

Support Provided by Nonprofit Organizations

The Minnesota Rural Water Association will assist the City of Browerville with implementing its WHP plan by providing 1) reference education and outreach materials for landowners, 2) technical support for implementing individual WHP action items listed in the plan, and 3) assisting the city with assessing the results of plan implementation.

CHAPTER FOUR

WELLHEAD PROTECTION GOALS

Minnesota Rules 4720.5240

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:

Promote public health, economic development and community infrastructure by maintaining a potable public drinking water supply for the community.

CHAPTER FIVE

OBJECTIVES AND PLANS OF ACTION

Minnesota Rules 4720.5252

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, 2) the potential contaminant source inventory, 3) the impacts that changes in land and water use present and 4) issues, problems, and opportunities referenced to administrative, financial, and technical considerations.

OBJECTIVES

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

1. Create awareness and general knowledge about the importance of WHP in the City of Browerville.
2. Properly inventory and manage potential contaminant sources to protect the drinking water supply for the City of Browerville.
3. Gather additional information within the DWSMA in order to better understand the size and vulnerability of the DWSMA.
4. Effectively track and report the implementation efforts and wellhead protection plan progress to pertinent governing authorities.
5. Manage the Inner Wellhead Management Zone to prevent contamination of the aquifer near the public supply wells.
6. Effectively prepare the City of Browerville for disruptions to the water distribution system and plan for future water sources.

WHP MEASURES AND ACTION PLAN

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:

- Public Education and Outreach
- Potential Contamination Source Management

- Land Use Management
- Data Collection
- Inner Wellhead Management Zone
- Reporting and Evaluation
- Water Use and Contingency Strategy

Establishing Priorities

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 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 time, legal, financial, and technical resources.

The City of Browerville defines a priority for implementing a WHP measure as an action that protects their drinking water supply from contamination from the potential contaminant source or any other possible threat to the quality or quantity of its drinking water supply. The following Table 8 lists each measure that will be implemented over the 10-year period that the city's WHP plan is in effect, including the priority assigned to each measure.

Table 8 - WHP Plan of Action

Public Education and Outreach

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
A.) Public Education and Outreach														
WHP Measure (#1): Provide DWSMA residents with a mailing that explains the importance of WHP.	1	High	City, MRWA	$100	X					X				
WHP Measure (#2): Post/update WHP educational materials on the city website, Facebook. Many educational/outreach materials are located on the MRWA website dealing with proper well management, water conservation, storage tank management etc.	1	High	City, MRWA	Staff Time	X	X	X	X	X	X	X	X	X	X
WHP Measure (#3): Support Envirofest: School presentations to local 6th grade classes, stressing water conservation and wellhead protection.	1	High	City	$200	X	X	X	X	X	X	X	X	X	X

Potential Contaminant Source Management

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
B.) Potential Contaminant Source Management														
WHP Measure (#4): Provide well owners in the DWMSA materials on proper well management and the importance of sealing unused wells.	2	Medium	City, MRWA	$250	X						X			
WHP Measure (#5) Provide well owners in the DWMSA materials on informing them of the Wellhead Protection Plan and Goals.	2	Medium	City, MRWA	$100		X						X		
WHP Measure (#6): Seal any unused unsealed wells in the DWSMA, apply for a grant to pay the costs associated with sealing them.	2	High	City, MDH, MRWA, SWCD	Based on bids received	As Needed									
WHP Measure (#7): Contact the school to determine if the tank is being monitored for leaks. Provide storage tank BMP information to owner. Offer to apply for grant to add technology, perform inspections or if any corrective actions are needed.	2	High	City, MRWA	$100	X									

Potential Contaminant Source Management (continued)

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
B.) Potential Contaminant Source Management														
WHP Measure (#8): Establish a time frame and budget to properly seal City Well #4. Obtain a cost estimate from a local well driller. Apply for MDH SWP Grant funds to have the well properly sealed.	2	High	City, MRWA	$20,000		X								
WHP Measure (#9): Re-post signs at the perimeter of the new WHPA on major roadway corridors to notify the public that they are in the DWSMA and to serve as a physical boundary identifier.	2	Low	City	Staff Time		X								
WHP Measure (#10): Work with Fire Department to determine if spill response equipment is needed. Apply for a grant if necessary to purchase equipment. Purchase the items if grant money is received.	2	Medium	City, MRWA	$10,000		X			X			X		

Potential Contaminant Source Management (continued)

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
B.) Potential Contaminant Source Management														
WHP Measure (#11): Explore the option of providing training to local First Responders to enable them to be better prepared to respond to spills and/or emergencies which could directly affect the City's drinking water supply. If deemed necessary, apply for grant funds to cover costs of training.	2	Medium	City, MRWA	$1,000		X			X			X		
WHP Measure (#12): Provide a letter about and map of the DWSMA to MNDOT, Fire Department, City Street Department, Todd County Emergency Management, MPCA and County Highway Department. Request their awareness and prompt response to accidents, spills and clean-up efforts.	2	Medium	City	Staff Time	X									

Potential Contaminant Source Management (continued)

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
B.) Potential Contaminant Source Management														
WHP Measure (#13): Send a letter to the County High Department and MNDOT notifying them that the City Public's water supply has high chloride levels and ask them to investigate changes that can be made to improve groundwater quality and still maintain public safety. If additional corrective actions or monitoring is needed work cooperatively with MDH and other local partnerships to apply for funds for corrective actions.	2	Low	City	Staff Time			X							
WHP Measure (#14): WHP Team and Manager will update the PCSI map and table.	2	Medium	City, MRWA, Consultant	Staff Time				X				X		
WHP Measure (#15): Old test borings wells are thought to exist. The city will work with MDH and others to try and find the location of these wells.	2	Medium	City, MDH, MRWA	Based on bids received		X								

Potential Contaminant Source Management (continued)

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
B.) Potential Contaminant Source Management														
WHP Measure (#16): If any old test boring wells are found, the city will apply for a grant and if successful have the wells sealed.	2	Low	City, MDH, MRWA	Based on bids received			X	X						
WHP Measure (#17): If a Class V well is identified within the DWSMA, record for PCSI and provide educational material to the owner about DWSMA and Class V well management.	2	Low	City, MRWA	Staff Time	As Occurs									
WHP Measure (#18): Old municipal wells are thought to exist. The city will work with MDH and others to try and find the location of these wells. If any of the old municipal wells are found, the city will apply for a grant to have them sealed if successful in getting the grant.	2	Medium	City, MDH, MRWA	Based on bids received			X							

Land Use Management

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
C.) Land Use Management														
WHP Measure (#19): Send Todd County, Iona and Hartford Townships a map of the DWSMA and letter discussing the importance of WHP. Ask to be notified of any requests for changes in land use or zoning which are located within the DWSMA. (Goal is to inform newly elected individuals about source water protection.)	2	Low	City, MRWA	Staff Time		X		X		X		X		X
D.) Data Collection														
WHP Measure (#20): Work with MDH on water quality monitoring. The standard assessment monitoring package is 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.	3	Medium	City, MRWA	Staff Time						X				

Data Collection (continued)

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
D.) Data Collection														
WHP Measure (#21): Field verify newly constructed wells within one mile of the DWSMA. This information may allow a better understanding of the extent and thickness of the city's aquifers and could result in a more refined WHPA in the future.	3	Medium	City	Staff Time	As Occurs									
WHP Measure (#22): Contact MN DNR Area Hydrologist to be notified when a new high capacity well is proposed within 1 mile of DWSMA. If one is identified, contact MDH Hydro Geologist to evaluate the effect that proposed pumping may have on the boundaries of the delineated WHPA or DWSMA. Work with well owner to reduce potential impacts on the PWS.	3	High	City, MDH, DNR	Staff Time	As Occurs									

Inner Wellhead Management Zone

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
E.) Inner Wellhead Management Zone														
WHP Measure (#23): Implement measures listed in the Inner Wellhead Management Zone (IMWZ) report.	5	High	City	Staff Time	X	X	X	X	X	X	X	X	X	X
WHP Measure (#24): Monitor the IMWZ around the wells to ensure setback distances are met for new potential contaminant sources.	5	High	City	Staff Time	X	X	X	X	X	X	X	X	X	X
WHP Measure (#25): Request MDH assistance to update the Inner Wellhead Management Zone Inventory for the public water supply wells.	5	High	City, MDH	Staff Time					X					X
F.) Reporting and Evaluation														
WHP Measure (#26): Prepare an evaluation of WHP plan implementation efforts every 2 ½ years.	4	Low	City, MDH, MRWA	Staff Time		X			X			X		

Reporting and Evaluation (continued)

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
F.) Reporting and Evaluation														
WHP Measure (#27): Summarize all WHP Plan implementation efforts in a report to MDH prior to the Scoping 1 meeting for the WHP Amendment.	4	Low	City, MDH, MRWA	Staff Time								X		
WHP Measure (#28): Annually coordinate an internal meeting with the administrator and public works director to discuss WHP Plan implementation and coordination. Discuss funding needs and pursuit of SWP Grant funds to help implement activities identified in the WHP Plan.	4	Medium	City	Staff Time	X	X	X	X	X	X	X	X	X	X
G.) Water Use and Contingency Strategy														
WHP Measure (#29): Review the contingency strategy portion of the city's wellhead protection plan to ensure that it reflects current personnel contact information, changes in the water supply system infrastructure and other needs and concerns.	6	Medium	City, MRWA	Staff Time			X			X			X	

Water Use and Contingency Strategy (continued)

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
G.) Water Use and Contingency Strategy														
WHP Measure (#30): Explore installing additional security measures at the well water treatment plant. Buy and install security equipment (e.g., lighting, fencing, locks, doors, windows, carriers, video equipment) related to drinking water protection. Contingent on grant funding.	6	Low	City	Staff Time	As Needed									
WHP Measure (#31): Work cooperatively with Todd County to enable CodeRED messaging capabilities in the Browerville area.	6	High	City, County	Staff Time		X								
WHP Measure (#32): Determine need of adding or replacing a public well. If need is determined work with MDH and/or Consultant to determine potential site for drilling a new public water supply well. The city can apply for MDH grants to help offset the cost of exploratory drilling and water quality sampling.	6	Medium	City, MDH	Unknown at this time	As Needed									

Water Use and Contingency Strategy (continued)

Description	Objective	Priority	Responsible Party & Cooperators	Cost	Implementation Time Frame									
					2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
G.) Water Use and Contingency Strategy														
WHP Measure (#33): If a need to add or replace public well is determined, construct a public well to ensure water quality and/or quantity needs are met.	6	Medium	City, MDH	Unknown at this time	As Needed									

CHAPTER SIX

EVALUATION PROGRAM

Minnesota Rules 4720.5270

The success of the wellhead protection management program must be evaluated in order to determine whether the plan is actually accomplishing what the City of Browerville set out to do. The following activities will be implemented to:

- Track the implementation of the objectives identified in Chapter 5 of this Plan;
- Determine the effectiveness of specific management strategies regarding the protection of the public water supply;
- Identify possible changes to these strategies which may improve their effectiveness; and
- Determine the adequacy of financial resources and staff availability to carry out the management strategies planned for the coming year.

1. The city will continue to cooperate with MDH in the annual monitoring of the water supply to determine whether the management strategies are having a positive effect and to identify water quality problems that may arise which must be addressed.

2. It is recommended that the WHP Team meets on an annual basis, although it will meet a minimum of once every 2 ½ years to review the results of each strategy implemented during the previous plan year(s) and identify and discuss whether modifications are needed for those strategies, and to identify strategies for the coming plan year(s).

3. 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 SEVEN

ALTERNATIVE WATER SUPPLY; CONTINGENCY STRATEGY

Minnesota Rules 4720.5280

I. PURPOSE

The purpose of this Contingency Plan is to establish, provide and keep updated, certain emergency response procedures and information for the Browerville Water Utility which may become vital in the event of a partial or total loss of public water supply services as a result of natural disaster, chemical contamination, or civil disorder of human-caused disruptions.

II. PUBLIC WATER SUPPLY CHARACTERISTICS

A. CURRENT SUPPLY SOURCE

The Browerville Water Utility supplies water to the City of Browerville. The system uses three wells finished into the Quaternary Buried Artesian aquifer. Below is a table with particular characteristics of each well.

	Well Number 4	**Well Number 7**	**Well Number 8**
Supply Source	Quaternary	Quaternary	Quaternary
Well Depth (ft.)	107’	88’	80’
Well Diameter (in.)	12”	12”	12”
Well Capacity (gpm)	350 gpm	475 gpm	500 gpm
Well Production (gpm)	150 gpm	300 gpm	300 gpm

B. TREATMENT

The raw water is high in iron and manganese. Treatment consists of three pressure type filters for iron and manganese removal.

C. STORAGE AND DISTRIBUTION

The system currently contains one 300,000-gallon elevated storage (96 foot) tower, in addition to necessary piping and valving. The water system contains 300-metered connections. Some of the distribution is looped but the system does contain ten dead ends.

D. MAPS/PLANS

The Browerville Water Utility has up to date maps of the water system. These maps are available and on file at the Browerville Water Utility Office. Additional sets of these maps are stored off site (Bolton & Menk, Inc.) in the event of a fire, natural disaster or other catastrophic event impacting the Browerville Water Utility.

III. PRIORITY OF WATER USERS DURING WATER SUPPLY EMERGENCY

Water Use Category	Maximum daily use (gpd)	Minimum daily use (gpd)
Residential	37,729	32,123
Institutional	8,370	7,115
Commercial	4,127	3,508
Industrial	126,551	107,568
Irrigation	NA	NA
Unaccounted	NA	NA
Wholesale	NA	NA

IV. ALTERNATIVE WATER SUPPLY OPTIONS

A. SURFACE WATER SOURCES AND TREATMENT NEEDS

The Long Prairie River is the closest surface water supply. The Minnesota National Guard has the ability to provide emergency treatment of surface waters for human consumption. The following procedure is recommended:

1. Contact the County Sheriff (320) 732-2157 to request assistance from the Minnesota National Guard.

2. The sheriff contacts the Minnesota National Guard, Division of Emergency Management, the State Duty Officer at (800) 422-0798, and the Community Support Group at (651) 282-4013 to request assistance for the Utility.

3. The Minnesota National Guard has the ability to provide Reverse Osmosis Water Purification Units (ROWPU) capable of supplying up to 1,500 gallons-per-hour, or 25 gallons-per-minute of potable water.

B. BOTTLED WATER SUPPLIES, DELIVERY AND DISTRIBUTION

1. The Minnesota National Guard can furnish equipment capable of hauling up to 2,000 gallons of potable water from another water supply to a city distribution point or facility in an emergency (see above for notification process.

2. The following vendor can be contacted for providing bottled water supply in the event of an emergency. These vendors are capable of providing bulk, bottled water in five-gallon containers. Truckload and pallet quantities are usually on hand and available.

Vendor: Kandiyohi Premium Water, Willmar, MN. Phone:
320-235-7194
Fax: 320-235-1721.

C. SYSTEM INTERCONNECTS WITH OTHER WATER SUPPLIES

We have no opportunities to have any interconnects at this time.

D. NEW WELL

Browerville Water Utility plans to look into the need and feasibility of a future new well(s); However, at this time no new wells are planned.

E. EMERGENCY OR BACKUP WELLS

Well number 4 (unique no. 198646) is being utilized as a backup well.

F. EMERGENCY TREATMENT OF WATER SYSTEM

Browerville Public Schools has an irrigation well that could potentially be utilized for emergency use.

G. SOURCE MANAGEMENT (BLENDING)

This is not an applicable option based on the existing infrastructure of the Browerville Water Utility.

V. INVENTORY OF AVAILABLE EMERGENCY EQUIPMENT AND MATERIALS

Description	Owner	Telephone	Location
Well Repair	Thein Well	320-796-2111	Spicer, MN
Pump Repair	Thein Well	320-796-2111	Spicer, MN
Electrician	Adam Morrill	320-304-1678	Browerville, MN
Electrician	Automatic Systems Co	651-631-9005	St. Paul, MN
Plumber	Noska Plumbing	320-594-6366	Browerville, MN
Backhoe	Andy Statema	320-594-6347	Browerville, MN
Backhoe	Chad Twardowski	320-732-3809	Long Prairie, MN
Chemical Feed	Hawkins Water Treatment	612-331-6910	Minneapolis, MN
Meter Repair	Core & Main	800-437-4034	Fargo, ND
Generator	Ziegler Power Systems	888-320-4292	Shakopee, MN
Valves	Core & Main	800-437-4034	Fargo, ND
Water Tower	Maguire Iron	605-334-9749	Sioux Falls, SD

VI. NOTIFICATION PROCEDURES

A. LEAD COORDINATING AGENCY

Water System		Cell	Work/Other
Personnel	**Name**	**Telephone**	**Telephone**
Mayor/Board Chair	Hannah Wieshalla	320-491-6319	
Council Members	Alan Fenner	218-640-3161	
Council Members	Angela Johnson	218-841-2624	
Council Members	Sue Wiersgalla	320-766-9758	
Council Members	Christopher Minor	320-766-1539	
State Incident Duty Officer	NA	NA	800-422-0798
County Emergency Director	Michael Wisniewski	320-533-4697	320-533-4697
Fire Chief	Patrick Sutlief	320-533-0534	
Sheriff	Michael Allen		320-732-2157
System Operator	Chuck Buhl	320-808-3938	320-594-6234
School Superintendent	Scott Vedbratten	218-259-4025	320-594-2272
Ambulance	Laura Stier	320-594-8228	320-594-8228
Hospital	Centracare	NA	320-732-2141
Power Company	Minnesota Power	NA	800-228-4966
Highway Department	Todd County	NA	320-732-2722
Telephone Company	CenturyLink	800-251-7056	800-251-7056
Neighboring Water System	Long Prairie, MN	NA	320-732-2167
MPCA Groundwater Division	Technician	NA	800-657-6792
MRWA Technical Services		NA	218-820-0595
MDH Public Water Supply		NA	320-223-7339

B. INCIDENT ASSESSMENT TEAM

Responsible Party	Name	Cell Phone	Work/Other Phone
Mayor/Board Chair	Hannah Wieshalla	320-491-6319	
Council Members	Alan Fenner	218-640-3161	
Council Members	Angela Johnson	218-841-2624	
Council Members	Sue Wiersgalla	320-766-9758	
Council Members	Christopher Minor	320-766-1539	
Fire Chief	Patrick Sutlief	320-533-0534	
Sheriff	Michael Allen		320-732-2157
County Emergency Director	Michael Wisniewski	320-533-4697	320-533-4697
Hazardous Materials Response	Browerville Fire Dept	320-533-0534	
System Operator	Chuck Buhl	320-808-3938	320-594-6234

C. Public Information Plan

1. Primary spokesperson for the media and/or public comment in the event of an emergency or contamination incident.

Name: **Hannah Wieshalla**
Title: **Mayor, City of Browerville**
Address: **Browerville City Hall 544 Main Street South**

Home Phone: **320-491-6319**

Public Information Center Location during Emergency: Browerville City Hall

Times Available: As required.

2. Information checklist to be conveyed to the public media:

Name of water system: _____

Contaminant of concern and date: _____

Source of contamination: _____

Public health hazard: _____

Steps the public can take: _____

Steps the water system is taking: _____

Other information: _____

3. Media Contacts

Media	Name	Telephone	Address
Newspaper	Independent News Herald	218-756-2131	PO Box 188 Clarissa, MN 56440
Radio	KEYL/KXDL	320-732-2164	221 Central Ave. Long Prairie, MN 56347
TV	KSAX/KRFW	320-763-5729	415 Fillmore Alexandria, MN 56308
TV	KCCO	320-763-5166	720 Hawthorne Alexandria, MN 56308

VII. MITIGATION AND CONSERVATION

A. MITIGATION

1. **Infrastructure maintenance/upgrades/maps:**
   We have annual flushing, valve turning, hydrant repair and painting. As upgrades are done to the system maps are updated and reprinted.

2. **Regular inspection of tower, well, pump house:**
   The water treatment plant for each well is inspected daily, along with each well and pump. The water tower is inspected weekly or on an as needed basis.

3. **Staff emergency training:**
   Emergency training is completed on different facets of the water system on a monthly basis.

4. **Site new backup well:**
   Browerville Water Utility plans to look into the need and feasibility of a future new well(s); However, at this time no new wells are planned.

5. **System valving to isolate problems:**
   Our emergency books and offices all have maps that show locations of main hydrant and service valves.

6. **Sanitation procedures for construction/repairs:**
   Shock chlorination by contractor is undertaken after the completion of any new construction or repairs. The area is then flushed and sampled for coliform bacteria.

7. **Other:**
   All services are metered, which helps focus attention during a crisis.

B. CONSERVATION

1. **Water Meters**
   Water meters are installed when service is turned on and read on a monthly basis. The utility can track water use by connection.

2. **Public Education**
   Conservation tips and reminders are included with the monthly utility bills. A consumer confidence report is provided annually to residents.

3. **Rate Structure**
   Structure is subject to change on an annual basis.

APPENDIX I:

WHPA and DWSMA Delineations and Vulnerability Assessment (PART 1)

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

DELINEATIONS – WELLHEAD PROTECTION AREA AND DRINKING WATER SUPPLY MANAGEMENT AREA

VULNERABILITY ASSESSMENTS – WELLS AND DRINKING WATER SUPPLY MANAGEMENT AREA

May 18, 2022 *(revised 08/30/2022)*

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

Public Water Supply ID: 1770002

City of Browerville
544 Main Street South
Browerville, Minnesota 56438-0247
320-594-2201

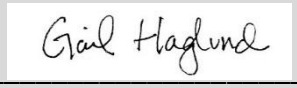
https://browerville.govoffice.com/

Contents

List of Tables

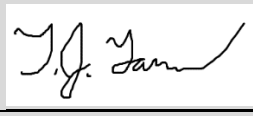
List of Figures

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:  Date: 05/20/2022 (revised 8/30/2022)

Printed Name: Gail Haglund License Number: 30098

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:  Date: 5/24/2022

Printed Name: Trent J. Farnum License Number: 50326

Contact Information

Wellhead Protection Plan Co-Managers

Chuck Buhl, Public Works Superintendent
320-594-6234
publicworks@browervillemn.com

Bobbi Jo Freie, Administrator
320-594-2201
ctybrow@browervillemn.com

State and Local Technical Assistance Planning Staff

Chad Anderson, Minnesota Department of Health Source Water Protection Planner
651-201-5847
chad.r.anderson@state.mn.us

Katie Breth, Minnesota Rural Water Association Planner
218-671-1006
katie.breth@mrwa.com

Licensed Hydrologist

Gail Haglund, Minnesota Department of Health Source Water Protection Hydrologist
651-201-4691
gail.haglund@state.mn.us

Glossary of Terms

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

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

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

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

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

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

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

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

Acronyms

CWI - County Well Index

DNR - Minnesota Department of Natural Resources

EPA - United States Environmental Protection Agency

FSA - Farm Security Administration

MDA - Minnesota Department of Agriculture

MDH - Minnesota Department of Health

MGS - Minnesota Geological Survey

MnDOT - Minnesota Department of Transportation

MnGEO - Minnesota Geospatial Information Office

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 Browerville has two primary wells screened in a sand and gravel aquifer that is buried beneath a layer of glacial sediments that range from sandy clay to clay-rich in the Browerville area. Such aquifers are known generically as Quaternary Buried Artesian Aquifers (QBAA). The city's aquifer at the two primary wells is encountered at a depth of approximately 48 feet below the ground surface (Table 1). Regionally, groundwater flow is to the east.

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 #4	198646	Emergency	12	92	107	1983	QBAA	Vulnerable
Well #7	752299	Primary	12	61	86	2007	QBAA	Vulnerable
Well #8	764941	Primary	12	60	80	2008	QBAA	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. All of the city's wells meet construction standards. The geologic sensitivity of the emergency well is moderate, however, the geologic sensitivity of both primary wells is low due to a thickness of clay-rich till over the buried sand and gravel aquifer. All three wells, however, are considered vulnerable to contamination due to tritium being detected in the well water (Table 2). Detectable tritium indicates the presence of young (post-1953) water, which indicates recent recharge from the surface.

Table 2 - Isotope and Water Quality Results
Date Sampled: 08/15/2019

Unique Number (Well Name)	Tritium[1] (TU)	Nitrate (mg/L)	Chloride (mg/L)	Bromide (mg/L)	Chloride/ Bromide Ratio
Well #7 752299	4.0 Modern Age	< 0.05	11	0.0222	496
Well #8 764941	4.4 Modern Age	< 0.05	13.6	0.0279	488

Notes- [1] Tritium age reference: MN DNR and MDH, 2020.

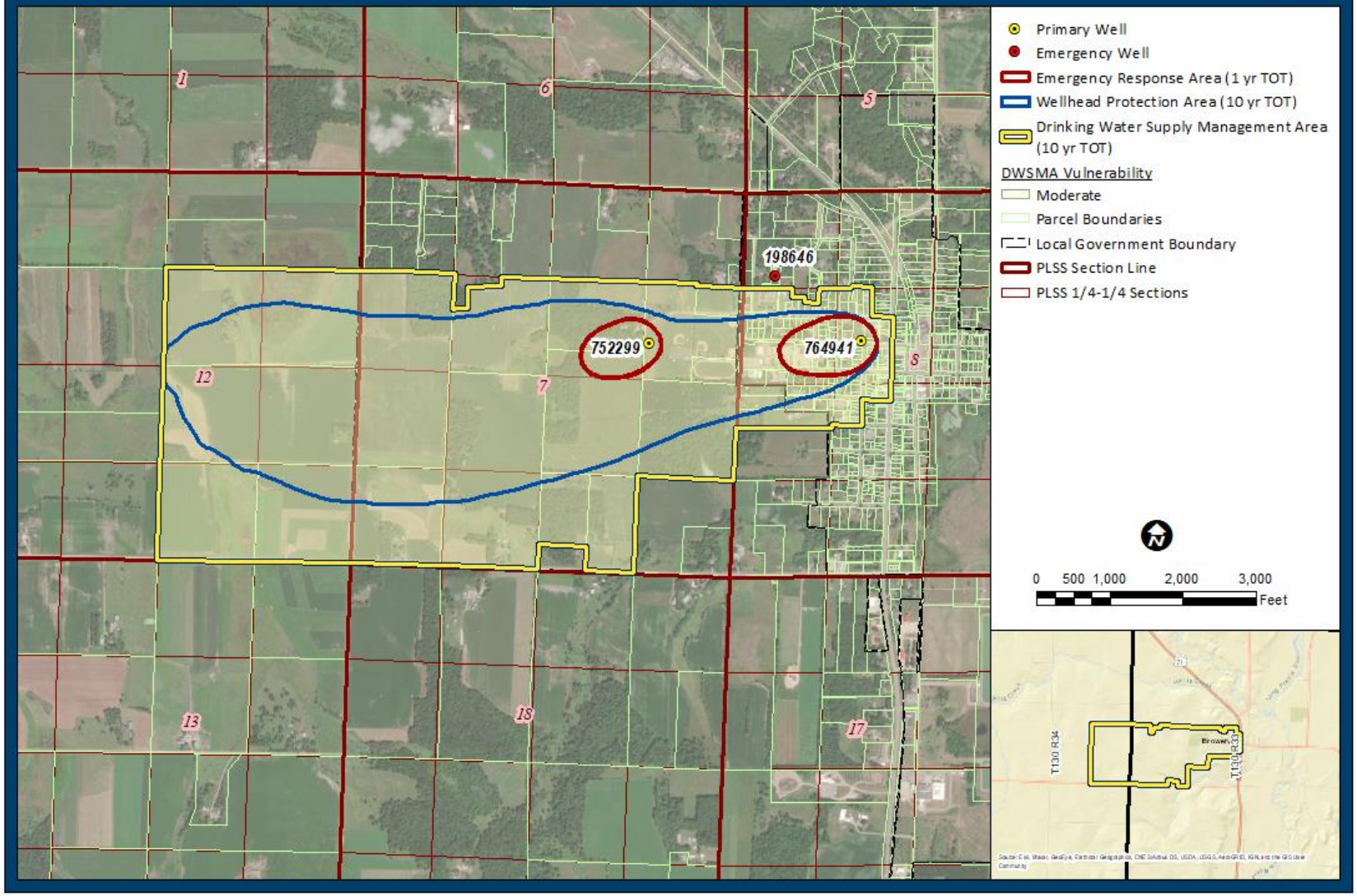
DWSMA Vulnerability - The vulnerability of the city's aquifer throughout the DWSMA is based on the geologic sensitivity ratings of wells and their monitoring data (Table 2). Based on this information MDH has assigned a moderate vulnerability to the DWSMA. This suggests that water and contaminants may travel from the land surface to the city's aquifer within a time span of years to decades and reflects an assumption that the clay-rich sediments that overlie the city's aquifer is leaky. Moderately vulnerable aquifers are prone to a variety of contaminant threats, including chemical storage tanks and unsealed wells, which can provide conduits for contaminants to quickly reach the city's aquifer.

Water Quality Concerns - At present, none of the contaminants for which the Safe Drinking Water Act has established health-based standards is found above maximum allowable levels in the city's water supply, nor are any present at one-half of those 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 and water quality monitoring. Further details can be found in the Recommendations section of this report.

Todd County
Minnesota

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



Technical Report

Discussion

This document describes the amendments to Part 1 of the wellhead protection (WHP) plan for the city of Browerville (PWSID 1770002). The purpose for amending the plan is to address the changes that have occurred since the plan was last approved, in order to update the WHP measures that are needed to protect public drinking water. The amended areas are smaller (Figure 1) because of changes to the location and size of the well capture zones, which were due in a large part to updating the groundwater modeling approach. 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. An inner wellhead management zone (IWMZ), which is the area within a 200-foot radius around the well, serves as the wellhead protection area for emergency wells and is not displayed in this report. 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 Browerville on June 29, 2021, 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 Browerville obtains its drinking water supply from two primary wells. Table 1 summarizes information regarding them.

Description of the Hydrogeologic Setting

The city of Browerville is located along Highway 71 in central Todd County. Well #8 (764941) is located about 1½ blocks west of Main Street (Highway 71). Well #7 (752299) is located about a half-mile west of Well #8, beyond municipal boundaries and in Hartford Township.

The landscape around Browerville is that of a gently rolling till plain that has been excavated locally by rivers such as the Long Prairie River and Eagle Creek. The river valleys have been backfilled with glacial outwash and alluvium; these sediments constitute highly productive aquifers that are widely used for irrigation. Geologic logs from wells in the area indicate that 100 to 300 feet of glacial sediment overlie bedrock, which is likely crystalline rock of Proterozoic age. Most of the glacial sediment consists of sandy-clay to clay-rich till with relatively thin lenses of coarser material contained therein. The wells used by the city draw water from one of these buried lenses of sand and gravel (Walsh, 2001). There is likely little hydraulic connection between the aquifer used by the city and the bedrock, and for the purposes of this project, the bedrock surface is considered impermeable.

Long Prairie River and Eagle Creek are the major surface water features that influence regional groundwater flow. Locally, Harris Creek traverses the city from the west along the north side, while Drayer Creek traverses along the south side. These two creeks drain toward the larger streams.

The buried sand and gravel layer that the city wells are screened in is referred to as a Quaternary Buried Artesian Aquifer (QBAA). The aquifer appears to be continuous through much of the city and the DWSMA (Peterson, 2010). Well #7 (752299) is cased through 48 feet of alternating layers of sandy clay and clay-rich till; the casing also extends through the top 13 feet of the buried sand and gravel aquifer. The screen is set between 61 to 86 feet. The aquifer thickness is 40 feet at the location of Well #7. The geology at the location of Well 8 (764941) is similar, where the thickness of the clay-rich till is 49 feet and the buried sand is at least 31 feet thick. Well #8 has 60 feet of casing and a 20-foot screen. In the vicinity of the city wells, the general direction of groundwater flow is from west to east (Figure 2).

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	Interpreted from well records found in the CWI database.
Porosity Type and Value	20%	Conservative estimate for glacial outwash (Fetter, 1988; Freeze and Cherry, 1979).

Attribute	Descriptor	Data Source
Aquifer Thickness	Variable, ranging 25-45 feet near the city wells	Interpreted from well records found in the CWI database.
Stratigraphic Top Elevation	Variable: 1278 feet in the vicinity of Well #7 1260 feet in the vicinity of Well #8	Interpreted from well records found in the CWI database.
Stratigraphic Bottom Elevation	Variable: 1238 feet in the vicinity of Well #7 1229 feet in the vicinity of Well #8	Interpreted from well records found in the CWI database.
Hydraulic Confinement	Confined	County Well Index
Transmissivity	Variable Range of Values: 200 – 10,230 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	Variable Range of Values: 20 - 225 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	In the vicinity of the city's wellfield, groundwater flow is toward the east-northeast, with an approximate compass direction of approx. 85º and a gradient of 0.003 (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 Browerville 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	Descriptor	How the Criterion was Addressed
Flow Boundary	Surface Water Features	Eagle Creek, Long Prairie River, Harris Creek and Drayer Creek were included in the model.
Flow Boundary	Other High Capacity Wells	High-capacity wells that exist within 1.5 miles of the city of Browerville's wells were included in the model (Table 6).
Daily Volume of Water Pumped	See Table 5	Pumping information was obtained from the DNR, Appropriations Permit Number 1980-3118, and was converted to a daily volume pumped by a well.
Groundwater Flow Field	In the vicinity of the city's wellfield, groundwater flow is toward the east-northeast, with an approximate compass direction of approx. 85º and a gradient of 0.003 (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.

Criterion	Descriptor	How the Criterion was Addressed
Aquifer Transmissivity	Reference Values: Well 7 (752299) = 9,960 ft^2/day Well 8 (764941) = 4,060 ft2/day	The aquifer test plan was approved on April 8, 2022, and T was derived from aquifer test and specific capacity data. Uncertainty regarding aquifer transmissivity was addressed as described in the "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 Appropriation Permit Number 1980-3118. 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. The water volumes for 2019 were excluded from the assessment because they are unrepresentative of normal annual water use. In 2019, extra flushing was needed during repair projects and to keep the pressure in the system while the water tower was being painted. 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	Use/Status	2017	2018	2019	2020	2021	5-Year Projected Pumping	Daily Volume (cubic meters)
Well #4 198646	Emergency	0	0	0	0	0	0	0
Well #7 752299	Primary	29.088	**31.997**	34.408	29.502	30.24	**31.997**	331.85
Well #8 764941	Primary	27.310	**27.487**	39.68	24.995	27.186	**27.487**	285.1
Totals		56.398	**59.484**	74.088	54.497	57.426	**59.484**	616.95

(Expressed as gallons. Bolding indicates greatest annual pumping volume. For this assessment, the 2019 annual pumping volumes were excluded.)

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

Table 6 - Other Permitted High-Capacity Wells (1.5 miles)

Unique Number	Well Name	DNR Permit Number	Aquifer	Use	Annual Volume of Water Pumped (MGY)	Daily Volume (cubic meters)
137304	Jennie-O Turkey Store Inc.	1986-3099	QBAA	Livestock Watering	5.7095	59.17
181229	Rickbeil Bros; Rickbeil, Terry	1984-3231	QWTA	Agricultural Crop Irrigation	14.795	153.34
221508	R D Offutt Company	1973-3118	QWTA	Agricultural Crop Irrigation	14.01	145.2
257112	Bauer, Richard; Bauer, Lisa	1972-0625	QBAA	Agricultural Crop Irrigation	9.886	102.5
445547	R D Offutt Company	1973-3334	QBAA	Agricultural Crop Irrigation	41.106	426
455526	Johnson, Larry	1989-3578	QBAA	Agricultural Crop Irrigation	10.1	104
572591	Johnson, Larry	1996-3146	QBAA	Agricultural Crop Irrigation	8.4	87.4
748983	Rickbeil, Terry	2013-1219	QWTA	Agricultural Crop Irrigation	22.2	230.5

Unique Number	Well Name	DNR Permit Number	Aquifer	Use	Annual Volume of Water Pumped (MGY)	Daily Volume (cubic meters)
753845	Johnson, Larry	2018-1019	QBAA	Agricultural Crop Irrigation	0	0
774683	Ind School District 787	2010-0458	QBAA	Landscaping/Athletic Field Irrigation	1.9	19.3
809448	Big Boyz Truck and Tire	2015-1146	QBAA	Other Special Categories	0	0

Method Used to Delineate the Wellhead Protection Area

The WHPA for the city of Browerville's wells was determined using the software code MODFLOW (McDonald and Harbaugh, 1988; Harbaugh et al., 2000; Harbaugh, 2005). The resulting WHPA boundaries were determined using a stochastic method and are a composite of the capture zones calculated from several different model scenarios (Figure 1).

MODFLOW was developed by the United States Geological Survey (USGS) and is publicly available. The specific software code used for this delineation was MODFLOW-NWT (Niswonger, 2011). 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, using PEST++IES (White et al, 2020) uses a range of feasible parameter values and generates possible calibrated "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 regional scale numerical groundwater model was constructed and consisted of 244 rows, 299 columns, and two layers. The regional model includes the cities of Eagle Bend, Clarissa, Browerville, and portions of Long Prairie. The model incorporates a variable areal grid spacing ranging from approximately 3 meters near the Browerville city wells and grading to 320 meters at the boundaries of the model domain. Layer tops and bottoms were derived from CWI logs within the model domain. River head boundaries represent cells where water is flowing both into and out of the aquifer and were used to simulate the rivers, streams, and lakes within the model domain within Layer 1. Vertical recharge was applied to Layer 1 of the model using modified values published by the U.S Geological Survey (Delin et al., 2007).

The Browerville city wells are screened in a buried sand and gravel aquifer, called QBAA. The aquifer is overlain by a thickness of glacial till that ranges in composition from sandy clay to clay-rich. Exploratory test borings confirm that the buried glacial aquifer is underlain by a relatively thick layer of clay-rich till; this lower layer was simulated as a no flow boundary and was not explicitly modeled. Pumping test information indicates that the transmissivity of the buried sand and gravel aquifer is variable. Pilot points were used in the model to simulate locations where aquifer hydraulic conductivity was estimated either from pumping tests or specific capacity data. Local and regional surface water features, including rivers and creeks, were simulated in Layer 1. Other high capacity wells were included in the model; daily pumping volumes for the wells were estimated using annual water volumes reported in the DNR MPARS database (Table 6).

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.

Representative aquifer parameters were used in the base case model scenario. Two hundred and forty-four additional realizations were calibrated and simulated to reflect uncertainty conditions, which are addressed in the next section. The model parameters for all model runs are listed in Table 6.

To determine the WHPA, the many MODFLOW model realizations were used with a particle tracking program called MODPATH (Pollock, 2016). MODPATH is used to evaluate advective transport of simulated particles moving through the simulated flow system. A series of 72 particles were launched at each well. A porosity of 20 percent was used and a reverse time of travel was calculated at 10 years. Each of these potential capture zones were 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. A probability threshold value of 10 percent was used 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 and/or flux. The sensitivity analysis quantifies the differences in model results produced by the natural variability of a particular parameter. Uncertainty analysis addresses the effects of poor data quality (lack of local detailed information or deficiencies in the data) on the model results. Together, sensitivity and uncertainty analyses are commonly used to evaluate the effects that natural variability and uncertainties in the hydrogeologic data have on the size and shape of the capture zones. The Monte Carlo approach is used to address the possible range of hydraulic conductivity near the city wells 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. In regard to the WHPA delineation, these analyses are used to document that the delineation is optimal, conservative, and protective of public health based on existing information.

Model Calibration

Utilizing the base case, a qualitative evaluation of the calibration can be made by comparing the simulated potentiometric surface (Figure 2) with observed water level targets obtained from the CWI database. Upon review the calibrated flow model generally captures the major features of the groundwater flow system along with the elevation, shape, magnitude, and gradient of the CWI database observed flow field.

A quantitative measure by which to evaluate the success obtained during calibration is to compare the root mean square of the residuals (RMSE) and the maximum observed head difference of the calibration dataset. The Browerville model was refined from a larger regional model of the watershed. The calibration dataset of the regional model is relatively large and includes water level information from 445 wells. The residual root mean square (RMS) error of the calibration well set was approximately 3.1 meters with a normalized RMSE of 4.7 percent. It is noted that this error is less than the calibration target of 10 percent (Groundwater Calibration Policy, 2018). The calibration targets (wells) with the greatest residual difference between measured and simulated heads were generally at locations beyond the contribution area to the city's wells.

Sensitivity Analysis

Model sensitivity is the amount of change in model results caused by the variation of a particular input parameter. Because of the relative simplicity of this particular 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 and an expanded capture zone, proportional to the porosity of the aquifer materials.

  How Addressed and Results – The pumping rate is based on the results presented in Table 5 and, therefore, is not considered a variable factor that will influence the delineation of the WHPA. The modeled pumping rate is based on the largest annual pumping during the last five years of record, as shown in Table 5, and therefore the sensitivity of the delineation to this parameter is assumed to be minimal when compared with the other parameters discussed below.

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

  How Addressed and Results – General flow direction was determined based upon static water levels of similarly screened wells in the area of the model. Overall, the sensitivity of the WHPA to the direction of groundwater flow should not be significant, given the current knowledge of the hydraulic head distribution in the aquifer.

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

  How Addressed and Results – The flow field shown 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 each well. The regional model has been calibrated to hydraulic heads. The sensitivity of the WHPA to the hydraulic gradient should not be significant given the current knowledge of the hydraulic head distribution in the aquifer.

- The **hydraulic conductivity** influences the size and shape of the capture zone. A decrease in hydraulic conductivity decreases the length of the capture zone and increases the distance to the stagnation point, making the capture zone more circular in shape and centered on the well.

  How Addressed and Results – Initial hydraulic conductivity was calculated from specific capacity and aquifer tests conducted throughout the region and

geostatistically smoothed across the model domain, with values near the well field reflecting those obtained from the city's wells. Two hundred and forty-four additional realizations were simulated wherein the hydraulic conductivity at each pilot point was randomly altered within probable ranges based on data confidence.

- The **aquifer porosity** influences the size and shape of the capture zone.

  How Addressed and Results – Decreasing the porosity causes a linear, proportional increase in the areal extent of the capture zone. A literature value of 20 percent was used for the delineation and this value was not varied (Fetter, 2001).

- The **aquifer thickness** influences the size and shape of the capture zone.

  How Addressed and Results – Final aquifer thicknesses used in this model were the result of a multi-step statistical analysis. A cross-sectional analysis was done to determine the thicknesses of the aquifer at well points throughout the modeled extent. Layer thicknesses were interpolated between wells and unrealistic values were identified and disposed of at all steps by comparing with adjacent well data, where available, and by using hydrogeologic judgment. As a result the model layering closely follows the overall stratigraphy through the region. For this reason, it was determined unnecessary to further assess aquifer thickness at this time.

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, a maximum historical (five-year) pumping rate or an engineering estimate of future pumping, whichever is greater (Minnesota Rules, part 4720.5510, subpart 4).
2. Probability Analysis – The Monte Carlo approach was used to estimate capture zone probability as well as variability in hydraulic conductivity (Layer 2) and conductance at river cells near the wellfield (Layer 1).

Capture areas were developed for a range of hydraulic conductivities and times of travel of one and 10 years (Figure 6). Table 6 documents the range of hydraulic conductivities used in Layer 2 to address MODFLOW uncertainty with respect to aquifer hydraulic conductivity.

Conductance values for Harris and Drayer Creeks were varied using the Monte Carlo approach to address streambed uncertainty in Layer 1. 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 Realizations

Well Name	File Name	Discharge (cubic meters per day)	Hydraulic Conductivity (meters per day)	Porosity (%)	Aquifer Thickness (meters)	Remarks
Well #7 752299	Base_model	331.8	68	20	13.8	Base Case
Well #8 764941	Base_model	285.1	40.7	20	9.2	Base Case
Combined			Range: 40.4 – 79.9			244 Final Realizations

Conjunctive Delineation

MDH is currently revising the *Guidance for Preparing a Conjunctive Delineation*. The draft guidance states that an assessment of the geographic area that may provide recharge to the aquifer within the groundwater capture zone should be focused on 1) a surface hydrologic feature and associated watershed and/or 2) overland flow and infiltration of precipitation or meltwater and contributing area defined by topography. The draft guidance also states that the assessment of whether to include a surface water contribution area shall focus on high vulnerability ERAs, as pathogens and high concentrations of chemical contaminants are the primary focus for inclusion. The vulnerability of the ERA for both wells is moderate, which is supported by the predominately low geologic sensitivity within and around the ERA of the buried glacial aquifer serving the wells. In addition, neither ERA geographically intersects local surface water features. For these reasons, the need for a conjunctive delineation was determined to be unnecessary.

Delineation of the Drinking Water Supply Management Area

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

- Center-lines of roads;
- Property lines; and
- Public Land Survey coordinates.

Summary of Comparisons Between the Previous (2010) and Current WHPA and DWSMA Delineations

Both the new WHPA and DWSMA are significantly smaller than the previous protection areas delineated 2010 (Figure 7). The decrease in protection areas is largely due to a change in the groundwater modeling approach. In 2010, a stochastic groundwater flow model, called Oneka, was used to calculate WHPA boundaries. Oneka was considered a suitable model to use given the uncertainties of the geologic setting. Pumping test information indicated that the transmissivity of the buried sand aquifer was significantly different at the locations of the city's two primary wells. The buried sand aquifer is about half as transmissive at the location of Well #8 (764941) compared to Well #7 (752299). The degree and location of variability within the potential well capture zones, however, was not well known. The uncertainty of aquifer properties was challenging to adequately simulate using a traditional deterministic flow model, such as MODFLOW. For this reason, Oneka, a probabilistic model was a good alternative for the Browerville setting.

Since 2010, there have been significant advances to better address the complexities of groundwater flow systems and parameter uncertainty in traditional groundwater models, such as MODFLOW. For this reason, a MODFLOW model was developed for this amendment. The use of PEST++IES (White et al, 2020) to optimize hydraulic conductivity combined with a Monte Carlo approach to address uncertainty resulted in a significant decrease in the protection areas compared to the previous modeling approach.

Vulnerability Assessments

The Part I wellhead protection plan includes the vulnerability assessments for the city of Browerville'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 vulnerability assessments for each well used by the city of Browerville 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 well itself should not provide a pathway for contaminants to enter the aquifer used by the public water supplier.
2. The geologic conditions at the well site include a cover of clay-rich geologic materials over the aquifer.
3. 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. Water samples were collected from the city's primary wells on August 15, 2019, and were analyzed for tritium, nitrate, chloride and bromide. Tritium was detected in the samples from both wells and the water is classed as "modern" (MN DNR and MDH,

2020), confirming the vulnerable nature of the wells. Although nitrates were not detected in either well, the chloride and bromide results confirm that the wells have had some impact by land-use activities (Table 2, Appendix B, Mullaney et al., 2009).

Assessment of Drinking Water Supply Management Area Vulnerability

The vulnerability of the DWSMA is shown in Figure 7 and is based upon the following information:

1. Review of the geologic logs contained in the CWI database indicate that the aquifer predominately exhibits a low geologic sensitivity throughout the DWSMA and is relatively isolated from the direct vertical recharge of surface water. Except for a couple of small areas along the south boundary of the DWSMA, the pollution sensitivity of the buried aquifers is also considered low and very low (Peterson, 2010).
2. Despite the clay-rich cover, the primary city wells have been sampled for tritium and the results indicate recent recharge. It is assumed that the overlying confining unit is leaky, and allows recharge to occur over time periods of years to decades (Walsh, 2010).

Therefore, given the information currently available, it is prudent to assign a moderate 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 Browerville's Wellhead Protection Plan.

1. Well Locating: This delineation is based on relatively little well data. If wells are constructed within one mile of the DWSMA, their locations should be field verified. This information may allow a better understanding of the extent and thickness of the city's aquifers and could result in a more refined WHPA in the future.
2. Water Quality Monitoring: The standard assessment monitoring package should be analyzed during year six, 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.

Selected References

Bowen, G.I. and Revenaugh, J. (2003), *Interpolating the isotopic composition of modern meteoric precipitation*, Water Resources Research 39, 1299, doi: 10.129/2003WR002086.

Delin, G.N., Healy, R.W., Lorenz, D.L., and Nimmo, J.R. (2007), *Comparison of local- to regional-scale estimates of ground-water recharge in Minnesota*, Journal of Hydrology, Vol. 334, No. 1-2, p. 231-249.

Doherty, J.E. and Hunt, R.J., (2010) *Approaches to highly parameterized inversion--A guide to using PEST for groundwater-model calibration*, U.S. Geological Survey, Scientific Investigations Report 2010-5169, Reston, Va., 37 p.

Fetter, C.W. (2001), *Applied hydrogeology (4th ed.)*, Prentice Hall, Saddle River, N.J., 598 p.

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

Harbaugh, A.W. (2005), *MODFLOW-2005, the U.S. Geological Survey modular groundwater model--the Ground-Water Flow Process*: Techniques and Methods 6-A16, U.S. Geological Survey, Reston, Va., 253 p.

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

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

Minnesota Department of Health (2018), *Groundwater Model Calibration Policy (2018*), accessed at: https://www.health.state.mn.us/communities/environment/water/docs/swp/calibrationpolicy.pdf

Minnesota Department of Natural Resource and Minnesota Department of Health. (2020), *Tritium Age Classification: Revised Method for Minnesota, GW-05*., St. Paul, Minn., accessed at https://files.dnr.state.mn.us/waters/groundwater_section/mapping/gw/gw-05-minnesota-tritium-age.pdf

Mullaney, J.R., Lorenz, D.L., and Arntson, A.D. (2009), *Chloride in groundwater and surface water in areas underlain by the glacial aquifer system, northern United States*, Scientific Investigations Report, 2009-5086, U.S. Geological Survey, Reston, Va., 41 p.

Niswonger, R.G., Panday, Sorab, and Ibaraki, Motomu, (2011), *MODFLOW-NWT, A Newton Formulation for MODFLOW-2005*: *U.S. Geological Survey Techniques and Methods 6-A37,* U.S. Geological Survey, Reston, Va., 44 p.

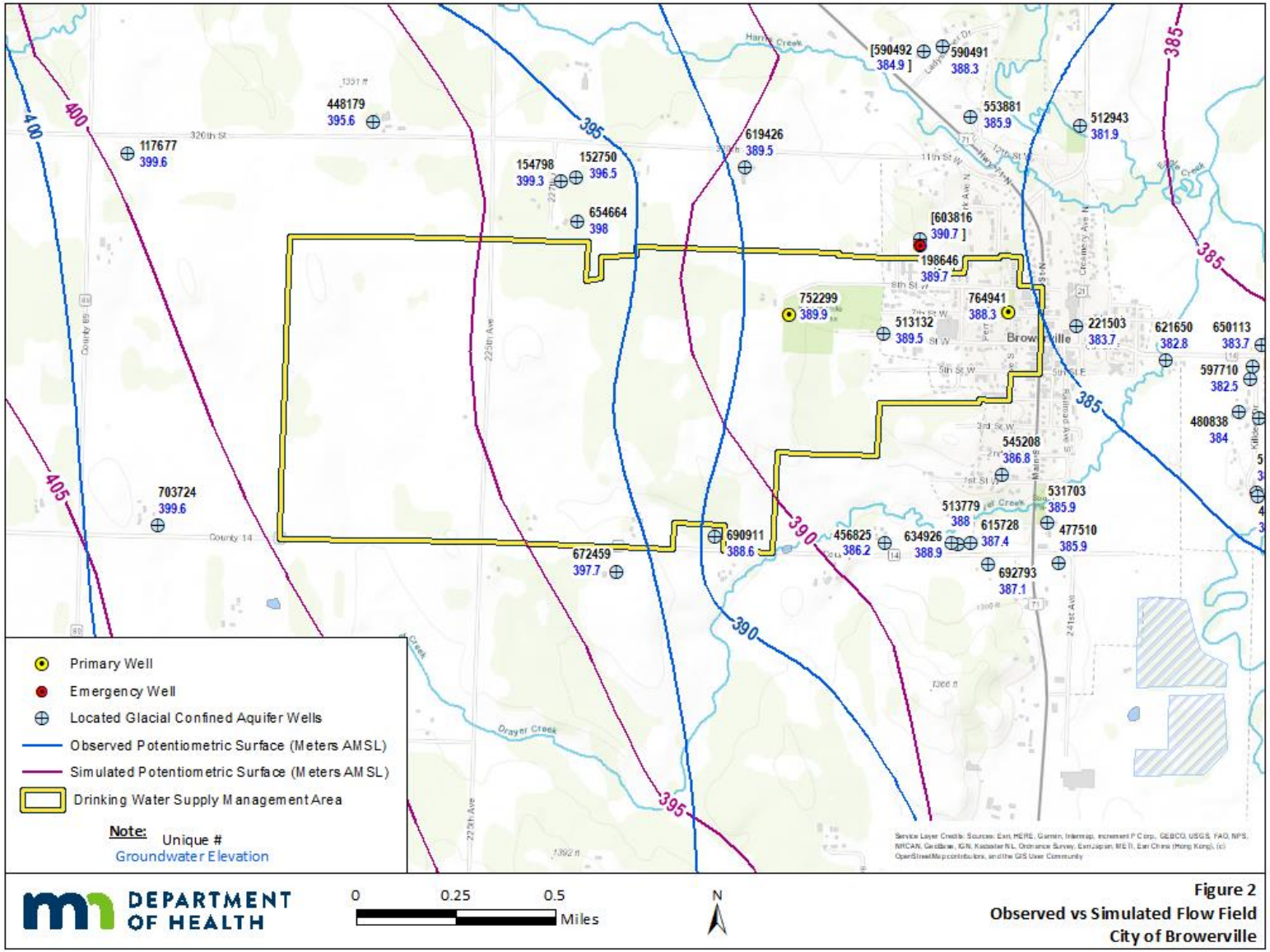
Petersen, T.A. (2010), *Geologic atlas of Todd County, Minnesota*, Minnesota Department of Natural Resources, Division of Waters, County Atlas Series, C-18, Part B, St. Paul, Minn., 4 plates, scale 1:80,000 to 1:350,000.

Pollock, D.W. (2016), *User guide for MODPATH Version 7—A particle-tracking model for MODFLOW: U.S. Geological Survey Open-File Report 2016–1086*, U.S. Geological Survey, Reston, Va., 35 p., http://dx.doi.org/10.3133/ofr20161086.

Walsh, J.F. (2010), *Wellhead protection plan for the city of Browerville, Minnesota--Part 1 - Amendment*, Minnesota Department of Health, St. Paul, Minn., 16 p.

White, J.T., Hunt, R.J., Fienen, M.N., and Doherty, J.E. (2020), *Approaches to Highly Parameterized Inversion: PEST++ Version 5, a Software Suite for Parameter Estimation, Uncertainty Analysis, Management Optimization and Sensitivity Analysis: U.S. Geological Survey Techniques and Methods 7C26,* U.S. Geology Survey, Reston, Va. 2 p., accessed at: https://doi.org/10.3133/tm7C26.

Figures


Primary Well
Emergency Well
Located Glacial Confined Aquifer Wells
Observed Potentiometric Surface (Meters AMSL)
Simulated Potentiometric Surface (Meters AMSL)
Drinking Water Supply Management Area
Note: Unique # Groundwater Elevation
DEPARTMENT OF HEALTH
0 0.25 0.5 Miles
N
Figure 2
Observed vs Simulated Flow Field
City of Browerville

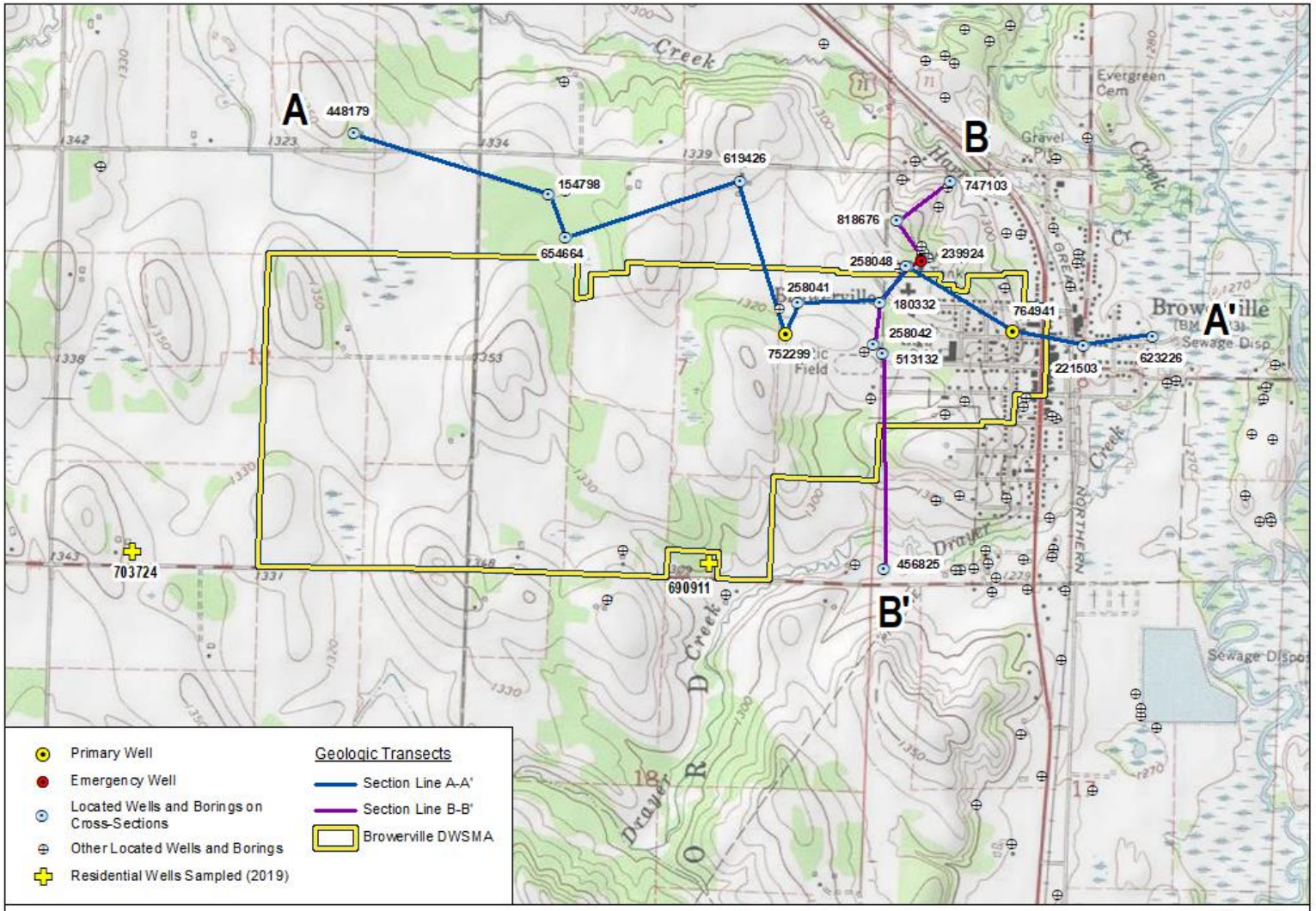
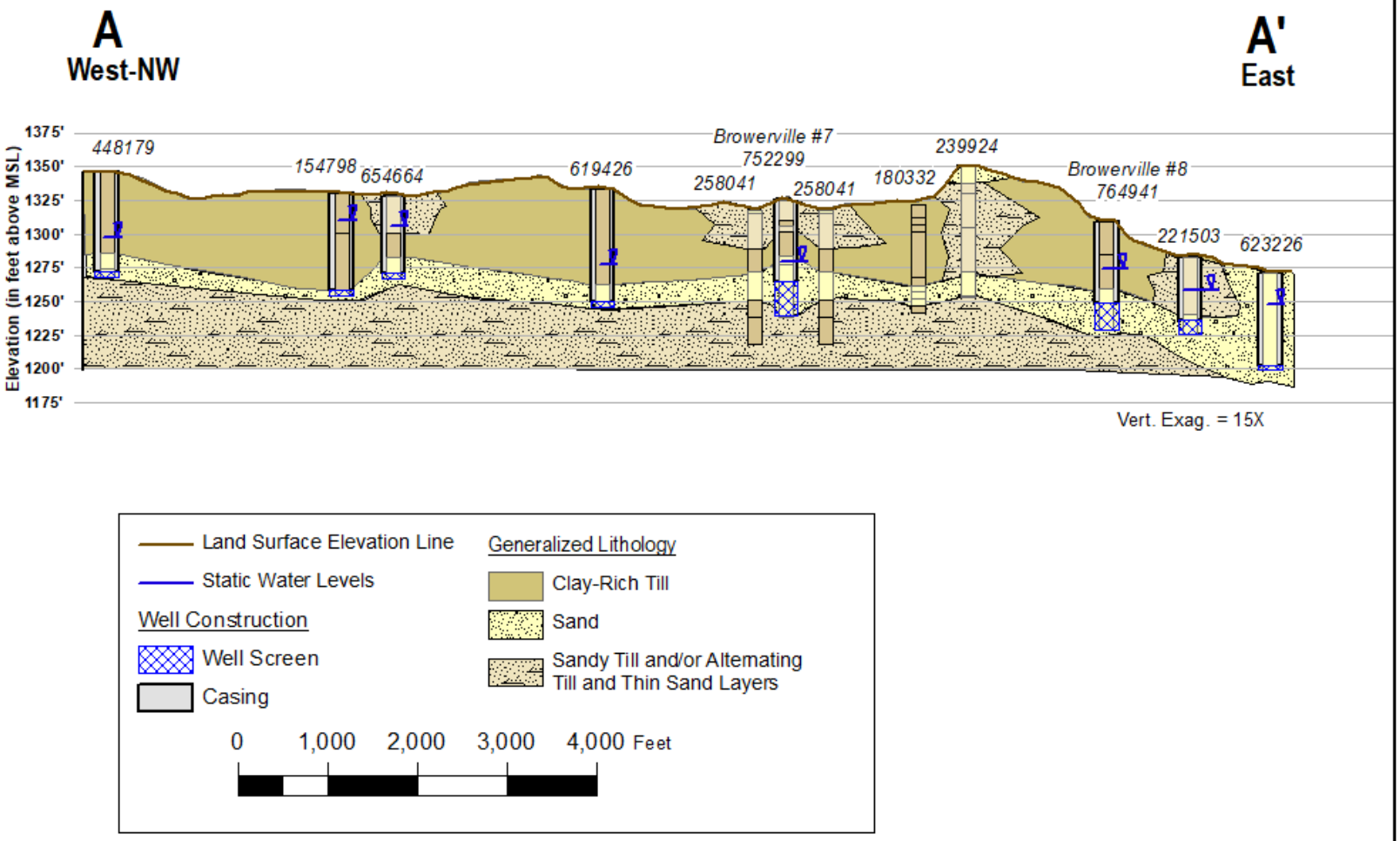
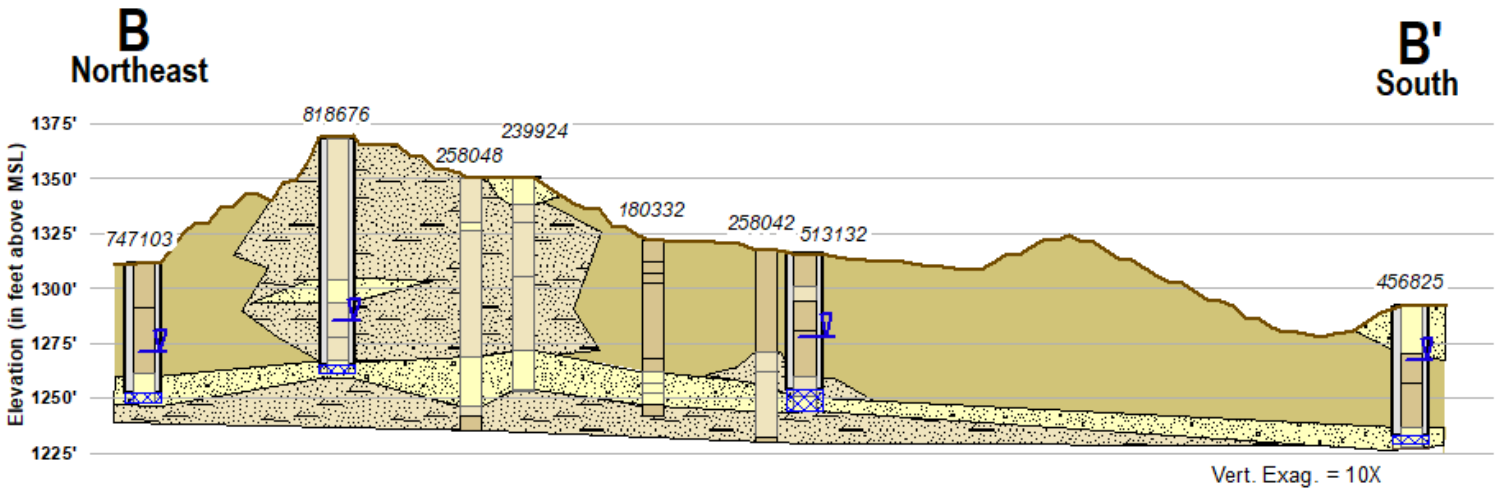


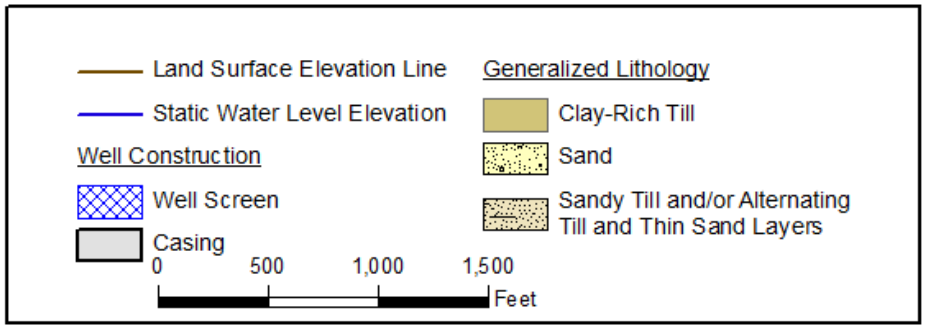
Figure 3
Geologic Cross-Section Locations
Browerville, MN



DEPARTMENT OF HEALTH

Figure 4
Geologic Cross-Section A-A'
Browerville, MN





DEPARTMENT OF HEALTH

Figure 5
Geologic Cross-Section B-B'
Browerville, MN

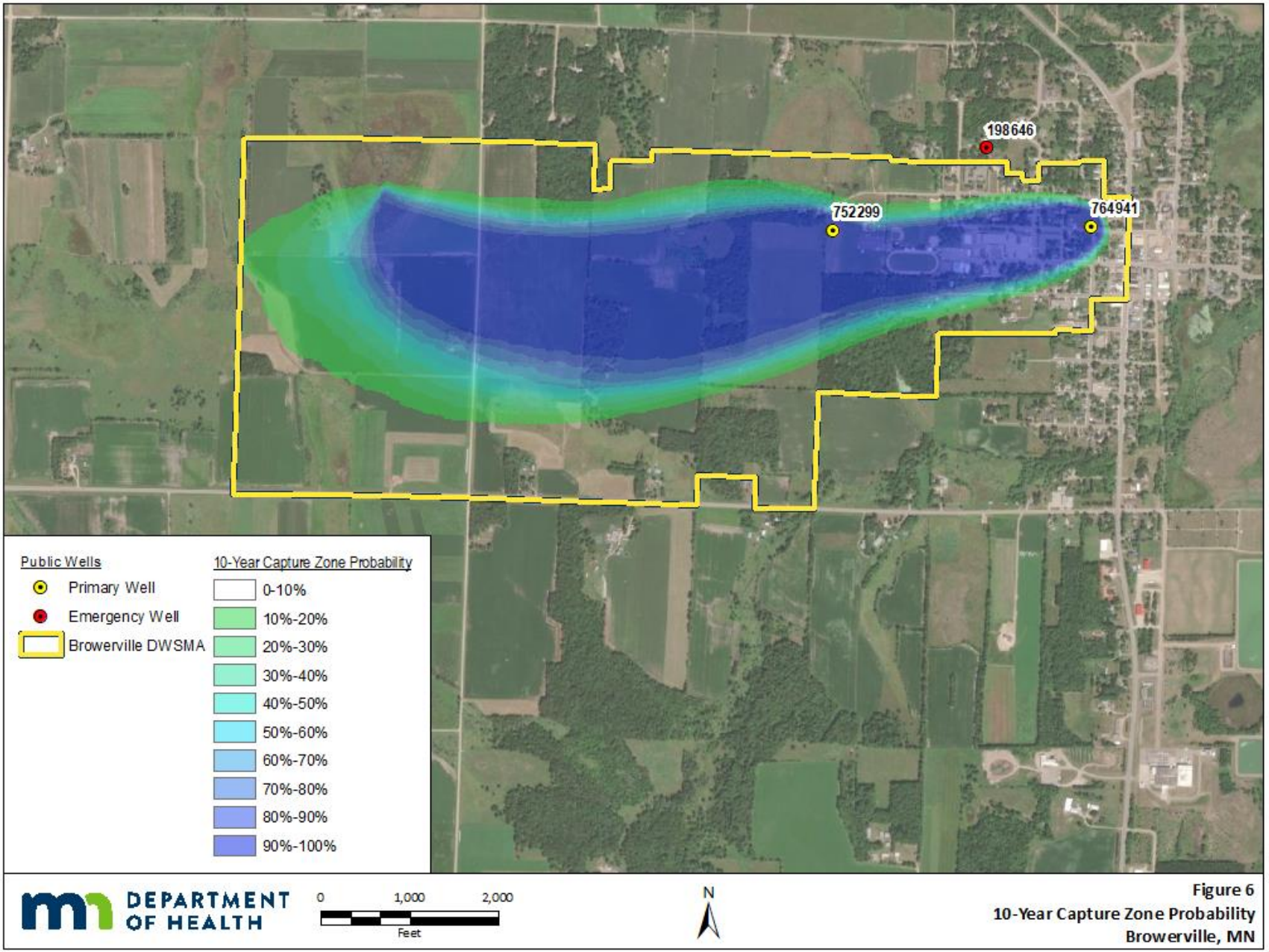


Figure 6
10-Year Capture Zone Probability
Browerville, MN

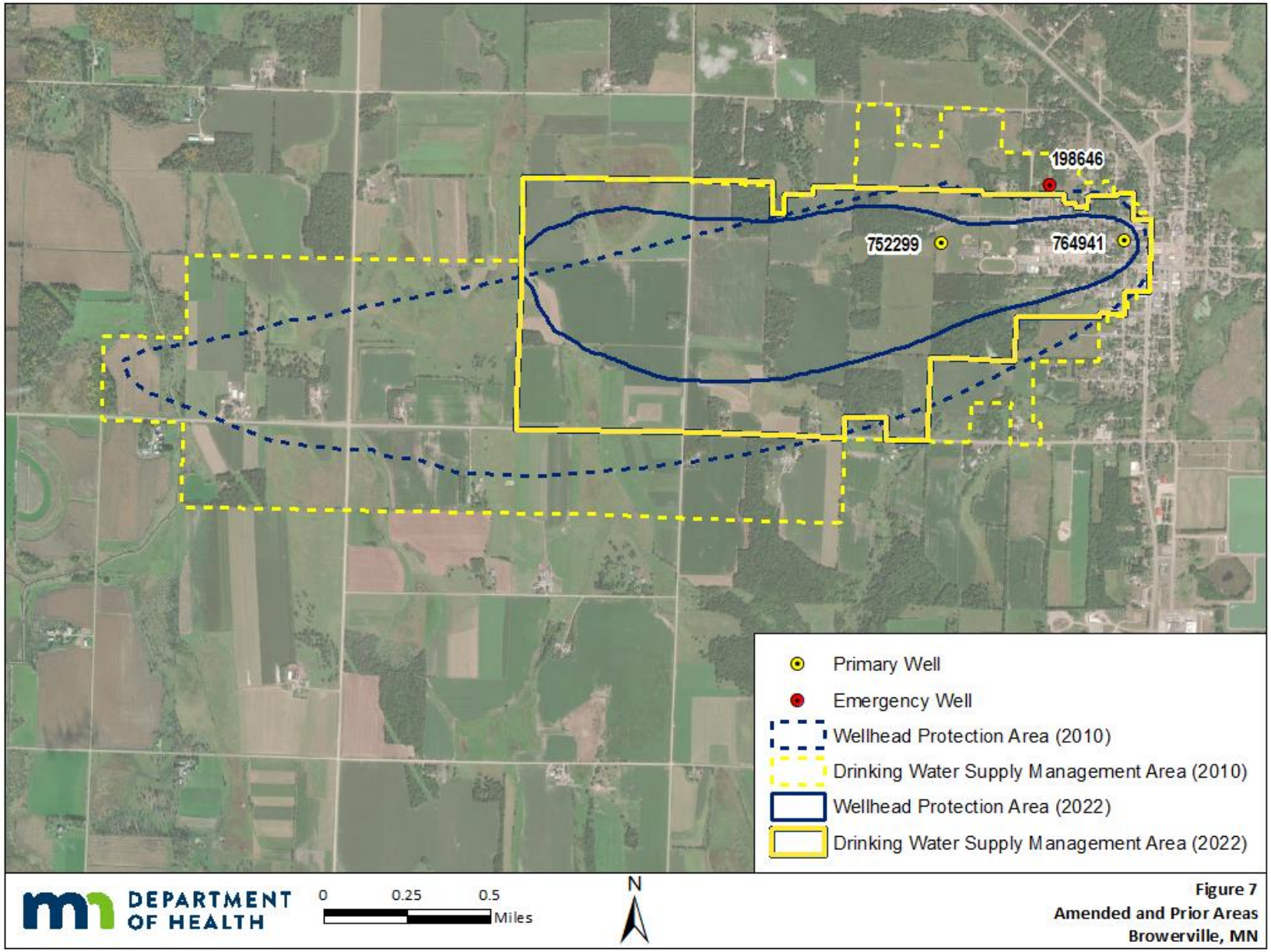


Figure 7
Amended and Prior Areas
Browerville, MN

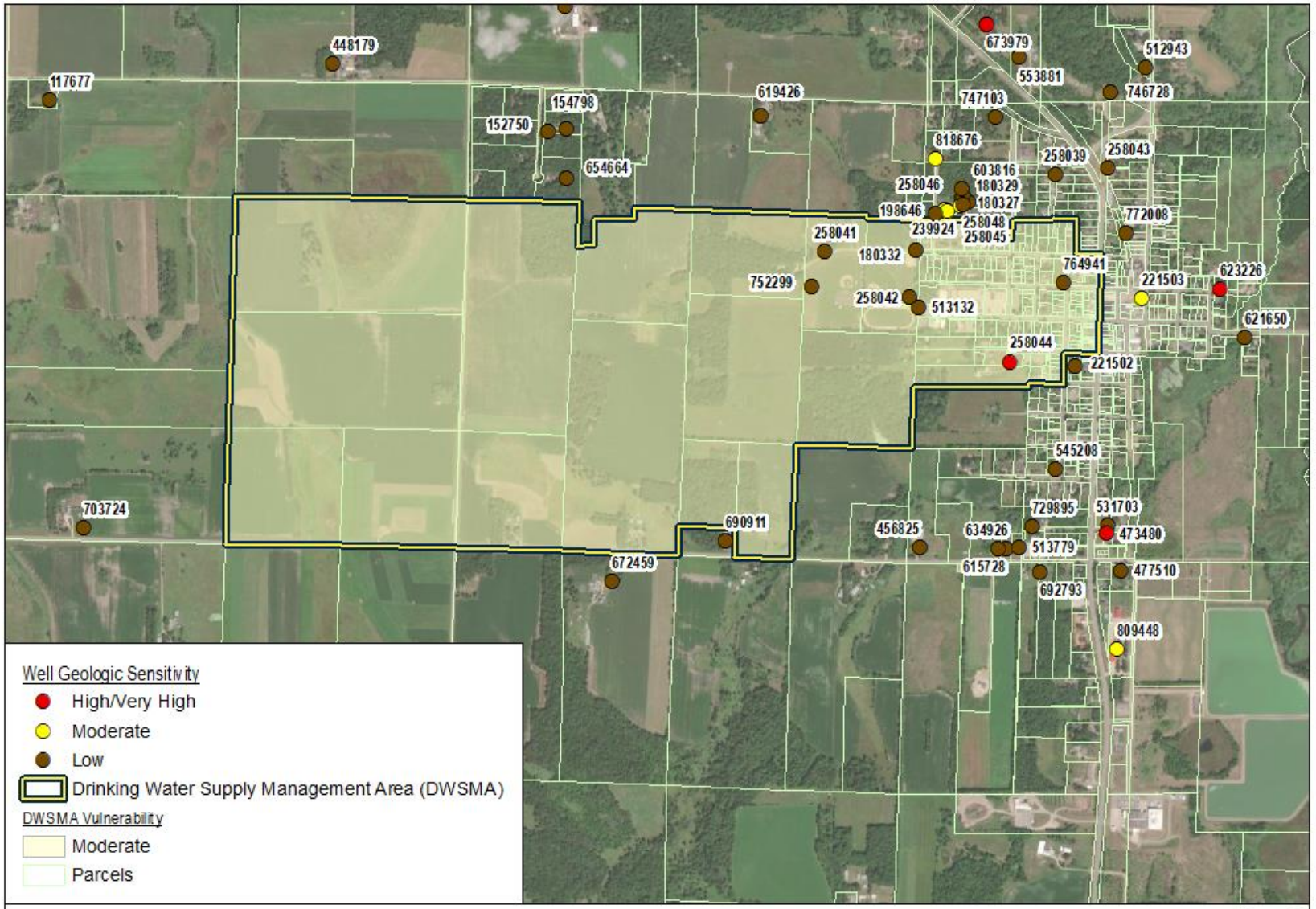


Figure 8
DWSMA Vulnerability
Browerville, mn

Appendix A: 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	M	M	M	M	MN Climatology Office
Geology	Maps and geologic descriptions	M	H	H	H	MGS and DNR
Geology	Subsurface data	M	H	H	H	MGS, MDH, DNR
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	M	M	M	M	NRCS
Soils	Eroding lands					
Water Resources	Watershed units	M	M	L	L	MnGEO, DNR
Water Resources	List of public waters	L	L	L	L	MnGEO, DNR
Water Resources	Shoreland classifications					
Water Resources	Wetlands map	L	M	L	L	USFWS
Water Resources	Floodplain map					
Land Use	Parcel boundaries map	L	H	L	L	Todd County
Land Use	Political boundaries map	L	H	L	L	MnGEO, City
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, CWI, MDH
Surface Water Quantity	Stream flow data	L	M	L	L	DNR, USGS
Surface Water Quantity	Ordinary high water mark data	L	H	L	L	DNR

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	Permitted withdrawals					
Surface Water Quantity	Protected levels/flows					
Surface Water Quantity	Water use conflicts	L	H	L	L	No relevant data found.
Groundwater Quantity	Permitted withdrawals	H	H	H	H	DNR
Groundwater Quantity	Groundwater use conflicts	H	H	H	H	No relevant data found.
Groundwater Quantity	Water Levels	H	H	H	H	No relevant data found.
Surface Water Quality	Stream and lake water quality management classifications					
Surface Water Quality	Monitoring data summary					
Groundwater Quality	Monitoring data	L	H	L	L	MDH, DNR
Groundwater Quality	Isotopic data	H	H	H	H	MDH, DNR
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 B:
Water Chemistry Results

Browerville Vulnerability Parameters

Sample Date **8/15/2019**

Sampling Point	Tritium[1] (TU)	Delta 180 (per mil)	Delta 2H (per mil)	Nitrate (mg/L)	Ammonia Nitrogen (mg/L)	Chloride (mg/L)	Bromide (mg/L)	Cl/Br	TOC (mg/L)	Arsenic (ug/l)
Well #7 752299	4.0 **Modern Age**	-11.2079	-75.717249	< 0.05	< 0.05	11	0.0222	496	1.9	< 1
Well #8 764941	4.4 **Modern Age**	-11.0351	-74.7188	< 0.05	0.13	13.6	0.0279	488	2.1	< 1
WHP Plan Measure 21 -- Results of two residential wells located within the DWSMA boundaries:										
690911 (*2003*; screened 57-61 feet) 21668 County Road 14	1.8 **Mixed Age**	-10.7129	-71.6241	< 0.05	0.37	8.84	0.041	215	3.8	< 1
703724 e(2003; screened 98-102 feet) 23086 County Road 14	< 0.8 **Mostly Pre-modern**	-10.6215	-71.094	< 0.05	1.9	0.792	0.0269	29	2.3	< 1

Notes: 1. Tritium age reference: MN DNR and MDH, 2020.

2. All of the above wells had relatively similar field parameter measurements: specific conductivity values ranged 580-626 umhos/cm, dissolved oxygen values ranged 0.21 – 0.39 mg/L, and Eh values ranged -70 to -99 mV.

3. < - means that the constituent was not detected by the laboratory

APPENDIX II:

Part One and Two WHPP Scoping Documents

DEPARTMENT OF HEALTH

Protecting, Maintaining and Improving the Health of All Minnesotans

July 12, 2021

Mr. Chuck Buhl, Public Works Director
P.O. Box 247
544 Main Street South
Browerville, Minnesota 56438

Dear Mr. Buhl:

Subject: Scoping Decision Notice No. 1 for Browerville, PWSID 1770002

This letter provides notice of the results of the Scoping 1 meeting held with you and Bobbi Jo Freie (City Administrator), Katie Breth (Minnesota Rural Water Association), and Chad Anderson and myself (Minnesota Department of Health) on June 29, 2021, regarding wellhead protection planning. During the meeting, we discussed the amendment of Browerville's Part I Wellhead Protection Plan that will document the 1) delineation of a wellhead protection area, 2) delineation of a drinking water supply management area, and 3) assessments of well and aquifer vulnerability related to these areas for the city's primary water supply wells. The wellhead protection area is the surface and subsurface area surrounding your public water supply wells through which contaminants are likely to move and affect your drinking water supply. The drinking water supply management area (DWSMA) is the area delineated using identifiable landmarks that reflect the wellhead protection area boundaries as closely as possible.

The city will have approximately two years to prepare its entire Wellhead Protection Plan, Part I and Part II. The wellhead protection rule describes the criteria used for determining the time period for completion of the Wellhead Protection Plan (Minnesota Rules, part 4720.5130). The Minnesota Department of Health (MDH) recommends that half of the time allotted be dedicated to completing Part II of the plan.

It is our understanding that MDH will assist the city with amending Browerville's Part I Plan. There will be no cost to the city for any involvement by MDH staff with this work. It will be the responsibility of the city to assist with the data collection to aid in the delineation and vulnerability assessments, if needed.

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

The enclosed Scoping Decision Notice No. 1 formally identifies the information the city must provide to MDH to meet wellhead rule requirements. The rule refers to the existing information required for wellhead planning as data elements. Much of this information is available in the public domain, as described in the Scoping Decision Notice No. 1 form. You only need to provide the information that is not in the public domain and, therefore, not available to MDH. The Scoping Decision Notice No. 1 form also 1) lists the Minnesota unique well number and well construction for each well that will be included in the WHP Plan [Table 1]; 2) lists the pumping volumes for each well [Table 2]; and 3) lists other high-capacity wells within approximately one and half miles of your existing DWSMA [Table 3]. Please review the summary of additional information that we'd like to receive from you, if it is available. The summary is included at the end of the Scoping Decision Notice No. 1 form. Thank you again for your quick response in May to my information request for the 5-year projected pumping volumes.

Finally, it is our understanding that you will continue serving as the wellhead protection manager on behalf of the city. Wellhead managers are responsible for providing written notice to local units of government of city's intent to prepare the WHP Plan, as required by the WHP rule (part 4720.5300, subpart 3). A copy of this notice should be forwarded to MDH and must include a list of the city wells, their unique well numbers, and contact information for the wellhead protection manager. Katie can provide you with some examples of the notification of intent that other communities have used. Please feel free to contact Katie at 218-671-1006.

In closing, we look forward to working with you on the completion of your Wellhead Protection Plan. If you have any questions regarding our comments, please contact me at 651-201-4691 or at gail.haglund@state.mn.us.

Sincerely,

Gail Haglund

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

GH:
Enclosures: Scoping Decision Notice No. 1; Summary of Data Requested; Table 1 - Public Water Supply Well Information; Table 2 - Annual Volume of Water Pumped From PWS Wells; Table 3 - Permitted High-Capacity Wells

cc: Katie Breth, Planner, Minnesota Rural Water Association
Chad Anderson, Minnesota Department of Health, St. Cloud District Office
Jennifer Soltys, Engineer, Drinking Water Protection, St. Cloud District Office

SCOPING DECISION NOTICE No. 1

The purpose for the first Scoping Meeting, as required by Minnesota Rules, part 4720.5310, is to discuss the information necessary for preparing the Part I Report of a Wellhead Protection Plan. The Part I Report identifies the area that provides the source of drinking water for Browerville so that the city can develop land use or management practices to protect their groundwater resource from contamination. Specifically, the Part I Report documents the delineation of the wellhead protection area (WHPA), the delineation of the drinking water supply management area (DWSMA) and assesses the vulnerability of the city wells and DWSMA.

The wellhead rule (Minnesota Rules, part 4720.5310) refers to the information required for wellhead planning as data elements. This form lists the data elements that are stated in Minnesota Rules, part 4750.5400. The Minnesota Department of Health (MDH) uses this form to designate which data elements are needed to prepare the Part I Report, based on the hydrogeological setting, vulnerability of the wells, and aquifer information known at the time of the Scoping 1 Meeting.

Name of Public Water Supply		**Date**
City of Browerville **(PWSID =1770002)**		July 12, 2021
Name of the Wellhead Protection Manager		
Mr. Chuck Buhl, Public Works Director		
Address	**City**	**Zip**
P.O. Box 247	Browerville	56438-0247
Unique Well Numbers		**Phone**
752299 (Well #7), 764941 (Well #8)		320-594-2201

Instructions for Completing the Scoping No. 1 Form

N	D	V	S	
X				**N =** If this box is checked with an "X," this data element is **NOT** necessary for the **Part I Report** of your Wellhead Protection Plan. This data element may be identified later at the Scoping 2 Meeting and used for the Part 2 Report. Please go to the next data element.

N	D	V	S	
	X			**D =** If this box is checked with an "X," the preparer of the Part I Report is **required** to use this information for the **DELINEATION** of the WHPA or the DWSMA. If there is no check in the "S" box, this information is available in the public domain or is on-file at MDH.

N	D	V	S	
		X		**V =** If this box is checked with an "X," the preparer of the Part I Report is **required** to use this information for the **VULNERABILITY** assessment of the city's wells or the DWSMA. If there is no check in the "S" box, this information is available in the public domain or is on-file at MDH.

N	D	V	S	
			X	**S =** If this box is checked with an "X," the PWS **must SUBMIT** the information to MDH.

DATA ELEMENTS ABOUT THE PHYSICAL ENVIRONMENT

A. PRECIPITATION

N	D	V	S	
	X			A.1: An existing map or list of local precipitation gauging stations.

Technical Assistance Comments: Precipitation values can be used to determine the local recharge in the groundwater model. The locations of the gauging stations are available in the public domain.

N	D	V	S	
	X			A.2: An existing table showing the average monthly and annual precipitation, in inches, for the preceding five years.

Technical Assistance Comments: This information may be used for determining local recharge for the groundwater model. This information is available in the public domain.

B. GEOLOGY

N	D	V	S	
	X	X	X	B.1 An existing geologic map and a description of the geology, including aquifers, confining layers, recharge areas, discharge areas, sensitive areas as defined in Minnesota Statutes, section 103H.005, subdivision 13, and groundwater flow characteristics.

Technical Assistance Comments: Information of this type is required to characterize the geologic and hydrogeologic setting of the city's wells. This information is used to define aquifer geometry, location and magnitude of the recharge and discharge areas, and groundwater flow information. The Todd County Geologic Atlases, Parts A and B, are useful for understanding local geology. Aquifer tests or alternatives listed in MN Rules, part 4720.5510, subpart 6, can be used to help characterize flow in the aquifer. The city has already provided MDH with longer term aquifer testing data for Wells #4, #7, and #8, as well as for former Wells #5 and #6. This information, along with existing specific capacity data, is useful for estimating aquifer parameters for the delineation.

N	D	V	S	
	X	X	X	B.2: Existing records of the geologic materials penetrated by wells, borings, exploration test holes, or excavations, including those submitted to the department.

Technical Assistance Comments: Information of this type may be useful to refine the understanding of the geologic and hydrogeologic setting on a local basis. Submit only if the city has information of test drilling or site investigations that is not available in the public domain.

N	D	V	S	
	X	X	X	B.3: Existing borehole geophysical records from wells, borings, and exploration test holes.

Technical Assistance Comments: Information from geophysical records may provide additional information about aquifer thickness, well construction, and water level information at a local scale. Submit only if the information is not available in the public domain.

N	D	V	S	
	X	X	X	B.4: Existing surface geophysical studies.

Technical Assistance Comments: Information from geophysical studies may be useful to refine the understanding of the geology on a local basis. Submit only if the information is not available in the public domain.

C. SOILS

N	D	V	S	
	X	X		C.1: Existing maps of the soils and a description of soil infiltration characteristics.

Technical Assistance Comments: This information is in the public domain and can be used to delineate the WHPA and assess the vulnerability of the DWSMA because it indicates the underlying geology.

N	D	V	S	
X				C.2: A description or an existing map of known eroding lands that are causing sedimentation problems.

Technical Assistance Comments:

D. WATER RESOURCES				
N	D	V	S	D.1: An existing map of the boundaries and flow directions of major watershed units and minor watershed units.
	X			
Technical Assistance Comments: This information is in the public domain and may be useful for helping to identify the boundaries of the groundwater flow model.				
N	D	V	S	D.2: An existing map and a list of public waters as defined in Minnesota Statutes, section 103G.005, subdivision 15, and public drainage ditches.
X				
Technical Assistance Comments:				
N	D	V	S	D.3: The shoreland classifications of the public waters listed under sub-item (2), pursuant to part 6120.3000 and Minnesota Statutes, sections 103F.201 to 103F.221.
X				
Technical Assistance Comments:				
N	D	V	S	D.4: An existing map of wetlands regulated under Chapter 8420 and Minnesota Statutes, section 103G.221 to 103G.2373.
	X			
Technical Assistance Comments This information is in the public domain and may be useful for helping to identify recharge and discharge areas in the groundwater flow model.				
N	D	V	S	D.5: An existing map showing those areas delineated as floodplain by existing local ordinances.
X				
Technical Assistance Comments:				

DATA ELEMENTS ABOUT THE LAND USE

E. LAND USE				
N	D	V	S	E.1: An existing map of parcel boundaries.
	X			
Technical Assistance Comments: This information may be helpful in delineating the DWSMA and is available in the public domain.				
N	D	V	S	E.2: An existing map of political boundaries.
	X			
Technical Assistance Comments: This information is available in the public domain.				
N	D	V	S	E.3: An existing map of public land surveys, including township, range, and section.
	X			
Technical Assistance Comments: This information is available in the public domain and may be helpful in delineating the DWSMA.				
N	D	V	S	E.4: A map and an inventory of the current and historical agricultural, residential, commercial, industrial, recreational, and institutional land uses and potential contaminant sources.
X				
Technical Assistance Comments:				

N	D	V	S	E.5: An existing, comprehensive land-use map.
X				

Technical Assistance Comments:

N	D	V	S	E.6: Existing zoning map.
X				

Technical Assistance Comments:

F. PUBLIC UTILITY SERVICES

N	D	V	S	F.1: An existing map of transportation routes or corridors.
	X			

Technical Assistance Comments: This information is available in the public domain and may be helpful in delineating the DWSMA.

N	D	V	S	F.2: An existing map of storm sewers, sanitary sewers, and the public water supply systems.
X				

Technical Assistance Comments:

N	D	V	S	F.3: An existing map of gas and oil pipelines used by gas and oil suppliers.
X				

Technical Assistance Comments:

N	D	V	S	F.4: An existing map or list of public drainage systems.
X				

Technical Assistance Comments:

N	D	V	S	F.5: An existing record of construction, maintenance, and use of the public water supply wells and other wells within the DWSMA.
	X	X	X	

Technical Assistance Comments: If the information is different than that on-file with MDH (Table 2), please provide 1) the pumping rates for the current and previous years, and the projected annual pumping rates for the next five years for each well in the city; and 2) well records for the city wells. Information about the city wells may affect the vulnerability assessment due to rehabilitation/reconstruction of a well or changes in pumping rates.

DATA ELEMENTS ABOUT WATER QUANTITY

G. SURFACE WATER QUANTITY

N	D	V	S	
	X			G.1: An existing description of high, mean, and low flows on streams.

Technical Assistance Comments: This information is available in the public domain and may be useful for developing and calibrating the groundwater flow model.

N	D	V	S	
	X			G.2: An existing list of lakes where the state has established ordinary high-water marks.

Technical Assistance Comments: This information is available in the public domain and may be used for the delineation.

N	D	V	S	
				G.3: An existing list of permitted withdrawals from lakes and streams, including source, use, and amounts withdrawn.

Technical Assistance Comments:

N	D	V	S	
				G.4: An existing list of lakes and streams for which state protected levels or flows have been established.

Technical Assistance Comments:

N	D	V	S	
	X	X	X	G.5: An existing description of known water-use conflicts, including those caused by groundwater pumping.

Technical Assistance Comments: Notify MDH of surface water/well interference problems of which the city is aware. Conflicts between use of groundwater resources and surface water bodies would indicate a hydrologic boundary that would need to be considered in delineating the WHPA.

H. GROUNDWATER QUANTITY

N	D	V	S	
	X	X	X	H.1: An existing list of wells covered by state appropriation permits, including amounts of water appropriated, type of use, and aquifer source.

Technical Assistance Comments: Submit this information for wells that are not permitted by the DNR because this information may be useful in identifying the hydrologic boundary conditions that could affect the size and shape of the WHPA boundaries.

N	D	V	S	
	X	X	X	H.2: An existing description of known well interference problems and water-use conflicts.

Technical Assistance Comments: Notify MDH of well interference problems of which the city is aware. Interference problems with other wells, if present, likely indicate a hydrologic boundary that would need to be considered in making the WHPA delineation.

N	D	V	S	
	X	X		H.3: An existing list of state environmental boreholes, including unique well number, aquifer measured, years of record, and average monthly levels.

Technical Assistance Comments: This information is available in the public domain.

DATA ELEMENTS ABOUT WATER QUALITY

I. SURFACE WATER QUALITY

N	D	V	S	
X				I.1: An existing map or list of the state water quality management classification for each stream and lake.

Technical Assistance Comments:

N	D	V	S	
X				I.2: An existing summary of lake and stream water quality monitoring data, including: 1. bacteriological contamination indicators; 2. inorganic chemicals; 3. organic chemicals; 4. sedimentation; 5. dissolved oxygen; and 6. excessive growth or deficiency of aquatic plants.

Technical Assistance Comments:

J. GROUNDWATER QUALITY

N	D	V	S	
	X	X	X	J.1: An existing summary of water quality data, including: 1) bacteriological contamination indicators; 2) inorganic chemicals; and 3) organic chemicals.

Technical Assistance Comments: Submit if the city has information that is not available in the public domain because the information may help explain groundwater flow paths.

N	D	V	S	
	X	X	X	J.2: An existing list of water chemistry and isotopic data from wells, springs, or other groundwater sampling points.

Technical Assistance Comments: Submit if the city has information that is not available in the public domain because the information may help explain groundwater flow paths.

N	D	V	S	
	X	X	X	J.3: An existing report of groundwater tracer studies.

Technical Assistance Comments: Submit if the city has information that is not available in the public domain because the information may help explain groundwater flow paths.

N	D	V	S	
		X	X	J.4: An existing site study and well water analysis of known areas of groundwater contamination.

Technical Assistance Comments: Submit if the city has information on contaminant sources not available in the public domain because these reports may contain additional geologic or hydrogeologic information.

N	D	V	S	
X				J.5: An existing property audit identifying contamination.

Technical Assistance Comments:

N	D	V	S	
	X	X		J.6: An existing report to the Minnesota Department of Agriculture and the Minnesota Pollution Control Agency of contaminant spills and releases.

Technical Assistance Comments: Notify MDH of reports on spills or contaminant releases that are on-file with the city but are not in the public domain. These reports do not need to be submitted but MDH staff would like to review reports.

Summary of Data Request
Specific Data to be Provided to MDH by the City of Browerville

As discussed during the first Scoping Meeting on June 29, 2021, the city will provide the following information for Part I of their Wellhead Protection Plan to the Minnesota Department of Health. The number of the data element that refers to the information needed to prepare the Part I Report is listed in the parenthesis at the end of each request.

1) Municipal Well Information: Use Tables 1 and 2 and the records for the city wells to review the accuracy of all city well construction and the pumping information. (F.5)

   Table 1 lists well use and construction for each of the city wells. Have you reconstructed any wells? Are there well records for reconstructed wells?

2) Groundwater Quality: Please provide MDH with any non-regulatory water quality data that you may have collected since the previous plan (2012) and that may be helpful for understanding groundwater flow paths (J.1 – J.4).

Table 1 – Browerville Well Information

Local Well ID	Unique Number	Use/ Status	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed/ Reconstructed	Aquifer[1]	Well Vulnerability
Well #4	198646	Emergency	12	92	107	1983	QBAA	Vulnerable
Well #7	752299	Primary	12	61	86	2007	QBAA	Vulnerable
Well #8	764941	Primary	12	60	80	2008	QBAA	Vulnerable

Note: 1. QBBA – Quaternary Buried Artesian Aquifer (buried glacial sand aquifer)

Table 2 - Annual Volume of Water Discharged from Browerville Wells

MPARS Permit ID ▾	Local Well ID	Unique No.	2016	2017	2018	2019*	2020	Highest annual volume from last 5 years	5-Year Projection	Pumping Volumes Used in Previous Delineation
1980-3118	#4	198646	0	0	0	0	0	0	0	0
1980-3118	#7	752299	25.897	29.088	**31.997**	34.408	29.502	31.997	31.997	26.1
1980-3118	#8	764941	23.899	27.310	**27.487**	39.68	24.995	27.487	27.487	26.1
TOTALS:			49.796	56.398	**59.484**	74.088	54.497	59.484	59.484	52.2

(Expressed as millions of gallons. **Bold values** indicate highest annual rate from "**5 most recent**" selected years.) Source: MN Dep't. of Natural Resources Division of Waters - MNDNR Permitting and Reporting System and City of Browerville Public Works.

Note: * The 2019 pumping volumes are excluded because of extra flushing needed during repair projects (water tower and filters) and to keep the pressure in the system during water tower maintenance.

Table 3 - Annual Volume of Water Discharged from Other Active High-Capacity Wells Within 1.5 Miles of the Browerville DWSMA

Unique Number	Well Name	DNR Permit Number	Aquifer[1]	Use	2019 Annual Volume of Water Pumped (MG)	5-Year Average Annual Volume of Water Pumped (MG)
137304	Jennie-O Turkey Store Inc.	1986-3099	QBAA	Livestock Watering	5.22	4.99
181229	Rickbeil Bros; Rickbeil, Terry	1984-3231	QWTA	Agricultural Crop Irrigation	12.42	13.0
214702	R D Offutt Company	1973-3051	QWTA	Agricultural Crop Irrigation	18.36	18.12
221508	R D Offutt Company	1973-3118	QWTA	Agricultural Crop Irrigation	12.45	11.04
257112	Bauer, Richard; Bauer, Lisa	1972-0625	QBAA	Agricultural Crop Irrigation	3.88	6.77
445547	R D Offutt Company	1973-3334	QBAA	Agricultural Crop Irrigation	38.51	31.56
455526	Johnson, Larry	1989-3578	QBAA	Agricultural Crop Irrigation	7.24	8.77
572591	Johnson, Larry	1996-3146	QBAA	Agricultural Crop Irrigation	4.01	7.21
748983	Rickbeil, Terry	2013-1219	QWTA	Agricultural Crop Irrigation	15.86	19.60
753845	Johnson, Larry	2018-1019		Agricultural Crop Irrigation	1.94	0.60
774683	Ind School District 787	2010-0458		Landscaping/Athletic Field Irrigation	0.77	1.44
809448	Big Boyz Truck and Tire	2015-1146		Other Special Categories	4.30	3.46
132637	J. Brown	1977-3762	QBAA	Agricultural Crop Irrigation	5.17	4.57
	Rickbeil Bros: 1	1967-0974		Agricultural Crop Irrigation	6.89	11.06

(Expressed as **millions of gallons**). Source: MN Dep't. of Natural Resources Division of Waters - MNDNR Permitting and Reporting System.

Note: 1. QBBA – Quaternary Buried Artesian Aquifer, and QWTA - Quaternary Water Table Aquifer


Browerville Wells
Primary
Emergency
Well #4
198646
Well #7
752299
Well #8
764941
Saint Johns Ave N
Perry Ave N
Park Ave N
Gillis Ave N
10th St W
9th St W
8th St W
7th St W
6th St W
CSAH 21
Main St W
Main St N
Main St S
DEPARTMENT OF HEALTH
N
0
500
1,000
Feet
Scoping 1
Locations of Municipal Wells
City of Browerville

DEPARTMENT OF HEALTH

Protecting, Maintaining and Improving the Health of All Minnesotans

July 28, 2022

Mr. Chuck Buhl, Superintendent
Ms. Bobbi Jo Freie, Administrator
City of Browerville
P.O. Box 247
Browerville, Minnesota 56438-0247

Subject: Scoping 2 Decision Notice and Meeting Summary – City of Browerville – PWSID 1770002

Dear Ms. Freie and Mr. Buhl,

This letter provides notice of the results of a scoping meeting held with both of you (city of Browerville), Wayne Cymbaluk (consultant), Katie Breth (Minnesota Rural Water Association), and me on July 19, 2022, at Browerville Community Center regarding wellhead protection (WHP) planning. During the meeting, we discussed the data elements that must be compiled and assessed to prepare the part of the WHP plan related to the management of potential contaminants in the approved drinking water supply management area. The enclosed Scoping 2 Decision Notice lists the data elements discussed at the meeting. We also discussed a summary of planning issues and recommendations that were identified during the Part 1 WHP Plan development process which should be considered for inclusion in your Part 2 WHP Plan.

The city of Browerville has met the requirements to distribute copies of the first part of the WHP plan to local units of government and hold an informational meeting for the public. The city of Browerville will have until January 1, 2026, to complete its WHP plan.

MDH understands a consultant, to be determined, will be working with you to develop a draft of the remainder of the WHP plan. I will be contacting you to review the progress of the development of Part 2 of your plan. Upon request, the Technical Assistance Planner can provide a glossary of terminology, identification of information sources for the required Data Elements, and other technical assistance documents. If you have any questions regarding the enclosed notice, contact me by email at chad.r.anderson@state.mn.us or by phone at 651-201-5847.

Sincerely,

Chad Anderson, Planner
Source Water Protection Unit
3333 Division Street, Suite #212
St. Cloud, Minnesota 56301

CA:ds-b
Enclosures: Scoping 2 Decision Notice, PCSI Requirements, WHP Planning Issues Summary
cc: Jennifer Soltys, MDH Engineer, St. Cloud District Office
Katie Breth, Groundwater Specialist, Minnesota Rural Water Association
Luke Stuewe, Minnesota Department of Agriculture

Date: July 28, 2022

Name of Public Water Supply: City of Browerville

PWSID: 1770002

Name of the Wellhead Protection Co-Managers: Ms. Bobbi Jo Freie, Administrator and
Mr. Chuck Buhl, Superintendent

Address: P.O. Box 247

City: Browerville

Zip: 56438-0247

Phone: 320-594-2201

Primary Unique Well Numbers: 75299 (Well #7), 764941 (Well #8)

DWSMA Vulnerability: ☐ Low ☒Moderate

The purpose for the second scoping meeting, as required by Minnesota Rules, part 4720.5340, is to discuss the information necessary for preparing Part 2 of a Wellhead Protection Plan. The Part 1 Plan identifies the area that provides the source of drinking water for the public water supply (PWS) and assesses how vulnerable that area is to contamination. The PWS can utilize that information to develop land use and management practices that protects their groundwater resource from contamination.

The wellhead rule (Minnesota Rules, part 4720.5340) refers to the information required for wellhead planning as data elements. This notice lists the data elements that are stated in Minnesota Rules, part 4750.5400 and are selected for the PWS because of the vulnerability of the drinking water supply management area (DWSMA) as determined in Part 1.

Scoping 2 Data Elements Needed for the Part 2

Data Elements are pieces of information in the form of a map, a list, records, tables, and inventories. Where appropriate, they should be reviewed and assessed in terms of their present and/or future implications on the 1) use of the well(s), 2) quality and quantity of water supplying the public water supply wells(s), and 3) land and groundwater uses in the DWSMA. It is important to discuss the relevance of the data elements to management of the DWSMA. Check the technical assistance comments for guidance on reviewing the data elements and conducting these assessments. Clearly identify in the plan which data elements are associated with which tables/figures. If a data element does not exist, state that in the narrative.

Submit –

The following information, highlighted with an asterisk* with blue text, MUST be submitted in the Part 2 by including it in the plan narrative and/or appendix.

- ☐ *A map that indicates the vulnerability and includes the DWSMA, WHP Area, and Emergency Response Area must be included in the Part 2. This map with vulnerability is a product of the Part 1 and provides a basis for planning activities in Part 2. SWP Planner can provide the DWSMA figure.

DATA ELEMENTS ABOUT THE LAND USE –

Land Use

- ☐ *An existing map of political boundaries.
- ☐ *An existing map of public land surveys including township, range, and section.

Technical Assistance Comments: A map or maps showing updated political boundaries and township, range, section with labels is required for determining land use authorities for the land within the DWSMA. DWSMA figure map provided by SWP Planner will also contain political boundaries with township, range, and section. Determine and discuss how the various land use authorities may affect the management of the DWSMA.

- A map and an inventory of the current and historical agricultural, residential, commercial, industrial, recreational, and institutional land uses and potential contaminant sources.
  - ☐ *The Potential Contaminant Source Inventory (PCSI) data in both a table and map format must be created and included in the Part 2. Include potential contaminant sources as listed on the PCSI attachment provided for each existing vulnerability within the DWSMA.
    - If DWSMA contains moderate vulnerability inventory all wells.
    - The inventory should include your community wells but not include any wells that are known to have been sealed according to the Minnesota Well Code (MN Rules 4725).
  - ☐ *A land use/land cover map and table. SWP Planner can provide a land cover map and data/table from federal sources. This data set should be used unless an alternative electronic data set that is more current and detailed is available. Assess and discuss changes in land use that could impact management of the DWSMA.

- ☐ *An inventory of the Inner Wellhead Management Zone (IWMZ). A recent IWMZ inventory (within six years) for each primary well with management recommendations on the MDH form, or a table that summarizes the number and type of contaminant sources with the management recommendations must be included. Incorporate or reference the recommendation(s) from the IWMZ into the Part 2. IWMZ will be completed by the SWP Planner with assistance from the PWS staff. A copy will be provided to the PWS.

Technical Assistance Comments: This section encompasses the Potential Contaminant Source Inventory known as the PCSI. See the Scoping 2 Decision Notice Potential Contaminant Source Inventory Requirement Attachment(s) and endorsement procedures/fact sheets for further information. Utilize the PCSI geodatabase attribute template provided by SWP Planner. Management strategies must be developed for potential sources of contamination that pose a risk to the drinking water supply.

- ☐ *An existing comprehensive land-use map.
- ☐ *An existing zoning map.

Technical Assistance Comments: This information can indicate areas in the DWSMA where growth or the addition of potential contaminant sources is likely to occur. Furthermore, the review of local zoning and comprehensive land-use maps facilitates the evaluation of the degree of compatibility current and future land uses have with the PWS goals of protecting the drinking water wells and aquifer

Public Utility Services

- ☐ *An existing map of transportation routes or corridors.

Technical Assistance Comments: Highway and railroad corridors can be used to move hazardous materials. These corridors should be evaluated to determine the level of risk they pose for spills in the DWSMA, considering their proximity to the wells, the local topography, and geologic conditions.

- ☐ *An existing map of storm sewers, sanitary sewers, and public water supply systems.

Technical Assistance Comments: Storm sewer systems and sanitary systems can be sources of contamination. Storm sewers are generally considered a public utility element designed to convey storm water runoff and use constructed features such as pipes and ponds. Evaluate the integrity and condition (age, type of material, any investigative work, etc.) of these systems in the DWSMA, noting the location of the water supply system and public water supply wells in relation to these potential contaminant sources. It is not necessary to include a map of your public water supply system in the Part 2 if you believe it would pose a threat to the security of your system.

☐ *An existing map of the gas and oil pipelines used by gas and oil suppliers.

Technical Assistance Comments: Petroleum pipelines can be sources of contamination (excluding liquefied natural gas pipelines). If possible, describe what is generally known about the condition of these pipelines in the DWSMA, and the readiness of the PWS to respond to an emergency. It is not necessary to include a map in the Part 2 if you believe it would pose a security threat.

Required to be discussed in plan-

The following information (if existing) MUST be reviewed and discussed in the development of the Part 2. The Part 2 narrative must contain a description identifying whether/how the information may influence the management of the DWSMA. The data element may be located in the public domain. While the map or document reviewed is not required to be included in the Part 2, the source of the data element must be provided in the plan narrative by indicating a web address or reference to its location. Provide a statement in the plan narrative if the data element does not apply or does not exist.

DATA ELEMENTS ABOUT THE PHYSICAL ENVIRONMENT –

Water Resources

- An existing map of the boundaries and flow directions of major watershed units and minor watershed units.

Technical Assistance Comments: Identify/list the major and minor watershed(s) in the Part 2 in order to become aware of local water planning efforts such as One Watershed One Plan (1W1P), Watershed Restoration and Protection Strategies (WRAPS), and/or Groundwater Restoration and Protection Strategies (GRAPS).

- An existing map showing those areas delineated as floodplain by existing local ordinances.

Technical Assistance Comments: Assess and describe any issues and management needed in the DWSMA based on the Federal Emergency Management Agency (FEMA) Floodplain 100-year FIRM (Flood Insurance Rate Map) and (or) other State and local floodplain or flooding information. Consult with the WHP Manager to evaluate any potential or historical flooding impacts on the public water supply wells or aquifer. The Inner Well Management Zone report and Sanitary Survey may be used to identify flooding issues and impacts.

DATA ELEMENTS ABOUT THE LAND USE –

Land Use

- An existing map of parcel boundaries.

Technical Assistance Comments: Parcel boundaries may have been used for delineation of the DWSMA in Part 1. In Part 2, parcel identification information must be included or linked and must be used for education or targeting activities or practices in addressing potential contaminants. In the narrative indicate if parcel data is available from the public domain (i.e., county GIS or associated website such as Beacon).

Part 1 -

The following information was reviewed and assessed in developing the Part 1. Some data elements may be in the public domain or non-existent, and others may have been determined by the MDH hydrogeologist to not be applicable to the physical setting, so discussion was not included in the Part 1. The Part 1 should be used as a data source for the Part 2. The technical assistance comments provide the requirements for how this information must be discussed and/or included in the Part 2. Include relevant excerpts or summaries from the Part 1 where indicated.

DATA ELEMENTS ABOUT THE PHYSICAL ENVIRONMENT –

- An existing geologic map and a description of the geology, including aquifers, confining layers, recharge areas, discharge areas, sensitive areas as defined in Minnesota Statutes, section 103H.005, subdivision 13, and groundwater flow characteristics.
- Existing records of the geologic materials penetrated by wells, borings, exploration test holes, or excavations, including those submitted to the department.
- Existing borehole geophysical records from wells, borings, and exploration test holes.
- Existing surface geophysical studies.

Technical Assistance Comments: Provide a summary in the plan narrative (few sentences/paragraph) of the Description of the Hydrologic Setting from Part 1. Provide the conclusions regarding the Well and DWSMA Vulnerabilities related to the geologic conditions and how these conditions influence the management of the DWSMA.

DATA ELEMENTS ABOUT THE LAND USE –

Public Utility Services

- An existing record of construction, maintenance, and use of the public water supply well and other wells within the DWSMA.

Technical Assistance Comments: Well construction records indicate what is known about the well(s) and can indicate if the well(s) have structural integrity or groundwater protection issues. Briefly summarize in the plan narrative what is discussed about each well from the Assessment of Well Vulnerability in Part 1.

DATA ELEMENTS ABOUT WATER QUANTITY –

Groundwater Quantity

- An existing list of wells covered by state appropriation permits, including amounts of water appropriated, type of use, and aquifer source.
- An existing description of known well interference problems and water use conflicts.
- An existing list of state environmental bore holes, including unique well number, aquifer measured, years of record, and average monthly levels.

Technical Assistance Comments: This information, if known, was incorporated into the Part 1, and was used to assist in determining hydrologic boundary conditions and area static water levels. In Part 2, information about Department of Natural Resources appropriation permit holders and any known well interference problems or water use conflicts must be discussed, including how this information could affect the management of the DWSMA.

DATA ELEMENTS ABOUT WATER QUALITY –

Groundwater Quality

- An existing summary of water quality data, including: 1. bacteriological contamination indicators; 2. inorganic chemicals; and 3. organic chemicals.
- An existing list of water chemistry and isotopic data from wells, springs, or other groundwater sampling points.
- An existing report of groundwater tracer studies.

Technical Assistance Comments: This information, if known, was incorporated into the Part 1. Provide a summary of the assessment of well vulnerability and/or any relevant chemistry and isotopic composition data available from PWS wells and other wells/sources.

- An existing site study and well water analysis of known areas of groundwater contamination.
- An existing property audit identifying contamination.
- An existing report to the Minnesota Department of Agriculture and the Minnesota Pollution Control Agency of contaminant spills and releases.

Technical Assistance Comments: This information, if known, was incorporated into the Part 1. Discuss whether there are groundwater contamination areas that could pose a risk to the public water supply well(s) now or in the future. Include any relevant data and how this information may affect the management of the DWSMA.

Revised: 01/2022

To obtain this information in a different format, call: 651-201-4570. Printed on recycled paper.

City of Browerville Scoping 2 Meeting
Wellhead Protection (WHP) Plan Amendment
Summary of Planning Issues

This planning issues summary is intended to guide plan writers and WHP teams when developing their amendment. It highlights key issues identified to date that you should consider and discuss. It should not be considered a list of complete requirements for the amendment.

Public Water Supplier: City of Browerville ("Browerville", or "City")

Summarize the management implications from minor changes in DWSMA or vulnerability:

- Both the new WHPA and DWSMA are significantly smaller than the previous protection areas delineated 2010 (Figure 7). The decrease in protection areas is largely due to a change in the groundwater modeling approach. Smaller DWSMA means less land outside city jurisdiction to consider for management, and possibly fewer potential contaminant sources.

Community changes and implications for management:

- Browerville has experienced population growth of 1.2% since 2000. If no high-consumption businesses and/or industries establish themselves in the next 10 years, major changes in pumping rates would not be anticipated.

Key management activities to carry forward:

Note to plan writer: Update current language so management strategies are SMART (Specific, Measurable, Achievable, Relevant/Realistic, Timing). Consider using the MDH Management Strategy Catalog.

- An evaluation of the activities proposed in the WHP Plan of Action from the 2011 WHP Plan (Chapter 5) suggests that five of the activities proposed were not completed as of the time the evaluation was conducted (May 24, 2021). These activities include Measures 1 (Municipal Well Management Practices), 6 (Private Well Management Practices), 13 (High Capacity Well Management), 18 (Well Inventory and Prioritization), and 25 (WHP Coordination, Tracking and Reporting). MDH recommends that Browerville review each Measure to confirm that the activity was not completed or is perhaps not applicable, and to determine whether each Measure should be a part of the next WHP Plan of Action.

- The May 2021 evaluation of the activities proposed in the 2011 WHP Plan indicates that Measures 2,3,4,5,7,8,9,10,11,12,14,15,16,17,19,20,21,22,23,24, and 26 were all completed. The nature of some of these actions is such that once they are complete, they may be eliminated,

while the amended WHP Plan may be better with the continuation of several of the measures. MDH recommends that Browerville analyze the management strategies that were written/included previously to determine which should be carried over to the new WHP Plan and if the language should be refined to fall in line more closely with the team's experience with implementing the measure and their success/failure with it.

New management strategies to consider:

- Field verify newly constructed wells within one mile of the DWSMA – year 5 or 6 activity (to coincide with water quality monitoring). This information may allow a better understanding of the extent and thickness of the city's aquifers and could result in a more refined WHPA in the future.
- Water Quality Monitoring: The standard assessment monitoring package should be analyzed during year six, 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.
- If the city considers that a new well could be necessary in next 10 years, it is recommended to include exploration/test well construction as a measure.

Old municipal wells that need to be sealed:

- The Old Municipal Well report for Browerville lists three active municipal wells [#s 4 (Emergency), and 7 – 8], with two inactive wells (Wells 5-6). If Wells 5-6 are eventually abandoned, they should be promptly sealed.

Important partnerships to maintain or establish:

- Todd County/Todd SWCD/Todd County Public Works Department/Todd County Emergency Management;
- Pertinent Townships;
- MDH, DNR, MNDOT, MPCA, MRWA.

Water quantity issues and implications:

- Existing data do not suggest water quantity issues.

Water quality issues and implications:

- The city's water supply wells are considered vulnerable to contamination due to tritium being detected. This is reinforced by the chloride concentrations and chloride/bromide ratios detected at Wells 7 & 8. Elevated concentrations or concentration ratios indicate human-impacted water quality from activities at the land surface such as road salt or wastewater.
- At present, none of the contaminants for which the Safe Drinking Water Act has established health-based standards is found above maximum allowable levels in the utility's water supply, nor are any present at one-half of those levels.

Sanborn Maps:

☐ Sanborn Maps are available for this area.

☒ Sanborn Maps are not available for this area.

APPENDIX III:

PCSI and DWSMA Parcel List

PCSI ID	PIN	FAC_NAME	ADDRESS	CITY	ZIP	STAT	PCS_C	PROGRAM_ID	TOTAL	COMMENT
1	30-4002900	Browerville Public Schools	620 PARK AVE N	Browerville	56438	A	UST	TS0009537	1	Active Underground Tank Fuel Oil 6000 Gal
2	12-0009200	RICHARD HALLEK	393 5TH ST W	Browerville	56438	A	WEL	258086	1	4 inch CASING, 54 feet Depth
3	12-0008200	ROBERT ENGLE	698 5TH ST W	Browerville	56438	A	WEL	258042	1	4 inch CASING, 25 feet Depth
4	30-4002200	BROWERVILLE HIGH SCHOOL	NA	Browerville	56438	A	WEL	513132	1	8 inch CASING, 72 feet Depth
5	30-0026400	SUE WIERSGALLA	208 8TH ST W	Browerville	56438	A	WEL	258098	1	4 Inch CASING, 120 feet Depth
6	12-0007501	ROBERT SADLO	761 8TH ST W	Browerville	56438	A	WEL	258085	1	4 inch CASING, 56 feet Depth
7	12-0008000	BERNICE HADASH	22904 COUNTY 14	Browerville	56438	A	WEL	258095	1	4 inch CASING, 137 feet Depth
8	12-0007900	LEE & LLOYD BUSCH	22636 COUNTY 14	Browerville	56438	A	WEL	672459	1	4 inch CASING, 82 feet Depth
9	13-0012200	LEE & LLOYD BUSCH	31223 225TH AVE	Browerville	56438	A	WEL	NA	1	HAND DUG, 20 feet Depth
10	13-0011900	GARY DRAYNA	NA	Browerville	56438	A	WEL	NA	1	4 inch CASING, 55 feet Depth
11	30-0004000	TEST HOLE #7	331 5TH ST W	Browerville	56438	A	WEL	00258044	1	
12	12-4000400	TEST HOLE #4	707 8TH ST W	Browerville	56438	A	WEL	00258041	1	
13	12-0007500	TEST HOLE #5	NA	Browerville	56438	A	WEL	00258042	1	
14	12-4000400	Well #7	707 8TH ST W	Browerville	56438	A	WEL	1770002S05	1	City Public Water Supply Well
15	30-4002000	Well #8	640 N GILLIS AVE	Browerville	56438	A	WEL	1770002S06	1	City Public Water Supply Well
16	12-4001100	Browerville City Pool Well	515 6TH ST W	Browerville	56438	A	WEL	266631	1	Browerville City Pool Well

Additional parcel information can be found on the Todd County Website.

APPENDIX IV:

Inner Well Management Zone (IWMZ)

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

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1770002 **COMMUNITY**
NAME	Browerville
ADDRESS	Browerville Water Superintendent, Browerville City Hall, PO Box 247, 544 North Main Street, Browerville, MN 56438

FACILITY (WELL) INFORMATION

NAME	Well #7
SAMPLE POINT ID	S05
UNIQUE WELL NO.	752299
COUNTY	Todd

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1770002 S05	**UNIQUE WELL NO.**	752299

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
Agricultural Related							
*AC1	Agricultural chemical buried piping	50	50		N		
*AC2	Agricultural chemical multiple tanks or containers for residential retail sale or use, no single tank or container exceeding, but aggregate volume exceeding 56 gal. or 100 lbs. dry weight	50	50		N		
ACP	Agricultural chemical tank or container with 25 gal. or more or 100 lbs. or more dry weight, or equipment filling or cleaning area without safeguards	150	150		N		
ACS	Agricultural chemical storage or equipment filling or cleaning area with safeguards	100	100		N		
ACR	Agricultural chemical storage or equipment filling or cleaning area with safeguards and roofed	50	50		N		
ADW	Agricultural drainage well[2] (Class V well - illegal[3])	50	50		N		
AAT	Anhydrous ammonia tank (stationary tank)	50	50		N		
AB1	Animal building, feedlot, confinement area, or kennel, 0.1 to 1.0 animal unit (stockyard)	50	20	100/40	N		
AB2	Animal building or poultry building, including a horse riding area, more than 1.0 animal unit	50	50	100	N		
ABS	Animal burial area, more than 1.0 animal unit	50	50		N		
FWP	Animal feeding or watering area within a pasture, more than 1.0 animal unit	50	50	100	N		
AF1	Animal feedlot, unroofed, 300 or more animal units (stockyard)	100	100	200	N		
AF2	Animal feedlot, more than 1.0, but less than 300 animal units (stockyard)	50	50	100	N		
AMA	Animal manure application	use discretion	use discretion		N		
REN	Animal rendering plant	50	50		N		
MS1	Manure (liquid) storage basin or lagoon, unpermitted or noncertified	300	300	600	N		
MS2	Manure (liquid) storage basin or lagoon, approved earthen liner	150	150	300	N		
MS3	Manure (liquid) storage basin or lagoon, approved concrete or composite liner	100	100	200	N		
MS4	Manure (solid) storage area, not covered with a roof	100	100	200	N		
OSC	Open storage for crops	use discretion	use discretion		N		
SSTS Related							
AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	N		
AA2	Absorption area of a soil dispersal system serving a facility handling infectious or pathological wastes, average flow 10,000 gal./day or less	150	150	300	N		
AA3	Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	50	50	100	Y	185	N
AA4	Absorption area of a soil dispersal system serving multiple family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well)[2]	50/300/150[4]	50/300/150[4]	100/600/300[4]	N		
CSP	Cesspool	75	75	150	N		
AGG	Dry well, leaching pit, seepage pit	75	75	150	N		
*FD1	Floor drain, grate, or trough connected to a buried sewer	50	50		N		
*FD2	Floor drain, grate, or trough if buried sewer is air-tested, approved materials, serving one building, or two or less single-family residences	50	20		N		

PWS ID / SAMPLE POINT ID	1770002 S05	UNIQUE WELL NO.	752299

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		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		N		
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		

PWS ID / SAMPLE POINT ID	1770002 S05	UNIQUE WELL NO.	752299

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				
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
	none found within 200' of this well.						

* New potential contaminant source.

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

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

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

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

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

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

PWS ID / SAMPLE POINT ID	1770002 S05	UNIQUE WELL NO.	752299

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

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

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

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

INSPECTOR	Breth, Katie	DATE	6 - 29 - 2021

PWS ID / SAMPLE POINT ID	1770002 S05	UNIQUE WELL NO.	752299

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Provide drainfield (septic system) education materials to Property Owner.		

COMMENTS

For further information, please contact:

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

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

Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1770002 **COMMUNITY**
NAME	Browerville
ADDRESS	Browerville Water Superintendent, Browerville City Hall, PO Box 247, 544 North Main Street, Browerville, MN 56438

FACILITY (WELL) INFORMATION

NAME	Well #8
SAMPLE POINT ID	S06
UNIQUE WELL NO.	764941
COUNTY	Todd

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1770002 S06	**UNIQUE WELL NO.**	764941

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
Agricultural Related							
*AC1	Agricultural chemical buried piping	50	50		N		
*AC2	Agricultural chemical multiple tanks or containers for residential retail sale or use, no single tank or container exceeding, but aggregate volume exceeding 56 gal. or 100 lbs. dry weight	50	50		N		
ACP	Agricultural chemical tank or container with 25 gal. or more or 100 lbs. or more dry weight, or equipment filling or cleaning area without safeguards	150	150		N		
ACS	Agricultural chemical storage or equipment filling or cleaning area with safeguards	100	100		N		
ACR	Agricultural chemical storage or equipment filling or cleaning area with safeguards and roofed	50	50		N		
ADW	Agricultural drainage well[2] (Class V well - illegal[3])	50	50		N		
AAT	Anhydrous ammonia tank (stationary tank)	50	50		N		
AB1	Animal building, feedlot, confinement area, or kennel, 0.1 to 1.0 animal unit (stockyard)	50	20	100/40	N		
AB2	Animal building or poultry building, including a horse riding area, more than 1.0 animal unit	50	50	100	N		
ABS	Animal burial area, more than 1.0 animal unit	50	50		N		
FWP	Animal feeding or watering area within a pasture, more than 1.0 animal unit	50	50	100	N		
AF1	Animal feedlot, unroofed, 300 or more animal units (stockyard)	100	100	200	N		
AF2	Animal feedlot, more than 1.0, but less than 300 animal units (stockyard)	50	50	100	N		
AMA	Animal manure application	use discretion	use discretion		N		
REN	Animal rendering plant	50	50		N		
MS1	Manure (liquid) storage basin or lagoon, unpermitted or noncertified	300	300	600	N		
MS2	Manure (liquid) storage basin or lagoon, approved earthen liner	150	150	300	N		
MS3	Manure (liquid) storage basin or lagoon, approved concrete or composite liner	100	100	200	N		
MS4	Manure (solid) storage area, not covered with a roof	100	100	200	N		
OSC	Open storage for crops	use discretion	use discretion		N		
SSTS Related							
AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	N		
AA2	Absorption area of a soil dispersal system serving a facility handling infectious or pathological wastes, average flow 10,000 gal./day or less	150	150	300	N		
AA3	Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	50	50	100	N		
AA4	Absorption area of a soil dispersal system serving multiple family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well)[2]	50/300/150[4]	50/300/150[4]	100/600/300[4]	N		
CSP	Cesspool	75	75	150	N		
AGG	Dry well, leaching pit, seepage pit	75	75	150	N		
*FD1	Floor drain, grate, or trough connected to a buried sewer	50	50		N		
*FD2	Floor drain, grate, or trough if buried sewer is air-tested, approved materials, serving one building, or two or less single-family residences	50	20		N		

PWS ID / SAMPLE POINT ID	1770002 S06	UNIQUE WELL NO.	764941

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	175	N
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		Y	133	N
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		Y	77	N
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		N		
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		

PWS ID / SAMPLE POINT ID	1770002 S06	UNIQUE WELL NO.	764941

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				
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
	none found within 200' of this well.						

* New potential contaminant source.

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

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

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

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

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

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

PWS ID / SAMPLE POINT ID	1770002 S06	UNIQUE WELL NO.	764941

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

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

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

Reminder Question: Were the wellhead protection measure(s) implemented?			
INSPECTOR	Breth, Katie	DATE	6 - 29 - 2021

PWS ID / SAMPLE POINT ID	1770002 S06	UNIQUE WELL NO.	764941

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

Environmental Health Division
Drinking Water Protection Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1770002 **COMMUNITY**
NAME	Browerville
ADDRESS	Browerville Water Superintendent, Browerville City Hall, PO Box 247, 544 North Main Street, Browerville, MN 56438

FACILITY (WELL) INFORMATION

NAME	Well #4
SAMPLE POINT ID	S01
UNIQUE WELL NO.	198646
COUNTY	Todd

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1770002 S01	**UNIQUE WELL NO.**	198646

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
Agricultural Related							
*AC1	Agricultural chemical buried piping	50	50		N		
*AC2	Agricultural chemical multiple tanks or containers for residential retail sale or use, no single tank or container exceeding, but aggregate volume exceeding 56 gal. or 100 lbs. dry weight	50	50		N		
ACP	Agricultural chemical tank or container with 25 gal. or more or 100 lbs. or more dry weight, or equipment filling or cleaning area without safeguards	150	150		N		
ACS	Agricultural chemical storage or equipment filling or cleaning area with safeguards	100	100		N		
ACR	Agricultural chemical storage or equipment filling or cleaning area with safeguards and roofed	50	50		N		
ADW	Agricultural drainage well[2] (Class V well - illegal[3])	50	50		N		
AAT	Anhydrous ammonia tank (stationary tank)	50	50		N		
AB1	Animal building, feedlot, confinement area, or kennel, 0.1 to 1.0 animal unit (stockyard)	50	20	100/40	N		
AB2	Animal building or poultry building, including a horse riding area, more than 1.0 animal unit	50	50	100	N		
ABS	Animal burial area, more than 1.0 animal unit	50	50		N		
FWP	Animal feeding or watering area within a pasture, more than 1.0 animal unit	50	50	100	N		
AF1	Animal feedlot, unroofed, 300 or more animal units (stockyard)	100	100	200	N		
AF2	Animal feedlot, more than 1.0, but less than 300 animal units (stockyard)	50	50	100	N		
AMA	Animal manure application	use discretion	use discretion		N		
REN	Animal rendering plant	50	50		N		
MS1	Manure (liquid) storage basin or lagoon, unpermitted or noncertified	300	300	600	N		
MS2	Manure (liquid) storage basin or lagoon, approved earthen liner	150	150	300	N		
MS3	Manure (liquid) storage basin or lagoon, approved concrete or composite liner	100	100	200	N		
MS4	Manure (solid) storage area, not covered with a roof	100	100	200	N		
OSC	Open storage for crops	use discretion	use discretion		N		
SSTS Related							
AA1	Absorption area of a soil dispersal system, average flow greater than 10,000 gal./day	300	300	600	N		
AA2	Absorption area of a soil dispersal system serving a facility handling infectious or pathological wastes, average flow 10,000 gal./day or less	150	150	300	N		
AA3	Absorption area of a soil dispersal system, average flow 10,000 gal./day or less	50	50	100	N		
AA4	Absorption area of a soil dispersal system serving multiple family residences or a non-residential facility and has the capacity to serve 20 or more persons per day (Class V well)[2]	50/300/150[4]	50/300/150[4]	100/600/300[4]	N		
CSP	Cesspool	75	75	150	N		
AGG	Dry well, leaching pit, seepage pit	75	75	150	N		
*FD1	Floor drain, grate, or trough connected to a buried sewer	50	50		N		
*FD2	Floor drain, grate, or trough if buried sewer is air-tested, approved materials, serving one building, or two or less single-family residences	50	20		N		

PWS ID / SAMPLE POINT ID	1770002 S01	UNIQUE WELL NO.	198646

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		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		Y	58	N
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		Y	97	
WEL	Operating well	record dist.	record dist.		Y	194	
WEL	Operating well	record dist.	record dist.		Y	165	
WEL	Operating well	record dist.	record dist.		Y	31	
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		

PWS ID / SAMPLE POINT ID	1770002 S01	UNIQUE WELL NO.	198646

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		
Additional Sources (If there is more than one source listed above, please indicate here).							
Potential Contamination Sources and Codes Based on Previous Versions of this Form							
	none found within 200' of this well.						

* New potential contaminant source.

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

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

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

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

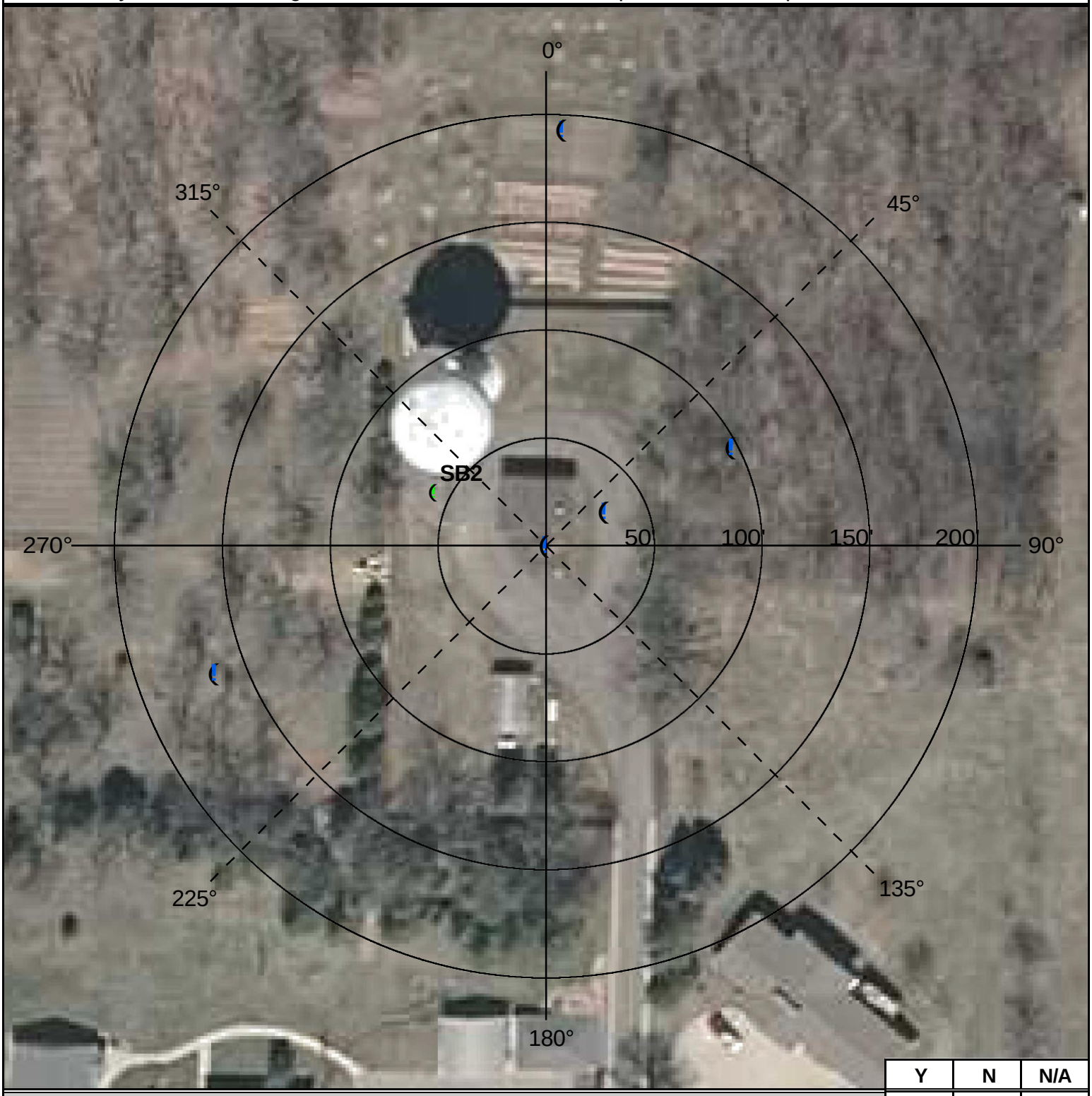
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls;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

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

PWS ID / SAMPLE POINT ID	1770002 S01	UNIQUE WELL NO.	198646

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

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



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

Reminder Question: Were the wellhead protection measure(s) implemented?			
INSPECTOR	Breth, Katie	DATE	6 - 29 - 2021

PWS ID / SAMPLE POINT ID	1770002 S01	UNIQUE WELL NO.	198646

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Seal inactive PWS Wells # 5 and 6 as noted in WHP Plan.		
Any sewer lines that are observed to be leaking, cracked, or deteriorated, should be replaced.		

COMMENTS

9/7/2003 - Location for PCSI Type SBM (bearing = 0, distance = 0 , inventory date: 12/8/1998) could not be determined.Browerville 6 is sealed as are test wells.

For further information, please contact:

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

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

APPENDIX V:

2021 Consumer Confidence Report

Browerville 2021 Drinking Water Report

Making Safe Drinking Water

Your drinking water comes from a groundwater source: two wells ranging from 80 to 86 feet deep, that draw water from the Quaternary Buried Artesian aquifer.

Browerville works hard to provide you with safe and reliable drinking water that meets federal and state water quality requirements. The purpose of this report is to provide you with information on your drinking water and how to protect our precious water resources.

Contact Bobbi Jo Freie, City Administrator, at 320-594-2201 or ctybrow@browervillemn.com if you have questions about Browerville's drinking water. You can also ask for information about how you can take part in decisions that may affect water quality.

The U.S. Environmental Protection Agency sets safe drinking water standards. These standards limit the amounts of specific contaminants allowed in drinking water. This ensures that tap water is safe to drink for most people. The U.S. Food and Drug Administration regulates the amount of certain contaminants in bottled water. Bottled water must provide the same public health protection as public tap water.

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

Browerville Monitoring Results

This report contains our monitoring results from January 1 to December 31, 2021.

We work with the Minnesota Department of Health to test drinking water for more than 100 contaminants. It is not unusual to detect contaminants in small amounts. No water supply is ever completely free of contaminants. Drinking water standards protect Minnesotans from substances that may be harmful to their health.

Learn more by visiting the Minnesota Department of Health's webpage Basics of Monitoring and testing of Drinking Water in Minnesota (https://www.health.state.mn.us/communities/environment/water/factsheet/sampling.html).

How to Read the Water Quality Data Tables

The tables below show the contaminants we found last year or the most recent time we sampled for that contaminant. They also show the levels of those contaminants and the Environmental Protection Agency's limits. Substances that we tested for but did not find are not included in the tables.

We sample for some contaminants less than once a year because their levels in water are not expected to change from year to year. If we found any of these contaminants the last time we sampled for them, we included them in the tables below with the detection date.

We may have done additional monitoring for contaminants that are not included in the Safe Drinking Water Act. To request a copy of these results, call the Minnesota Department of Health at 651-201-4700 between 8:00 a.m. and 4:30 p.m., Monday through Friday.

Some contaminants are monitored regularly throughout the year, and rolling (or moving) annual averages are used to manage compliance. Because of this averaging, there are times where the Range of Detected Test Results for the calendar year is lower than the Highest Average or Highest Single Test Result, because it occurred in the previous calendar year.

Definitions

- **AL (Action Level)**: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
- **EPA:** Environmental Protection Agency
- **MCL (Maximum contaminant level)**: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
- **MCLG (Maximum contaminant level goal)**: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
- **MRDL (Maximum residual disinfectant level):** The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
- **MRDLG (Maximum residual disinfectant level goal)**: The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
- **N/A (Not applicable)**: Does not apply.
- **ppb (parts per billion)**: One part per billion in water is like one drop in one billion drops of water, or about one drop in a swimming pool. ppb is the same as micrograms per liter (μg/l).
- **ppm (parts per million)**: One part per million is like one drop in one million drops of water, or about one cup in a swimming pool. ppm is the same as milligrams per liter (mg/l).
- **PWSID**: Public water system identification.

Monitoring Results – Regulated Substances

LEAD AND COPPER – Tested at customer taps.

Contaminant (Date, if sampled in previous year)	**EPA's Ideal Goal** (MCLG)	**EPA's Action Level**	**90% of Results Were Less Than**	**Number of Homes with High Levels**	**Violation**	**Typical Sources**
Lead (08/10/20)	0 ppb	90% of homes less than 15 ppb	2 ppb	0 out of 10	NO	Corrosion of household plumbing.
Copper (08/10/20)	0 ppm	90% of homes less than 1.3 ppm	0.38 ppm	0 out of 10	NO	Corrosion of household plumbing.

INORGANIC & ORGANIC CONTAMINANTS – Tested in drinking water.

Contaminant (Date, if sampled in previous year)	**EPA's Ideal Goal** (MCLG)	**EPA's Limit** (MCL)	**Highest Average or Highest Single Test Result**	**Range of Detected Test Results**	**Violation**	**Typical Sources**
Nitrate	10 ppm	10.4 ppm	0.15 ppm	N/A	NO	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.

CONTAMINANTS RELATED TO DISINFECTION – Tested in drinking water.

Substance (Date, if sampled in previous year)	**EPA's Ideal Goal** (MCLG or MRDLG)	**EPA's Limit** (MCL or MRDL)	**Highest Average or Highest Single Test Result**	**Range of Detected Test Results**	**Violation**	**Typical Sources**
Total Trihalomethanes (TTHMs)	N/A	80 ppb	43.1 ppb	N/A	NO	By-product of drinking water disinfection.
Total Haloacetic Acids (HAA)	N/A	60 ppb	10.5 ppb	N/A	NO	By-product of drinking water disinfection.
Total Chlorine	4.0 ppm	4.0 ppm	0.46 ppm	0.15 - 0.64 ppm	NO	Water additive used to control microbes.

Total HAA refers to HAA5

OTHER SUBSTANCES – Tested in drinking water.

Substance (Date, if sampled in previous year)	**EPA's Ideal Goal** (MCLG)	**EPA's Limit** (MCL)	**Highest Average or Highest Single Test Result**	**Range of Detected Test Results**	**Violation**	**Typical Sources**
Fluoride	4.0 ppm	4.0 ppm	0.68 ppm	0.59 - 0.62 ppm	NO	Erosion of natural deposits; Water additive to promote strong teeth.

Potential Health Effects and Corrective Actions (If Applicable)

Fluoride: Fluoride is nature's cavity fighter, with small amounts present naturally in many drinking water sources. There is an overwhelming weight of credible, peer-reviewed, scientific evidence that fluoridation reduces tooth decay and cavities in children and adults, even when there is availability of fluoride from other sources, such as fluoride toothpaste and mouth rinses. Since studies show that optimal fluoride levels in drinking water benefit public health, municipal community water systems adjust the level of fluoride in the water to an optimal concentration between 0.5 to 0.9 parts per million (ppm) to protect your teeth. Fluoride levels below 2.0 ppm are not expected to increase the risk of a cosmetic condition known as enamel fluorosis.

Monitoring Results – Unregulated Substances

In addition to testing drinking water for contaminants regulated under the Safe Drinking Water Act, we sometimes also monitor for contaminants that are not regulated. Unregulated contaminants do not have legal limits for drinking water.

Detection alone of a regulated or unregulated contaminant should not cause concern. The meaning of a detection should be determined considering current health effects information. We are often still learning about the health effects, so this information can change over time.

The following table shows the unregulated contaminants we detected last year, as well as human-health based guidance values for comparison, where available. The comparison values are based only on potential health impacts and do not consider our ability to measure contaminants at very low concentrations or the cost and technology of prevention and/or treatment. They may be set at levels that are costly, challenging, or impossible for water systems to meet (for example, large-scale treatment technology may not exist for a given contaminant).

A person drinking water with a contaminant at or below the comparison value would be at little or no risk for harmful health effects. If the level of a contaminant is above the comparison value, people of a certain age or with special health conditions - like a fetus, infants, children, elderly, and people with impaired immunity – may need to take extra precautions. Because these contaminants are unregulated, EPA and MDH require no particular action based on detection of an unregulated contaminant. We are notifying you of the unregulated contaminants we have detected as a public education opportunity.

- More information is available on MDH's A-Z List of Contaminants in Water (https://www.health.state.mn.us/communities/environment/water/contaminants/index.html) and Fourth Unregulated Contaminant Monitoring Rule (UCMR 4) (https://www.health.state.mn.us/communities/environment/water/com/ucmr4.html).

UNREGULATED CONTAMINANTS – Tested in drinking water.

Contaminant	Comparison Value	Highest Average Result or Highest Single Test Result	Range of Detected Test Results
Sodium*	20 ppm	6.74 ppm	N/A
Sulfate	500 ppm	61.8 ppm	N/A

*Note that home water softening can increase the level of sodium in your water.

Some People Are More Vulnerable to Contaminants in Drinking Water

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. The developing fetus and therefore pregnant women

may also be more vulnerable to contaminants in drinking water. These people or their caregivers should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline at 1-800-426-4791.

Learn More about Your Drinking Water

Drinking Water Sources

Minnesota's primary drinking water sources are groundwater and surface water. Groundwater is the water found in aquifers beneath the surface of the land. Groundwater supplies 75 percent of Minnesota's drinking water. Surface water is the water in lakes, rivers, and streams above the surface of the land. Surface water supplies 25 percent of Minnesota's drinking water.

Contaminants can get in drinking water sources from the natural environment and from people's daily activities. There are five main types of contaminants in drinking water sources.

- **Microbial contaminants,** such as viruses, bacteria, and parasites. Sources include sewage treatment plants, septic systems, agricultural livestock operations, pets, and wildlife.
- **Inorganic contaminants** include salts and metals from natural sources (e.g. rock and soil), oil and gas production, mining and farming operations, urban stormwater runoff, and wastewater discharges.
- **Pesticides and herbicides** are chemicals used to reduce or kill unwanted plants and pests. Sources include agriculture, urban stormwater runoff, and commercial and residential properties.
- **Organic chemical contaminants** include synthetic and volatile organic compounds. Sources include industrial processes and petroleum production, gas stations, urban stormwater runoff, and septic systems.
- **Radioactive contaminants** such as radium, thorium, and uranium isotopes come from natural sources (e.g. radon gas from soils and rock), mining operations, and oil and gas production.

The Minnesota Department of Health provides information about your drinking water source(s) in a source water assessment, including:

- How Browerville is protecting your drinking water source(s);
- Nearby threats to your drinking water sources;
- How easily water and pollution can move from the surface of the land into drinking water sources, based on natural geology and the way wells are constructed.

Find your source water assessment at Source Water Assessments (https://www.health.state.mn.us/communities/environment/water/swp/swa) or call 651-201-4700 between 8:00 a.m. and 4:30 p.m., Monday through Friday.

Lead in Drinking Water

You may be in contact with lead through paint, water, dust, soil, food, hobbies, or your job. Coming in contact with lead can cause serious health problems for everyone. There is no safe level of lead. Babies, children under six years, and pregnant women are at the highest risk.

Lead is rarely in a drinking water source, but it can get in your drinking water as it passes through lead service lines and your household plumbing system. Browerville is responsible for providing high quality drinking water, but it cannot control the plumbing materials used in private buildings.

Read below to learn how you can protect yourself from lead in drinking water.

1. **Let the water run** for 30-60 seconds before using it for drinking or cooking if the water has not been turned on in over six hours. If you have a lead service line, you may need to let the water run longer. A service line is the underground pipe that brings water from the main water pipe under the street to your home.
    - You can find out if you have a lead service line by contacting your public water system, or you can check by following the steps at: https://www.mprnews.org/story/2016/06/24/npr-find-lead-pipes-in-your-home
    - The only way to know if lead has been reduced by letting it run is to check with a test. If letting the water run does not reduce lead, consider other options to reduce your exposure.
2. **Use cold water** for drinking, making food, and making baby formula. Hot water releases more lead from pipes than cold water.
3. **Test your water.** In most cases, letting the water run and using cold water for drinking and cooking should keep lead levels low in your drinking water. If you are still concerned about lead, arrange with a laboratory to test your tap water. Testing your water is important if young children or pregnant women drink your tap water.
    - Contact a Minnesota Department of Health accredited laboratory to get a sample container and instructions on how to submit a sample:
      Environmental Laboratory Accreditation Program
      (https://eldo.web.health.state.mn.us/public/accreditedlabs/labsearch.seam)
      The Minnesota Department of Health can help you understand your test results.
4. **Treat your water** if a test shows your water has high levels of lead after you let the water run.
    - Read about water treatment units:
      Point-of-Use Water Treatment Units for Lead Reduction
      (https://www.health.state.mn.us/communities/environment/water/factsheet/poulead.html)

Learn more:

- Visit Lead in Drinking Water
  (https://www.health.state.mn.us/communities/environment/water/contaminants/lead.html)
- Visit Basic Information about Lead in Drinking Water (http://www.epa.gov/safewater/lead)
- Call the EPA Safe Drinking Water Hotline at 1-800-426-4791.To learn about how to reduce your contact with lead from sources other than your drinking water, visit Common Sources (https://www.health.state.mn.us/communities/environment/lead/fs/common.html).

APPENDIX VI:

Utility Maps – Located at City Hall

APPENDIX VII:

Old Municipal Well Inventory

DEPARTMENT OF HEALTH

Protecting, Maintaining and Improving the Health of All Minnesotans

Old Municipal Well Report for Browerville

PWSID: 1770002

MDH

May 2019

Minnesota Department of Health
Environmental Health in Minnesota

MDH Public Water Supply Sources Report

PWSID: **1770002**
PWS Name: **Browerville**
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 imcomplete 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)
S01	**Well #4**	GW	Emergency	Active	198646 **O***	10/07/1999 (T. Johnson)	1983	**108**	92	12	08-20-1983	**107**	92	12
S02	**Well #5**	GW	Other	Inactive	239924 **O***	10/07/1999 (T. Johnson)	**1987**	**96**	81	12	**09-24-1986**	**97**		12
S03	**Well #6**	GW	Other	Inactive	603816 **R***	10/07/1999 (T. Johnson)	1997	105	86	12	10-29-1997	105	86	12
S05	**Well #7**	GW	Primary	Active	752299	12/11/2009 (J. Walsh)	2007	86	61	12	11-21-2007	86	61	12
S06	**Well #8**	GW	Primary	Active	764941	12/11/2009 (J. Walsh)	2008	80	60	12	10-17-2008	80	60	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)
S04	**Well #7**	GW	Sealed	Inactive	603816 **S***	duplicate of 1770002S03	1997	105	86	0	10-29-1997	105	86	12

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
Well A	Well No. 1	221501	48	48	36	8	Before 1924	Cable Tool/Bored			1987	Pumping station in the central portion of the village. Lots 1-6, Block 11.	Combined dug and drilled well. Dug portion is 12 ft wide X 20 ft deep. Sealed 1987.

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
												NE corner of tract.	
Well B	Well No. 2	221502	50		40	16	1953					S end of the town at the center of a 100 sq ft tract of land at the SE corner of First and Main Streets.	
Well C	Well No. 3	240133	54	54	46	8	1962	Cable Tool/Bored			1987	Lots 1-6, Block 11, 108 ft SW of Well No. 1	Sealed 1987.
Well D	Well No. 4	198646 S*	108	107	92	12	1983	Rotary/Drilled					Emergency active.
Well E	Well No. 5	239924 S*	97	97		12	1986	Rotary/Drilled					Inactive.

Databases Searched	Remarks
County Well Index (1-mile radius); MDH DWP Microfiche; MDH 1988-2002 Muni Well Inventory (1Suite); Biennial Report of the MN State Dairy and Food Commissioner-1907; Minnesota Geological Survey City Well File Folders; MGS Bulletin (22, 27, 31, or 32); MDH DWP MNDWIS; MN Historical Soc.- Fire Underwriters Insp. Bureau (Fisher) historical map ; Sanborn Fire Insurance Maps; MDH WELLS	

Old Municipal Well Data Compiled By: **Mara Boulanger** Compiled Date: **5/17/2019 10:17:07 AM**

OLD MUNICIPAL Well Data - the following data are from RAW HYDRO spreadsheets, and need to be processed accordingly.

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			Dug: 14 feet Drilled: additional 60 feet Total: 74 feet			10 inch	Pre-1924	Dug and Drilled	No mention after 1931				
2	Well Number (No.)1	221501	Dug: 20 feet Drilled: additional 36 feet Total: 56 feet 1968: 48 feet		24-56 feet	Dug: 12 feet Drilled: 8 inch	1931 Redrilled in 1959?	Dug and Drilled	*Dug portion was filled in; start date was 1955, end date was 1959			*Central part of the village *Adjacent to the Pumphouse *Lots 1-6 , Block 11 of the Original Town	
3	Well No. 2	221502	50 feet		0-40 feet	16 inch	1954	Drilled				*Central part of the village *Southeast corner of First and Main Street	
4													

OLD MUNICIPAL Well Data - the following data are from RAW HYDRO spreadsheets, and need to be processed accordingly.													
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
	Cross Connection of Todd County Dairy Cooperative											*Established in 1954 *Connection broken in 1957	
5	Well No. 3	240133	1962: 44 feet 1981: 54 feet		1962: 0-35 feet 1981: 0-46 feet	1962: 10 inch 1979: 8 inch liner	1962: 10 inch well 1979: 8 inch liner well added	Drilled				*Center part of the village *108 feet Southwest of Well No.1 *Lots 1-6, Block 11 of the Original Town	
6	Well No. 4 (STILL IN USE)	198646 S*											
7	Well No. 5 (STILL IN USE)	239924 S*											
Databases Searched					**Remarks**								
Old Municipal Well Data Compiled By: **Jim Walsh** Compiled Date: **6/28/2011**													

Source: MN Dep't. of Health - 5/17/2019

Use of MDH Public Water Supply Sources Report

The report you have received shows three classes of Public Water Supply wells:

- In Use (actively used)
- Removed From Flow (for back-up or emergency use; may be disconnected from PWS)
- **Old Municipal Wells (unused wells with no documented location, unique ID number, and/or well sealing record)**

Old Municipal Wells are unsealed, abandoned wells. These wells pose a risk of contamination to existing wells and aquifers. According to State Well Code and under the terms of your Wellhead Protection Plan, your PWS may need to identify, locate, and properly seal Old Municipal Wells within your Drinking Water Supply Management Area, to current MDH standards. While historical records may indicate that some of these wells were "capped", "abandoned", or "sealed" in the past, unless it can be shown that the sealing was performed to current standards, they may need to be located, cleaned out, and sealed properly with a well sealing record issued.

The report lists database references that were searched to compile the report. Under "Remarks" are notes and questions to help you with this process. State grant funding is available to help fund sealing of these old public water supply wells.

If you have questions, please talk to your MDH Planner or Hydrologist to address your PWS's specific issues. This report is not intended to be the "last word" on the status of Old Municipal Wells and your input will be critical in successfully finding and sealing these potential sources of contamination.

Restart

APPENDIX VIII:

Comprehensive Plan Future Land Use Map – Map available for viewing at City Hall

APPENDIX IX:

Glossary of Terms

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 103I.005, subdivision 24).

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