Wellhead Protection Plan Part II Amendment

Potential Contaminant Inventory, Goals, and Management Strategy

City of White Bear Lake, Minnesota

WHBRL 166377 | August 30, 2022

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City of White Bear Lake, Minnesota

SEH No. WHBRL 166377

August 30, 2022

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Glossary of Terms

Data Element

A specific type of information required by the Minnesota Department of Health (MDH) to prepare a Wellhead Protection Plan (WHPP).

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 I3).

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 I9). 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.

Potential Contaminant Source Inventory (PCSI)

The identification and assessment of potential sources of contamination and other threats within the DSWMA to be managed to reduce the risk of contamination and other threats to the water supply.

Surface Water Contribution Area (SWCA)

In a conjunctive delineation, the geographic area that may provide recharge to the aquifer within the well capture zone, attributed to: 1) the presence of a surface hydraulic feature; and 2) the runoff of precipitation or meltwater.

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 II.

Acronyms

CWI	County Well Index
DNR	Minnesota Department of Natural Resources
DWSMA	Drinking Water Supply Management Area
EPA	United States Environmental Protection Agency
ERA	Emergency Response Area
IWMZ	Inner Wellhead Protection Management Zone
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MGS	Minnesota Geological Survey
MnDOT	Minnesota Department of Transportation
MPARS	MNDNR Permitting and Reporting System (formerly known as SWUDS)
MPCA	Minnesota Pollution Control Agency
PCSI	Potential Contaminant Source Inventory
PLS	Public Land Survey
SWCA	Surface Water Contributing Area
SWCD	Soil and Water Conservation District
UMN	University of Minnesota
USGS	United States Geological Survey
WHP	Wellhead Protection
WHPA	Wellhead Protection Area

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Wellhead Protection Plan Part II Amendment

Potential Contaminant Inventory, Goals, and Management Strategy

Prepared for City of White Bear Lake, Minnesota

1 Introduction

The Wellhead Protection Plan (WHPP) Amendment for the City of White Bear Lake (The City) was prepared by Short Elliott Hendrickson Inc. (SEH®) in cooperation with the Minnesota Department of Health (MDH). It contains specific actions that The City will take to fulfill WHPP requirements that are specified under Minnesota Rules, part 4720.5100 to 4720.5590. Also, the roles that federal, state, and other local agencies in protecting The City drinking water supply are also identified. The WHPP was developed for The City municipal wells identified in **Table 1** and is effective for 10 years after the approval date specified by MDH.

The primary source water for the City of White Bear Lake's drinking water comes from three wells screened in bedrock aquifers. The City also has two wells for emergency purposes. All five wells are listed in **Table 1**.

The Wellhead Protection Area (WHPA) is the region that supplies groundwater to The City wells. The area around it, which is to be protected and managed, is defined as the Drinking Water Supply Management Area (DWSMA). These areas were delineated in WHPP Part I Amendment (WSP, 2021) and included in **Appendix B**. Geographic landmarks, such as roads and property lines, were used to map the boundaries of the DWSMA so that it is readily identifiable. The location of the DWSMA, relative to other communities, is shown on **Figure 1**. The well vulnerabilities, WHPA, and DWSMA were approved by the MDH and are shown on **Figure 2**.

The City is responsible for implementing its WHPP, plan of action as described in **Table 15** of this report. Furthermore, The City will evaluate the status of plan implementation throughout the next 10 years on at least every two-and-a-half-year basis to identify whether its WHPP is being implemented on the approved schedule.

1.1 Report Contents

This report is Part II of WHPP Amendment for The City and includes the following:

- A review and assessment of the data elements.
- The results of the Potential Contaminant Source Inventory (PCSI).
- A review of changes, issues, problems, and opportunities related to the public water supply and the identified potential contaminant sources.
- A detailed discussion of the potential contaminant source management strategies and corresponding goals, objectives, and action plans.
- A review of the wellhead/source water protection evaluation program.
- An alternative water supply contingency strategy.

1.2 Content of Appendices

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

Appendix A contains the Scoping Decision Notice No. 2 which was developed by the MDH based on the findings of WHPP Part I Amendment.

Appendix B contains the final WHPP Part I Amendment (WSP, 2021). WHPP Part I Amendment of the plan is summarized in **Section 2**. In WHPP Part I Amendment of the plan, the WHPAs and DWSMAs were delineated, and vulnerability assessments of the wells and corresponding DWSMA were amended based on updated data available on the source water aquifer used by the municipal wells.

Appendix C contains the inventory of potential contamination sources that may present a risk to The City's drinking water. The Inventory was developed by reviewing previous files and records from multiple agencies including the United States Environmental Protection Agency (EPA), Minnesota Pollution Control Agency (MPCA), Minnesota Department of Agriculture (MDA), and the MDH. This part of the plan is discussed in **Section 3** in terms of assigning risk to The City's water supply and is discussed as issues, problems, or opportunities summarized in **Section 6**.

Appendix D contains the Inner Wellhead Management Zone (IWMZ) – Potential Contaminant Source Inventory (PCSI) Report that was conducted by the MDH.

Appendix E contains the MDH Public Water Supply Sources Report for Old Municipal Wells.

Appendix F contains written comments received during the 60-day Local Units of Government (LUG) period.

Appendix G contains the Minnesota Department of Natural Resources (DNR) approval letter for the City of White Bear Lake's Water Supply Plan under DNR Water Appropriation Permit numbers 1969-0174 and has been determined to meet contingency requirements for the WHPP Amendment.

1.3 General Information

Public Water Supply

- Name: City of White Bear Lake PWSID #***1620024***
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2 Delineation of the Wellhead Protection Area, Drinking Water Supply Management Area, and Vulnerability Assessments

2.1 WHPA and DWSMA Delineation

The boundaries of the WHPA and DWSMA and the DWSMA vulnerability are shown on **Figures 1** and **2**. Well vulnerability is listed in **Table 2**. The WHPP Part I Amendment, which can be found in **Appendix B,** provides a detailed description of the process used for 1) delineating the WHPA and the DWSMA, and 2) preparing the vulnerability assessments of The City's water supply well(s) and DWSMA. The WHPP Part I Amendment delineated one continuous DWSMA that corresponds to the source water used to supply The City's 5 active municipal wells.

The WHPAs are defined by a 10-year time of travel; the WHPAs and DWSMAs are shown on **Figure 1**. Additionally, **Figure 1** shows the Emergency Response Areas (ERAs), which are defined by a 1-year time of travel. The IWMZ is the area within a 200-foot radius around each well. Definitions of rule-specific terms that are used are also provided in the "Glossary of Terms."

2.2 DWSMA Vulnerability Assessment

An assessment of DWSMA vulnerability was completed in WHPP Part I Amendment. From this assessment the DWSMA was assigned low, moderate, and high vulnerability. **Figure 2** shows vulnerability for the DWSMA. Generally, the higher the vulnerability rating, the greater the risk that a released contaminant may result in contaminated drinking water. The significance of this assessment is presented in terms of travel time and the relative likelihood that a contaminant may move from a potential contaminant source to the source water aquifer.

MDH guidance (MDH, 1997) was followed in determining the DWSMA vulnerability. Boring logs available for wells within the DWSMA were reviewed were reviewed for total depth as well as soil and bedrock classification to establish the presence of confining units. Geologic cross-sections were developed and used to evaluate and interpret the extent of confining layers to act as a protective layer within Tertiary sediment and bedrock aquifers. L-scores were calculated based upon geologic sensitivity guidelines developed by the DNR for wells within the DWSMA (Geologic Sensitivity Project Workgroup, 1991). Geologic sensitivities were then determined for each of the wells and the results were used for assessing vulnerability during the WHPP Part I.

MDH has determined the following definitions for vulnerabilities found within the DWSMA:

- High vulnerability indicates that vertical recharge to the source water aquifer occurs over a time period of weeks to years.
- Moderate vulnerability indicates that vertical recharge to the source water aquifer occurs over a time period of years to several decades.
- Low vulnerability indicates that vertical recharge to the source water aquifer occurs over a time period of several decades to a century.

Isotopic data and water chemistry were also considered in the vulnerability assessment. However, the amount of chemical and isotopic data currently available only gives a snapshot of the conditions at the time of sampling and additional sampling and analysis will provide a better understanding of the system and additional insight to the DWSMA vulnerability. All of The City's municipal wells (except Well #2) are considered vulnerable to contamination due to the detection

of tritium and other water quality parameters in the well water. Detectable tritium indicates the presence of young (post-1953) water. Further details for requested sampling and the timeline for sampling included in the management strategies part of this plan as listed in **Table 15** and described in **Section 7.0** through **Section 11.0**.

3 Data Elements and Assessment

Chapter 3 outlines the Scoping 2 Data elements and provides a summary of information gathered for the part 2 WHP plan.

The data elements that are included in this plan document establish potential contaminant sources and determine the need for the WHPP measures that will be implemented to help protect The City's water supply from potential sources of contamination. The City met with representatives from MDH to discuss the data elements that are specified in Minnesota Rules, part 4720.5400, for preparing a WHPP Amendment.

A scoping meeting held on December 16, 2021, addressed the data elements that were needed to support the delineation of the WHPA, the DWSMA, and the well and DWSMA vulnerability assessments. The scoping notice discussed the data elements required to 1) identify potential risks to the public water supply and 2) develop effective management strategies to protect the public water supply in relation to the well and DWSMA vulnerability. The result of the scoping meeting were communicated to The City by the MDH through a formal scoping decision notice.

The WHPP Part II data elements are based on the determination that the DWSMA has areas of low, moderate, and high vulnerability. Each data element is required to be assessed for its impact on 1) use of the well(s), 2) quality and quantity of water supplying the public water supply well(s), and 3) land and groundwater uses in the DWSMA. This information is found in **Appendix A**.

Information must be available to assess each data element. For the data elements determined to have sufficient available information, staff from the MDH and The City discussed whether a data element was considered an issue, concern, or opportunity that The City must address in this plan. For the items confirmed, the information is discussed in **Section 3** and summarized in **Section 4** with PCSI data element detail provided in **Appendix C** and non-PCSI data elements depicted on the figures. The PCSI locations (**Appendix C**) queried as part of this plan were assessed for locational accuracy during the development of this plan. Potential contaminant sources that were found to have poor or incorrect locations were reassigned based on local knowledge or historical data provided with each data source. Several remaining actions were identified during the data element assessment process as being deficient in reference to data quality, location, or amount of data and are discussed in **Section 9.0**.

Figure 2 shows the vulnerability for the DWSMA, the WHP Area, and the ERAs.

3.1 Data Elements to be Submitted in the Plan

The Scoping II Notice determined that the following information 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.
  - **Figure 1** depicts the IWMZ, ERA, WHPA, and DWSMA. **Figure 2** depicts the vulnerability for the entire DWSMA.

3.1.1 Data Elements about the Physical Environment

3.1.1.1 Soils

- Existing Maps of the soils and a description of soil infiltration characteristics.
  - A map of the soils and their infiltration characteristics within the DWSMA area is depicted on **Figure 3**. A map of known eroding lands in the DWSMA area is depicted on **Figure 4**.
- A description or an existing map of known eroding lands that are causing sedimentation problems.

The area around The City's well field is generally characterized by thick unconsolidated deposits, known as surficial geology, above bedrock. The surficial geology is primarily associated with erosional and depositional glacial events occurring during the Quaternary Period. Multiple glacial advances are recognized in the area, each depositing soils with complex properties unique to their source material such as the Superior lobe that advanced from the north and the Grantsburg sublobe (associated with the Des Moines lobe) that advanced from the southwest, but originating from the northwest having a Winnipeg provenance. The key surficial geologic features include:

- Anoka Sand Plain consisting of sandy glaciolacustrine (glacier associated lake) sediment of fine to medium sand, silt, and clay; surficial organic deposits are common on the sand plain.
- To the southeast of Vadnais Lake, glaciolacustrine sediments occur consisting of bedded silt and clay layers with some fine sand; the glaciolacustrine sediments are generally less than 50 feet thick and occurs at or near the surface to the northeast and west in the area.
- The glaciolacustrine sediments are underlain by typically loam textured till of the Grantsburg sublobe.
- The Grantsburg sublobe till is underlain by glacial outwash sands and gravel as well as a discontinuous, sandy loam till associated with the Superior Lobe.
- The Superior Lobe deposits typically lie on top of bedrock, except in deeper north-south trending bedrock valleys present on the subcrop bedrock topography in the region.
  - Regionally, preglacial and interglacial streams carved valleys in the bedrock surface up to 500 feet or more in depth.

As described above, hundreds of feet of glacial sediment overlie bedrock in the wellhead protection area including sequences of the following: (1) Glacial till, unsorted mix of silt, clay, sand or larger material; (2) outwash including sands and gravels; and (3) lacustrine deposits of generally fine-grained sediment. In addition, recent and ongoing sedimentation has occurred in fluvial, lacustrine, and anthropogenic environments along current stream networks. These unconsolidated sediments make up a series of discontinuous water-table and buried artesian aquifers, otherwise known as surficial aquifers, separated by finer grained "confining" units. The presence of fine-grained materials can retard vertical flow of groundwater to deeper bedrock aquifers. However, within this region, these quaternary deposits are highly heterogeneous both laterally and vertically.

Surficial, native soils are often disturbed and/or replaced in urbanized areas, particularly where organic rich sediments were present at the surface. Much of the DWSMA has been distrubed due to residential, comemrcial, and industrial development. As seen on the figures large areas of no data are presented within the DWSMA due to these developments. Therefore, Land Use data will be more indicative of disturbed or eroded soils.

3.1.2 Data Elements about the Land Use-

3.1.2.1 Land Use

- An existing map of political boundaries.
  - **Figure 5** depicts parcels and boundaries that intersect the DWSMA. The DWSMA falls within two Minnesota Counties: Ramsey County and Washington County. Parcels for these counties are illustrated on **Figure 15** through **Figure 16** and are also available on the respective County interactive mapping websites. The ERA intersects the municipalities of White Bear Lake and Mahtomedi. The remainder of the DWSMA intersects the municipalities of Birchwood Village, Dellwood, Grant, Maplewood, Oakdale, and White Bear Township. The DWSMA reflects the most current and available parcel and municipal boundaries. The entire DWSMA must reflect what is known about parcel and municipal boundaries. The DWSMA reflects the most current and available parcel and municipal boundaries. The entire DWSMA must reflect what is known about parcel and municipal boundaries.
- An existing map of public land surveys including township, range, section.
  - Multiple Township, Range, and Section (TRS) Boundaries intersect the DWSMA and are shown on **Figure 5**. The ERA fully or partially intersects five different TRS boundaries: T30N, R22W (Section 25); T30N, R21W (Section 30); T30N, R22W (Section 35); T30N, R22W (Section 36); T30N, R22W (Section 36).

3.1.2.2 Potential Contaminant Source Inventory (PCSI)

Potential Contaminant Sources were inventoried as determined from the Scoping Notice.

1. A map and an inventory of the current and historical agricultural, residential, commercial, industrial, recreational, and institutional land uses and potential contaminant sources.
   a. The DWSMA consists of primarily residential with localized areas of commercial and industrial property. Some agricultural land is present in the northeastern portions of the DWSMA. The DWSMA is located within a large Metropolitan region known as the Twin Cities and areas within the DWSMA since the time of development has been and is presently residential. Any future commercial and industrial land uses may become potential contaminant sources as land activities may affect source water quality and quantity. At this time land use over the course of this plan is not expected to change.

PCS Inventory Requirements for Low, Moderate, and High Vulnerability

2. All potential contaminant sources as listed on Low, Moderate, and High Vulnerability PCSI Requirements.
   a. PCSI identified for this plan are detailed in **Appendix C** and depicted on **Figure 15 and 16**. The inventory, mapping, and management of land uses and potential sources of contamination for the DWSMA reflect what is known about these data elements. PCSI identified for this plan are discussed in greater detail in **Chapter 4**.
   b. The Scoping Notice requires assessment of many types of PCSI depending on the DWSMA Vulnerability. The PCSI that were and were not identified within the DWSMA are listed in **Table 9**.
3. A land use/land cover map and table.
   a. Land use is depicted on **Figure 7** and detailed in **Table 5** and details the Metropolitan Council 2020 Generalized Land Use map. The Metropolitan Council mapping in general depicts the majority of the area within the DWSMA as residential with smaller areas of parks, commercial, and industry also being present. Additionally, a comprehensive land use map for each municipality is discussed in item 5 below.

4. Inventory of the Inner Wellhead Management Zone (IWMZ).
    a. Detailed in **Appendix D** and listed on **Table 8**. The IWMZ was completed by the SWP Planner with assistance from the PWS staff. The IWMZ was completed 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. The summary of these reports was incorporated into **Table 15**.
5. An Existing Comprehensive Land-Use Map.
    a. A comprehensive land-use map including Land Use and Future Land Use is depicted on **Figure 8 and 9** and detailed in **Table 4 and 6**. The area within the DWSMA is under the ordinances, planning, and jurisdiction of eight communities: Birchwood Village, Dellwood, Grant, Mahtomedi, Maplewood, Oakdale, White Bear Township, and White Bear Lake. Land use changes over the lifetime of this plan are expected to remain a mixture of residential, commercial, and industrial.
6. An Existing Zoning Map.
    a. An existing zoning map is depicted on **Figure 10** and detailed in **Table 3**. Zoning within the DWSMA is typical of a major metropolitan region. Zoning within the DWSMA can primarily be described as urban. Residential is the primary land use follow by open water and recreational (parks and preserves). Industrial and commercial uses are common within each city center. Agricultural land is sparse throughout this area.

3.1.2.3 Public Utility Services

Public utilities can contribute or transport possible contaminants that can impact the DWSMA which include public utilities associated with the following municipalities: Birchwood Village, Dellwood, Grant, Mahtomedi, Maplewood, Oakdale, White Bear Township, and White Bear Lake. The following public utility services were identified to fall within the DWSMA:

- An existing map of transportation routes or corridors
    - Transportation Routes are depicted in **Figure 6**. Multiple major and minor roadways traverse the areas to be managed within the DWSMA. Interstate 694 runs west to east through the southern portion of the DWSMA. Minnesota State Highway 244 (County Road 15) runs west to east through the center of the DWSMA. County Highway's 68, 70, and 27 run south to north through the DWSMA. Multiple county, township, and city roads are within DWSMA. Roadway corridors pose a risk for transportation related spills and dumping. Industry and commercial business pose some risk with their associated transportation of hazardous substances through traffic activities. The presence of these transportation facilities will be managed by proactively working with local emergency management entities to make them aware of the DWSMA and consider DWSMA protection should any spills occur. The Minnesota Department of Transportation (MnDOT) has multiple programs and specifications for helping to mitigate the dispersal, flow, or recharge of contamination.
    - Multiple regional recreational trails for walking and biking trails are located within the DWSMA.
    - No railroad lines were found to intersect the DWSMA.
- An existing map of storm sewers, sanitary sewers, and public water supply systems.
    - Public water supply systems, storm sewers, and sanitary sewers within the DWSMA are generally in good condition and are maintained by the eight municipalities that make up the DSWMA.

- Public water supply systems. A map of public water supply systems is available at each City and Township office. It was determined for this WHPP to not consolidate maps of each distribution system in electronic maps for security reasons.
- Stormwater systems. Stormwater utilities are depicted in **Figure 11-1** through **Figure 11-6**. Stormwater outlets are considered a PCS within areas of High Vulnerability. The areas within the DWSMA were found to have stormwater outlets and are depicted on **Figure 16**. The locations are within the City of Mahtomedi and addressed with the City's MS4 permit with the MPCA.
- Sanitary systems. Sanitary systems are depicted in **Figure 11-1** through **Figure 11-6**.

- An existing map of the gas and oil pipelines used by gas and oil suppliers.
  - The National Pipeline Mapping System (NPMS) Public Viewer shows one hazardous liquid pipelines within the DWSMA. This pipeline is depicted in **Figure 12**. A hazardous liquid pipeline is located south of all The City Wells within the southern edge of the DSWMA. The presence of these hazardous liquid pipelines will be managed by proactively working with local emergency management entities to make them aware of the DWSMA and consider DWSMA protection should any spills occur.
- An existing map or list of public drainage systems.
  - Public Drainage systems are depicted in **Figure 13**. Depicted on the figure is the Department of Natural Resources Buffer Protection Map (watercourses and ditches), DNR stream centerlines (including confluence and flow direction), wetlands, and local watersheds. Public Drainage systems can help understand surface to groundwater interactions, recharge to groundwater, and contaminant travel.

3.2 Data Elements Required to be Discussed in the Plan

3.2.1 Data Elements about the Physical Environment

3.2.1.1 Water Resources

Management of the DWSMA must consider local and federal knowledge on Water Resources. Water Features. The following data elements are required to be discussed:

- An existing map of the boundaries and flow directions of major watershed units and minor watershed units:
  - Water resources including watersheds, and flow direction are depicted on **Figure 13**. Surface water resources in The City's DWSMA is within the following three watersheds as delineated by the Minnesota DNR:
    1. City of St. Paul-Mississippi River (HUC12 -070102060803)
    2. Rice Creek (HUC12 -070102060303)
    3. Lake St. Croix (HUC12 -070300051202)
  - The City is in the Watershed Districts of the Ramsey-Washington Metro Watershed District (RWMWD), the Vadnais Lake Area Water Management Organization (VLAWMO), Valley Branch Watershed District, and Rice Creek Watershed District.
  - The general water flow direction follows the series of regional lakes through primarily unnamed streams southward towards to the Mississippi River where it then flows south to southeast. Water planning efforts should be coordinated with One Watershed One Plan (1W1P), Watershed Restoration and Protection Strategies (WRAPS), and/or Groundwater Restoration and Protection Strategies (GRAPS).

  - Multiple water bodies are within the DWSMA including White Bear Lake, Long Lake, Lost Lake, Goose Lake, Priebe Lake, Echo Lake, Heiner's Lake, and Varney Lake. The lakes that are within the ERA include Heiner's Lake, and Varney Lake.
  - Zoning in the area surrounding a majority of lakes within the DWSMA is primarily residential. Management of this data element though public and government awareness, coordinated with the City of White Bear Lake, will help to assure that water-quality standards are met. These surface water resources contribute to groundwater resource recharge and a decrease in surface water quality and quantity will impact the recharge to the source water aquifers.

- An existing map showing those areas delineated as floodplain:
  - **Figure 14** depicts floodplain delineated as part of the Federal Emergency Management Agency (FEMA) flood zone survey. These layers depict the annual flood chance based on a 0.2% and 1% chance based upon historical data. The City's well field area is within the proximity of many local and regional drainage basins and intersects multiple delineated wetlands. A majority of the DWSMAs are in areas with a minimal flood hazard. Some portions of The City's DWSMA intersect mapped floodplains and wetlands. Portions of The City DWSMA have mapped wetland and floodplains within the ERA. The City is not aware of any issues related to flooding around their public water supply wells. A flood zone is depicted within the IWMZ of Well 4; however, the well elevation is much higher of that of the surrounding area and it is not expected to be an issue.

3.2.2 Data Elements about the Land Use-

3.2.2.1 Land Use

- An existing map of parcel boundaries.

  - **Figure 15 and 16** depicts parcels that intersect the DWSMA. The DWSMA falls within two Minnesota Counties: Ramsey County and Washington County. Parcels for these counties are also illustrated on land use, future land use, and zoning figures (**Figure 8, Figure 9, and Figure 10**).

  - Alternative, for more detailed information, parcel data is also available on the respective County interactive mapping websites or available on the Minnesota Geospatial data commons for download.

3.3 Data Elements Pertaining to the Part 1 WHPP

Data Elements pertaining to the Part 1 WHPP are summarized, reviewed and assed in this document. The Part I WHPP is included in **Appendix B**.

3.3.1 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 Status section 103H.005, subdivision 13, and groundwater flow characteristics.

In the DWSMA, the ground water that supplies the City Wells is from the OPDC, CJDN, CWON, and CMTS aquifers that underlie glacial deposits. A description of the hydrogeologic setting for the conceptual model for these aquifers is presented in The WHPP Part I Amendment (**Appendix B**).

The bedrock underlying The City well field and surrounding areas consists of Precambrian to Ordovician age, Paleozoic sedimentary strata overlying Precambrian age basement rock. Vadnais Heights is on the northeastern part of the Twin Cities Basin associated with , an geologic feature known as the Hollandale Embayment. The embayment formed during the Paleozoic Era and is a syncline between the structural features known as the Wisconsin Arch to the east and the Transcontinental Arch to the west.

Twin Cities Basin is centered approximately where the Minnesota and Mississippi Rivers meet, and is bounded on the east by the St. Croix River and on the north and west by the subcrop of Precambrian rocks. The basin was covered and uncovered by a succession of shallow, epeiric seas, that eroded and depositied sediment to form what is now a series of early Paleozoic sedimentary bedrock. These Paleozoic units filled the basin up to 1,000 feet above the underlying Precambrian units. The Ordovician was followed by a period of erosion. In the area surrounding The City well field, the upper bedrock units are of the Upper Ordovician Period, suggesting Devonian Period rocks found elsewhere in the Twin Cities basin were either not deposited or have been eroded away. The structural features of the Twin City Basin result in bedrock units generally sloping to the southwest in the area.

While variation and extent of bedrock aquifers occur, in general five regional aquifers are described and support much of the potable water for the Twin Cities region, from oldest to youngest:

1. Mt Simon-Hinckley Aquifer
2. Tunnel City-Wonewoc Aquifer
3. Prairie du Chien-Jordan Aquifer
4. St. Peter Aquifer
5. Quaternary Aquifer(s).

These aquifers are often hydrologically disconnected by a variety of interbedded confining layers. Regional aquifers can also be subdivided further; for example, the Prairie du Chien and Jordan Aquifers may be hydraulically disconnected if the lower member of the Prairie du Chien (Oneota Dolomite) acts as a confining unit. Primary lithology, and hydrogeologic designations are summarized in below, from oldest to youngest, for the area around The City well field.

Geologic Formation	Age	Primary Hydrogeologic Designation	Approximate Thickness	Primary Regional Lithology
Hinckley Sandstone	Pre-Cambrian	Aquifer	Not Available	Quartzose sandstone overlying the Precambrian bedrock
Mt Simon Sandstone	Middle Cambrian	Aquifer	~ 200 to 336 ft	Quartz sandstone that contains interbedded siltstone and very fine sand.
Eau Claire Formation	Middle to Upper Cambrian	Confining	~ 60 to 90 ft	Fine grained sandstone, siltstone, and shale.
Wonewoc Sandstone	Upper Cambrian	Aquifer	~ 50 to 60 ft	Very fine to very coarse-grained Sandstone.
Tunnel City Group	Upper Cambrian	Aquifer / Confining	~ 150 to 180 ft	Lower is massively bedded very fine to fine-grained sandstone; upper is coarse-grained sandstone.
St Lawrence Formation	Upper Cambrian	Confining	~ 38 to 59 ft	Dolomitic siltstone with interbedded very fine-grained sandstone and shale.
Jordan Sandstone	Upper Cambrian	Aquifer	~ 85 to 100 ft	Upward sequence of fine to coarser grained sandstone.

Geologic Formation	Age	Primary Hydrogeologic Designation	Approximate Thickness	Primary Regional Lithology
Prairie du Chien Group	Lower Ordovician	Aquifer / Confining	~ 125 to 140 ft	Upper Shakopee Formation is a heterolithic unit of dolostone, sandy dolostone, and sandstone; lower Oneota Dolomite is medium to thick dolostone beds.
St. Peter Sandstone	Middle to Upper Ordovician	Aquifer / Leaky Confining	~ 145 to 155 ft	Light gray, medium to fine grained sandstone. Basal unit may be interbedded shale.
Glenwood Formation	Upper Ordovician	Confining	~ 0 – 3 to 5 ft	Predominantly shale
Platteville Formation	Upper Ordovician	Confining	~ 0 to 30 ft	Limestone and dolostone.

- Existing records of the geologic materials penetrated by Wells, borings, exploration test holes, or excavations, including those submitted to the department.
  - A list of existing state environmental boreholes, including unique well number, aquifer measured, years of record, and water levels is provided to the public by the MDH. The MDH tracks wells and boreholes information through the Minnesota Well Index (MWI). Information from the MWI is included in **Appendix C** and detailed in the PCSI part of this plan.
- Existing borehole geophysical records from wells, borings, and exploration test holes.
  - The Minnesota Geologic Survey and the Minnesota Department of Natural Resource provide information on geophyiscal records from wells, borings, and exploration test holes within the County Atlas Program. The geology of the area is fairly well established and no additional data from geophysical records were addressed or dicsussed within the Part I WHPP.
- Existing surface geophysical studies.
  - No additional surface geophysical studies were included in the Part I WHPP. Detailed information on studies can be obtained from the Minnesota Geologic Survey.

3.3.2 Data Elements about the Physical Environment –

3.3.2.1 Public Utility Service

- An existing record of construction, maintenance, and use of the public water supply well and other wells within the DWSMA.
  - Detailed information on the construction, maintenane, and use of the public water supply wells are detailed in **Table 1** and **Table 2**. Vulnerability and sensitivity of the public water supply wells were established in the Part I WHPP.
  - Geologic sensitivity rating is an empirical value determined by dividing the cumulative thickness of low permeability units (e.g. clay) above the aquifer by 10 (DNR, 1991). The L-score results ranged from 0 to 21. This indicates much of the DWSMA is underlain by low-permeable material creating hydraulic separation from grade. For the DWSMA vulnerability assessment, and pursuant to MDH guidance (MDH, 1997), geologic sensitivity classifications of low to very low sensitivity would be automatically increased to a classification of moderate vulnerability due to the presence of tritium, which has been detected at all of the City Wells except Well No. 2. However, the area around the City Wells has retained a vulnerability rating of low

due to the presence of the Glenwood Formation, seen in **Appendix B**, that is known to be an effective barrier to downward migration in those areas.

3.3.3 Data Elements about Water Quantity –

3.3.3.1 Surface Water Quantity

- An existing description of known water-use conflicts, including those caused by groundwater pumping.
  - The Part I WHPP did not identify any known water-use conflicts.

  No known surface water conflicts have been identified due to groundwater pumping from The City wellfield. However, it should be noted that White Bear Lake is located in the northern portion of the DSWMA and has recently had public concerns due to the high fluctuation in the lakes water level. White Bear Lake water levels fluctuate up to eight feet between historic highs and lows. This recent concern over the lake level of White Bear Lake initiated additional modeling and observation from the Minnesota DNR. As of this report, the DNR has concluded that groundwater use in the area complies with Minnesota's groundwater sustainability standard.

  - In 2012, a lawsuit was filed against the DNR claiming that the DNR allowed communities and businesses in the White Bear Lake are to use too much groundwater which led to unacceptably low lake levels. The following provides a series of events related to the litigation.
  - 2012 – Lawsuit Filed by the White Bear Lake Homeowners Association and the White Bear Lake Restoration Association.
  - 2014 – The DNR and the plaintiffs in the lawsuit reached a settlement contingent on achieving several goals in a 36-month stay period.
  - 2016 – No legislative funding for shift to surface water use and therefore, the lawsuit went to trial.
  - 2017 – The lawsuit went to trial in 2017 and the Ramsey County District Court (District Court) favored with the plaintiffs and ordered a number of restrictions and requirements for the DNR to implement.
  - 2018 – In 2018, the District Court issued an amendment to the court order and the DNR completes the required changes, legislation, sustainability analysis.
  - 2019 – In 2019 the DNR appeals the District Court order to the Minnesota State of Appeals. The Minnesota State Court of Appeals reversed the District Court decision which remanded the matter back to the District Court for further administrative proceedings.

  For further information on the White Bear Lake issue, the DNR has the following website: White Bear Lake | Minnesota DNR (state.mn.us).

3.3.3.2 Groundwater Quantity

- An existing list of wells covered by State appropriation permits, including amounts of water appropriated, type of use, and aquifer source.
  - A list of existing wells covered by state appropriation permits, including amounts of water appropriated, type of use, and aquifer source is listed in **Table 7** and was obtained from the DNR Permitting and Reporting System (MPARS) for a 2-mile radius around The City well field.
- An existing description of known well interference problems and water use conflicts.

- No known groundwater conflicts have been identified due to groundwater pumping from The City wellfield. The DNR regulates water quantity through appropriation permits.

- An existing list of state environmental bore holes, including unique well number, aquifer measured, years of record, and average monthly levels.
  - A list of existing state environmental boreholes, including unique well number, aquifer measured, years of record, and water levels is provided to the public by the MDH. The MDH tracks wells and boreholes information through the Minnesota Well Index (MWI). Information from the MWI is included in **Appendix C** and detailed in the PCSI part of this plan.

3.3.4 Data Elements about Water Quality -

3.3.4.1 Groundwater Quality

- An existing summary of water quality data, including: 1. bacteriological contamination indicators; 2. Inorganic chemicals; and 3. Organic chemicals
  - Samples from The City water supply system are routinely collected and analyzed by the MDH as required under the Minnesota Public Water Supply Program and the federal *Safe Drinking Water Act*. The samples from the water supply system distribution are tested for microorganisms, inorganic compounds, organic chemicals, pesticides and herbicides, and radioactive contaminants. No contaminants were detected at levels that violated federal drinking water standards or the Minnesota Department of Health: Health Based Guidelines. There are currently no known issues related to the quality of the water obtained by the public water supply wells.
- A list of water existing chemistry and isotopic data from wells, springs, or other groundwater sampling points
  - Nitrate was detected at low concentration in Wells No. 3 and 4 and tested for but not detected in the remaining wells.
  - Tritium has been detected in Wells No. 1, 3, and 4. Tritium is a harmless isotope of hydrogen that was released into the atmosphere during the above-ground testing of nuclear weapons in the early 1950s. A tritium level of 1 tritium unit (TU) or greater is an indication that these aquifers are somewhat vulnerable to contamination because it means that at least some portion of the water was in contact with the atmosphere within the past 60 years.
- A report of existing groundwater tracer studies
  - No known tracer studies have been conducted in the area.
- An existing site study and well water analysis of known areas of groundwater contamination
  - The MPCA and MDA documents and records known areas of groundwater contamination within the “What’s in My Neighborhood” (WIMN) database. Listings from this database are included in **Appendix C** and detailed in **Section 4**.
  - Since 2002, the MDH has partnered with the MPCA to investigate Per- and Polyfluoroalkyl Substances (PFAS) in Minnesota. In the eastern Twin Cities, six (6) sites have been identified by the MDH to have been a source of PFAS-bearing wastes. At this time no known PFAS plumes intersect the DWSMA; however, as with other emerging contaminants, The City should remain aware of PFAS in Minnesota and work with the MPCA and the MDH to complete sampling or monitoring in wells.
- An existing property audit identifying contamination.

  - The Minnesota Pollution Control Agency documents sites with Affidavits, Deed Restrictions and Environmental Covenants. This database can be accessed via the Minnesota Geospatial Data commons. Properties with known contamination will be documented within the MPCA's WIMN database and included in **Appendix C** and detailed in **Section 4**. Any issues, problems, and concerns relating to identified contamination is listed in **Table 10**.

- An existing report to the Minnesota Department of Agriculture and the Minnesota Pollution Control Agency of contaminant spills and releases.
  - The MDA spills and the MPCA incident reports (MPCA "spills") databases contain information pertaining to known and documented spill sites. These reports can be accessed through the agencies websites and are also when relevant included in **Appendix C** and detailed in **Section 4** of this report.

4 Assigning Potential Contamination Sources

The scoping notice further defines required data elements based upon 1) results of the assessment of DWSMA and well vulnerability; and 2) the presence or absence of human-caused contaminants in the source water. Information associated with the PCSI is organized as follows:

- The types of potential contamination sources that may exist within the DWSMA were derived from the information collected to satisfy the data element requirements described in **Section 3 and** based upon the scoping notice provided by the MDH (**Appendix A**).
- Data elements that meet the requirements laid out by the scoping notice are included in the PCSI and are discussed in **Section 4.2, Section 4.3,** and summarized in **Appendix C**.
- **Table 8** indicates a summary and the risk that The City has assigned to potential point sources of contamination that are located within the IWMZ.
- **Table 9** summarizes and depicts the risk that The City has assigned to potential point sources of contamination that are located in the remainder of the DWSMA beyond the IWMZ.

4.1 Issues, Problems, and Opportunities related to Potential Contaminant Sources

An overview of required data elements is discussed in **Section 3.** Local, state, and federal databases were assessed in determining potential contaminant sources to satisfy required data elements. From these requirements, the following sources were identified for the DWSMA.

4.1.1 Aquifers

The source water aquifers were established in the WHPP Part I Amendment (**Appendix B**) to be susceptible to surficial recharge and the DWSMA was assigned low, moderate, and high vulnerabilities. Due to the presence of some confining units overlying aquifers, there is a reduced connection for surface water directly recharging the source water aquifers. However, the presence of tritium in the aquifer indicate surface water is reaching bedrock aquifers. The potential contaminant sources identified as part of this plan can help identify, manage, limit, and even prevent future anthropogenic alteration to the drinking water quality and quantity.

Recharge to the aquifer from overlaying layers may introduce contaminants and negatively impact source water quality. It is important to support local watershed groups, which support healthy ecosystems and enabling areas of higher quality recharge to the aquifers. In addition to aquifer recharge, pumping and other modifiers to the hydraulic head of the aquifer may change flow paths within the aquifer. Pumping on the aquifer is monitored by the DNR through water appropriation reporting and aquifer quality is evaluated by the MDH through schedule routine sampling.

4.1.2 Land Use

The City is unaware of any proposed large-scale land use changes within the DWSMA that could potentially impact the municipal wells or source water aquifers. Changes in land use have the potential to introduce pathways or sources of contamination to the source water aquifers. Zoning for the DWSMA is under the ordinances, planning, and jurisdiction of the cities of Birchwood

Village, Dellwood, Grant, Mahtomedi, Maplewood, Oakdale, White Bear Township, and White Bear Lake, and Ramsey/Washington Counties.

Many of the properties in the DWSMA are fully developed with commercial, industrial, and residential properties. Some areas of agricultural land is present in the northeastern portion of the DWSMA within and near the City of Grant. Industrial and commercial uses may also be associated with known or potential contaminant sources that may be a threat to source water *quality* or *quantity*. Source water quantity could be affected by new property uses that are not connected to municipal water may utilize well water. New wells by entities should be entered into the Minnesota Well Index and large-scale water use should be applied to under a DNR Appropriation permit. Source water quality could be affected by standard commercial and industrial property uses as their operations may involve potential contaminant sources; therefore, best management practices for their operations should be followed to limit the potential for contamination to reach the source water aquifer. Land use/zoning and future zoning within the DWSMA is depicted on **Figures 7, 8, 9, and 10**.

4.1.3 Well Water

Private and public wells can both impact the quality or quantity of the source water aquifer. Wells that penetrate confining layers can act as a preferential pathway, or conduit, for potential contaminant sources to reach the source water aquifer. Wells within the DWSMA may extend into the source water aquifer and if improperly constructed or maintained could transmit contaminants into the aquifer. Additionally, wells that draw large quantity of water from the source water aquifer has the possibility to adversely affect source water quantity.

This WHPP is particularly concerned with other unsealed/unknown private or water supply wells at depth greater than 100 feet specifically located within the Low Vulnerability portions of the DWSMA as well as all unsealed wells in areas of Moderate and High DWSMA Vulnerability. The MDH database, Minnesota Well Index (MWI), was used to identify existing wells within the DWSMA and included as part of this PCSI. With particular emphasis on the ERA, The City and SEH searched for unknown or unverified wells and review of the Old Municipal Well Report (**Appendix E**) provided by the MDH. This report details previous records on public water supply wells.

The placement of additional high-capacity wells, increased pumping from existing wells, or significant changes in current groundwater appropriations within the DWSMA may also have an impact on groundwater availability to all users, or even increased risk of contamination entering the aquifer. An existing list of wells covered by state appropriation permits issued by the DNR, including amounts of water appropriated, type of use, and aquifer source is listed in **Table 7** and was obtained from the DNR Permitting and Reporting System (MPARS) for a 2-mile radius around The City well field. At this time, no issues with groundwater quality are currently addressed by the DNR in appropriation permits.

Multiple regional studies on the Twin Cities aquifers are being currently studied by the MPCA, DNR, USGS, and other planning entities are currently ongoing for the region and the City should remain aware of their findings. Other entities that perform regional support or studies are listen in **Table 13** and **Table 14**. The MPCA, MDH, and DNR will be able to provide information or guidance as more information is made available.

4.1.4 Surface Water

Surface-groundwater interaction is a concern designating a portion of the DWSMA with high vulnerability due to tritium detections within Public Water Supply Wells. Tritium detected in groundwater means that at least a portion of the aquifer is being recharged from water that has been exposed to the atmosphere (surface water) in the last 60 years. Using this data, it can be concluded that at least some portion of surface water is recharging the source water aquifer. This causes concern for any surface-groundwater interaction regarding surface water quantity and contaminant migration from surficial sources.

White Bear Lake is located in the northern portion of the DSWMA and has recently had public concerns due to the high fluctuation in the lakes water level. White Bear Lake water levels fluctuate up to eight feet between historic highs and lows. This recent concern over the lake level of White Bear Lake initiated additional modeling and observation from the Minnesota DNR. As of this report, the DNR has concluded that groundwater use in the area complies with Minnesota's groundwater sustainability standard.

or further information on the White Bear Lake issue, the DNR has the following website for the most up to date information:

White Bear Lake | Minnesota DNR (state.mn.us).

4.1.4.1 Transportation Corridors

Transportation corridors within the DWSMA are discussed in this plan as they have easement or Right-of-Way and have the potential to affect water quantity or quality. Transportation corridors may manage stormwater through culverts, ditches or ponds all of which may supply recharge to the source water aquifer. Potential contaminant sources may be transported and traffic accidents may lead to spills.

High vulnerability area of the DWSMA is located within the eastern edge of the DWSMA, because Minnesota State Highway 244 runs across this high vulnerability area, there is an increase in potential contaminant sources such as point source releases from transportation accidents (spills) and stormwater management from stormwater culverts, pipes, and retention ponds. As such, any such spills that occur within this transportation corridor are reported to the MPCA Duty officer and associated emergency response will be assessed or completed by the MPCA's Emergency Management Unit following MPCA's Emergency Management Program Spill Cleanup Policy (MPCA Incident Reports are discussed in more detail in **Section 4.2.6.1**).

4.1.4.2 Municipal Separate Storm Sewer Systems (MS4)

Stormwater within MnDOT's Metro District is managed under Municipal Separate Storm Sewer Systems (MS4) General Permit. The MS4 identifies systems of conveyances – such as gutters, ditches, city streets, and storm drains – to reduce the amount of stormwater pollution that reaches surface water and groundwater. Regulated MS4s cover large areas and are owned or operated by a public entity such as a city, county, township, watershed district or university. Because runoff from sidewalks, driveways, and city streets can contain pollutants, such as fertilizers, oil, road salt, litter, and other debris, the MS4 General Permit requires the system owner or operator develop a Stormwater Pollution Prevention Program (SWPPP) that incorporates best management practices applicable to reduce stormwater pollution within their MS4. (MnDOT, https://dot.state.mn.us/environment/ms4/index.html)

4.1.5 Disposal Wells (Class V Injection Wells)

The EPA is the regulatory authority for Class V Wells. The EPA is required to maintain an inventory of Class V shallow disposal wells. Class V Wells are typically shallow disposal systems that are used to place a variety of fluids below the land surface. Examples of Class V injection wells include motor vehicle waste disposal wells, large capacity cesspools, storm water drainage wells, aquifer remediation wells, and large capacity septic systems.

Class V Wells can act as a direct pathway for contaminants to penetrate the source water aquifer. Two Class V Wells were listed within the DWSMA, and multiple others present within the area surrounding the DWSMA. SEH contacted Lawrence Curley EPA Compliance Assistance & Enforcement for Underground Injection Control in EPA Region 5, on April 13, 2022. These are depicted on **Figure 15**.

The following EPA representative for the State of Minnesota Underground Injection Control division can be reached for more information:

Lawrence Curley

Email: curley.lawrence@epa.gov

Phone: 312-886-6339

Or https://www.epa.gov/uic/underground-injection-control-epa-region-5-il-mi-mn-oh-and-wi

The City should remain aware of Class V Wells and prevent the installation of any such type of well as they can pose an immediate threat to the source water aquifer.

4.1.6 MPCA Potential Contaminant Source Inventory

The MPCA provides multiples statewide database sources for potential contaminate sources as part of their GIS ready “What’s in my Neighborhood” database and Spills database. Resources are described as follows:

- MPCA “What’s in My Neighborhood” database is mapped using the following locating methodology including Address Matching House Number, Digitized-DRG, Digitized - Map Tool, Zip Code Centroid, Interpolation Unknown, and GPS – Other. These location methods are considered reliable aside from Zip Code Centroid and Interpolation Unknown.
- The MPCA Spills (incidents reports) database provides an address that was used to geocode registered Spills within the DWSMA.

Sites which were located by the MPCA using poor location accuracy were attempted to be relocated by The City and SEH using address matching and local knowledge.

4.1.6.1 MPCA Spill Listings (MPCA Incident Reports)

In the State of Minnesota, spills that may cause pollution, such as spills of toxic, flammable, corrosive, and dangerous industrial chemicals, are required to be reported. Spills of any quantity are required to be reported, except for petroleum that has a reporting threshold of greater than five gallons. Spill sites depicted in **Figure 16** and detailed in **Appendix C** can remain a potential source of contaminants after closure.

4.1.6.2 Tank Sites

Underground and above ground storage tanks used to store large quantities of liquids and potentially hazardous substances are considered high risk for groundwater contamination. If

leaking or ruptured, tanks could release large quantities of chemicals into the subsurface, which could enter source water aquifers and public water supply wells. Tank sites depicted in **Figure 16** and detailed in **Appendix C** can remain a potential source of contaminants even after closure.

4.1.6.3 Leak Sites

Leaking storage tanks sites also pose a high risk for groundwater contamination. As discussed in the previous section, these sites have had a storage tank release its contents into or onto the ground. Although many have been “cleaned” and “closed” by the MPCA, some of these sites may still have remaining soil and/or groundwater contamination. Leak sites depicted in **Figure 16** and detailed in **Appendix C** can remain a potential source of contaminants after closure.

4.1.6.4 VIC Sites and Petroleum Brownfield Sites

The MPCA Voluntary Investigation and Cleanup (VIC) Program database lists properties with known or suspected environmental contamination. The VIC sites include sites or facilities, which present a substantial danger to the public health, welfare, or the environment in the state of Minnesota. The VIC Program is a non-petroleum brownfield program. VIC provides technical assistance to buyers, sellers, developers, or local governments seeking to voluntarily investigate or clean up contaminated land. Properties often enter the VIC program in preparation for sale, financing or redevelopment. Voluntary parties that complete investigation and/or cleanup activities under MPCA oversight can receive liability assurances that protect them from future Superfund liability. In some cases, the MPCA may use institutional controls as part of the overall site remedy and notify interested parties of any property use conditions or restrictions. VIC sites depicted in **Figure 16** and detailed in **Appendix C** can remain a potential source of contaminants after closure.

Petroleum Brownfield sites may have been contaminated with petroleum due to a past or current leak. Petroleum Brownfields program staff assesses the risk associated with petroleum contamination at these sites and then provide technical assistance to help get the site cleaned up, developed, and/or transferred to a new owner. Petroleum Brownfields depicted in **Figure 16** and detailed in **Appendix C** can remain a potential source of contaminants after closure.

4.1.6.5 Hazardous Waste Generators

Hazardous waste generator are facilities are facilities or businesses registered and regulated by the State that generate a specified amount of hazardous waste per month. The type of hazardous waste generators are as follows:

- Hazardous Waste, Large Quantity Generator (LQG): A LQG is a facility that generates at least 1,000 kilograms (2,200 pounds) of hazardous waste or 1 kilogram (2.2 pounds) of acutely hazardous waste per calendar month. An MPCA permit is not required for a large quantity generator, but the facility must have a current hazardous waste license. This means that they must tell the MPCA what kinds of waste they generate, how much waste they generate, and how they dispose of the waste.
- Hazardous Waste, Small to Minimal Quantity Generator: A small to minimal quantity generator is a facility that generates less than 1,000 kilograms (2,200 pounds) of hazardous waste or 1 kilogram (2.2 pounds) of acutely hazardous waste per calendar month. These facilities have less stringent rules than large quantity generators. This group includes Small Quantity Generators (SQGs), which produce 100 - 1000 kg of hazardous waste per month; Very Small Quantity Generators (VSQGs), which produce less than 100 kg of hazardous waste per month; and Conditionally Exempt Generators,

which produce less than 100 kg or 10 gallons of hazardous waste per year. Like large quantity generators, SQGs and VSQGs must have current hazardous waste licenses.

4.1.7 Minnesota Department of Agriculture

MDA listings represent emergencies and locations of spills and investigations managed by the MDA for agricultural chemical incidents. MDA listings are depicted in **Figure 16** and detailed in **Appendix C**.

4.2 Inventory Results and Risk Assessment

A map and description of the locations of potential contamination sources are presented in **Appendix C** and depicted on **Figure 16** as described in detail under **Section 4**. Inventory results also considered the following: 1) a summary of the results for the IWMZ is listed in **Table 8**, and 2) for the remainder of the DWSMA in **Table 9**.

The priority assigned to each type of potential contamination source addresses each of the following: 1) the number inventoried; 2) its proximity to a City well; 3) the capability of local geologic conditions to absorb a contaminant; 4) the effectiveness of existing regulatory controls; and 5) the time required for The City to obtain cooperation from governmental agencies that regulate it. Risk assignments are summarized as follows:

- A high (H) risk potential implies that the potential source type has the greatest likelihood to negatively impact The City water supply and should receive highest priority for management.
- A moderate (M) risk potential implies that the potential source type may have an impact on The City water supply and should receive an intermediate priority for management.
- A low (L) risk potential implies that a potential source type may have a marginal or negligible impact on The City water supply and should receive a low priority for management.

4.2.1 Data Accuracy and Limitations

For this plan, The City has attempted to identify and specifically locate as many potential contaminant sources as possible and feasible given the current level of information and available resources. However, some potential contaminant sources may exist within the DWSMA that have not yet been identified or accurately located. Management strategies for the plan involve updating the PCSI if any changes are identified.

5 Impact of Land and Water Use Changes on the Public Water Supply Wells

The City anticipates that changes to the physical environment, land use, surface water, and groundwater may occur over the ten-year period that the WHPP Amendment is in effect. This must be considered to determine whether new potential sources of contamination may be introduced in the future and to identify future actions for addressing these anticipated sources.

Land and water use changes may introduce new contamination sources or result in changes to groundwater use and quality. The anticipated changes may occur within the jurisdictional authority of the City of White Bear Lake; however, because the DWSMA extends into adjacent

city limits, it is likely that changes will occur outside the jurisdictional authority of the City of White Bear Lake as well.

Table 10 describes the anticipated changes to the physical environment, land use, and surface water or groundwater in relationship to the following:

1. The influence that existing governmental land and water programs and regulations may have on the anticipated change.
2. The administrative, technical, and financial considerations of The City and property owners within the DWSMA.

6 Issues, Problems, and Opportunities

6.1 Identification of Issues, Problems, and Opportunities

The City has identified water and land use issues, problems, and opportunities related to the following:

1. The aquifer used by The City water supply wells;
2. The quality of the well water; or
3. Land or water use within the DWSMA.

Issue, Problems, and Opportunities were assessed each of the following parameters:

- Input from public meetings and written comments that it received.
- Data elements identified by MDH during the scoping meetings.
- Status and adequacy of The City and local government 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 the **Table 11** which defines the nature and magnitude of contaminant source management issues in the DWSMA. Identifying the issues, problems, and opportunities as well as resource needs enables The City to take advantage of opportunities that may be available to make effective use of existing resources. In addition, The City can set meaningful priorities for source management and solicit support for implementing specific source management strategies.

6.2 Comments Received

There have been several occasions for local governments, state agencies, and the general public to identify issues and comment on The City's WHPP Amendment. At the beginning of the planning process, local units of government were notified that The City was going to develop its WHPP Amendment and were given the opportunity to identify issues, as well as to comment. Following completion of the WHPP Part I Amendment, a public information meeting was held to review the results of the delineation of the WHP area, DWSMA, and the vulnerability assessments. Also, a public hearing was held before the completed WHPP Amendment was sent to MDH for state agency review and approval.

Comments received during local government review are included in **Appendix F** with written responses provide below.

The following comments were provided by Sam Paske, Metropolitan Council, are re-stated below followed by respective responses:.

1. *The White Bear Lake WHPP provides sound information regarding wellhead protection (WHP) issues and identifies high-level objectives to be addressed through the plan implementation process. The extension of the White Bear Lake drinking water supply management area (DWSMA) into neighboring communities creates an opportunity for the sharing of ideas and resources that will promote coordinated WHP activities. Similarly, DWSMAs for Vadnais Heights, North St. Paul, Mahtomedi, and White Bear Township extend into White Bear Lake and intersect with the White Bear Lake DWSMA. White Bear Lake may want to consider the formation of a wellhead protection*

coordinating committee with DWSMA-overlapping governmental units to facilitate communication and source water protection planning activities. This group would support the goals outlined in Chapter 8 and could aid wellhead protection managers in their efforts to identify issues, share information, and communicate source water protection activities. The Anoka County Municipal Wellhead Protection Group could serve as a model for these activities.

a. Response: A management strategy is included with this plan to work cooperatively with local units of government on wellhead protection and consider forming a Wellhead Committee.

2. *White Bear Lake could also consider adding 'success criteria' to the plan objectives identified in section 9, and further specifying what the activities associated with the plan objectives in section 9.2. Doing so would support the plan evaluation program and could be included in wellhead protection progress reports.*

    a. Response: Success criteria are included in Section 10 of this report. "The City will assess results of each action item that has been taken to determine whether the action item has been accomplished to its purpose or whether modification is needed."

3. *The integration of the WHPP with the City's planning process is a critical task in strengthening source water protection. There are a number of resources available to communities to aid in the wellhead and source water planning and protection effort. Some examples include:*
    - *White Bear Lake Systems Statement*
    - *Master Water Supply Plan*
    - *Water Conservation Toolbox*
    - *Stormwater Reuse Guide*
    - *Council Reports on Groundwater and Surface Water Interactions (2010, 2020)*
    - *The Minnesota Technical Assistance Program*
    - *University of Minnesota Extension: Lawn and Turfgrass Management Program*

    a. Response: Section 7 and Table 13 have been updated to include these resources. Additionally, a management strategy has been added to encourage potential parties in utilizing these programs and the implementation of the indicated metro area policies.

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

In addition to its own controls, The City will have to rely upon partnerships formed with local units of government, state agencies, and federal agencies with regulatory controls or resource management programs in place to help implement its WHPP Amendment. The level of support that a local, state, and federal agency can provide to help offset the risk that is presented by a potential contamination source will depend up on its legal authority as well as the resources that are available to local governments.

7.1 Existing Controls and Programs of The City's Well Locations

Portions of the DWSMA fall completely outside of the jurisdiction of the City of White Bear Lake, but all wells are located within The City. The City holds fee title to the real property on which the wells are situated.

The City has identified a number of legal controls and/or programs that are in-place that can be used to support the management of potential local contamination sources. These can be found in **Table 12**.

7.2 Local Government Controls and Programs

Table 13 details departments or programs within the County and other local government programs that 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.

7.3 State Agency and Federal Agency Support

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

Table 14 identifies specific regulatory programs or technical assistance that state and federal agencies may provide to The City to support implementation of its WHPP Amendment. 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 WHPP Amendment was approved by MDH.

7.4 Support Provided by Nonprofit Organizations

A number of existing organizations work to support water management programs in the area including:

- One Watershed, One Plan: Developed by the Local Government Water Roundtable (Association of Minnesota Counties, and the Minnesota Associations of Watershed Districts and Soil and Water Conservation Districts), the program establishes specific

water management responsibilities to local governments in order to organize and develop focused implementation plans on a watershed scale.

- Watershed Restoration and Protection Strategies (WRAPS) and Groundwater Restoration and Protection Strategies (GRAPS)
- Rice Creek Watershed Districts
- Ramsey-Washington Metro Watershed District (RWMWD)
- Valley Brand Watershed District
- Minnesota Rural Water Association also provides reference education and outreach materials for landowners.

8 Goals

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

The overall goal of the City of White Bear Lake is to promote public health, economic development and community infrastructure by maintaining a safe and adequate drinking water supply for all residents of the community, both now and into the future.

9 Objectives and Plan of Action

Objectives provide the focus for ensuring that the goals of the WHPP Amendment 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 each of the following: 1) the data elements (**Section 2**, and **Appendix A**; 2) the PCSI (**Section 4 and Appendix C**); 3) the impacts that changes in land and water use present (**Section 5**); and 4) issues, problems, and opportunities related to administrative, financial, and technical considerations (**Section 6**).

The PWS (WHP Manager) will manage and budget resources (staff time, hard costs of activities where money may need to be budgeted, etc.) for the implementation of the management strategies in the plan; the PWS (WHP Manager) is responsible for annually reviewing and budgeting time and financial resources needed for the coming year to implement measures in a plan; and MDH or Minnesota Rural Water Association staff will be contacted to answer questions or provide technical assistance needed to implement activities in the plan.

9.1 Objectives

The following specific objectives have been identified to support goals of the WHPP Amendment for The City:

A. Create awareness and general knowledge about the importance of WHP in the Community and in the DWSMA.

B. Properly inventory and manage potential contaminant sources to protect the drinking water supply for The City.

C. Support ongoing data collection efforts to enhance future WHP activities.

D. Effectively track, evaluate, and report the implementation efforts and wellhead protection progress to all governing authorities.

E. Manage the IWMZ to prevent contamination.

F. Effectively prepare The City for disruptions to the water distribution system.

G. Partner with local units of government to better protect the aquifer used by The City and when possible, develop local land use controls that can benefit the source water aquifer.

9.2 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 WHPP Amendment is in effect. The objective that each measure supports is noted, as well as the following: 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.

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

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

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

Based upon the factors listed above, the WHP team has prioritized WHP measures that will be implemented by The City over the 10-year period that this plan is in effect and assigned an appropriate priority ranking.

The objective that each measure supports is noted as well as the following: 1) lead party and any cooperators; 2) anticipated cost for implementing the measure; and 3) the year or years in which it will be implemented. **Table 15** lists each measure that it will implement over the ten-year period that The City's WHPP Amendment is in effect, as well as the priority that it has assigned to each measure.

10 Evaluation Program

Plan evaluation is specified under **Section 9.1** and provides the mechanism for determining whether WHPP action items are achieving the intended result or whether they need to be modified to address changing administrative, technical, or financial resource conditions within the DWSMA. Evaluation is used to support plan implementation and is required under Minnesota Rules, part 4720.5270, and prior to amending The City's WHPP Amendment. The City has identified the following procedures that it will use to evaluate the success of implementing its WHPP Amendment:

- The WHP team will meet at a minimum every two- and one-half years to assess the status of plan implementation and to identify issues that impact implementation of action steps throughout the DWSMA.
- The City will assess results of each action item that has been taken to determine whether the action item has been accomplished to its purpose or whether modification is needed.

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 that it will hold with The City to begin amending the WHPP Amendment.

11 Contingency Strategy

The City's Water Supply Plan, Water Emergency Plan, and Conservation Plan was completed in 2016 and has received approval on November 5, 2020, by the DNR. The plan has been adopted by the City Council and provides a detailed water contingency strategy. The DNR and Metropolitan Council approval letters can be found in **Attachment G**.

12 References

Birchwood Village 2030 Comprehensive Plan, 2010

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MPCA *Petroleum Remediation Program Maps* online, http://pca-gis02.pca.state.mn.us/prp/index.html

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National Wetlands Inventory. MnDNR Accessed 2022.

White Bear Township Comprehensive Plan, March 2019. Accessed March 2022

Soil Survey Geographic Database. USDA Natural Resources Conservation Service. Accessed 2022.

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Tables

Table 1 – Water Supply Wells Included in WHP

Well Name	Unique Well No.	Well Status
Well #1	014005	Primary
Well #2	222880	Emergency
Well #3	205733	Primary
Well #4	226566	Primary
Well #5	226567	Emergency

Table 2 – Water Supply Well Data

Well Name	Unique Well No.	Date Constructed	Aquifer	Total Depth (ft)	Casing Depth (ft)	Casing Diameter (in)	Vulnerability
Well #1	014005	August 1959	Jordan	490	390	16	Vulnerable
Well #2	222880	October 1962	WECS	970	700	16	Not Vulnerable
Well #3	205733	March 1966	OPCJ	513	289	20	Vulnerable
Well #4	226566	January 1969	OPCJ	476	267	20	Vulnerable
Well #5	226567	June 1956	Jordan	463	371	12	Vulnerable

Note:

WECS – Wonewoc, Eau Claire, and Mt. Simon Aquifers

OPCJ - Prairie Du Chien – Jordan Aquifer

Table 3 – Zoning within DWSMA

Zoning Category	Zoning within DWSMA (acres)	Percentage of Total Acres
City of White Bear Lake		
Unzoned	7	0.3%
B-1, Neighborhood Business District	1	0.0%
B-2, Limited Business District	29	1.4%
B-3, Auto-oriented Business District	5	0.2%
B-4, General Business District	42	2.0%
I-1, Limited Industry District	1	0.0%
O, Open Space	6	0.3%
P, Public Facilities District	482	22.6%
R-3, Single Family Residential District	1024	48.1%
R-5, Single Family, Two Family, Medium Density Residential District	7	0.3%
R-6, Medium Density Residential District	85	4.0%
R-7, High Density Residential District	9	0.4%
R-B, Residential-Business Transition District	0	0.0%
R1-S, Low Density Single Family Residential – shoreland district	12	0.6%
ROW, Right of Way	379	17.8%
Water	42	2.0%
City of Maplewood		
Business Commercial	30	12.2%
Business Commercial Modified	5	2.1%
Farm Residential	16	6.6%
Limited Business Commercial	1	0.4%
Open Space/Park	57	23.1%
Planned Unit Development	27	10.9%
Shopping Center	12	5.1%
Single Dwelling	76	30.7%
Small Lot Single Dwelling	9	3.7%
Double Dwelling	6	2.3%
Multiple Dwelling	7	3.0%

Table 3 (Continued) – Zoning within DWSMA

Zoning Category	Zoning within DWSMA (acres)	Percentage of Total Acres
White Bear Township		
B-1, Limited Business	2	1.0%
R-1, Suburban Residential	170	99.0%
City of Oakdale		
Community Commercial	12	52.5%
PUD, Planned Unit Development	11	47.5%
City of Birchwood Village		
Institutional	1	0.4%
Park, Recreational, or Preserve	16	8.2%
Seasonal/Vacation	2	0.9%
Single Family Detached	173	87.8%
Undeveloped	5	2.7%
City of Mahtomedi		
B1, Office Business	3	0.2%
B2, Limited Business	5	0.3%
B3, Downtown Business	2	0.1%
B4, General Business	47	2.8%
B5, Interstate/General Business	15	0.9%
C, Conservation	37	2.2%
IB, Industrial/Business Park	93	5.6%
VMU, Village Mixed Use	16	1.0%
P, Park Lands/Public	166	10.1%
PB, Public Buildings	73	4.4%
R1-A, Low Density Residential	24	1.5%
R1-B, Low Density Residential	194	11.8%
R1-C, Low Density Residential	75	4.5%
R1-D, Low Density Residential	422	25.6%
R1-E, Low Density Residential	220	13.3%
R2, Medium Density Residential	58	3.5%
R3, Medium Density Single Family Attached Residential	67	4.0%

Table 3 (Continued) – Zoning within DWSMA

Zoning Category	Zoning within DWSMA (acres)	Percentage of Total Acres
R4, High Density Multiple Family Residential	11	0.7%
RR, Rural Residential	111	6.7%
MU-PUD, Mixed Use/Planned Unit Development	10	0.6%
City of Grant		
A2, Agricultural Small	80	100%
City of Dellwood		
R1, Residential	111	100%

Table 4 – Land Use within DWSMA

Land Use Category	Land Use within DWSMA (acres)	Percentage of Total Acres
City of White Bear Lake		
Commercial	67	3.4%
Multi Family (Apartments and Condos)	269	13.8%
Public	410	21.0%
Semi-Public	135	6.9%
Single Family	999	51.2%
Single Family Attached (Townhomes)	49	2.5%
Vacant	23	1.2%
City of Maplewood		
Commercial	59	24.0%
Government	0	0.1%
High Density Residential	3	1.3%
Low Density Residential	95	38.6%
Medium Density Residential	26	10.5%
Institution	3	1.4%
Open Space	59	24.1%
White Bear Township		
Commercial	2	1.0%
Public	19	10.9%
Single Family - Detached	153	88.0%
Vacant	0	0.2%
City of Oakdale		
5+ Units	6	27.7%
Commercial	1	2.9%
Park and Recreation	0	1.4%
Vacant	15	68.0%
City of Birchwood Village		
Institutional	0.8	0.4%
Park, Recreational, or Preserve	16.1	8.2%
Seasonal/Vacation	1.7	0.9%
Single Family Detached	172.7	87.8%

Table 4 (Continued) – Land Use within DWSMA

Land Use Category	Land Use within DWSMA (acres)	Percentage of Total Acres
Undeveloped	5.3	2.7%
City of Mahtomedi		
Major Highway	0	0.0%
Industrial and Utility	61	2.3%
Institutional	142	5.4%
Mixed Use Industrial	5	0.2%
Office	3	0.1%
Open Water	1022	38.6%
Park, Recreational, or Preserve	108	4.1%
Retail and Other Commercial	28	1.1%
Seasonal/Vacation	1	0.0%
Single Family Attached	81	3.0%
Single Family Detached	989	37.3%
Mixed Use Residential	0	0.0%
Multifamily	8	0.3%
Undeveloped	199	7.5%
City of Grant		
Agricultural	8	9.6%
Single Family Detached	23	29.1%
Undeveloped	49	61.3%
City of Dellwood		
R1, Residential	111	100%

Table 5 – Metropolitan Council 2020 Generalized Land Use within DSWMA

Land Use Category	Land use within DWSMA (acres)	Percentage of Total Acres
Agricultural	5	0.1%
Farmstead	0	0.0%
Golf Course	144	2.5%
Industrial or Utility	84	1.4%
Institutional	360	6.2%
Major Highway	106	1.8%
Mixed Use Commercial	17	0.3%
Mixed Use Industrial	5	0.1%
Mixed Use Residential	3	0.1%
Multifamily	93	1.6%
Office	22	0.4%
Open Water	1092	18.8%
Park, Recreational, or Preserve	399	6.9%
Retail and Other Commercial	144	2.5%
Seasonal/Vacation	0	0.0%
Single Family Attached	162	2.8%
Single Family Detached	2863	49.4%
Undeveloped	301	5.2%

Table 6 – Future Land Use within DWSMA

Land Use Category	Land Use within DWSMA (acres)	Percentage of Total Acres
City of White Bear Lake		
Very Low Density Residential	12	0.4%
Low Density Residential	984	32.9%
Medium Density Residential	280	9.4%
High Density Residential	45	1.5%
Commercial; Commercial Mixed Use	73	2.4%
Business Park	11	0.4%
Other Public/Semi-Public	221	7.4%
Park/Open Space	301	10.1%
ROW, Right of Way	1010	33.8%
Rail/ROW	7	0.2%
Water	43	1.5%
City of Maplewood		
Commercial	39	11.2%
Institutional	4	1.1%
Low Density Residential	96	27.7%
Medium Density Residential	26	7.5%
High Density Residential	3	0.9%
Mixed-Use - Community	20	5.8%
Open Space	59	17.2%
ROW, Right of Way	99	28.6%
White Bear Township		
Commercial	2	1.0%
Public-Institutional	11	6.2%
Residential - Low Density	151	87.0%
Township Green Space	1	0.5%
Township Park Property	9	5.3%
City of Oakdale		
Commercial	16	72.3%
High Density Residential	6	27.7%
City of Birchwood Village		
Institutional	1	0.4%
Parks/Open Space	14	7.1%
Residential	182	92.5%

Table 6 (Continued) – Future Land Use within DWSMA

Land Use Category	Land Use within DWSMA (acres)	Percentage of Total Acres
City of Mahtomedi		
Village Mixed Use	5	0.2%
Rural Residential	56	2.1%
Community Commercial	25	0.9%
Neighborhood Commercial	4	0.2%
Industrial/Business Mix	93	3.5%
Low Density Residential	1044	39.4%
Medium Density Residential	75	2.8%
High Density Residential	9	0.3%
Mixed Residential Commercial	6	0.2%
Public or Private Open Space	71	2.7%
Utility	0	0.0%
Public Institutional	136	5.1%
Public Park	104	3.9%
ROW, Right of Way	0	0.0%
Open Water	1023	38.6%
City of Grant		
RR/AG, Rural Residential/Ag	80	100%
City of Dellwood		
R1, Residential	111	100%

Table 7 – Other Permitted High-Capacity Wells within 2 Miles of Water Supply Wells

Unique Number	Well Name	DNR Permit Number	Aquifer	Use	2015-2019 Average Use (MGY)	Average Daily Use (M3/d)
151596	White Bear Township	1984-6121	OPDCCJDN	Municipal/Public Water Supply	135.3	1,403.1
676446	White Bear Township	1984-6120	CJDN	Municipal/Public Water Supply	24.4	253.0
226570	White Bear Township	1984-6120	CJDN	Municipal/Public Water Supply	5.7	59.1
205744	City of North St. Paul	1977-6176	CJDN	Municipal/Public Water Supply	61.3	635.7
208223	City of North St. Paul	1977-6176	OPDCCJDN	Municipal/Public Water Supply	46.3	480.1
208222	City of North St. Paul	1977-6176	OPDCCJDN	Municipal/Public Water Supply	41.8	433.5
112222	Vadnais Heights, City Of	1980-6153	OPCJ	Municipal/Public Water Supply	0.1	1.0
233149	Saputo Dairy Foods USA, LLC	1986-6316	CJDN	Agricultural/Food Processing	151.115	1,567.1
753675	Mahtomedi, City of	1969-0163	CJDN	Municipal/Public Water Supply	62.845	651.7
433255	Mahtomedi, City of	1969-0163	OPDCCSTL	Municipal/Public Water Supply	20.761	215.3
655934	Ind School District 624	2004-3020	OPDC	Landscaping/Athletic Field Irrigation	3.1	32.1
127293	RAMSEY COUNTY PARKS and RECREATION	1987-6205	OPDC	Golf Course Irrigation	14.008	145.3
151584	Gem Lake Hills Inc	1986-6211	OPDCCJDN	Golf Course Irrigation	12.844	133.2
151575	Oakdale Public Works	1978-6197	CJDNCSTL	Municipal/Public Water Supply	0.02	0.2

Source: MN Dept. of Natural Resources Division of Waters - DNR Permitting and Reporting System (MPARS)

Table 8 – Potential Contamination Sources and Assigned Risk for the IWMZ

Potential Contaminant Source Type	Status	Number of Sites Within DWSMA	Assigned Risk
Well #1 (014005)			
Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	A	1	Low
Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	A	3	Low
Petroleum tank or container, 1100 gal. or more, without safeguards	A	1	Low
Well #2 (222880)			
Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	A	1	Low
Storm water drain pipe, 8 inches or greater in diameter	A	2	Low
Well #3 (205733)			
Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	A	2	Low
Storm water drain pipe, 8 inches or greater in diameter	A	3	Low
Petroleum tank or container, not buried, between 56 and 1100 gal.	A	1	Low
Well #4 (226566)			
Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	A	1	Low
Storm water drain pipe, 8 inches or greater in diameter	A	2	Low
Petroleum tank or container, not buried, between 56 and 1100 gal.	A	1	Low

Table 9 – Potential Point Contamination Source Type and Assigned

Potential Contaminant Source Type	Number of Sites Within DWSMA	Assigned Risk
Wells	168	High
Class V Well	2-Status Unknown	High
Potential Contamination Site (Brownfield, Superfund, etc)	3	Moderate
Aboveground Storage Tanks	1	Moderate
Underground Storage Tanks	9	Moderate
Leaking Underground Storage Tank	10	Moderate
Spill (MPCA and MDA)	7	Moderate
Stormwater Outlet	4	Moderate

Notes:

DWSMA consists of areas of Low, Moderate and High Vulnerability. No sites of the following type were identified within the DWSMA or ERA per the vulnerability requirements described in the Scoping notice:

Storage and Preparation Areas (RMP and TRS), Pipeline Facility and Suspected Contaminant of Concern, Animal Burial Site, Animal Feedlot, Ash Disposal Site, Nonpublic/roadway Drainage Ditch, Dump (unpermitted), Grave, Hazardous Waste Handler, Hazardous Waste Generator, Land Application, Nuclear Reactor, Pipeline Crossing Over Water, Rail Crossing Over Water, Road Crossing Over Water, Storage or Preparation Area, Pit, Sinkhole, Sludge Disposal Site, Solid Waste Management Site, Subsurface Sewage Treatment System, Waste – Metro Area, Wastewater Disposal Site, Wastewater Stabilization Pond , or Wastewater Treatment Pond

Table 10 – Expected Land and Water Use Changes

Expected Change (Physical Environment, Land Use, Surface Water, Groundwater)	Impacted of the Expected Change on the Source Water Aquifer	Influence of Existing Government Programs and Regulations on the Expected Change	Administrative, Technical, and Financial Considerations due to the Expected Change
Construction and maintenance of PCSI such as private wells, tanks, or stormwater utilities within DWSMA may affect the source water aquifer	Private wells and other PCSI sources have the potential to impact source water aquifer	Best management practices are provided by regulatory agencies in charge of each PCSI source. The MDH may assist with sealing and locating of improperly managed wells.	City can implement proactive measures such as providing best management practices to PCSI property owners.
The City should remain aware of any land use changes over the course of the Wellhead Protection Plan that may impact the source water aquifer.	Potential for water quality, quantity leading to unforeseen water supply changes.	EPA, MPCA, and DNR related programs and regulations will be updated in correspondence to new activity.	The City will need to work cooperatively with MnDOT, MPCA, MDH, Minnesota DNR, and other local government units to prevent or minimize impacts from any land use or remedial activity if it deemed applicable.
The DWSMA extends outside of The City's jurisdiction.	Increased commercial and industrial uses are may take place within the DWSMA.	Neighboring municipalities should consider The City's DWSMAs during planning efforts. When possible, utilize local watershed organizations for source water protection. Watersheds promote activities and educational events that improve watershed health.	As commercial and industrial land use increases within the DWSMA local watersheds and local governments help to protect surface water and recharge into the aquifers. The Vadnais Lake Area WMO, Valley Brand Watershed District, Rice Creek and Ramsey-Washington Watershed Districts are local resources that may help The City to facilitate collaborative WHP activities.
No anticipated City increase of groundwater use, however expected increase in use from other entities.	Potential change in wellhead protection area.	Review of surrounding DNR appropriation permits.	Staff time working with DNR on appropriation permits. Future revaluation of wellhead protection area.
No changes to the physical makeup of the aquifer are expected.	No changes, therefore, no impact.	No changes, therefore, existing programs or regulations are adequate.	Because there are no expected changes to the physical makeup of the aquifer no additional administrative, technical or financial considerations required.

Table 11 – Issues, Problems, and Opportunities

Issue Identified	Impacted Feature	Problem Associated with the Identified Issue	Opportunity Associated with the Identified Issue	Adequacy of Existing Controls to Address the Issue
The DWSMA extends outside City of White Bear Lake Boundaries and The City's jurisdiction.	Aquifer, Well Water Quality, DWSMA	Water is recharging the source water aquifer from lands outside The City jurisdiction. The City has no land use controls or authority over these areas.	The City will need to work cooperatively with the neighboring entities such as MnDOT, watersheds, DNR, municipalities, and townships.	Cooperation of neighboring entities. Watershed organizations can provide education and projects that protect the watershed by improving recharge into the source water aquifer.
The WHPA delineations for the city wells were created using maximum pumping rates and conservative assumptions in the fracture flow delineation. While the delineations are conservative and are based on the best available data, there is some information that could improve the quality of any future re-evaluations.	Delineation, Water Quality, and Water quantity	Unknowns of fracture flow, surface and groundwater interaction along with known water quality data makes it difficult to assess and determine if there is a problem.	If requested work with MDH to develop a sampling program to help improve fracture flow delineation.	Continue to work cooperatively with the MDH to complete water chemistry testing.
Possible water right issues and lawsuits related to surface water levels due to groundwater pumping in the DWSMA.	Water Quantity	Water levels in nearby surface water bodies	Continue to record water usage. If requested, work with MDH and the MnDNR to investigate if any such issues exist. Work with local watershed groups to improve local watersheds.	Minnesota DNR regulates water usage and evaluates water appropriation permits. Local and regional watersheds can improve water flow to surface water bodies balancing out any potential negative effects from pumping.
Special consideration needs to be given for stormwater practices in the highly vulnerable area.	Water Quality	Stormwater may recharge aquifers in highly vulnerable areas. These areas are outside of City Jurisdiction.	The MPCA establishes guidelines for municipal stormwater under the MS4 general permit. Reach out to neighboring communities with high vulnerability to see if they are under a MS4 Permit and these area are protected.	MPCA sets guidelines for municipal stormwater under the MS4 General permit.

Table 11 (Continued) – 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
Land use within the DWSMA is likely to continue to be utilized for commercial and industrial entities.	Water Quality	The source water aquifer has been determined to be potentially vulnerable to land use as the result of tritium dating.	Provide education materials, monitor for water quality changes, and work with neighboring entities to improve surface water recharge into the aquifers.	The City will need to develop education materials and provide it through their website. The City should continue working with neighboring entities such as watershed districts and organizations.
Multiple Private Wells are located within the DWSMA. All wells have the potential to carry contaminants to the source water aquifer. If unused wells or wells with poor construction are identified The City can work with the property owner and MDH to seal such wells.	Aquifer, Well Water Quality	Unused wells which have not been sealed according to MDH standards may provide a pathway for pollutants to enter into the aquifer.	With the assistance of MDH, The City can locate, assess and seal the wells if they pose a threat to The City's drinking water supply.	MDH Well Management has the ability to require local governments to properly address unused improperly sealed wells. The City can utilize the MDH WHP grant program to seal the wells.
Multiple Potential Contaminant Sources were inventoried to be within the DWSMA. Many of these relate to facilities where chemicals had been stored or are still stored.	Aquifer	Private facilities may not be aware they are within a DWSMA. Discrepancies may arise between planning efforts	Cooperate with other local government units, state agencies, and private industry to incorporate wellhead protection principles into other planning efforts to insure all DWSMA are included in local government planning.	Local ordinances establish criteria for conditional use permits; however, outside The City jurisdiction and may not take into consideration Provide access to best management strategies for various PCSI sources.
The MDH has compiled historical information, the Old Municipal Well Report, for use in the planning process.	Aquifer, Well Water Quality	Wells which have not been sealed according to MDH standards may provide a pathway for pollutants to enter into the aquifer.	With the assistance of MDH The City can locate, assess and seal the wells if they pose a threat to The City's drinking water supply.	MDH Well Management has the ability to require local governments to properly address unused improperly sealed wells. The City and local governments can utilize the MDH WHP grant program to seal the wells.

Table 11 (Continued) – 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
It is always difficult to foresee or plan for every threat or potential contaminant source which may affect The City.	Aquifer, Well Water Quality, DWSMA	The City may not be prepared technically or financially to address potential threats unknown to them at this time.	If a critical issue or potential contaminant threat becomes an issue in the future for The City, The City can ask for assistance from the various state agencies to promptly take action to prevent this contaminant source from contaminating their drinking water supply.	Grants dollars may also be available to help cover various cost and equipment.
Wellhead protection principles may not be incorporated into other plans developed by other local government units	Aquifer	Discrepancies may arise between planning efforts	Cooperate with other local government units to incorporate wellhead protection principles into other planning efforts to insure all DWSMA are included in local government planning.	Local ordinances and controls may be adopted to account for unseen issues.

Table 12 – Controls and Programs near Wellfield

Type of Control	Program Description
State Plumbing Code MN Rule 4714	The City of White Bear Lake follows State Plumbing Code including Mn Rule 4714.
MS4 Permit	A municipal separate storm sewer system (MS4) is regulated by the MPCA. Stormwater within DWSMA areas of High Vulnerability are of concern for this plan. The only area of High Vulnerability is within the City of Mahtomedi. The City of Mahtomedi has an approved MS4 Permit listed under preferred ID MS400031.

Table 13 – Local Agency Controls and Programs

Government Unit	Name of Control/Program	Program Description
Metropolitan Council	Thrive MSP 2040 Regional Plan, Water Systems Statement	Metropolitan Council is the regional policy-making body and planning agency
Metropolitan Council, Minnesota Pollution Control Agency, University of Minnesota	Water Conservation Toolbox, Stormwater Re-use Guide, Council reports on groundwater and Surface water Interactions, Lawn and Turfgrass Program, MPCA Stormwater Resources	Resources for water suppliers and developers to conserve and protect water resources.
Ramsey-Washington Metro Watershed District (RWMWD)	Watershed District	Special purpose governmental unit responsible for protecting the water resources of the watershed, located in the eastern portion of Ramsey County and the western edge of Washington County, Minnesota.
Vadnais Lake Area Water Management Organization (VLAWMO)	Watershed Organization	Protect and enhance the water resources within the watershed. Water quality monitoring, education and outreach projects, wetland protection, and water quality enhancement projects.
Ramsey County	County Soil and Water Conservation District	Soil & Water Conservation division conserves and enhances natural resources in Ramsey County by providing technical, financial, and educational support to residents, property owners, and state, local and federal governmental agencies and environmental organizations.
Ramsey County	Recycling & Waste	Ramsey County operates free collection sites for residents to dispose of yard waste, household hazardous waste, organic waste and medicines.
Washington County	The Washington Conservation District	The Washington conservation District is dedicated to soil and water conservation, with projects ranging from erosion prevention to preservation of wildlife.
Washington County	Land and Water Legacy Program	The Land and Water Legacy Program is part of Washington County and is dedicated to the preservation of water quality, woodlands, and other natural areas.

Government Unit	Name of Control/Program	Program Description
Washington County	Recycling & Waste	Washington County operate free collection site for residents to dispose of yard waste, household hazardous waste, consumer electronics, and recyclables.
Various Local Governments	Land Use Applications / Zoning and Planning	Planning and zoning works to ensure strong economic development, a healthy tax base, and a desirable quality of life.
White Bear Lake Conservation District	Conservation District	The White Bear Lake Conservation District was formed by the State of Minnesota in May of 1971. Subject to provisions of Minnesota Statutes, Chapters 98, 105, 106, 110, 112, 115 and the rules and regulations of the respective agencies and governing bodies vested with jurisdiction and authority thereunder.
University of Minnesota	Minnesota Technical Assistance Program (MnTAP) and other programs	Helps Minnesota businesses develop and implement industry-tailored solutions that prevent pollution at the source, maximize efficient use of resources, and reduce energy use and costs to improve public health and the environment.
Rice Creek Watershed District	Watershed District	The mission of the Rice Creek Watershed District is to conserve and restore the water resources of the District for the beneficial use of current and future generations. The Rice Creek Watershed District encompasses approximately 201 square miles of Anoka, Hennepin, Ramsey and Washington counties in Minnesota.
Valley Branch Watershed District	Watershed District	The Valley Branch Watershed District (VBWD) is a local unit of government that manages water resources within the Valley Branch watershed per authorities given in Minnesota Statutes 103B, 103D, and Minnesota Rules 8410. The VBWD covers approximately 70 square miles including numerous waterbody basins and streams. The VBWD lies primarily within Washington County but includes approximately one square mile in Ramsey County.
Water Research Foundation	Nonprofit 501(c)(3) Research Foundation	Online research library for applied research important to water utilities, innovation platform (LIFT Link) with a database of more than 140 innovative technologies, supports the world's largest body of stormwater best practice data

Table 14 – State and Federal Agency Controls and Programs

Government Unit	Type of Program	Program Description
MN Dept. of Health (MDH)	State Well Code (MR Section 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 (MDH)	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 (DNR)	Water Appropriation Permitting (MR Section 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 WHPP Amendment.
MN Pollution Control Agency (MPCA)	Multiple Programs	MPCA administers the programs dealing with storage tank regulations and storm water management. Petroleum Pipelines (Also Office of Pipeline Safety) Hazardous waste generator best management practices and regulation MPCA Small Business Assistance Program provides free, non-regulatory, confidential environmental assistance
Environment Protection Agency (EPA)	Shallow Disposal Well Program	EPA has the regulatory authority over Class V Injections Well or also known as Shallow Disposal Wells.
Minnesota Department of Transportation (MnDOT)	Municipal Separate Storm Sewer System (MS4)	An MS4 is a conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs and gutters, ditches, man-made channels, storm drains, etc.) that is also owned or operated by a public entity (which can include cities, townships, counties, military bases, hospitals, prison complexes, highway departments, universities, etc.). Stormwater discharges associated with MS4s are subject to regulation under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) MS4 Permit. The MS4 General Permit is designed to help reduce the amount of sediment and other pollution that enters surface and groundwater from storm sewer systems to the maximum extent practicable. Through the MS4 General Permit, the system owner or operator is required to develop a Stormwater Pollution Prevention Program (SWPPP) that incorporates best management practices applicable to their MS4.

Table 15 – Management Strategies

Measure	Priority	Public Education and Outreach Management Measure	Object Addressed	Cost Estimate	The City Measure Unless Cooperation is Noted	Implementation Time Frame										
						2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
1	High	The City will notify the public it serves that it has an approved Wellhead Protection Plan through their consumer confidence report, newsletter, strategic plan, or website.	A	Staff Time	MDH	•										
2	High	The City will post a copy of their Wellhead Protection Plan on their website. The City will yearly check to make sure the link works.	A	Staff Time	MDH	•	•	•	•	•	•	•	•	•	•	•
3	High	The City will provide WHP educational materials. Materials will address general WHP principles and practice and provide best management practices for tanks, private wells and other potential contaminant sources. Public Educational materials will be made available to the public on the City website(s), educational events, or hard copies available at City Hall.	A	Staff Time, or obtain cost estimate	MDH, MPCA, DNR, MRWA	•	•	•	•	•	•	•	•	•	•	•
4	High	Utilize existing The City Enterprise or ArcGIS Online systems to create a ESRI based Story Map detailing WHP principals and relevant management strategies. Once Implemented, on a yearly basis, check that all links and maps are working as intended.	A	>$5,000 and/or Staff Time	The City, Consultant			•	•	•	•	•	•	•	•	•
5	High	Provide Public Education particularly related to water conservation through pamphlets, mailings, or on the City Website.	A	<$2,500 and/or Staff Time	The City, Consultant			•	•	•	•	•	•	•	•	•

Table 15 (Continued) – Management Strategies

Measure	Priority	Potential Contaminant Source Management Measure	Object Addressed	Cost Estimate	The City Measure Unless Cooperation is Noted	Implementation Time Frame										
						2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
6	High	Obtain a cost estimate and apply for grant or MDH Well Management funds to seal unused or Old Municipal Wells if feasible and restore site as necessary. Utilize the Old Municipal Well Report to identify any such wells.	B	>$2,500 and/or Staff Time	MDH	As Needed										
7	High	The City will provide educational material about private wells by providing a link, reference, or digital copy of the MDH publication, “Well Owner’s Handbook”. This can be provided on the City’s website.	B	<$1,000 and/or Staff Time	MDH			•		•		•		•		•
8	High	The City will promote any well sealing or cost-sharing programs available through the MDH or Ramsey County that assist or reimburse the costs and Administration of sealing unused, poorly maintained, damaged or abandoned private wells located within the DWSMA. The City will work with neighboring communities on this management strategy as opportunities arise.	B	>$2,500 and/or Staff Time	MDH Landowners	As Needed										
9	High	The City will contact the owners of the Class V wells within the DWSMA to see if the Class V well is still active. Provide activity status information to MDH SWP Planner	B, G	Staff Time	EPA, Property Owners						•					
10	Moderate	If additional Class V Well are identified, work with MDH Planner to provide the Class V owner information regarding regulations to Class V Wells.	B	>$2,500 and/or Staff Time	MDH, EPA	As Needed										
11	High	Request information from the MPCA any PCS sites within Medium and High Vulnerability Areas.	B	>$1,000 and/or Staff Time	MPCA, MDH			•						•		

Table 15 (Continued) – Management Strategies

Measure	Priority	Potential Contaminant Source Management Measure	Object Addressed	Cost Estimate	The City Measure Unless Cooperation is Noted	Implementation Time Frame										
						2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
12	High	The City will provide educational material or best management practices provided by the MPCA on above ground storage tanks.	B	>$1,000 and/or Staff Time	MPCA, MRWA	•		•		•		•		•		•
13	High	The City will provide education material about basic underground storage tanks requirements by providing the MPCA Fact Sheets, “Underground Storage Tanks: Are you doing the Big Five?” and “What Tank Owners Need to Know About the Underground Storage Tank Rules”.	B	>$1,000 and/or Staff Time	MPCA	•		•		•		•		•		•
14	Moderate	The City should remain aware of any updates to the PCSI. Update PCSI locations if they are determined to be on the incorrect parcel and make note of any new PCSI sources during this plan’s implementation. This information can be used during the next plan amendment.	B	>$2,500 and/or Staff Time	MPCA, MDH	As Needed										

Table 15 (Continued) – Management Strategies

Measure	Priority	Land Use and Planning Management Measure	Object Addressed	Cost Estimate	The City Measure Unless Cooperation is Noted	Implementation Time Frame										
						2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
15	Moderate	Integrate wellhead protection principles into local planning efforts including comprehensive plans, as opportunities become available for update of planning efforts.	A, G	>$2,500 and/or Staff Time	Local LUGs	As needed, next estimated plan development is estimated between 2027-2030.										
16	High	The City's DWSMA intersects and is adjacent to many other DWSMAs. When applicable, include and participate with other regional Wellhead Protection Teams to accomplish Wellhead Protection Principals. Reach out to Local LUGs on their interest in forming regional planning group.	A, G	Staff Time	Local LUGs	On-going										
17	High	Provide the Ramsey County Highway Department and MnDOT a map of the DWSMA and ask that they take into consideration this area when they are conducting road construction or maintenance projects (i.e. storm water or diversions, fuel and construction equipment management and maintenance, chemical use, etc.).	A, G	Staff Time	MnDOT, Ramsey County HWY Department		•									
18	Moderate	Hold yearly or as-needed meetings with watershed agencies and discuss opportunities to work on projects. If a project is identified, apply for a source water implementation grant to assist with costs.	A, G	>$2,500 and/or Staff Time	Watershed agency	Yearly/As needed										
19	Moderate	Coordinate with local watershed agencies on public outreach and educational opportunities. Educational material provided may highlight water conservation, watershed protection, and other wellhead protection principals. Public outreach may include hyperlinks to watershed material on the City of White Bear Lake's website.	A, G	>$2,500 and/or Staff Time	Watershed agency	As Needed										

Table 15 (Continued) – Management Strategies

Measure	Priority	Data Collection and Planning Management Measure	Object Addressed	Cost Estimate	The City Measure Unless Cooperation is Noted	Implementation Time Frame										
						2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
20	High	The WHPA delineations for the city wells were created using maximum pumping rates and conservative assumptions in the fracture flow delineation. These factors combine to 'build in' a safety factor, which is necessary when attempting to simulate natural systems and their inherent heterogeneity. While the delineations are considered to be conservative and are based on the best available data, there is some information that could improve the quality of any future re-evaluations. The standard assessment monitoring package (Chloride + Bromide, Nitrate + nitrite N, Tritium) should be analyzed during year six for Well #1 (14005), Well #2 (222880), Well #3(205733), and Well #4 (226566), 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	D	Staff Time	MDH						•					
21	High	Special consideration needs to be given for stormwater practices in the highly vulnerable area. Highly vulnerable areas include portions of the City of Mahtomedi. Let the City of Mahtomedi know that portions of their City is within a High Vulnerability portion of the DWSMA, ask that they provide a map of all stormwater outlet/outfalls in this area. Ask that any future stormwater work in this area consider the DWSMA and that it may be covered by a SWP grant.	D	Staff Time and if any opportunities arise get a cost estimate for work.	MDH, City of Mahtomedi	Look for Opportunities										
22	High	Update Paul Kauppi as the Project Advisory Team member from the City of White Bear Lake for the North-East Groundwater Management Area Plan. Continue advisory role for the plan and continue to attend meetings as requested.	D	Staff Time	MDH, The City, MnDNR	•				•						•

Table 15 (Continued) – Management Strategies

Measure	Priority	Data Collection and Planning Management Measure	Object Addressed	Cost Estimate	The City Measure Unless Cooperation is Noted	Implementation Time Frame										
						2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
23	High	Detailed in the MPCA Minnesota PFAS Blueprint, the Response Monitoring project is conducting ongoing PFAS sampling from water suppliers. If requested, The City will work with the MPCA/MDH to support any such efforts listed in the PFAS Blueprint. If cost of any effort is not covered by the MDH/MPCA, seek an MDH implementation grant to cover associated fees.	D	Staff Time	MDH, MPCA	If requested and funding is available										
24	High	Send a DWSMA map to applicable emergency responders and fire departments with the DWSMA. Ask for any reported spill incidents to notify Wellhead Protection Manager. Work with City of White Bear Lake emergency responders so they know where the IWMZ is located and to let City staff know if any spills happen in these areas.	F	Staff Time and any educational costs	The City		•						•			

Table 15 (Continued) – Management Strategies

Measure	Priority	Data Collection and Planning Management Measure	Object Addressed	Cost Estimate	The City Measure Unless Cooperation is Noted	Implementation Time Frame										
						2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
25	High	The City DNR Water Supply plan was last submitted in 2016 and approved in 2020. This plan will likely be updated around 2026 (pending DNR status), when the approval letter is issued to The City, include a physical or digital copy of that approval letter in The City's WHP folder/records.	F	>$2,500 and/or Staff Time	The City, DNR					•						

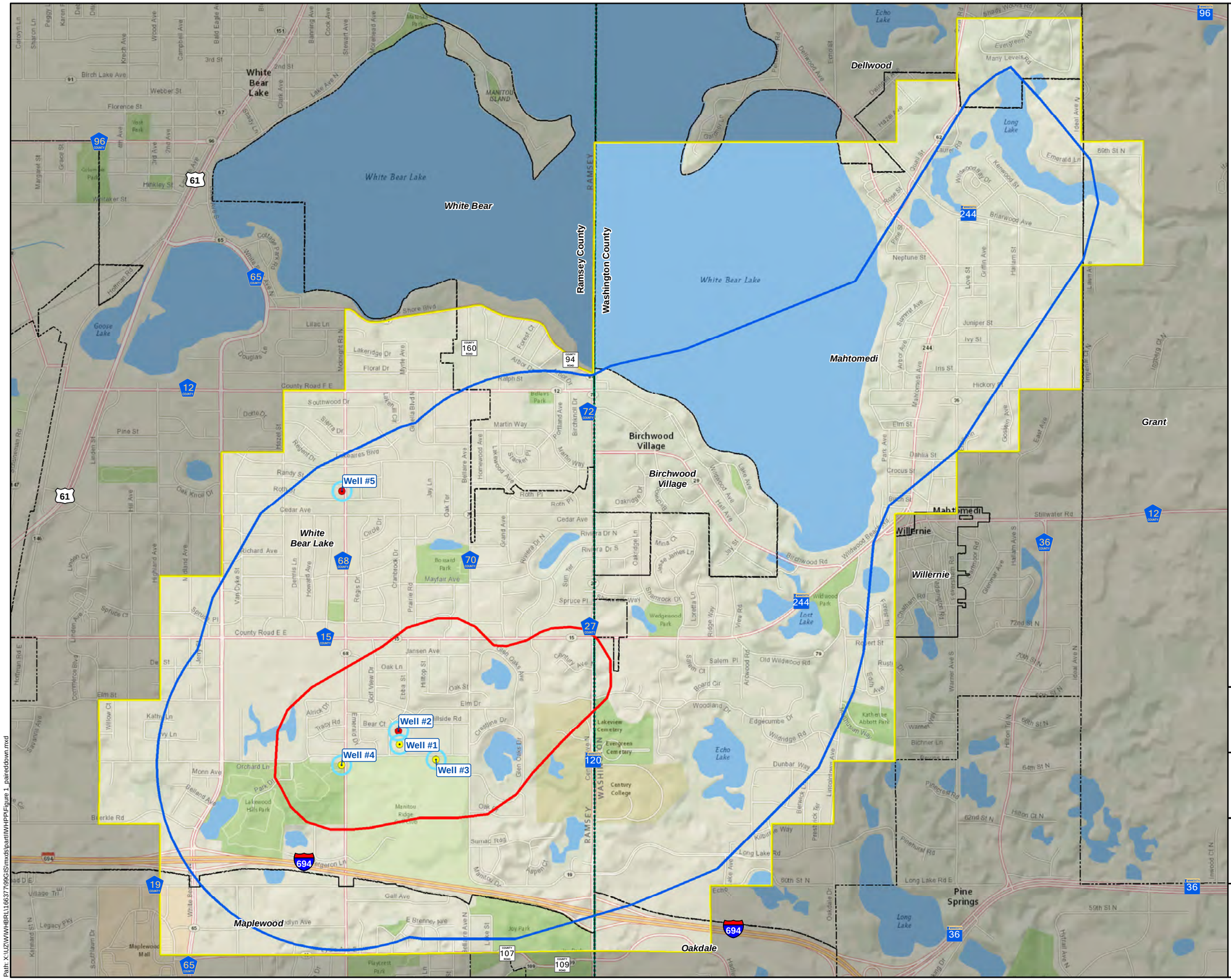
Table 15 (Continued) – Management Strategies

Measure	Priority	IWMZ Management Measure	Object Addressed	Cost Estimate	City Measure Unless Cooperation is Noted	Implementation Time Frame										
						2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
26	High	Assist MDH staff in completing future Inner Wellhead Management Zone (IWMZ) Inventories for the public water supply wells.	E	Staff Time	MDH						•					•
27	High	Work with MDH to ensure that setback distances for new potential contamination sources are met.	E	>$1,000 and/or Staff Time. May Require cost estimate	MDH	As needed										

Table 15 (Continued) – Management Strategies

Measure	Priority	Planning and Reporting Management Measure	Object Addressed	Cost Estimate	The City Measure Unless Cooperation is Noted	Implementation Time Frame										
						2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
28	Medium	<u>Implementation, Tracking and Reporting Activities</u> Maintain a "WHP folder" that contains documentation of WHP activities you have completed.	D	Staff Time	MDH, MRWA	•	•	•	•	•	•	•	•	•	•	•
29	Medium	<u>WHP Program Evaluation Plan Reporting:</u> Complete an Evaluation Report every years (at a minimum every 2.5 years) that evaluates the progress of plan of action. Submit on year 8 of the plan.	D	Staff Time	MDH, MRWA		•		•		•		•			•
30	High	City will contact MDH Planner upon 2.5 year review completion. Convene wellhead protection meeting to evaluate and assess needs and grant opportunities. This evaluation form is available on the MDH website.	D	Staff Time	MDH			•			•				•	

Figures



Drinking Water Supply Management Area

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 4/11/2022
Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, St Paul, Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 1

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Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

DWSMA Vulnerability

- High Vulnerability

  High vulnerability indicates that vertical recharge to the source water aquifer occurs over a time period of weeks to years.
- Moderate Vulnerability

  Moderate vulnerability indicates that vertical recharge to the source water aquifer occurs over a time period of years to several decades.
- Low Vulnerability

  Low vulnerability indicates that vertical recharge to the source water aquifer occurs over a time period of several decades to a century.

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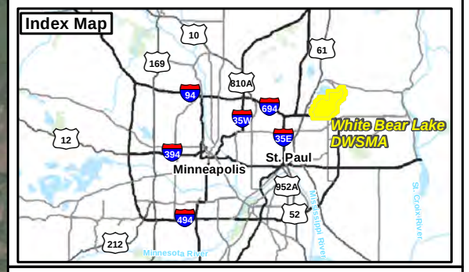


DWSMA Vulnerability

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

Project: WHBRL 166377
Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, White Bear Lake, Washington County FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 2

Path: X:\LIZ\WW\WHBRL\166377\99GIS\mxds\part\WHPP\Figure 2_DWSMA Vulnerability.mxd

Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

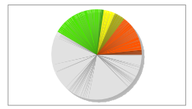
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

Soil Survey Geographic Database (SSURGO) Hydrologic Group

- A - Soils in this group have low runoff potential when thoroughly wet. Water is transmitted freely
- A/D - These soils have low runoff potential when drained and high runoff potential when undrained.
- B - Soils in this group have moderately low runoff potential when thoroughly wet. Water transmission
- B/D - These soils have moderately low runoff potential when drained and high runoff potential when
- C - Soils in this group have moderately high runoff potential when thoroughly wet. Water transmission
- C/D - These soils have moderately high runoff potential when drained and high runoff potential when
- No Data



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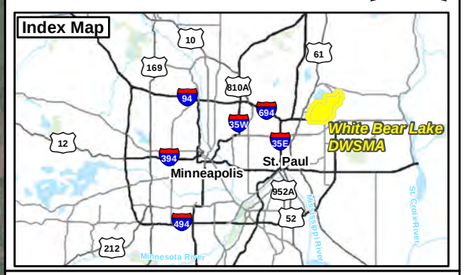


Soils Characteristics

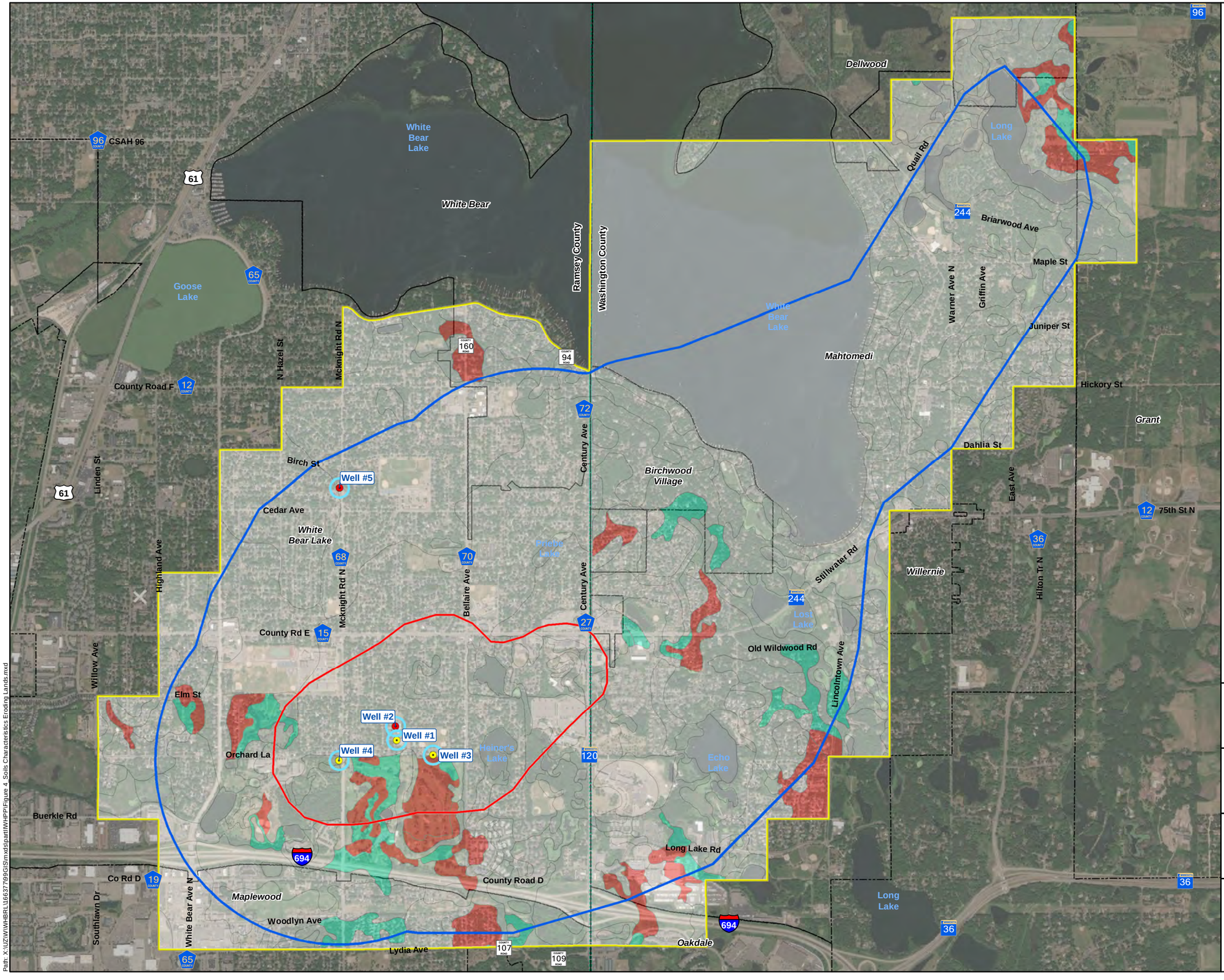
Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

Project: WHBRL 166377
Print Date: 4/8/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 3

Path: X:\UZ\WI\WHBRL\166377\99GIS\mxd\spatIlWHPP\Figure 3_Soil Characteristics.mxd



Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

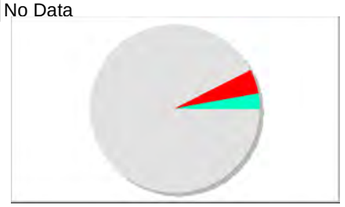
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

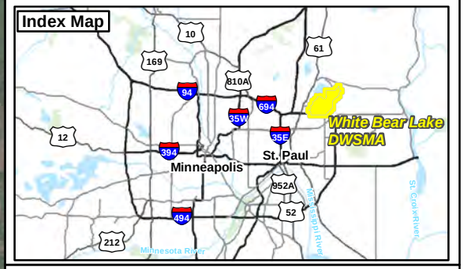
- Municipal Boundry
- County Boundry

Soil Survey Geographic Database (SSURGO) Erosion Class

- Class 1 - The soil has lost on the average <25% of the original A and/or E horizons, or of the uppermost 20 cm if the original A and/or E horizons were less than 20 cm thick.
- None - deposition
- No Data



0 2,000 4,000 Feet



Soils Characteristics Eroding Lands

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 4/8/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 4

Path: X:\UZ\WI\WHBRL\166377099\GIS\mxd\splan\WHPP\Figure 4_Soils Characteristics Eroding Lands.mxd

T30 R22WS14
T30 R22WS13
T30 R21WS18
T30 R21WS17
T30 R21WS16
Dellwood
CSAH 96
White Bear Lake
61
White Bear
Long Lake
Quail Rd
244
Briarwood Ave
T30 R22WS23
65
Goose Lake
T30 R22WS24
Ramsey County
Washington County
T30 R21WS19
T30 R21WS20
Maple St
T30 R21WS21
Warner Ave
Griffin Ave
White Bear Lake
Juniper St
160
94
N Hazel St
Mcknight Rd N
Mahtomedi
County Road F
12
Hickory St
72
Grant
Century Ave
Dahlia St
Birch St
Well #5
Linden St
61
Birchwood Village
East Ave
T30 R22WS26
Cedar Ave
T30 R22WS25
T30 R21WS30
T30 R21WS29
12
75th St N
T30 R21WS28
White Bear Lake
68
70
Priebe Lake
36
Highland Ave
Mcknight Rd N
Bellaire Ave N
Century Ave
Stillwater Rd
Willernie
Hilton Tr N
244
Lost Lake
County Rd E
15
27
Old Wildwood Rd
Willow Ave
Elm St
Lincolntown Ave
Well #2
Well #1
Well #3
Well #4
T30 R22WS35
Orchard La
T30 R22WS36
Heiner's Lake
120
T30 R21WS31
T30 R21WS32
T30 R21WS33
Buerkle Rd
694
Long Lake Rd
Co Rd D
19
County Road D
Maplewood
Woodlyn Ave
Long Lake
36
Southlawn Dr
White Bear Ave N
Oakdale
Lydia Ave
65
107
109

Legend

Public Water Supply Well Locations
- Emergency Well
- Primary Well

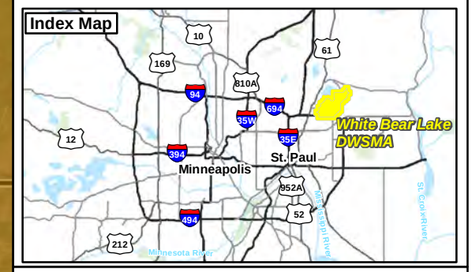
Wellhead Protection Plan - Boundaries
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area
- Emergency Response Area
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries
- Birchwood Village
- Dellwood
- Grant
- Mahtomedi
- Maplewood
- Oakdale
- White Bear Township
- White Bear Lake
- Willernie
- County Boundry

Public Land Survey
- Township Range Section

0 2,000 4,000 Feet

Index Map



Political Boundaries

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
St Paul, Minnesota

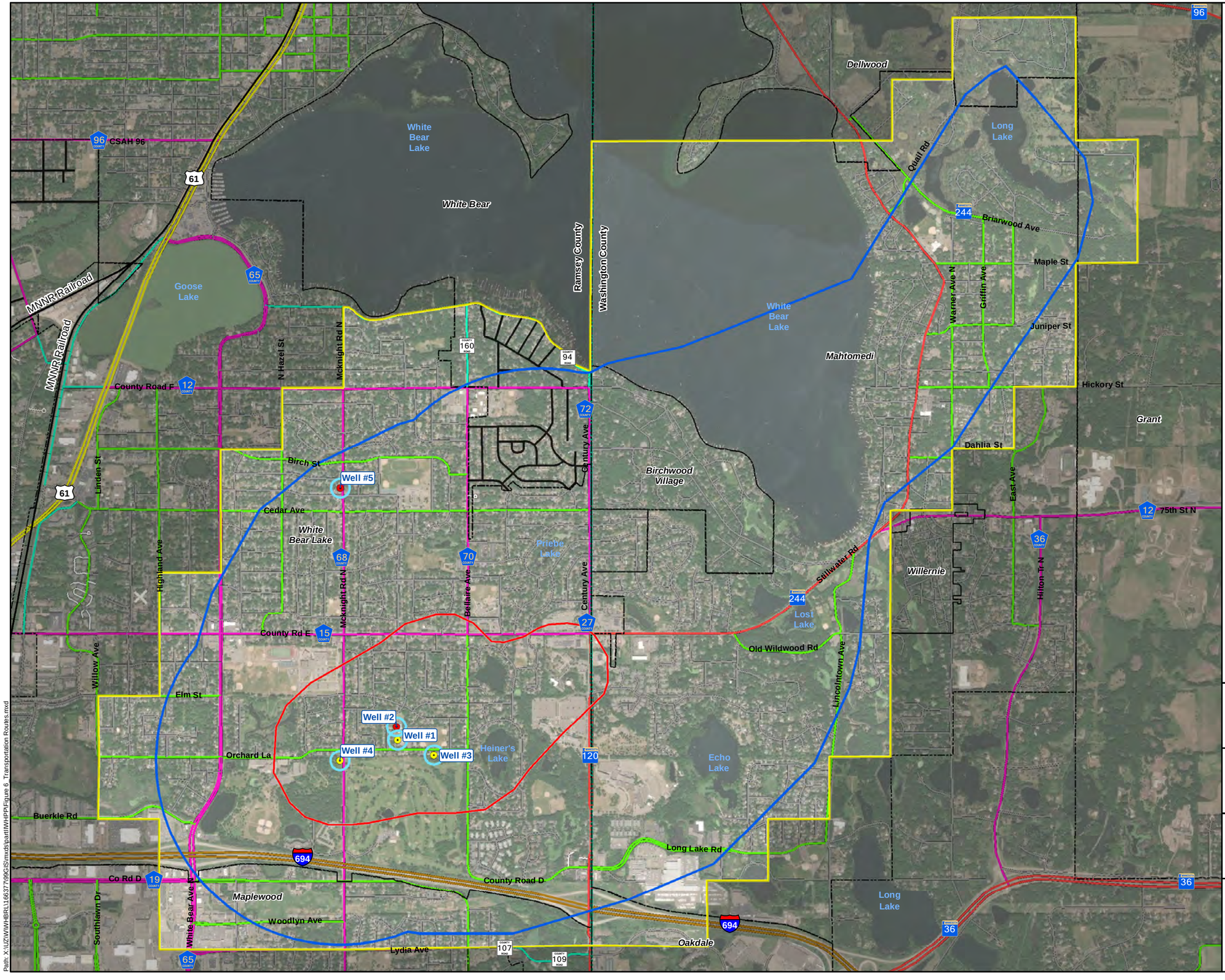
SEH

Project: WHBRL 166377
Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 5

Path: X:\UZ\WV\WHBRL\166377\99GIS\mxds\part\WHPP\Figure 5_Political Boundaries.mxd



Transportation Routes

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

Project: WHBRL 166377
Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 6

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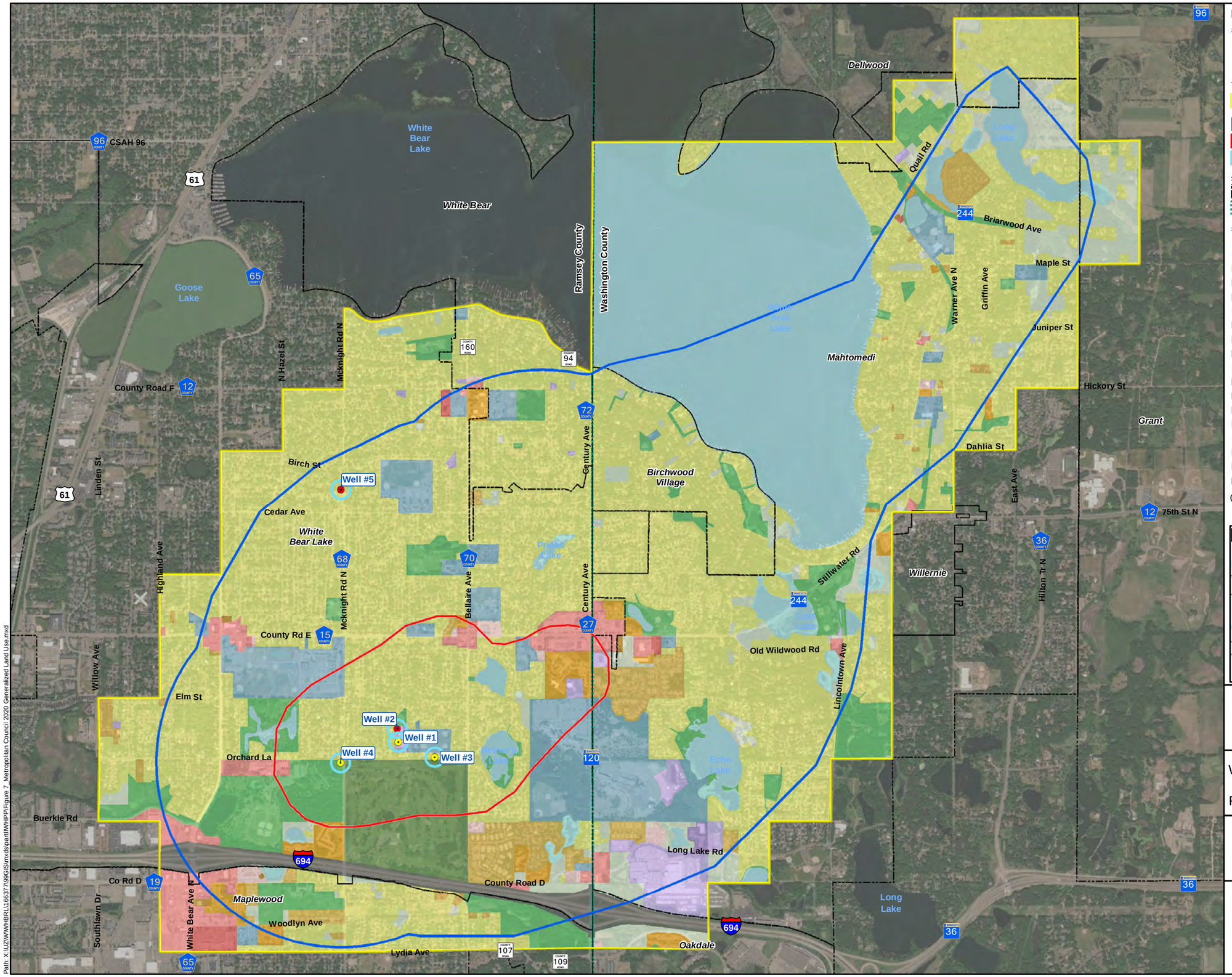


Legend

Public Water Supply Well Locations
- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area
- Emergency Response Area
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries
- Municipal Boundry
- County Boundry

Metropolitan Council, 2020
- Seasonal/Vacation
- Single Family Detached
- Industrial and Utility
- Farmstead
- Institutional
- Water
- Park, Recreational or Preserve
- Retail and Other Commercial
- Mixed Use Residential
- Office
- Mixed Use Commercial and Other
- Golf Course
- Mixed Use Industrial
- Agricultural
- Undeveloped
- Single Family
- Multifamily
- Major Highway

0 2,000 4,000 Feet

Metropolitan Council 2020 Generalized Land Use

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

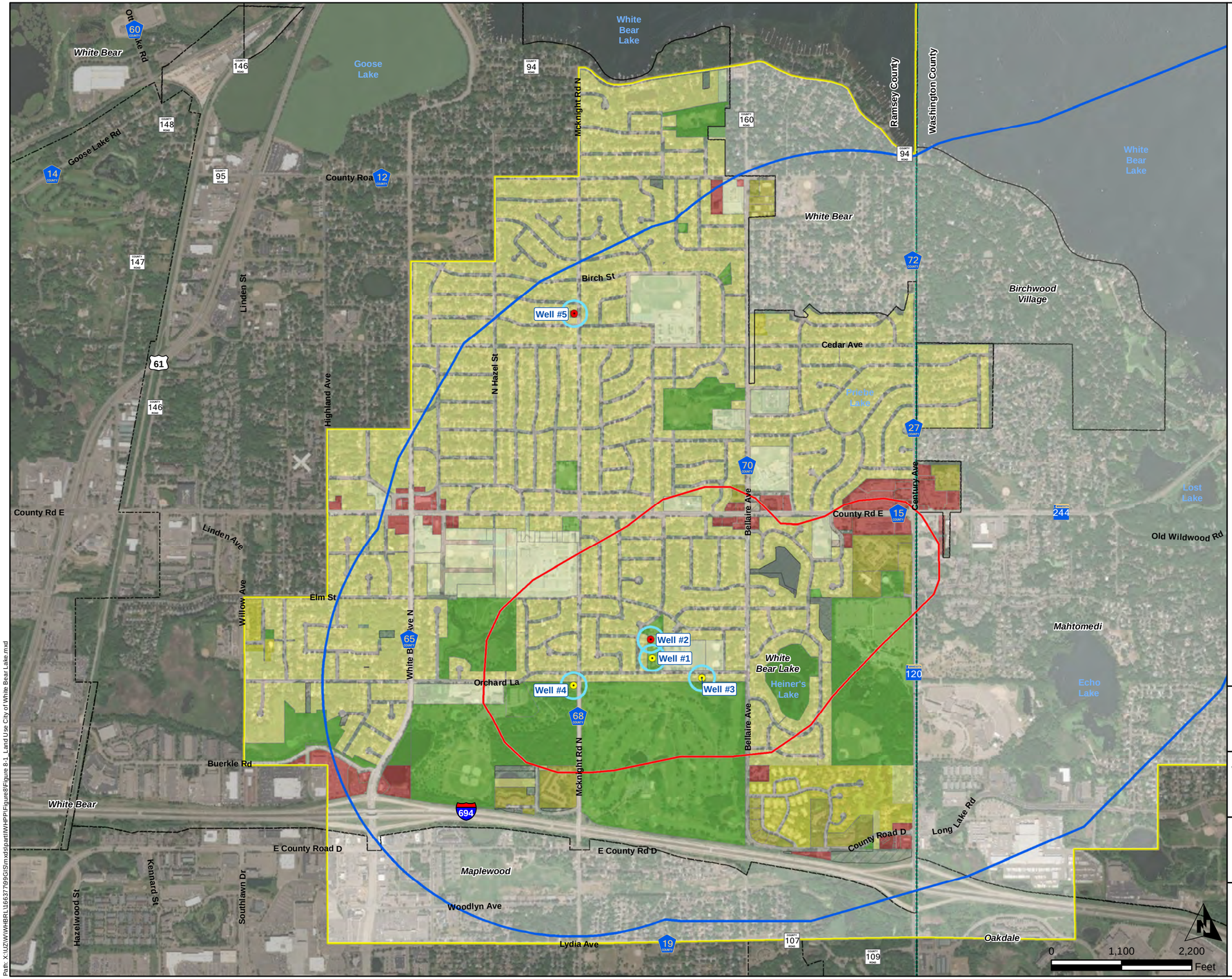
SEH

Project: WHBRL 166377
Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 7

Path: X:\UZW\WHBRL\166377\99GIS\mxds\part\WHPP\Figure 7_Metropolitan Council 2020 Generalized Land Use.mxd



Land Use
City Of White Bear Lake

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 8-1

Path: X:\UZ\WI\WHBRL\166377\99\GIS\mxd\spanl\WHPP\Figure8\Figure 8-1_Land Use City of White Bear Lake.mxd

Well #2
Well #1
Well #3
Well #4
Heiner's Lake
Orchard La
Mcknight Rd N
White Bear Lake
Bellaire Ave
Mahtomedi
Buerkle Rd
694
E County Road D
E County Rd D
County Road D
Long Lake Rd
Woodlyn Ave
Maplewood
Lydia Ave
White Bear Ave N
Beam Ave
Radatz Ave
Helen St N
Oakdale

0 650 1,300 Feet

Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of Maplewood Land Use

- Commercial
- Government
- High Density Residential
- Medium Density Residential
- Low Density Residential
- Institution
- Open Space

= Map Extent

Dellwood (Page 5)
Grant (Page 7)
Mahtomedi (Page 3)
White Bear Township (Page 8)
Birchwood Village (Page 6)
White Bear Lake (Page 1)
Maplewood (Page 2)
Oakdale (Page 4)

Land Use
City Of Maplewood

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

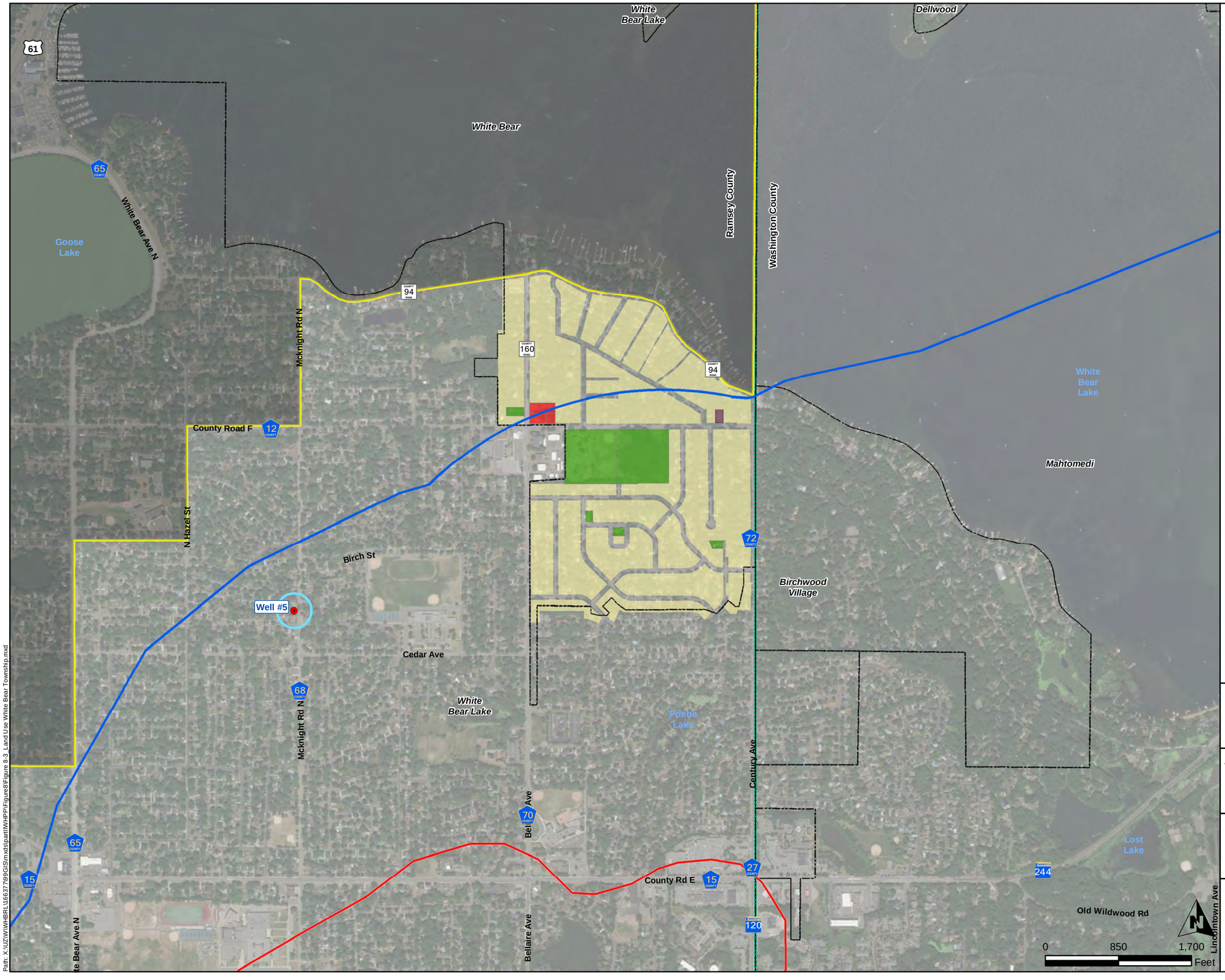
SEH

Project: WHBRL 166377
Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 8-2

Path: X:\UZ\WW\HBRL\166377\899GIS\mxd\plan\WHPP\Figure8\Figure 8-2_Land Use City of Maplewood.mxd



Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

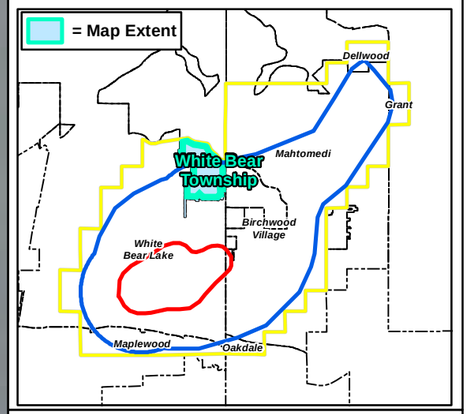
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

White Bear Lake Township Land Use

- Commercial
- Public
- Single Family - Detached
- Vacant



Land Use
White Bear Township

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 8-3

Path: X:\UZ\WW\HBRL\166377\899\GIS\mxd\plan\WHPP\Figure8\Figure 8-3_Land Use White Bear Township.mxd

Orchard La
Well #3
Heiner's Lake
Bellaire Ave
White Bear Lake
Echo Lake
Mahtomedi
Lincolntown Ave
Long Lake Rd
Long Lake
County Road D
E County Rd D
Maplewood
Lyd Ave
Beam Ave
Helen St N
Oakdale
Hadley Ave N
694
120
36
35
19
107
109
0 590 1,180 Feet

Legend

Public Water Supply Well Locations
- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries
- Municipal Boundry
- County Boundry

City of Oakdale Land Use
- 5+ Units
- Commercial
- Park and Recreation
- Vacant

= Map Extent

Dellwood
Grant
Mahtomedi
White Bear Township
Birchwood Village
White Bear Lake
Maplewood
Oakdale

Land Use
City of Oakdale

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

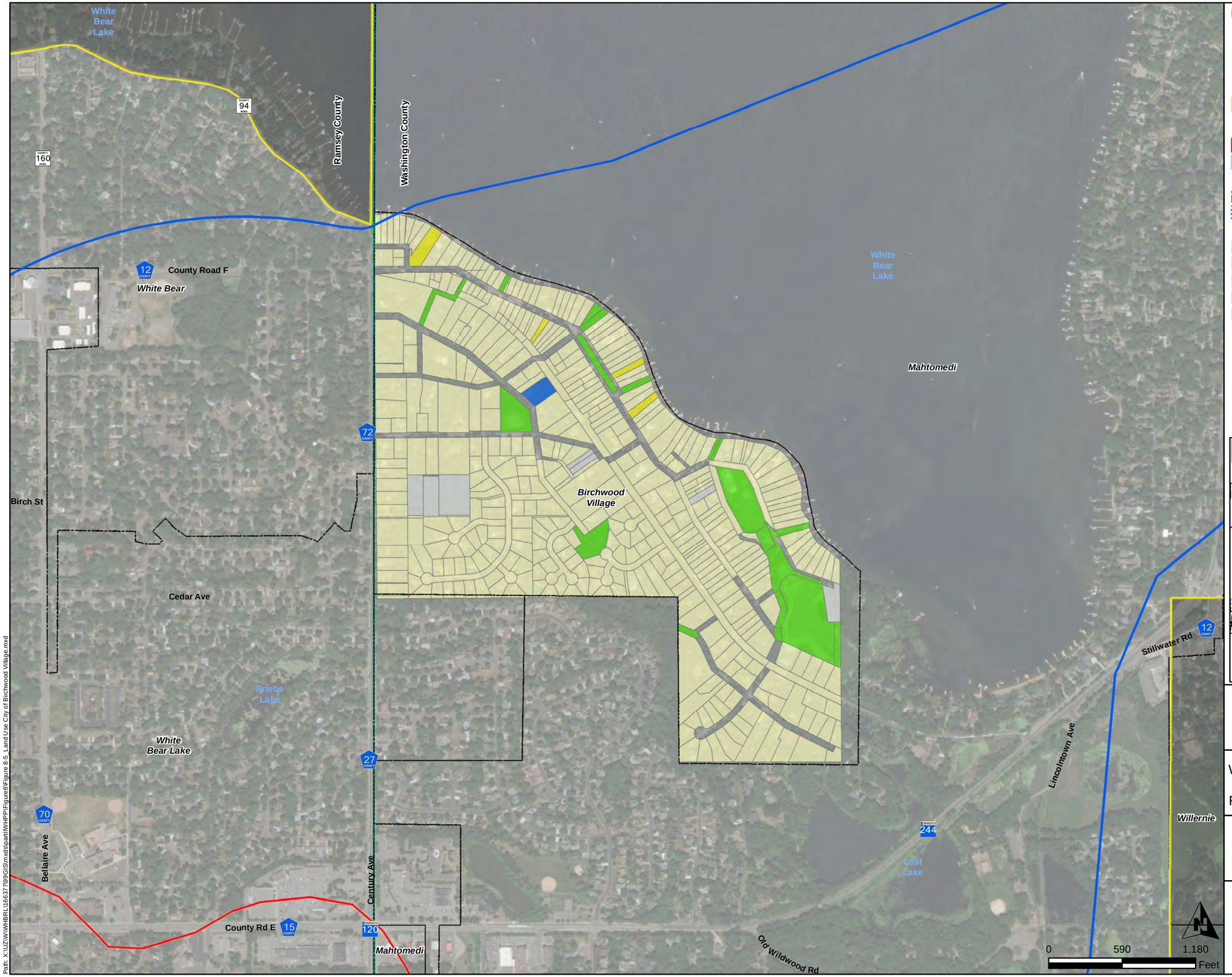
SEH

Project: WHBRL 166377
Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 8-4

Path: X:\IZ\WW\HBRL\166377\899GIS\mxd\plan\WHPP\Figure8\Figure 8-4_Land Use City of Oakdale.mxd



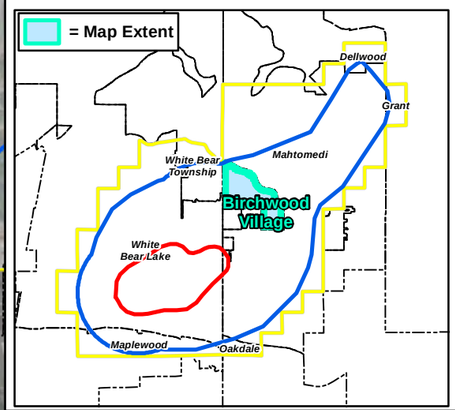
Legend

Public Water Supply Well Locations
- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area
- Emergency Response Area
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries
- Municipal Boundry
- County Boundry

Birchwood Village Land Use
- Institutional
- Park, Recreational. or Preserve
- Seasonal/Vacation
- Single Family Detached
- Undeveloped



Land Use
City Of Birchwood Village

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

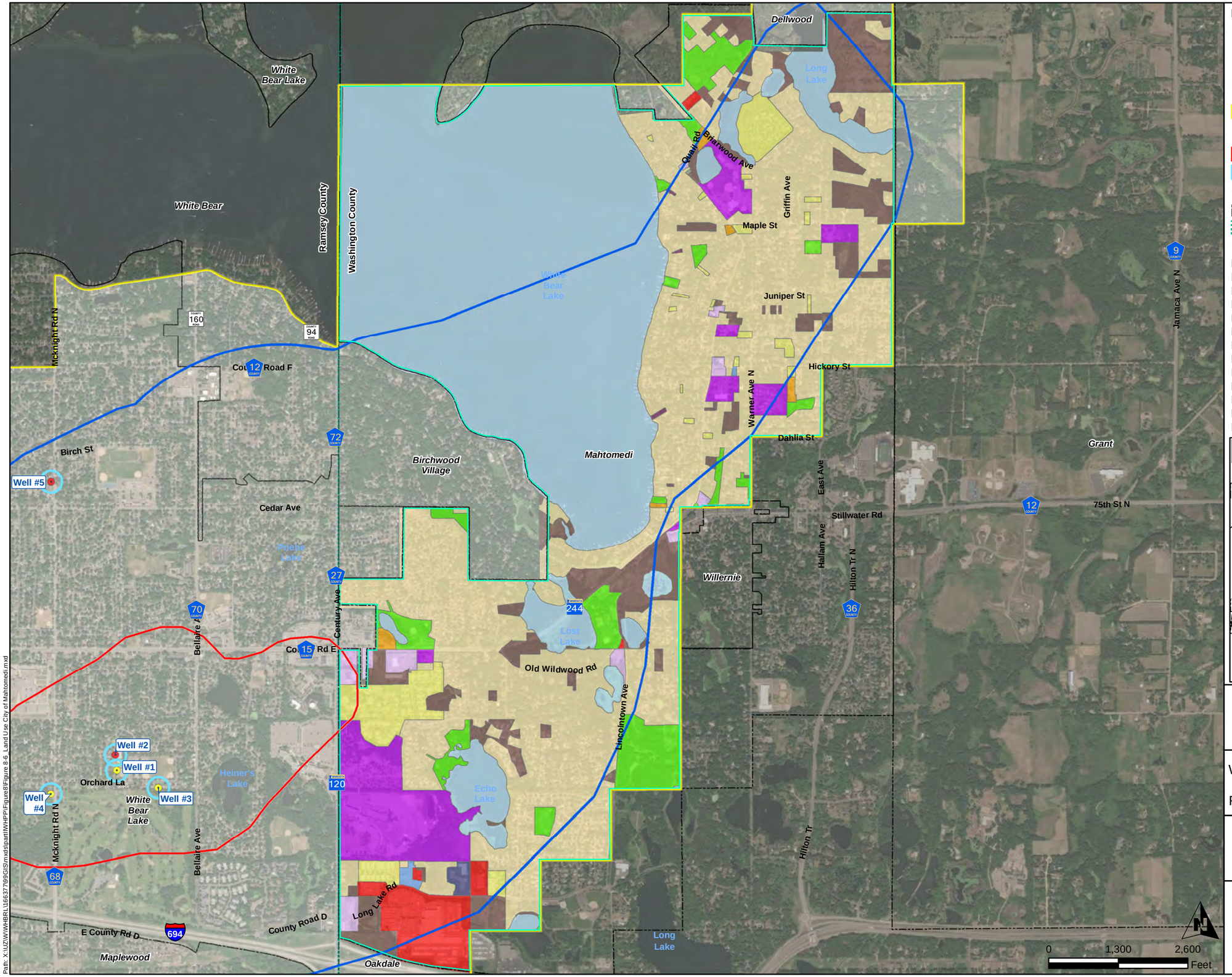
SEH

Project: WHBRL 166377
Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 8-5

Path: X:\UZ\WH\WHBRL\166377\99GIS\mxds\part\WHPP\Figure8\Figure 8-5_Land Use- City of Birchwood Village.mxd



Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

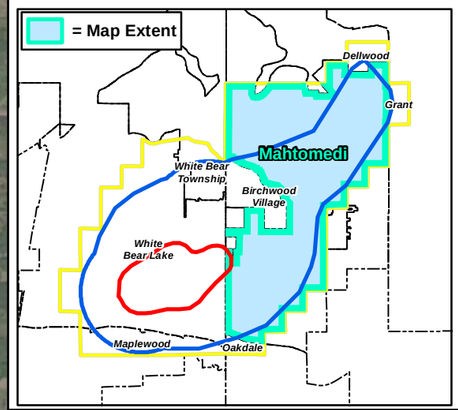
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of Mahtomedi Land Use

- Major Highway
- Industrial and Utility
- Institutitional
- Mixed Use Industrial
- Office
- Open Water
- Park, Recreational, or Preserve
- Retail and Other Commercial
- Seasonal/Vacation
- Single Family
- Single Family Detached
- Multifamily
- Undeveloped



Land Use
City Of Mahtomedi

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 8-6

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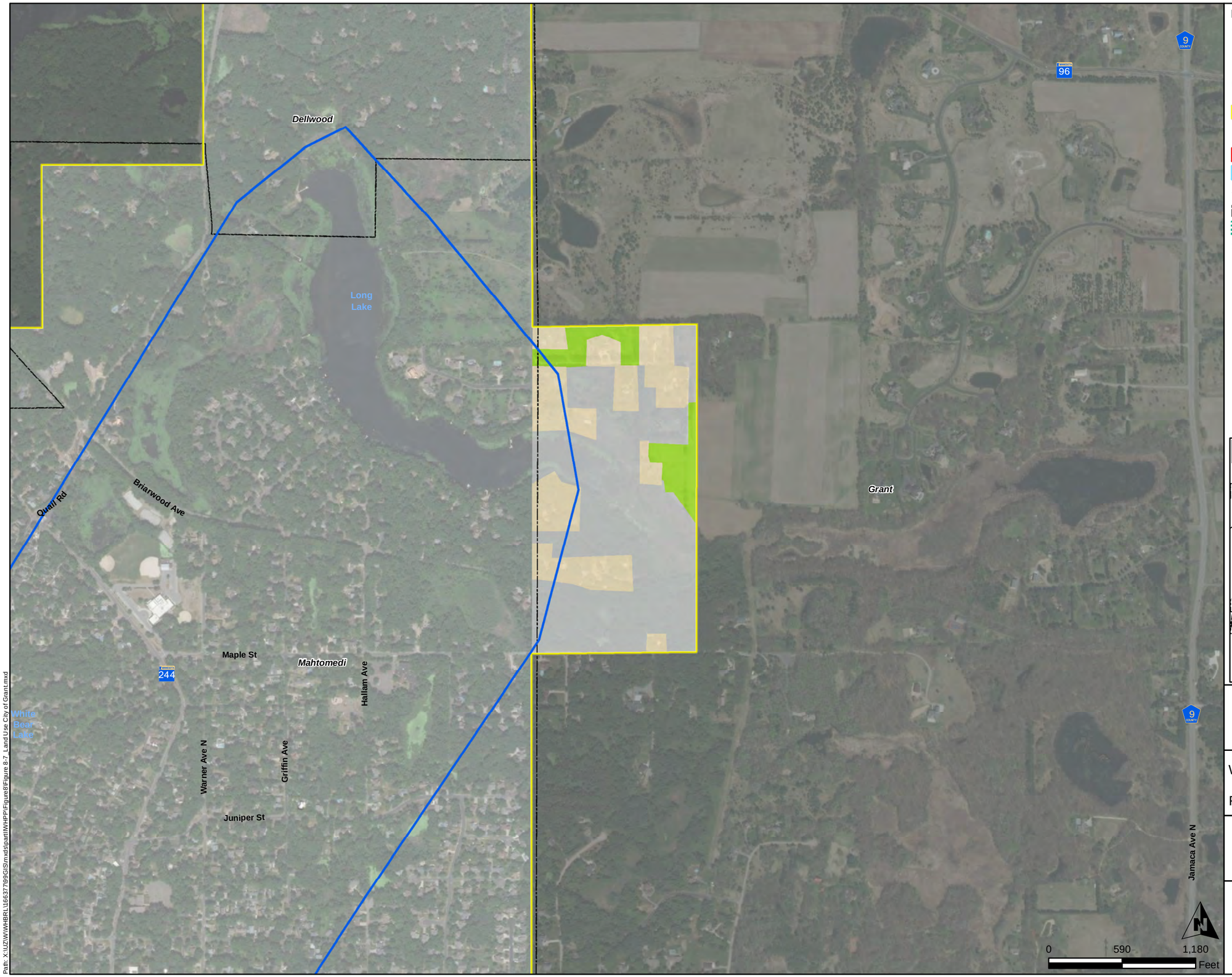


Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

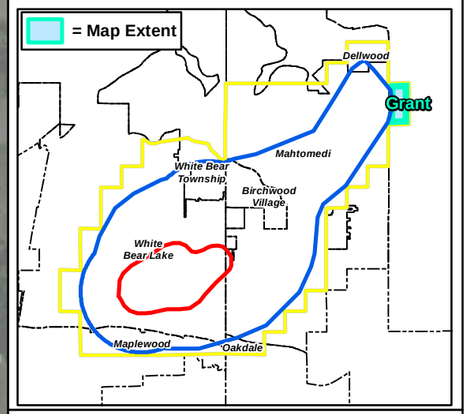
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of Grant Land Use

- Agricultural
- Single Family Detached
- Undeveloped



Land Use
City of Grant

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377

Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 8-7

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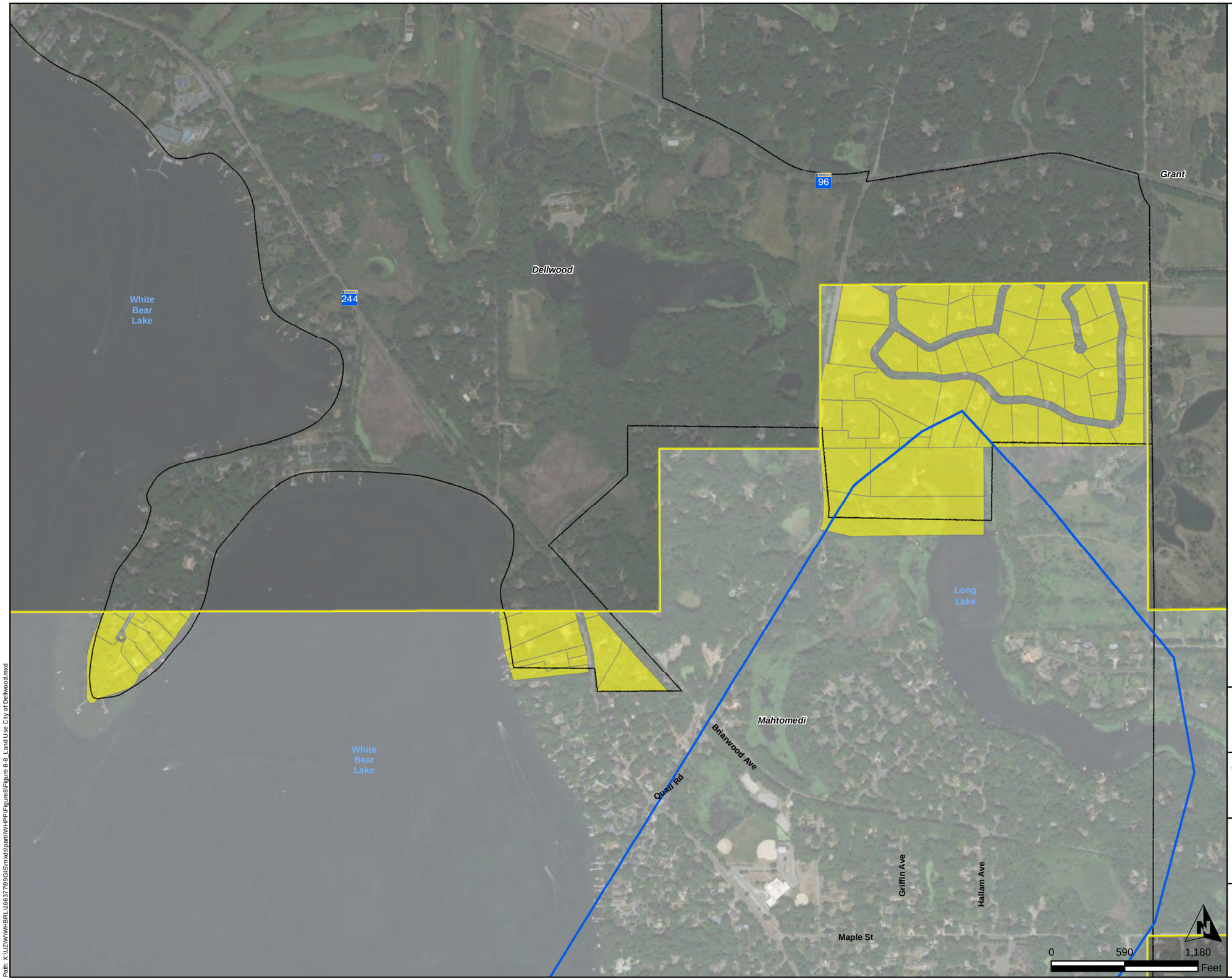


Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

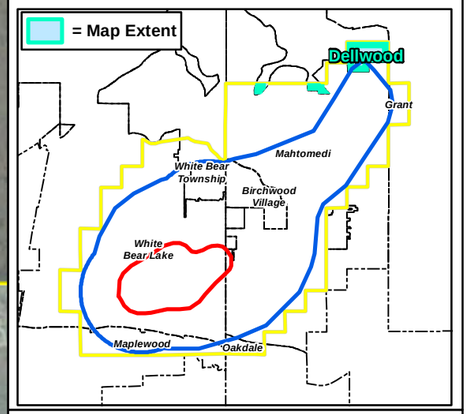
Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of Dellwood Zoning

- R1

*Map Depicts City of Dellwood Zoning
- No Seperate Land Use Map has been developed by the City



Land Use
City Of Dellwood

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

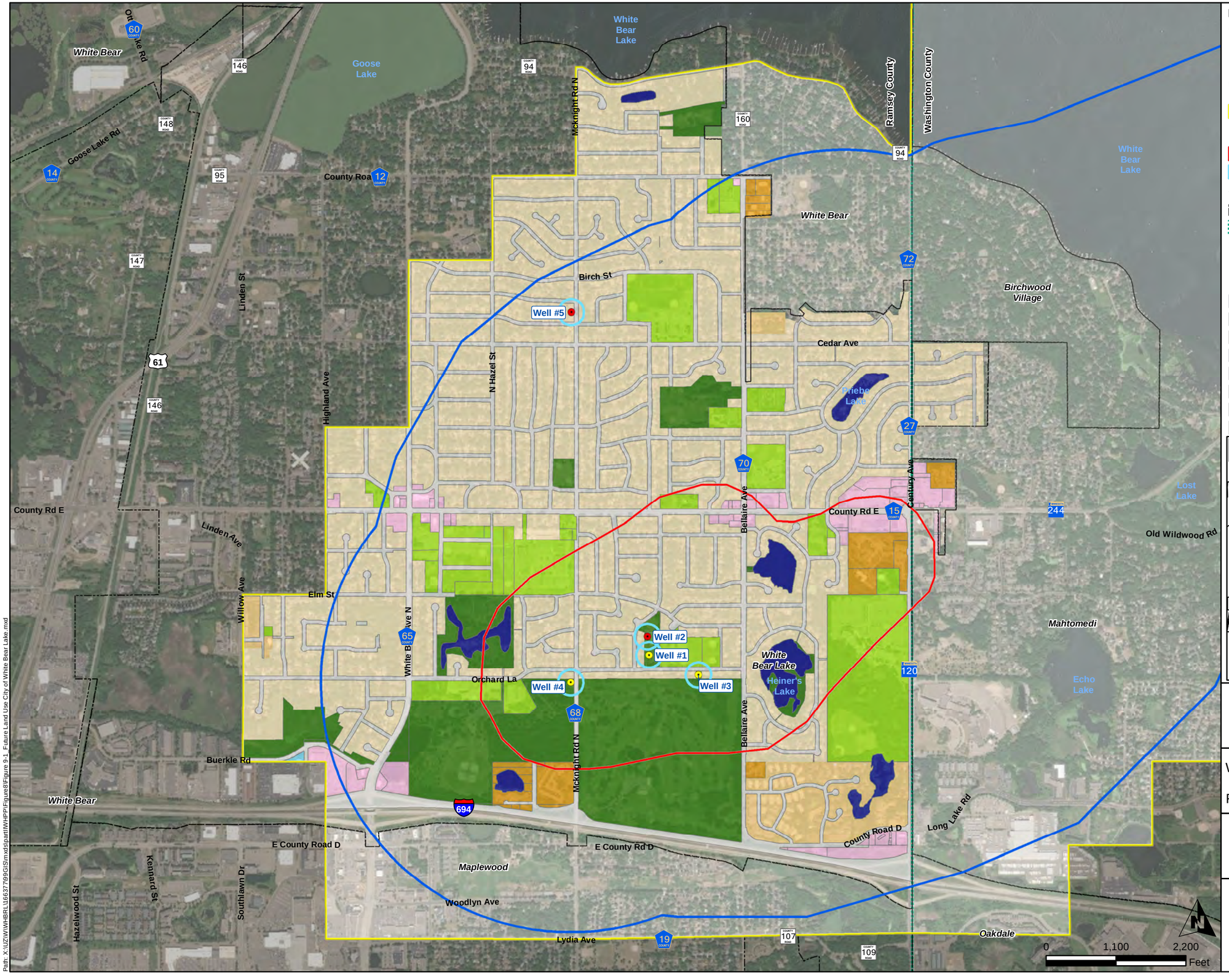
Project: WHBRL 166377

Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 8-8

Path: X:\UZ\WW\HBRL\166377\899GIS\mxd\Spatt\WHPP\Figure8\Figure 8-8_Land Use City of Dellwood.mxd



Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

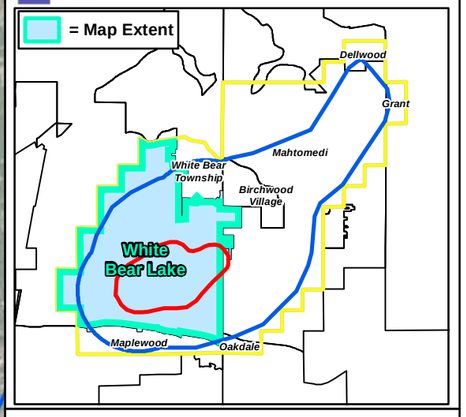
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of White Bear Lake Future Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial; Commercial Mixed Use
- Business Park
- Other Public/Semi-Public
- Park/Open Space
- ROW
- Rail/ROW
- Water



Future Land Use
City Of White Bear Lake

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

Project: WHBRL 166377
Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 9-1

Well #2
Well #1
Well #3
Well #4
Heiner's Lake
Orchard La
Mcknight Rd N
White Bear Lake
Bellaire Ave
Mahtomedi
Buerkle Rd
Long Lake Rd
E County Road D
E County Rd D
County Road D
Woodlyn Ave
Maplewood
Lydia Ave
White Bear Ave N
Beam Ave
Radatz Ave
Helen St N
Oakdale
65
68
694
20
19
107
109
120

Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

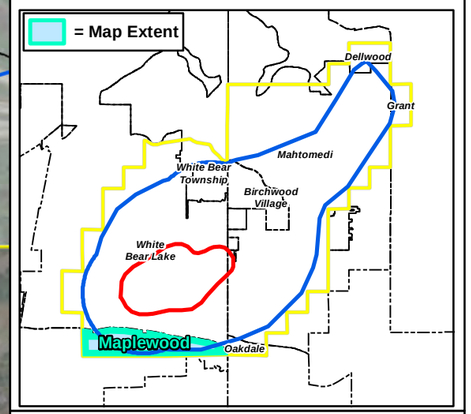
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

Maplewood Future Land Use

- Commercial
- Institutional
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Mixed-Use - Community
- Open Space
- ROW



Future Land Use
City Of Maplewood

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377

Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 9-2

0 650 1,300 Feet

Path: X:\IZ\WW\HBRL\166377\99GIS\mxd\plan\WHPP\Figure8\Figure 9-2_Future Land Use City of Maplewood.mxd

White Bear Lake
Dellwood
61
White Bear
65
White Bear Ave N
Goose Lake
Ramsey County
Washington County
94
Mcknight Rd N
160
94
White Bear Lake
County Road F
12
N Hazel St
Birch St
Well #5
Cedar Ave
68
Mcknight Rd N
White Bear Lake
Priebe Lake
Century Ave
72
Birchwood Village
Mahtomedi
White Bear Lake
70
Bellaire Ave
65
15
27
County Rd E
15
120
Bellaire Ave
244
Lost Lake
Old Wildwood Rd
Lincolntown Ave
0
850
1,700
Feet

Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

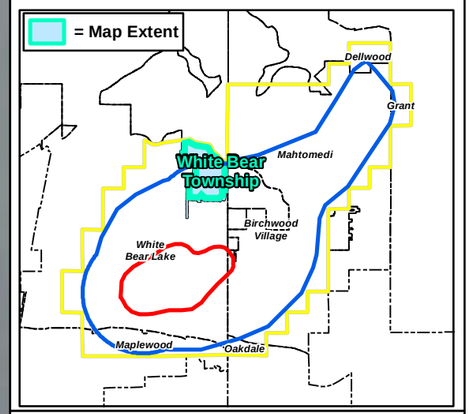
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

Township of White Bear Lake Future Land Use

- Commercial
- Public-Institutional
- Residential - Low Density
- Township Green Space
- Township Park Property



Future Land Use
White Bear Township

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

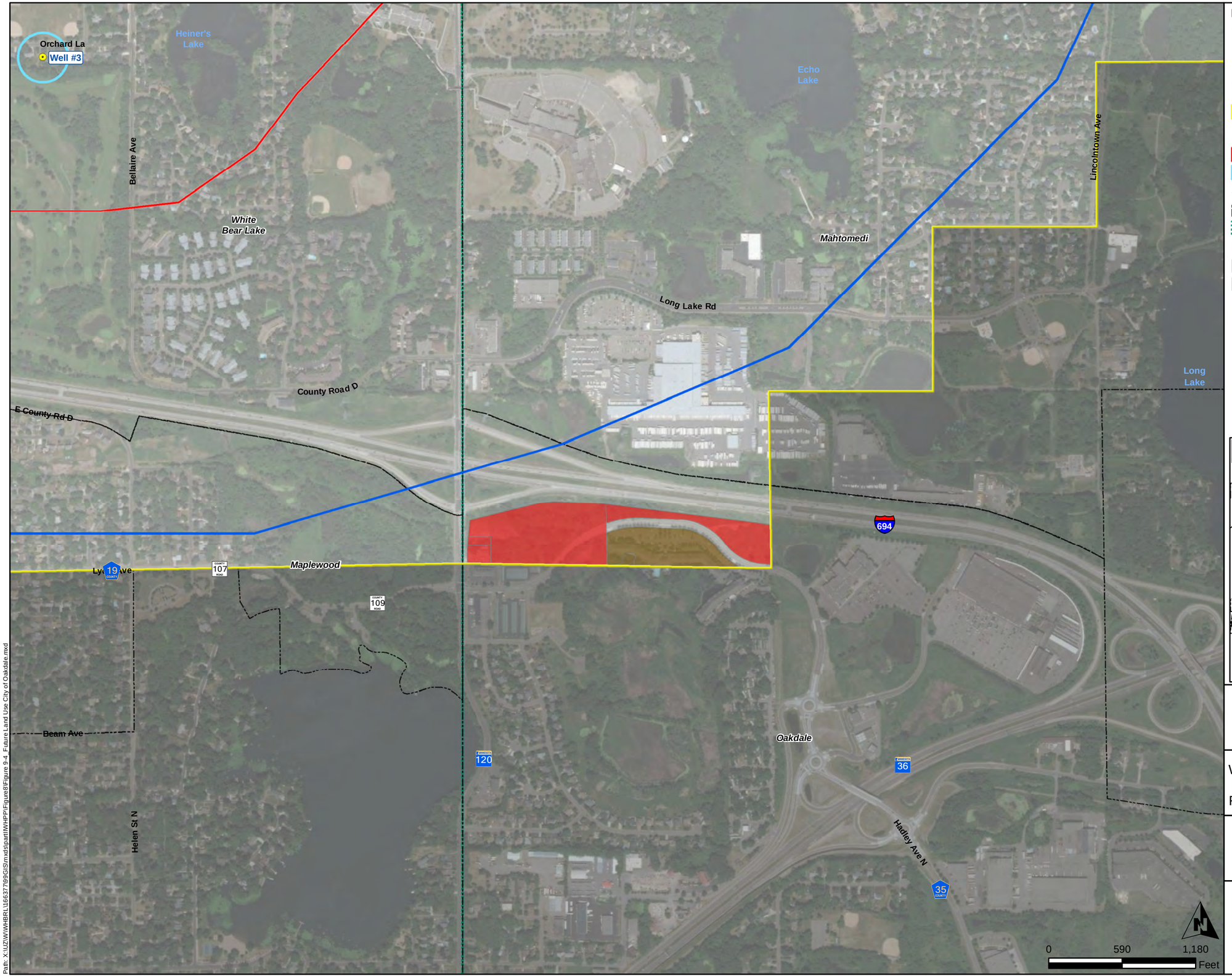
SEH

Project: WHBRL 166377
Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 9-3

Path: X:\UZ\WW\HBRL\166377\899\GIS\mxd\plan\WHPP\Figure8\Figure 9-3_Future Land Use White Bear Township.mxd



Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

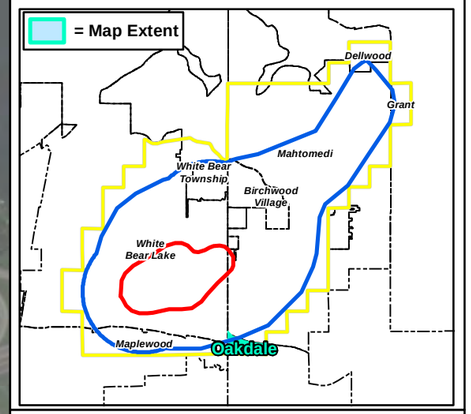
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of Oakdale Future Land Use

- Commercial
- High Density Residential



Future Land Use
City of Oakdale

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377

Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 9-4

Path: X:\UZ\WW\HBRL\166377\899GIS\mxd\part#\WHPP\Figure8\Figure 9-4_Future Land Use City of Oakdale.mxd

White Bear Lake
Ramsey County
Washington County
County Road F
White Bear
White Bear Lake
Mahtomedi
Birchwood Village
Birch St
Cedar Ave
Priebe Lake
White Bear Lake
Bellaire Ave
Century Ave
County Rd E
Mahtomedi
Lost Lake
Lincolntown Ave
Stillwater Rd
Willernie
Old Wildwood Rd
0
590
1,180
Feet

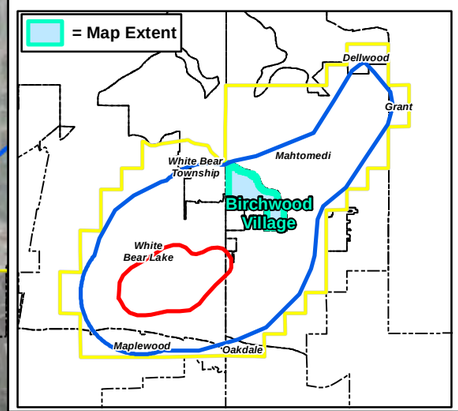
Legend

Public Water Supply Well Locations
- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries
- Municipal Boundry
- County Boundry

Birchwood Village Future Land Use
- Institutional
- Parks/Open Space
- Residential



Future Land Use
City Of Birchwood Village

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 9-5

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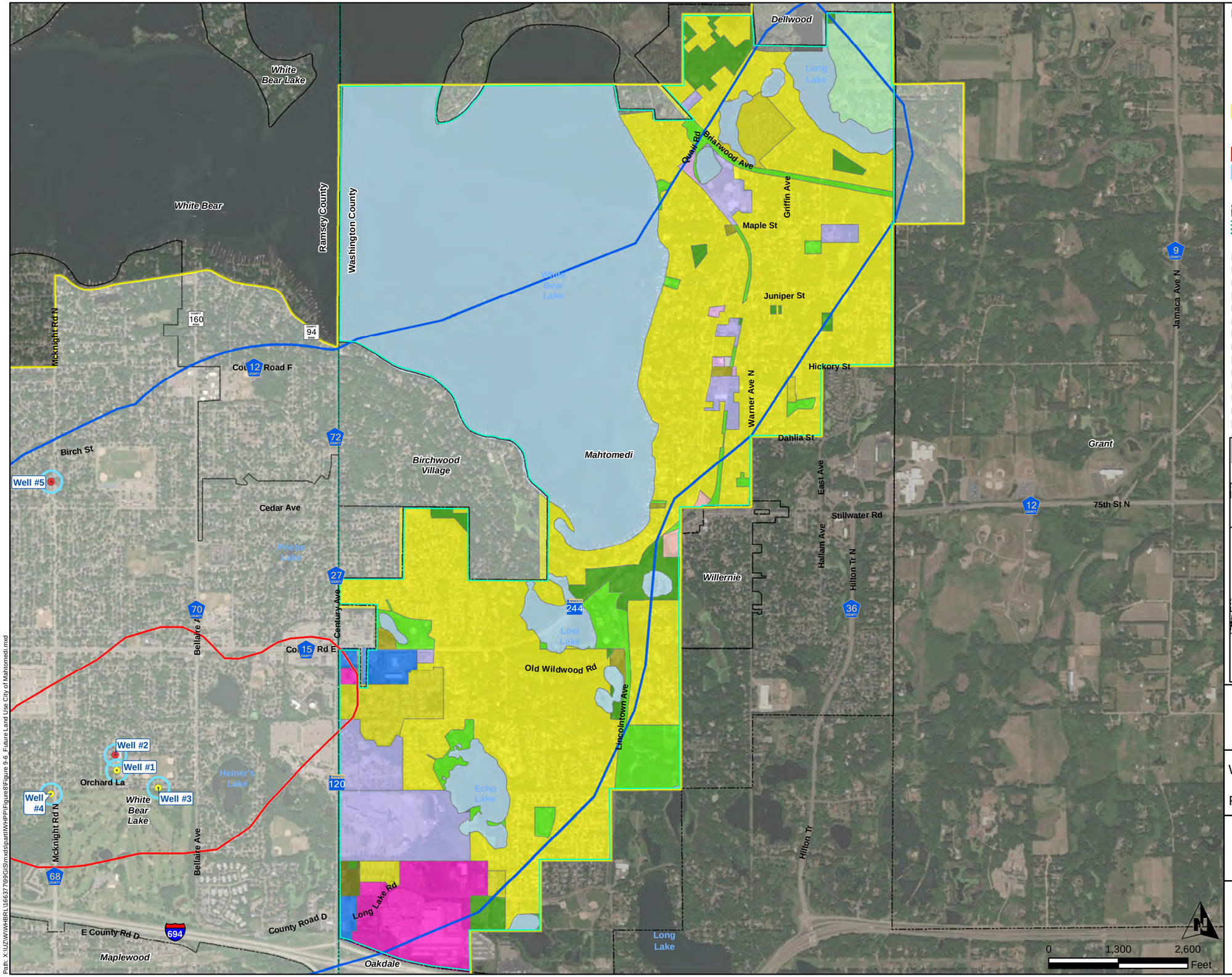


Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

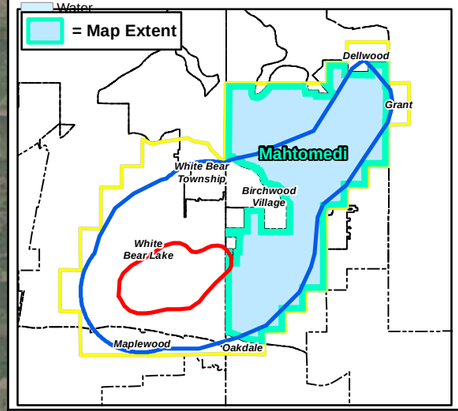
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of Mahtomedi Future Land Use

- Village Mixed Use
- Rural Residential
- Community Commercial
- Ind-Bus Mix
- Neighborhood Com
- Low Density Res
- Medium Density Res
- High Density Res
- Mixed Res Com
- Park/Private Open Sp
- Utility
- Public Institutional
- Public Park
- ROW
- Water



Future Land Use
City Of Mahtomedi

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 9-6

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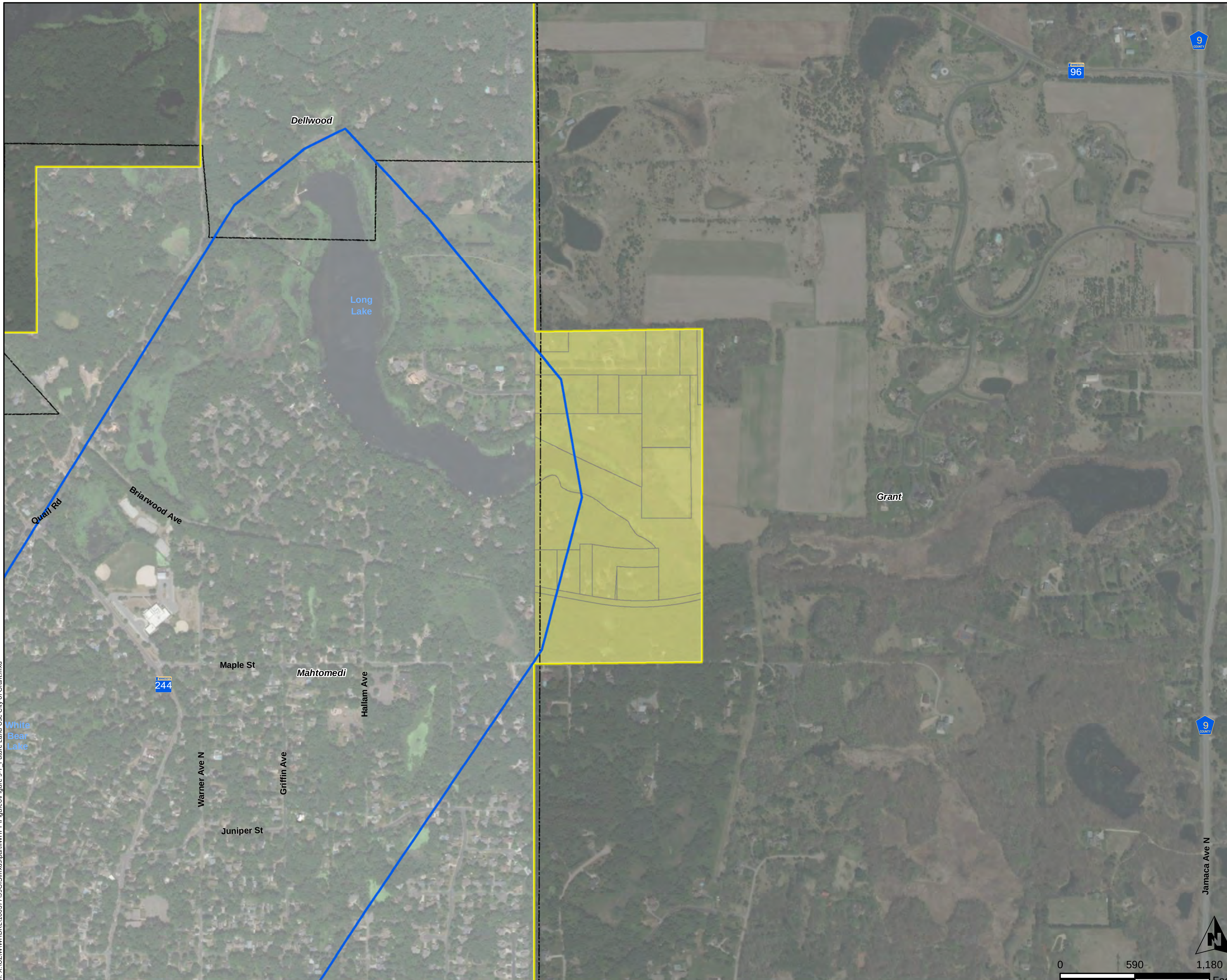


Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

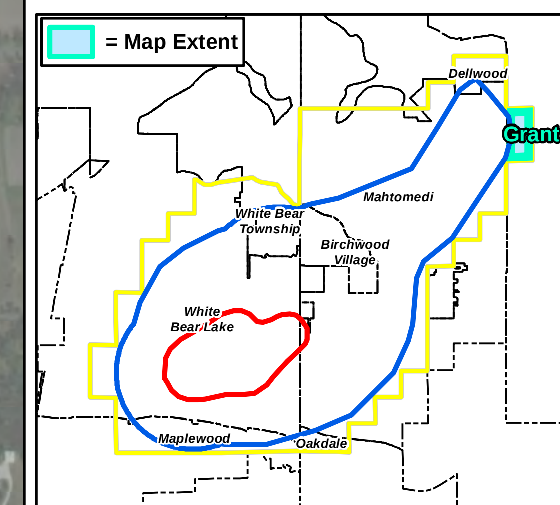
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of Grant Future Land Use

- Rural Residential/Ag (RR/AG): 4 DU/40 AC



Future Land Use
City of Grant

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

This map is neither a legally recorded map nor a survey map and is not intended to be used as one. This map is a compilation of records, information, and data gathered from various sources listed on this map and is to be used for reference purposes only. SEH does not warrant that the Geographic Information System (GIS) Data used to prepare this map are error free, and SEH does not represent that the GIS Data can be used for navigational, tracking, or any other purpose requiring exacting measurement of distance or direction or precision in the depiction of geographic features. The user of this map acknowledges that SEH shall not be liable for any damages which arise out of the user's access or use of data provided.

SEH

Project: WHBRL 166377

Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 9-7

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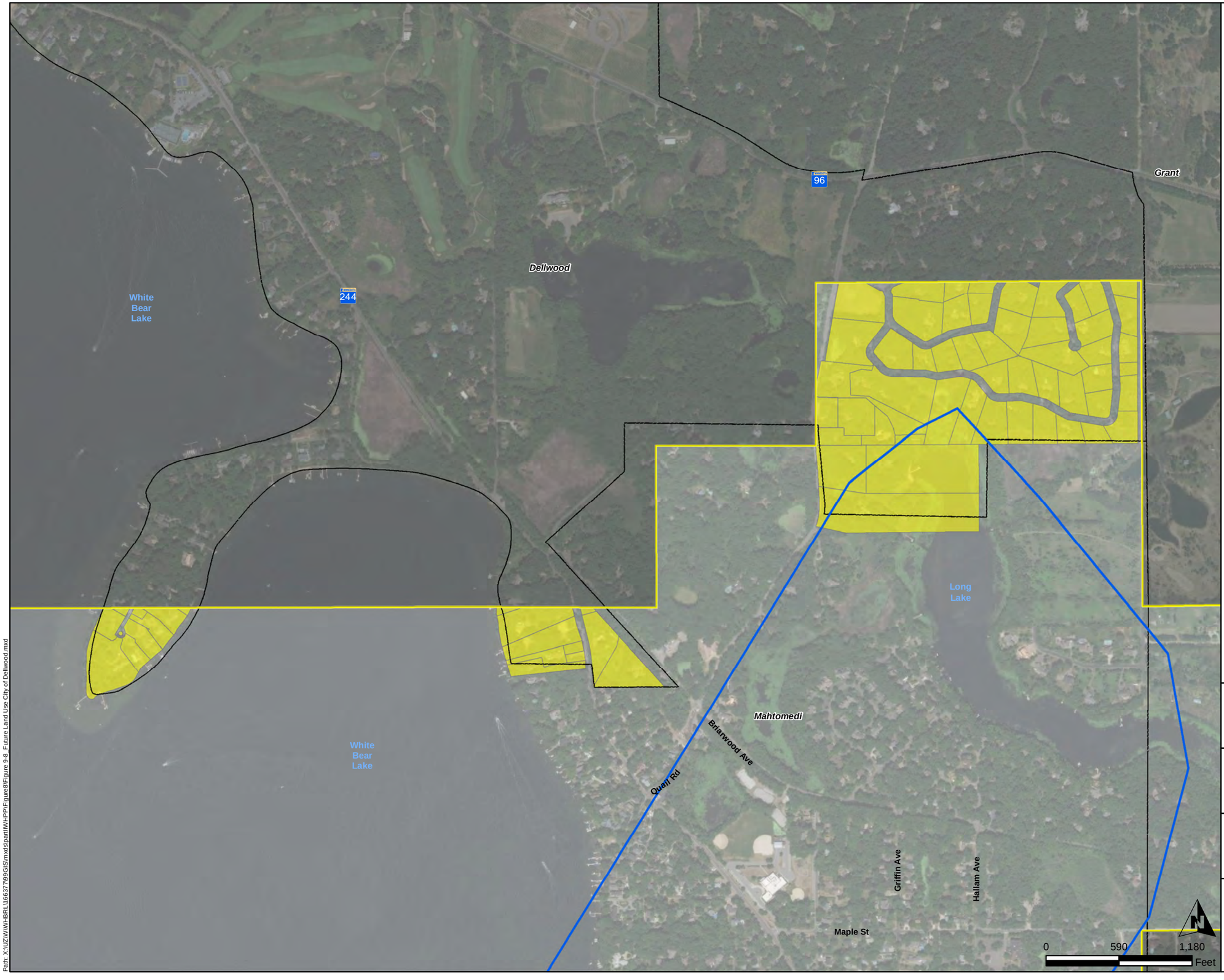


Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

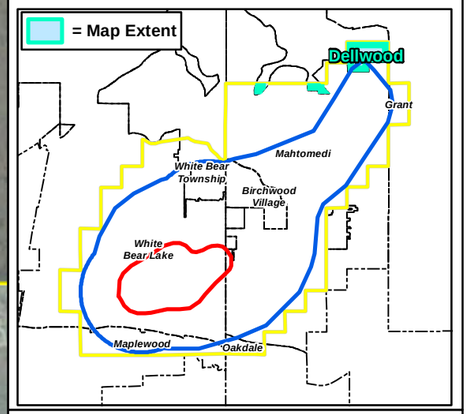
Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of Dellwood Future Zoning

- R1

*Map Depicts City of Dellwood Zoning
- No Seperate Land Use Map has been developed by the City



Future Land Use
City Of Dellwood

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377

Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 9-8

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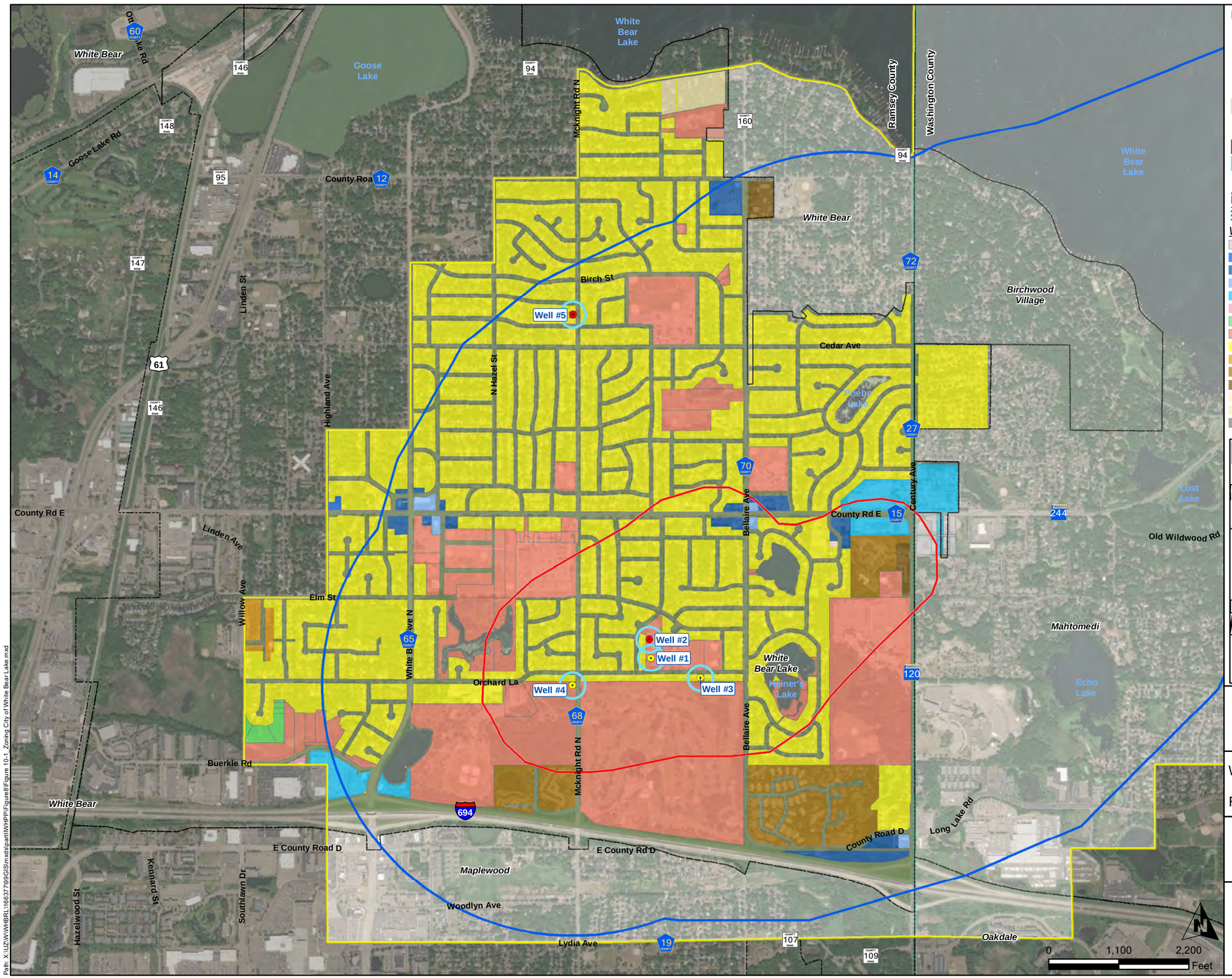


Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

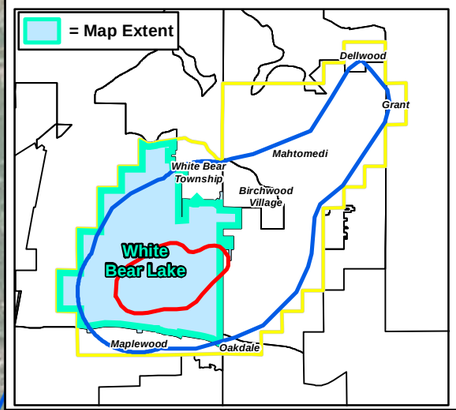
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area
- Emergency Response Area
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

White Bear Lake Zoning

- Unzoned
- Neighborhood Business District (B-1)
- Limited Business District (B-2)
- Auto-oriented Business District (B-3)
- General Business District (B-4)
- Limited Industry District (I-1)
- Open Space (O)
- Public Facilities District (P)
- Single Family Residential District (R-3)
- Medium Density Residential District (R-5)
- Medium Density Residential District (R 6)
- High Density Residential District (R-7)
- Residential-Business Transition District (R-B)
- Low Density Single Family Residential – shoreland district (R1-S)
- Right of Way (ROW)



Zoning
City Of White Bear Lake

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 4/13/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
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Figure 10-1

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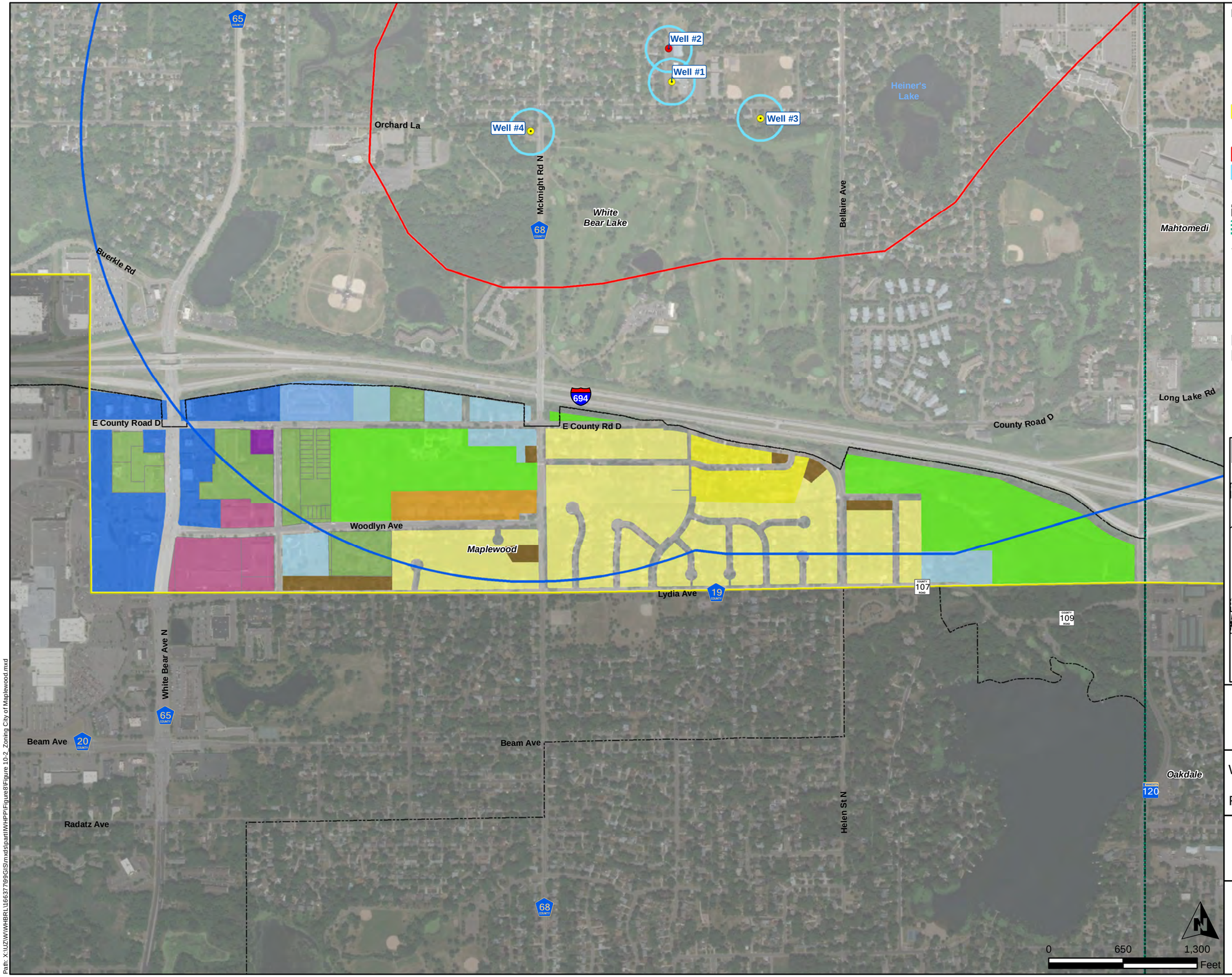

Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
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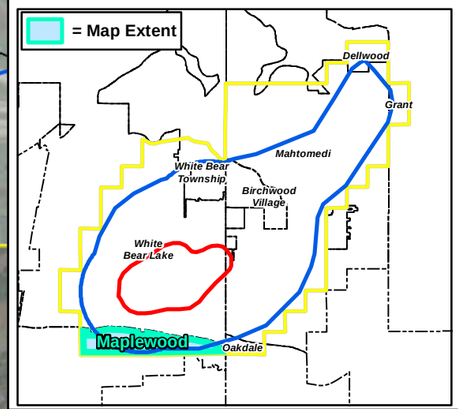
Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

Zoning City of Maplewood

- Business Commercial
- Business Commercial Modified
- Farm Residential
- Limited Business Commercial
- Open Space/Park
- Planned Unit Development
- Shopping Center
- Single Dwelling
- Small Lot Single Dwelling
- Double Dwelling
- Multiple Dwelling



Zoning
City Of Maplewood

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

Project: WHBRL 166377

Print Date: 4/12/2022

Map by: Mark Sherrill
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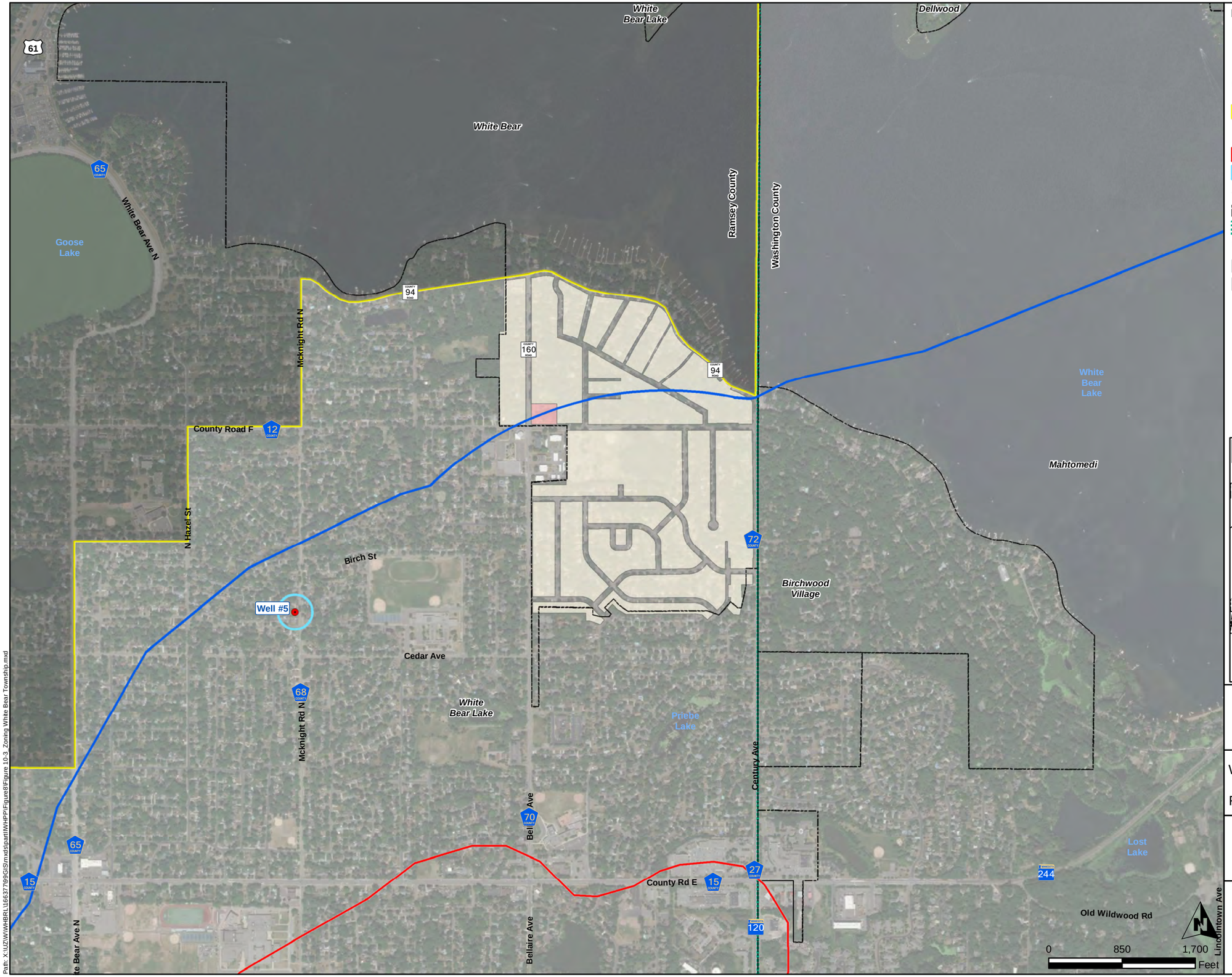
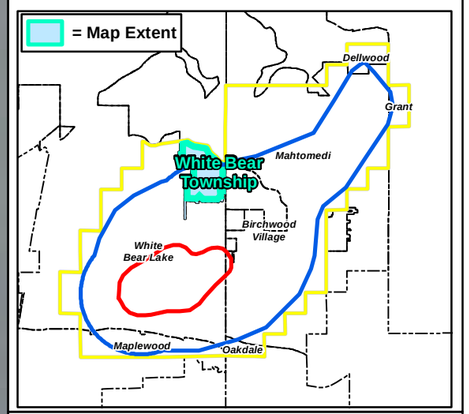
Figure 10-2

Path: X:\UZ\WH\WHBRL\166377\99GIS\mxds\part\WHPP\Figure8\Figure 10-2_Zoning City of Maplewood.mxd





Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

White Bear Lake Township Zoning

- B-1, Limited Business
- R-1, Suburban Residential

Zoning
White Bear Township

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

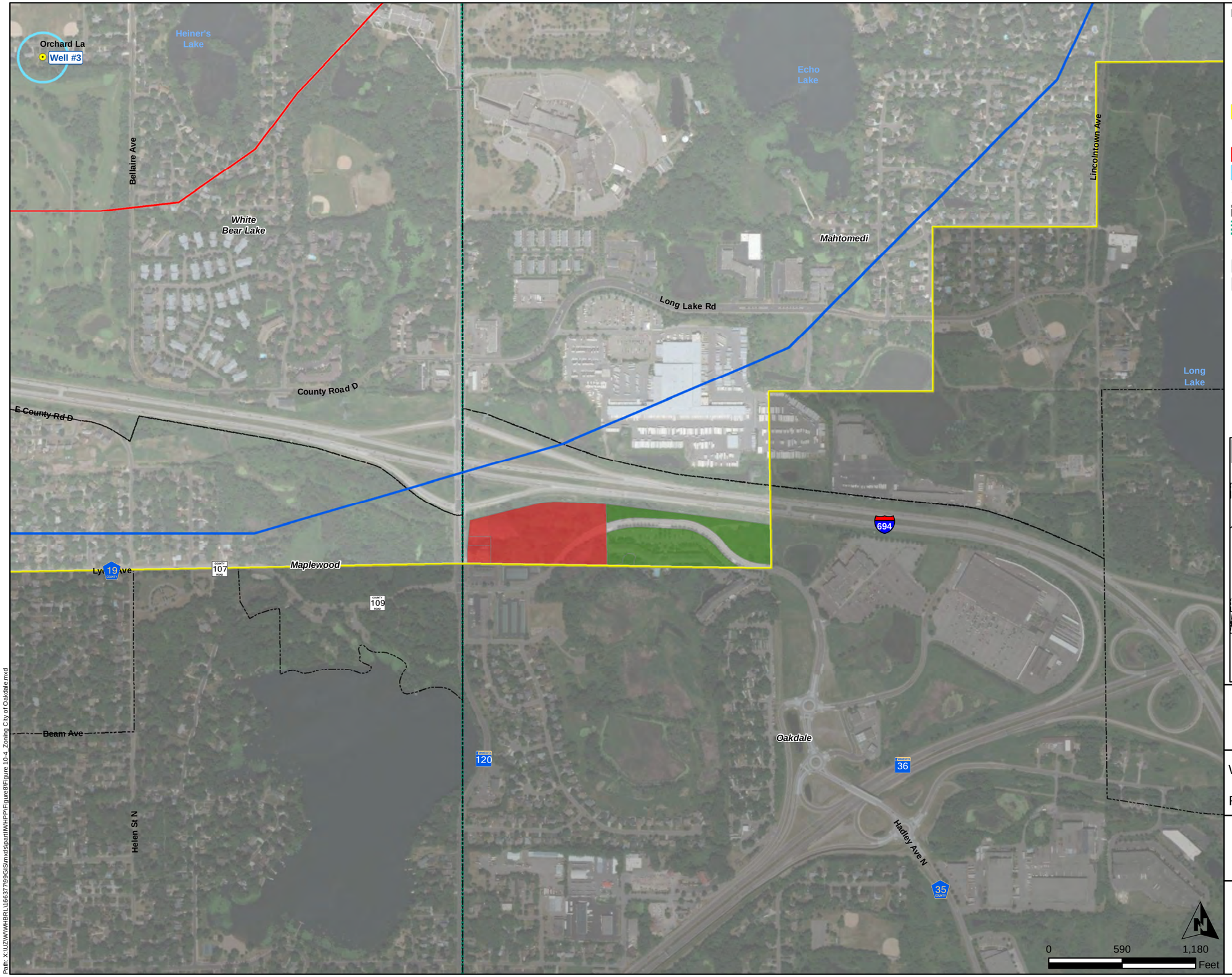
Project: WHBRL 166377

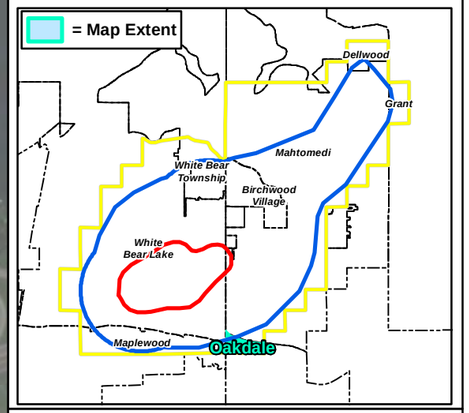
Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI
MnDOT, City of White Bear Lake
Washington County, FSA Aerial,
MnDNR, ESRI Baselayers/Aerial

Figure 10-3

Path: X:\UZ\WW\HBRL\166377\899GIS\mxd\spatt\WHPP\Figure8\Figure 10-3_Zoning White Bear Township.mxd





Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of Oakdale Zoning

- Community Commercial
- PUD

Zoning
City of Oakdale

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377

Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 10-4

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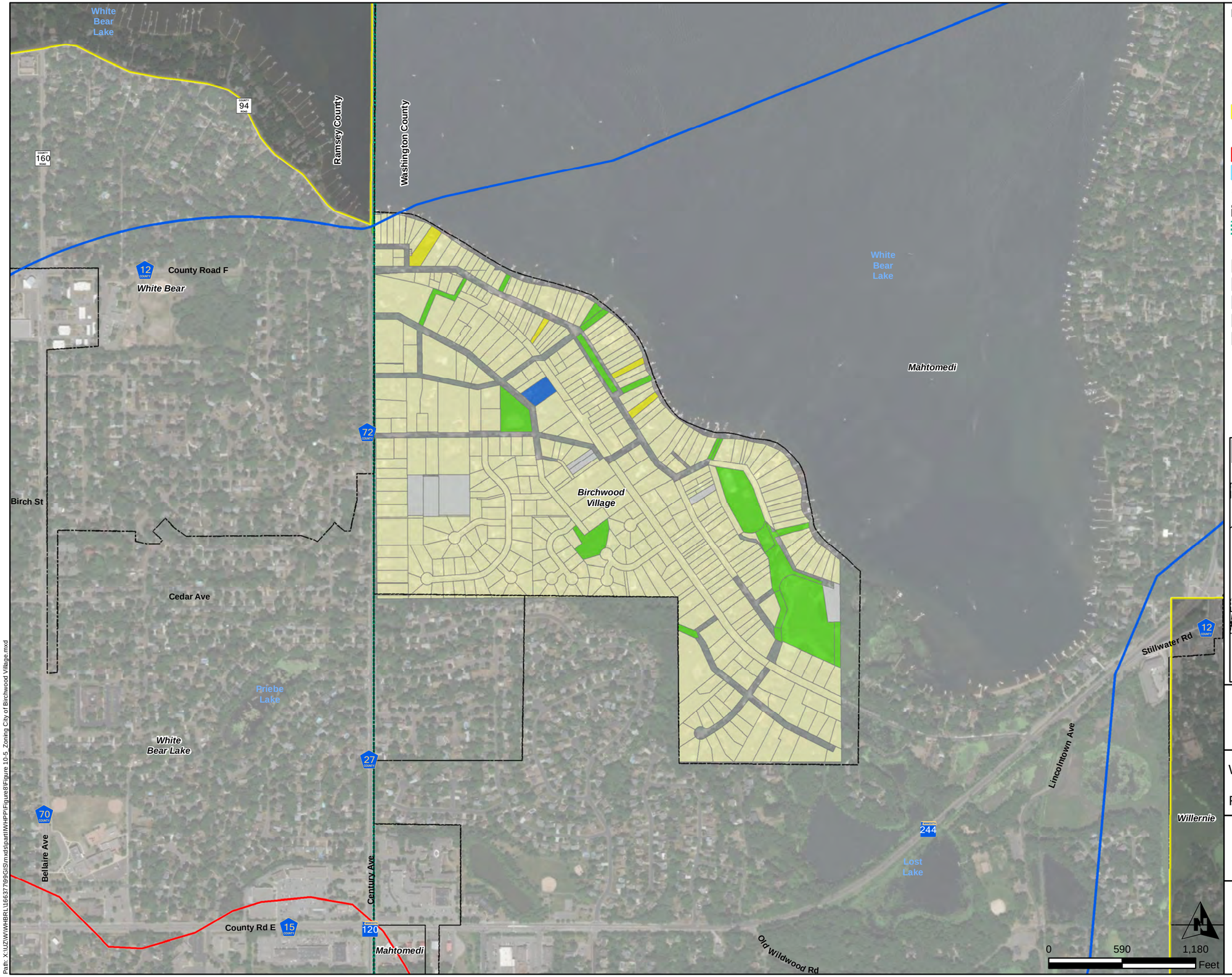


Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

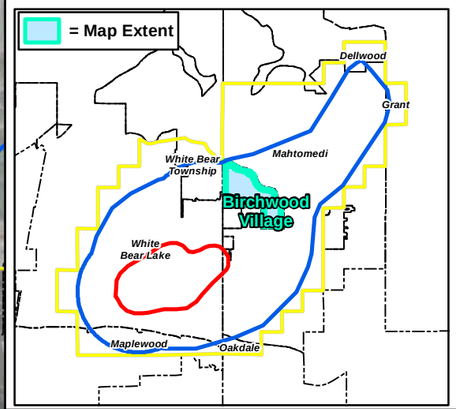
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

Birchwood Village Zoning

- Institutional
- Park, Recreational. or Preserve
- Seasonal/Vacation
- Single Family Detached
- Undeveloped



Zoning
City Of Birchwood Village

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

Project: WHBRL 166377

Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 10-5

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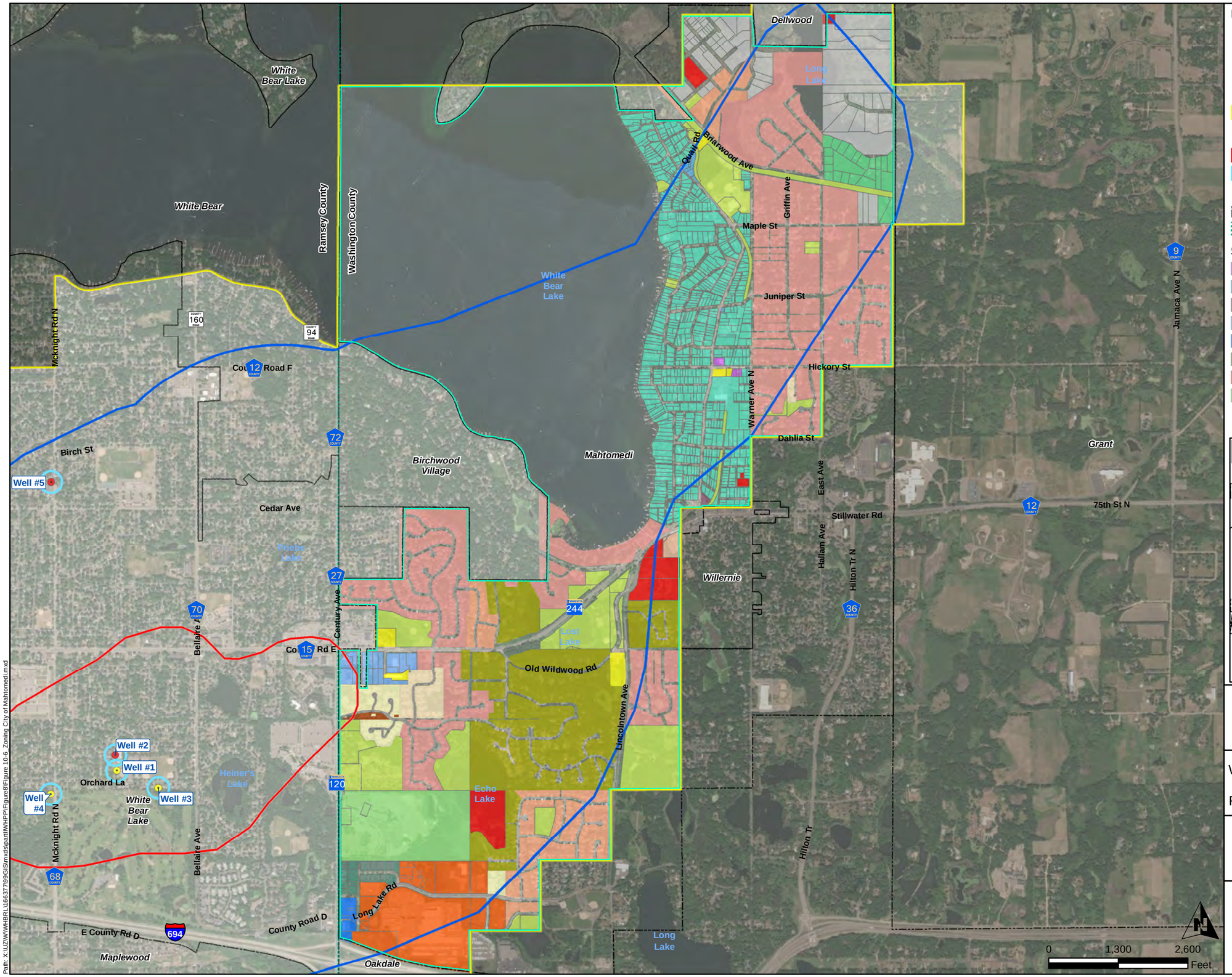


Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

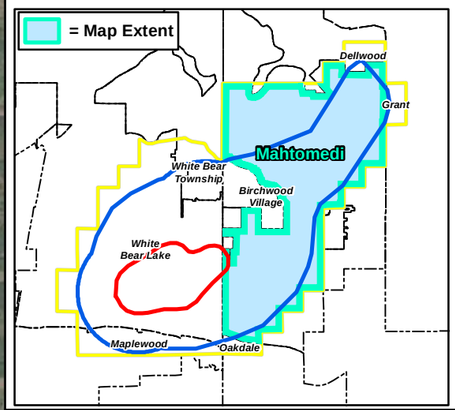
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of Mahtomedi Zoning

B-1	B4	R-4	MU-PUD
B-2	B5	R1-A	
B-3	C	R1-B	
B-4	IB	R1-C	
B-5	VMU	R1-D	
B1	P	R1-E	
B2	PB	R2	
B3	R-2	R3	
	R-3	RR	



Zoning
City Of Mahtomedi

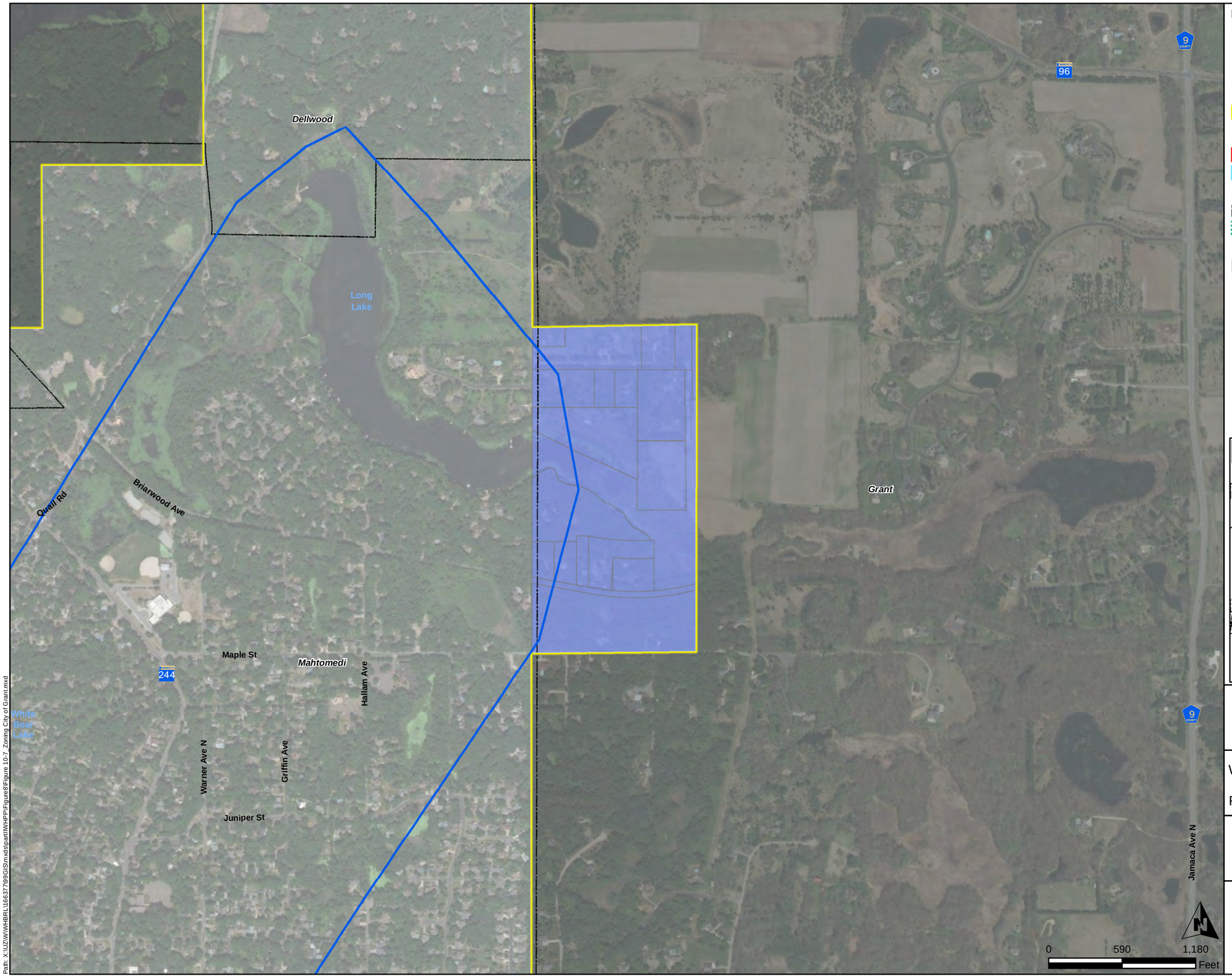
Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 10-6



Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

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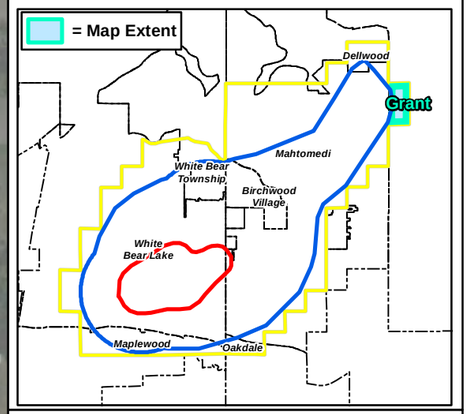
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of Grant Zoning

- A2 - Agricultural Small



Zoning
City of Grant

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377

Print Date: 4/12/2022

Map by: Mark Sherrill
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Figure 10-7

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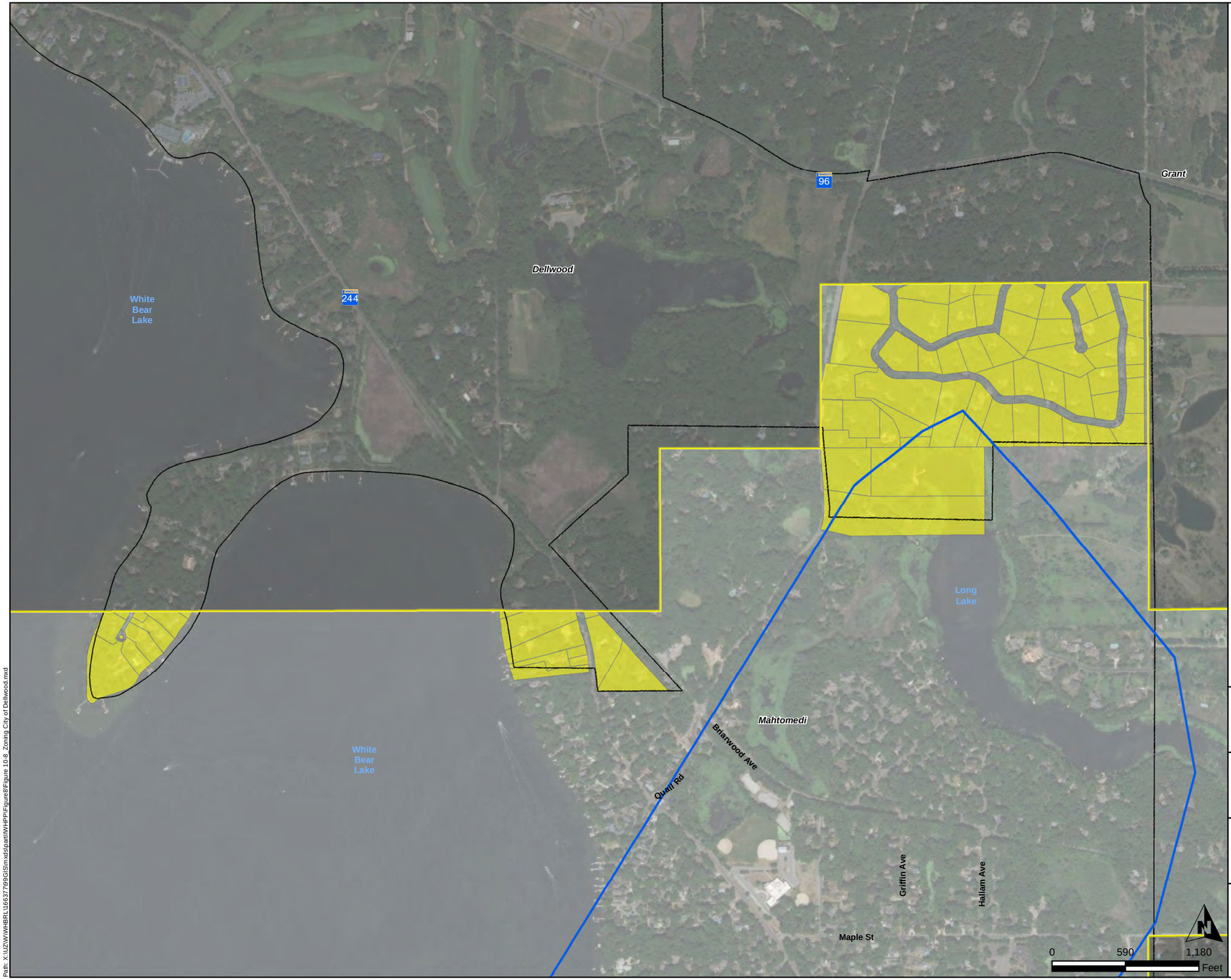

Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
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- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

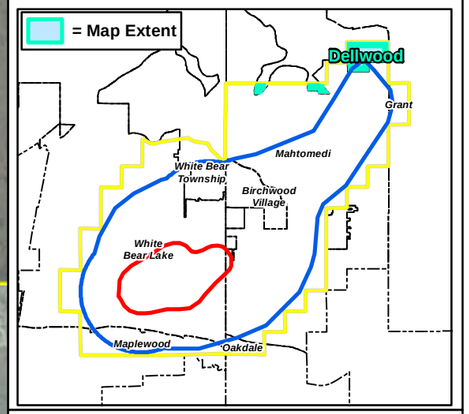
Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

City of Dellwood Zoning

- R1

*Map Depicts City of Dellwood Zoning
- No Seperate Land Use Map has been developed by the City



Zoning
City Of Dellwood

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377

Print Date: 4/12/2022

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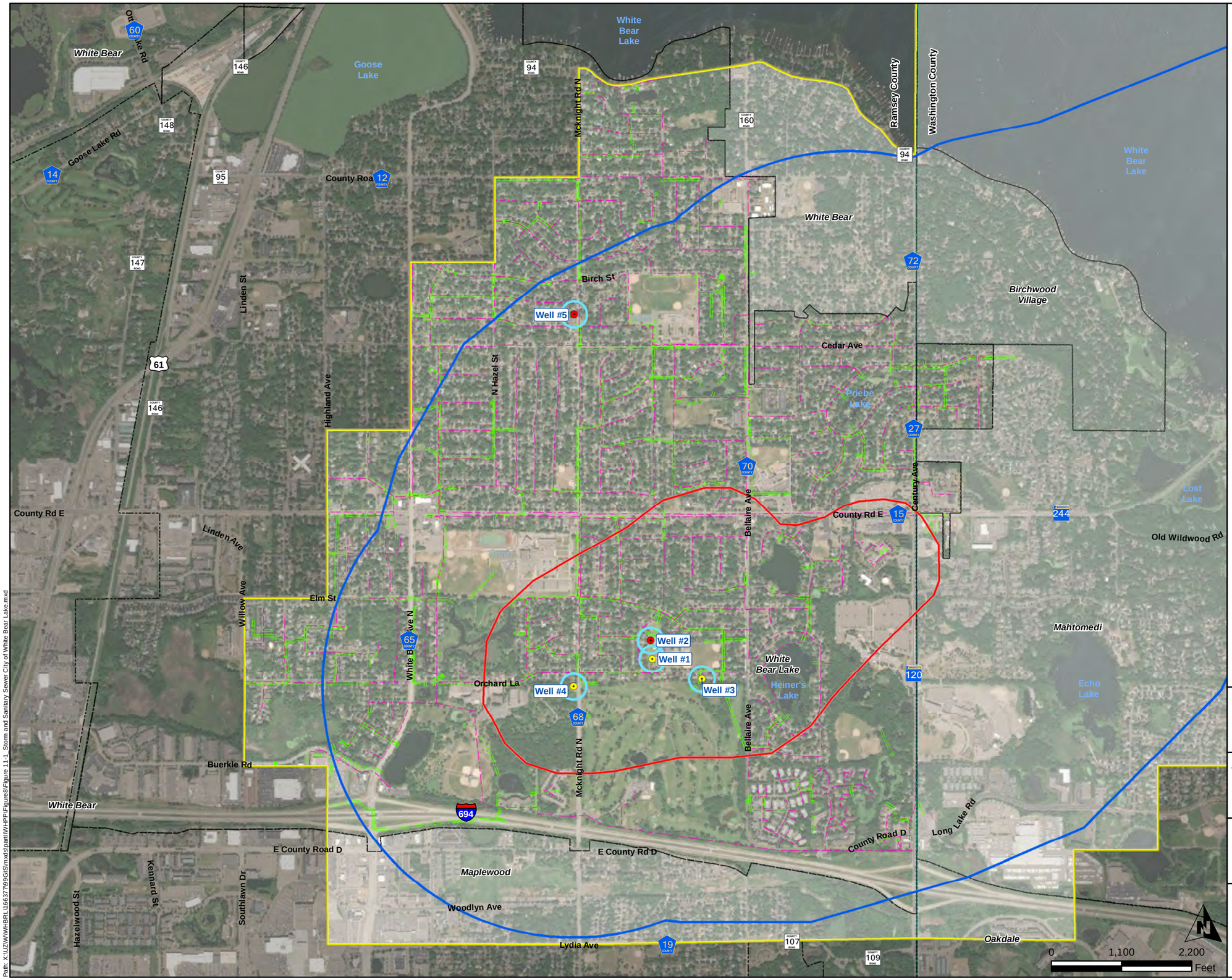
Figure 10-8

Path: X:\UZ\WW\HBRL\166377\899GIS\mxd\Spatt\WHPP\Figure8\Figure 10-8_Zoning City of Dellwood.mxd



Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

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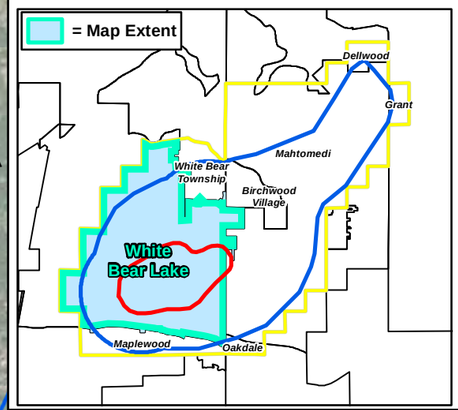
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

Public Utility

- Sanitary Sewer
- Storm Sewer



Storm and Sanitary Sewer City Of White Bear Lake

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

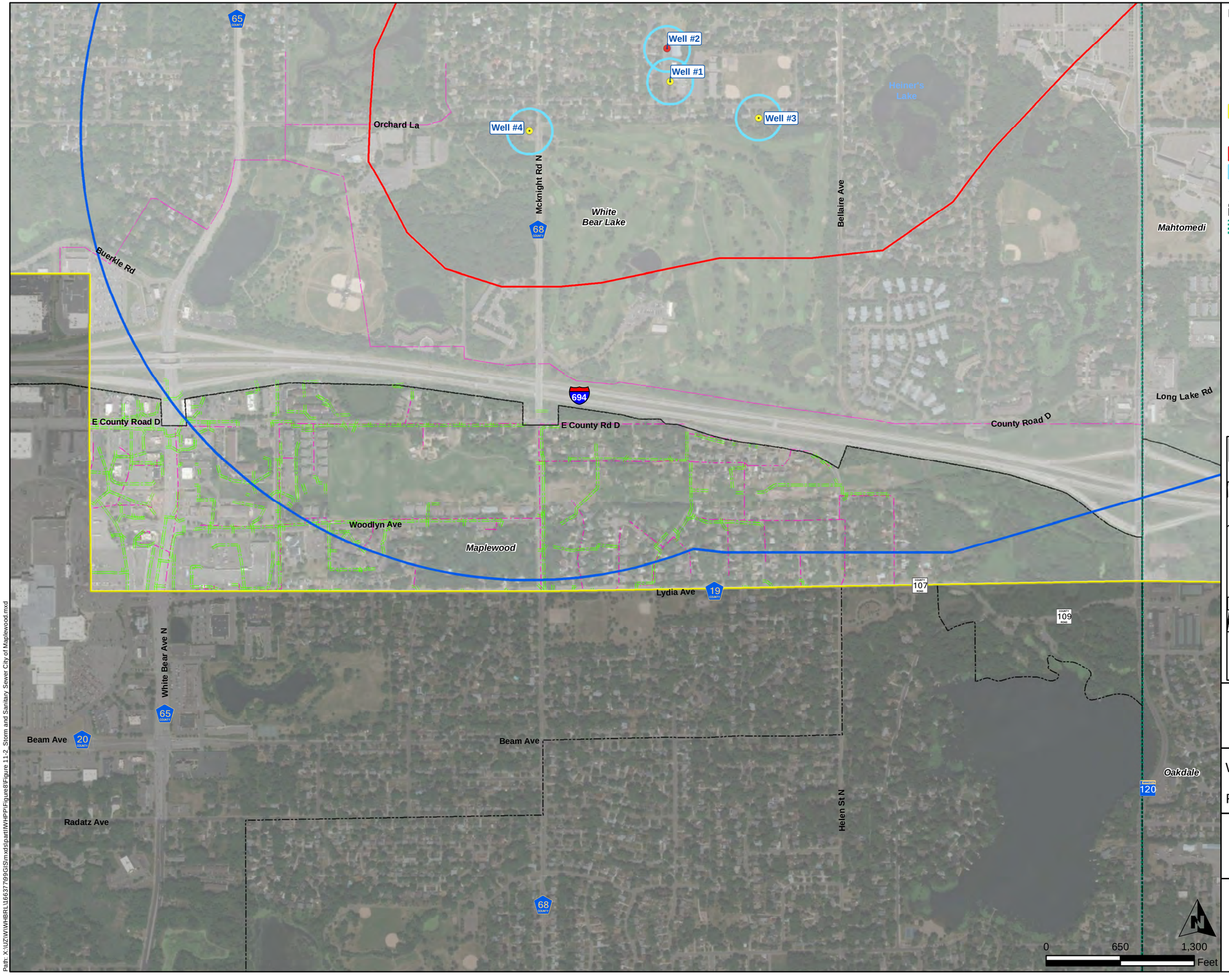
SEH

Project: WHBRL 166377
Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 11-1

Path: X:\UZ\WH\WHBRL\166377\99\GIS\mxds\part\WHPP\Figure8\Figure 11-1_Storm and Sanitary Sewer City of White Bear Lake.mxd



Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

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- Emergency Response Area (ERA)
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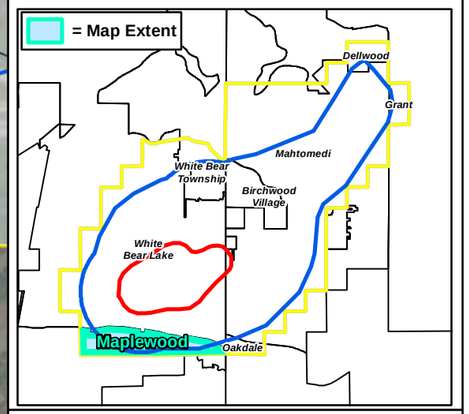
Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

Public Utility

- Sanitary Sewer
- Storm Sewer



Storm and Sanitary Sewer City Of Maplewood

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377

Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 11-2

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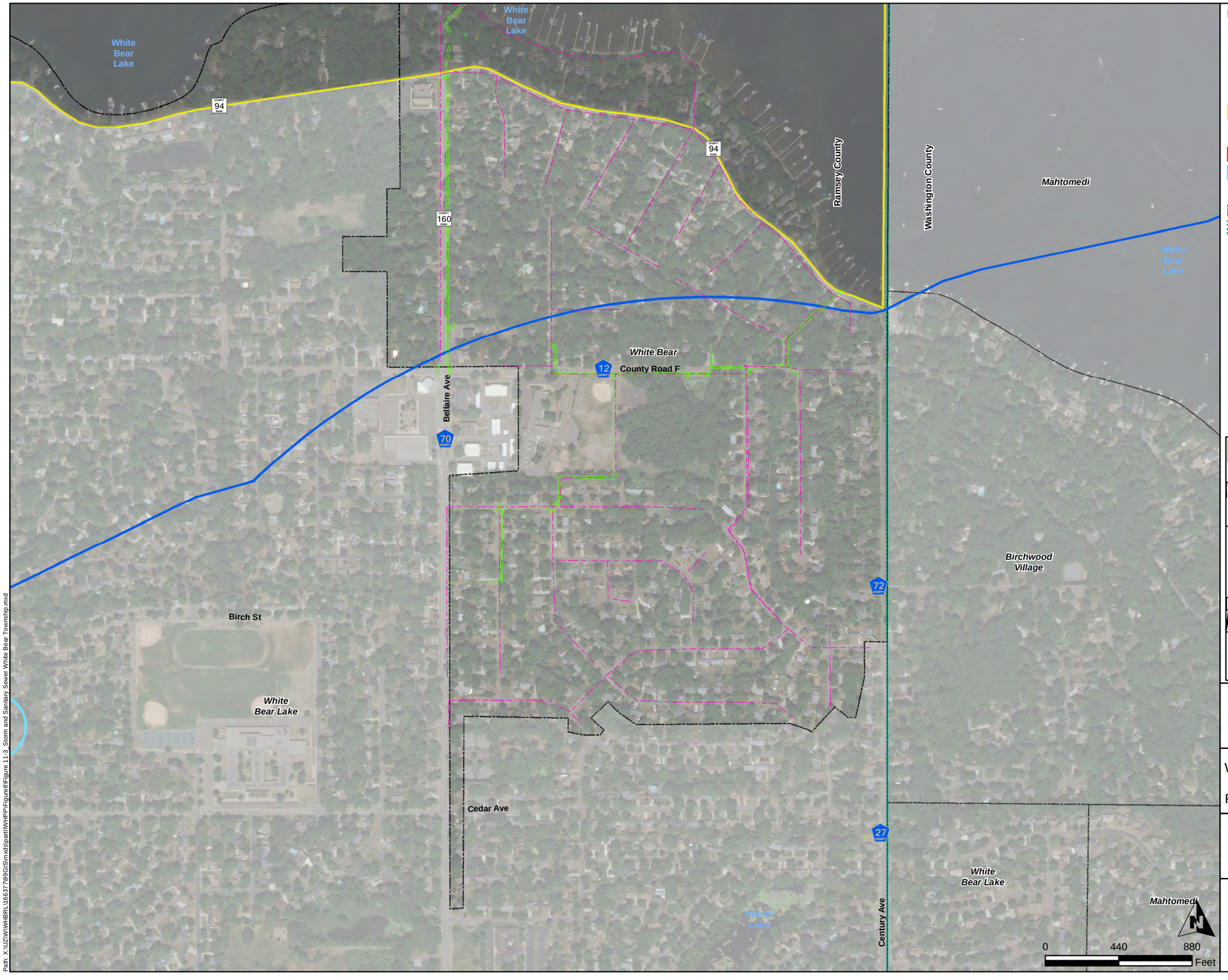

Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

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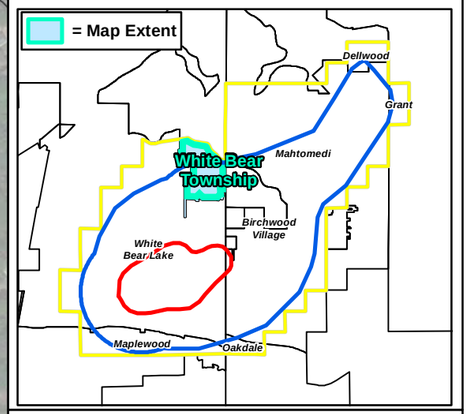
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

Public Utility

- Sanitary Sewer
- Storm Sewer



Storm and Sanitary Sewer White Bear Township

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

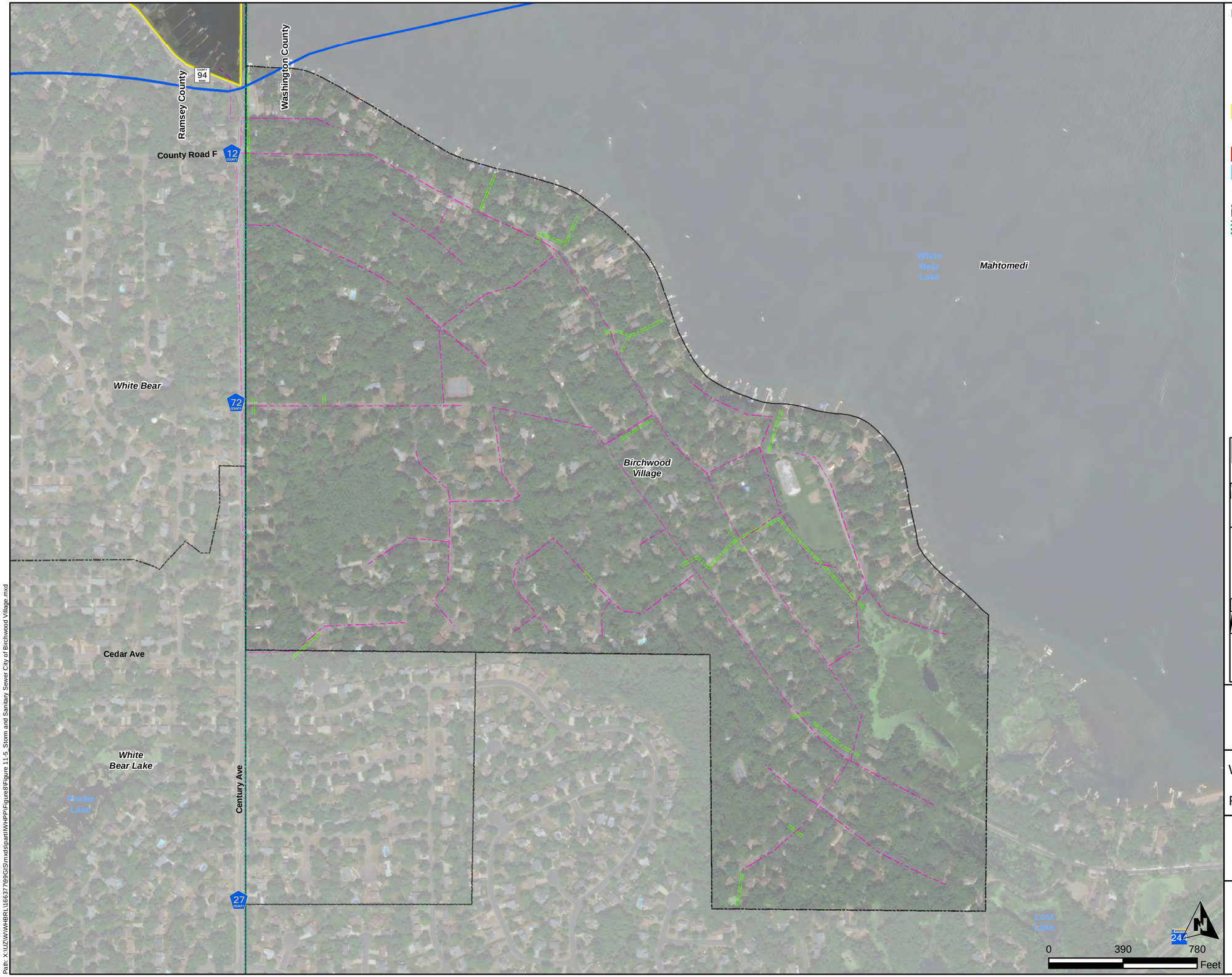
Project: WHBRL 166377

Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 11-3

Path: X:\UZ\WW\HBRL\166377\899GIS\mxd\part\WHPP\Figure8\Figure 11-3_Storm and Sanitary Sewer White Bear Township.mxd



Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

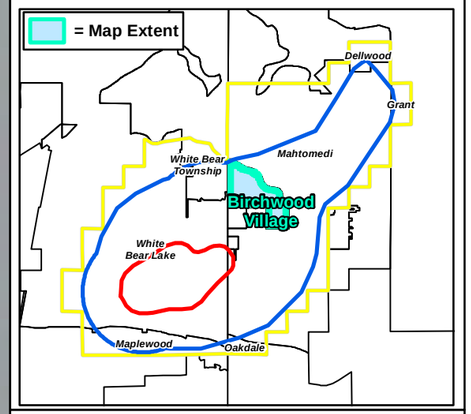
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

Public Utility

- Sanitary Sewer
- Storm Sewer



Storm and Sanitary Sewer City Of Birchwood Village

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377

Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 11-5

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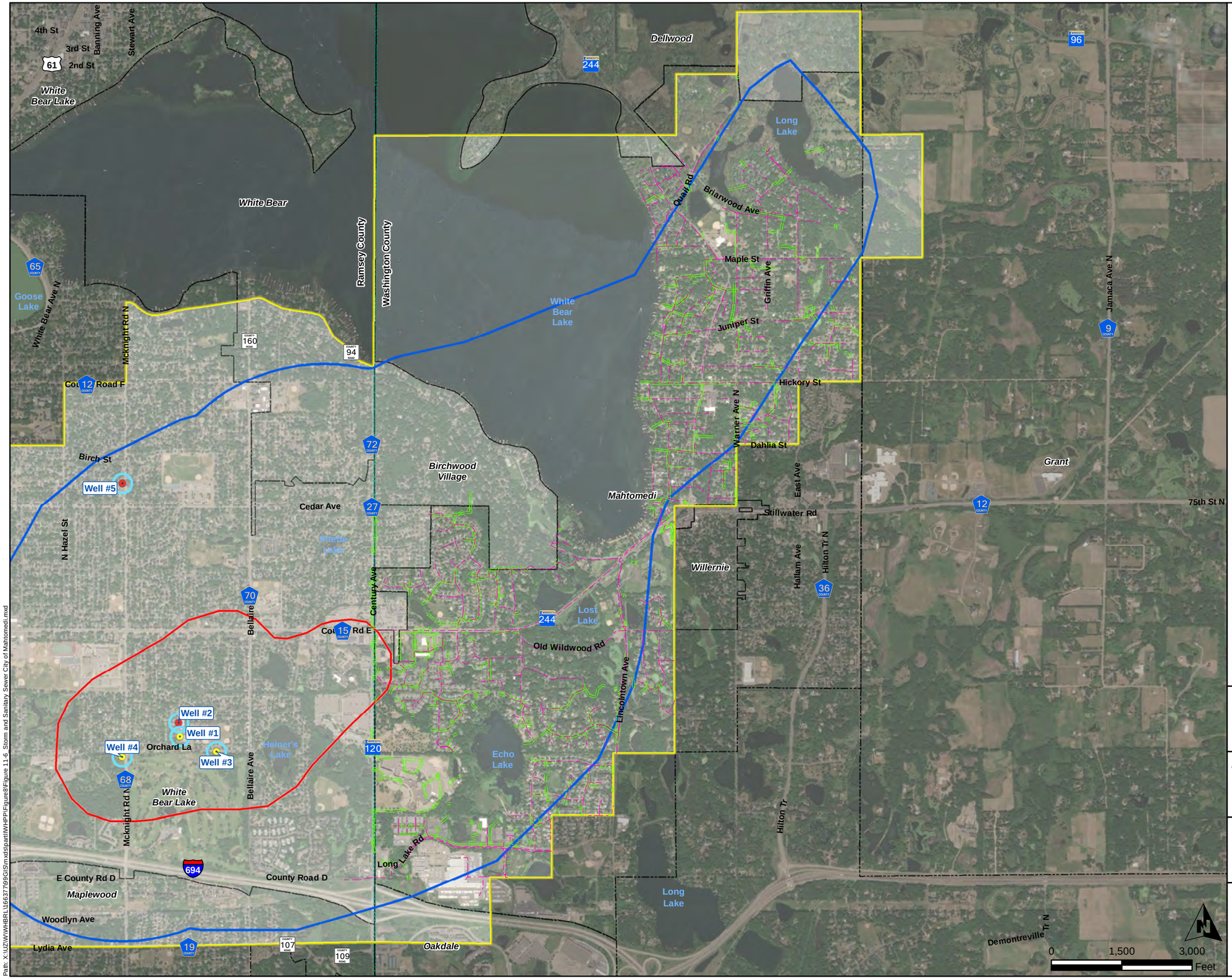


Path: X:\UZ\WWHBRL\166377099GIS\mxd\sipart\WHPP\Figure8\Figure 11-6_Storm and Sanitary Sewer City of Mahtomedi.mxd

Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

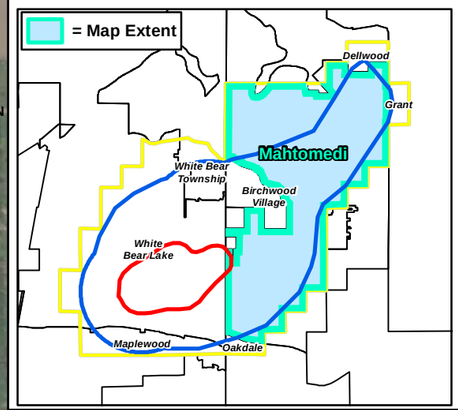
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

Public Utility

- Sanitary Sewer
- Storm Sewer



Storm and Sanitary Sewer City Of Mahtomedi

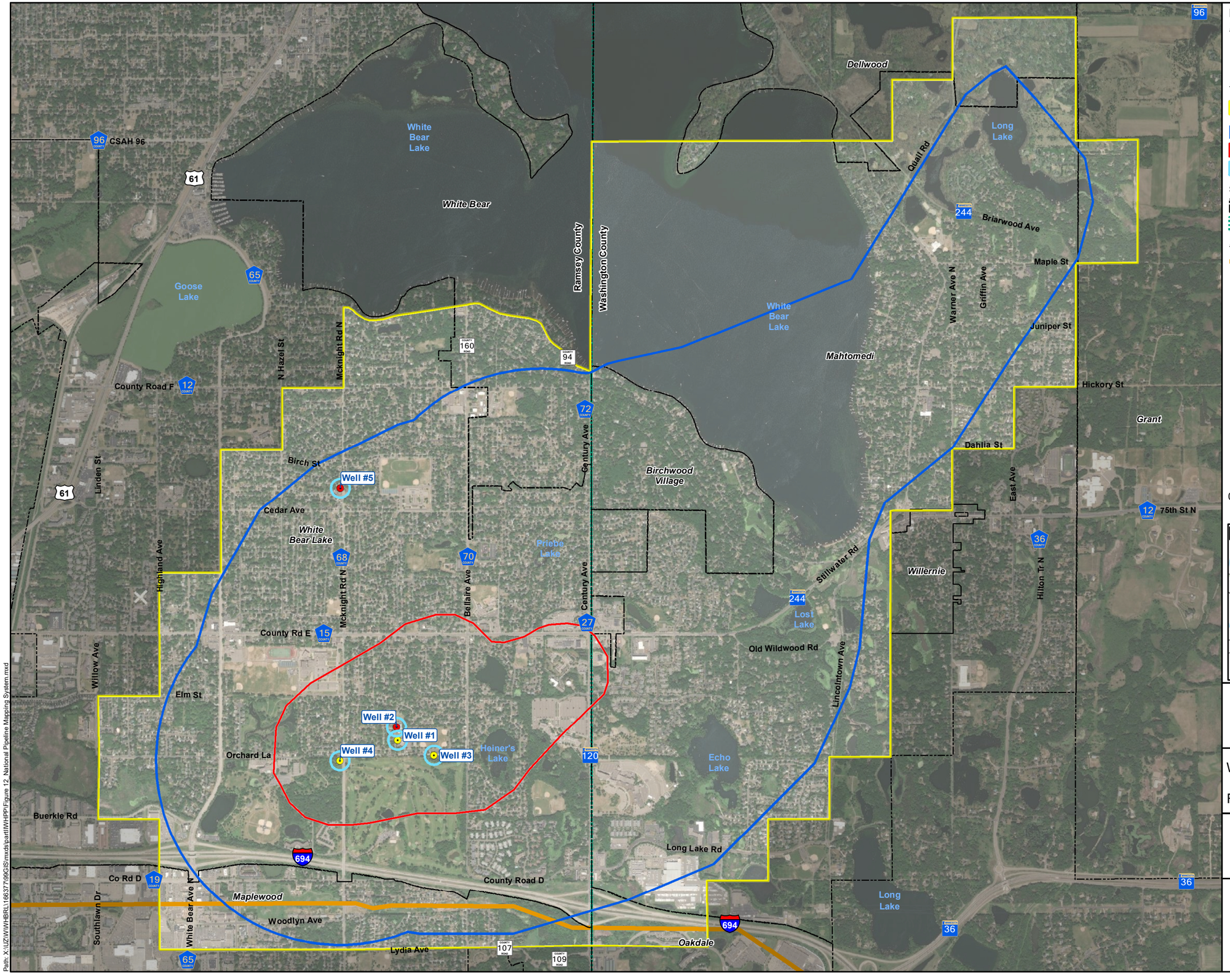
Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 4/12/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 11-6



Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

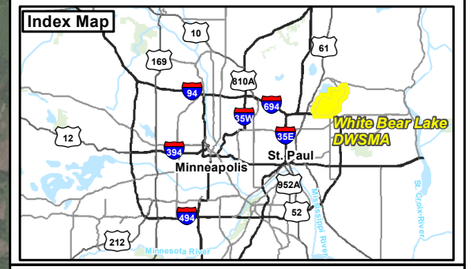
Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

National Pipeline Mapping System

- Hazardous Liquid Pipelines

0 2,000 4,000 Feet



National Pipeline Mapping System

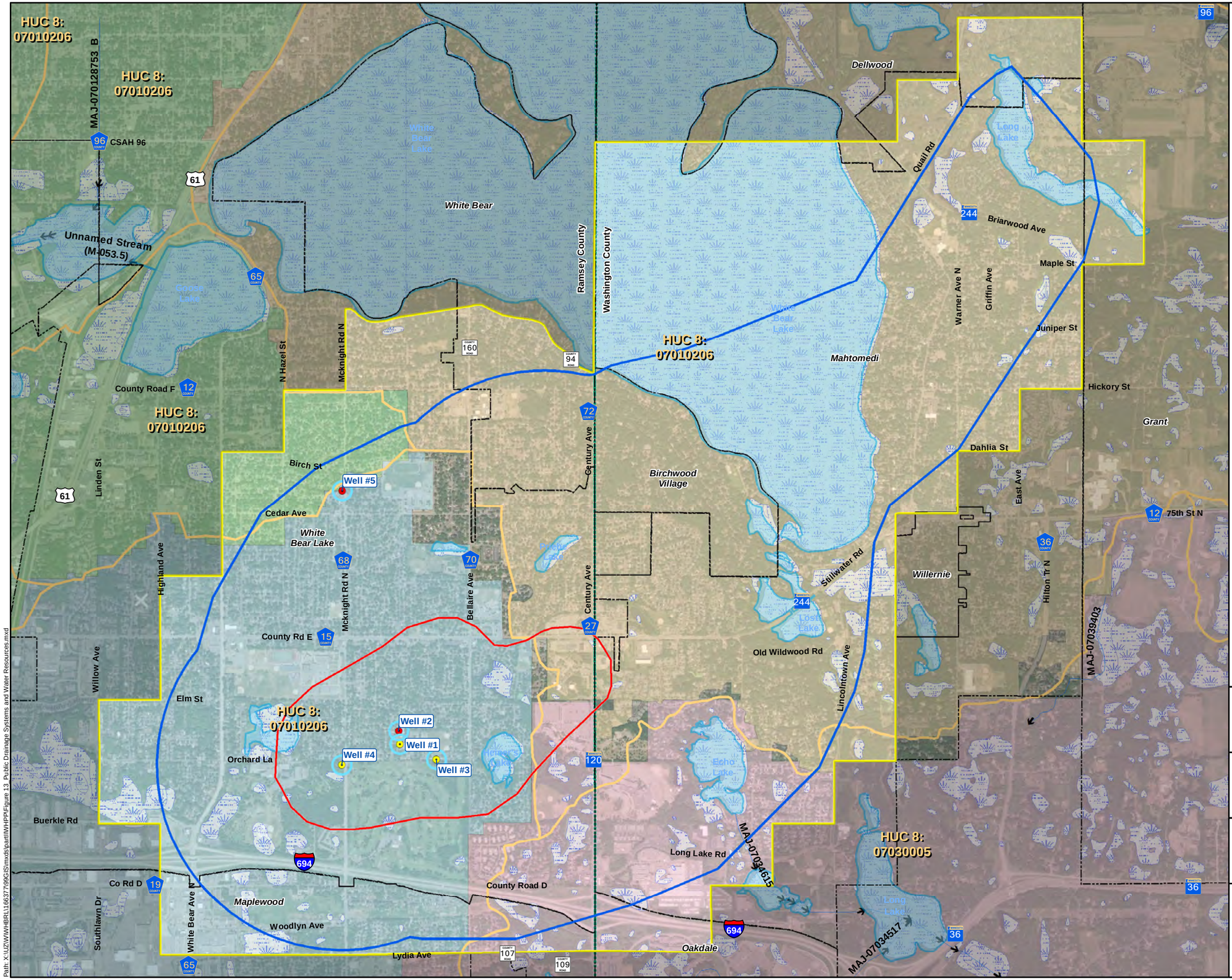
Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

Project: WHBRL 166377
Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 12

Path: X:\UZ\WWHBRL\166377\99GIS\mxds\part II\WHPP\Figure 12_National Pipeline Mapping System.mxd



Legend

Public Water Supply Well Locations
- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries
- Municipal Boundry
- County Boundry

Buffer Protection Map (MnDNR)

Watercourses and Ditches
- 16.5-ft Buffer
- Potential trout stream delisting and buffer map removal
- 50-ft Buffer
- Needs field review

Lakes, Reservoirs, and Wetlands
- 50-ft Buffer
- Needs field review

DNR River and Stream Centerlines (Flow)
- Confluences and Flow Direction

MNDNR Watershed Suite
- Watershed Boundary
- National Wetlands Inventory (Tile q3534, q3535)

Watershed Management District
- RAMSEY-WASHINGTON METRO
- RICE CREEK
- VADNAIS LAKE
- VALLEY BRANCH

0 2,000 4,000 Feet

Public Drainage Systems & Water Resources

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

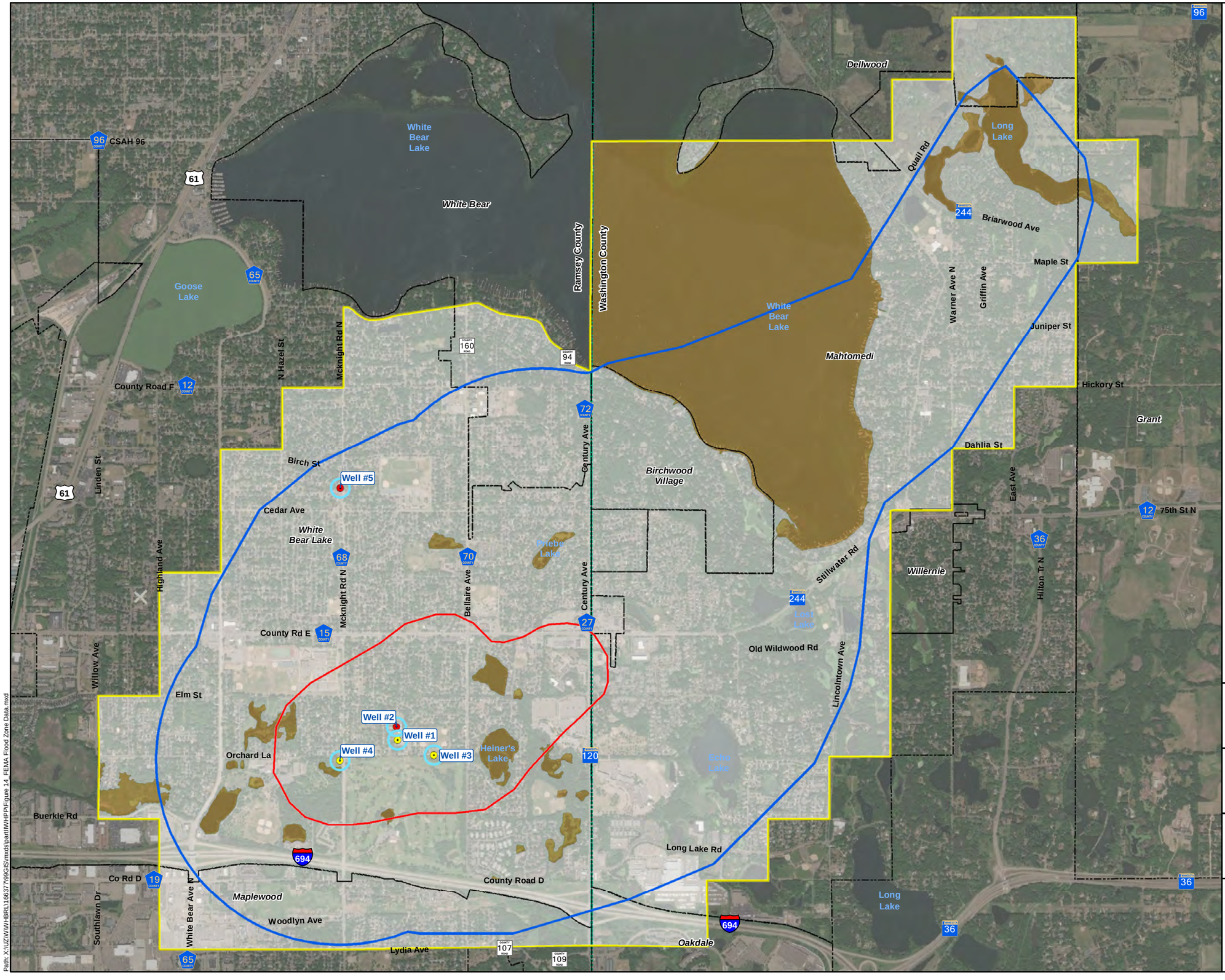
SEH

Project: WHBRL 166377
Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 13

Path: X:\IZ\WW\HBRL\166377\99GIS\mxds\partIIWHPP\Figure 13_Public Drainage Systems and Water Resources.mxd



Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

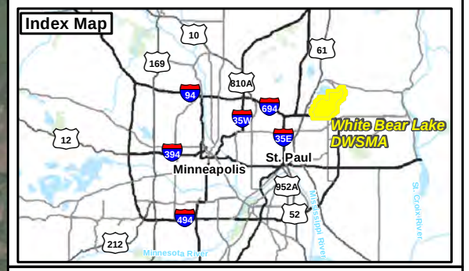
Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

FEMA DFIRM Flood Zone Data

- 0.2% Annual Chance Flood
- A & AE - 1% Annual Chance Flood
- The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood, are labeled Zone C or Zone X

0 2,000 4,000 Feet



FEMA Flood Zone Data

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

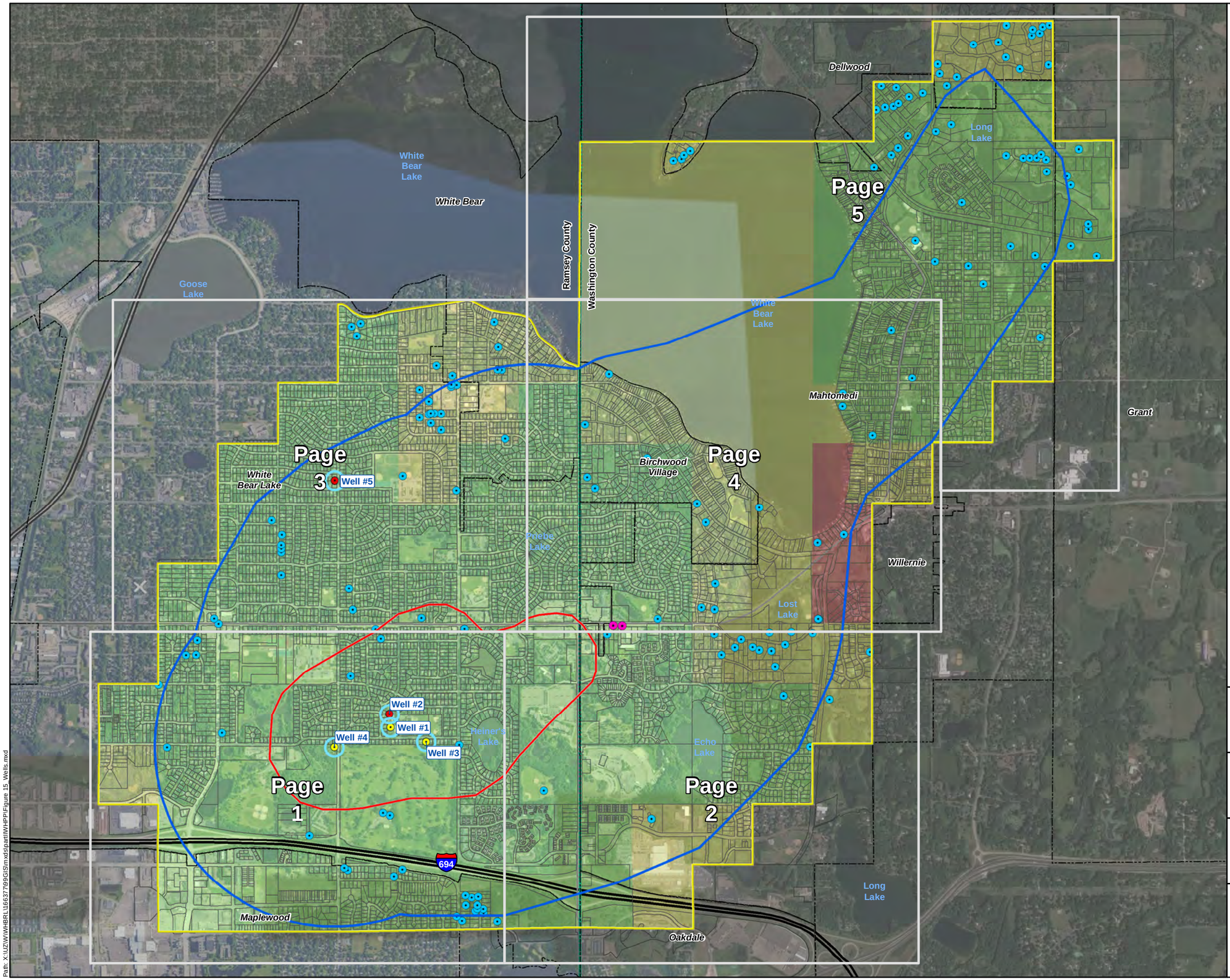
Project: WHBRL 166377

Print Date: 4/11/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 14

Path: X:\UZ\WW\WHBRL\166377\99\GIS\mxds\part\WHPP\Figure 14_FEMA Flood Zone Data.mxd



Legend

Public Water Supply Well Locations
- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries
- Municipal Boundry
- County Boundry

DWSMA Vulnerability
- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

EPA Class V Well
- Other Class V Well

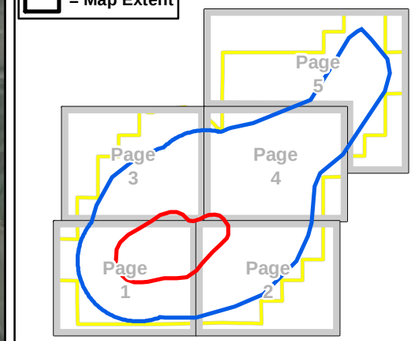
Minnesota Well Index
- Minnesota Well Index Well

Note: MDH Scoping notice requires only wells greater than 100 feet in depth to be inventoried in low vulnerability portions of the DWSMA.

0 1,250 2,500 Feet

N

= Map Extent



PCSI - Wells

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 5/2/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 15-Index

Path: X:\UZ\WW\WHBRL\166377\99GIS\mxd\part\WHPP\Figure 15_Wells.mxd

Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

DWSMA Vulnerability

- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

EPA Class V Well

- Other Class V Well

Minnesota Well Index

- Minnesota Well Index Well

Note: MDH Scoping notice requires only wells greater than 100 feet in depth to be inventoried in low vulnerability portions of the DWSMA.

0 430 860
Feet

= Map Extent

Page 1 | Page 2 | Page 3 | Page 4 | Page 5

PCSI - Wells

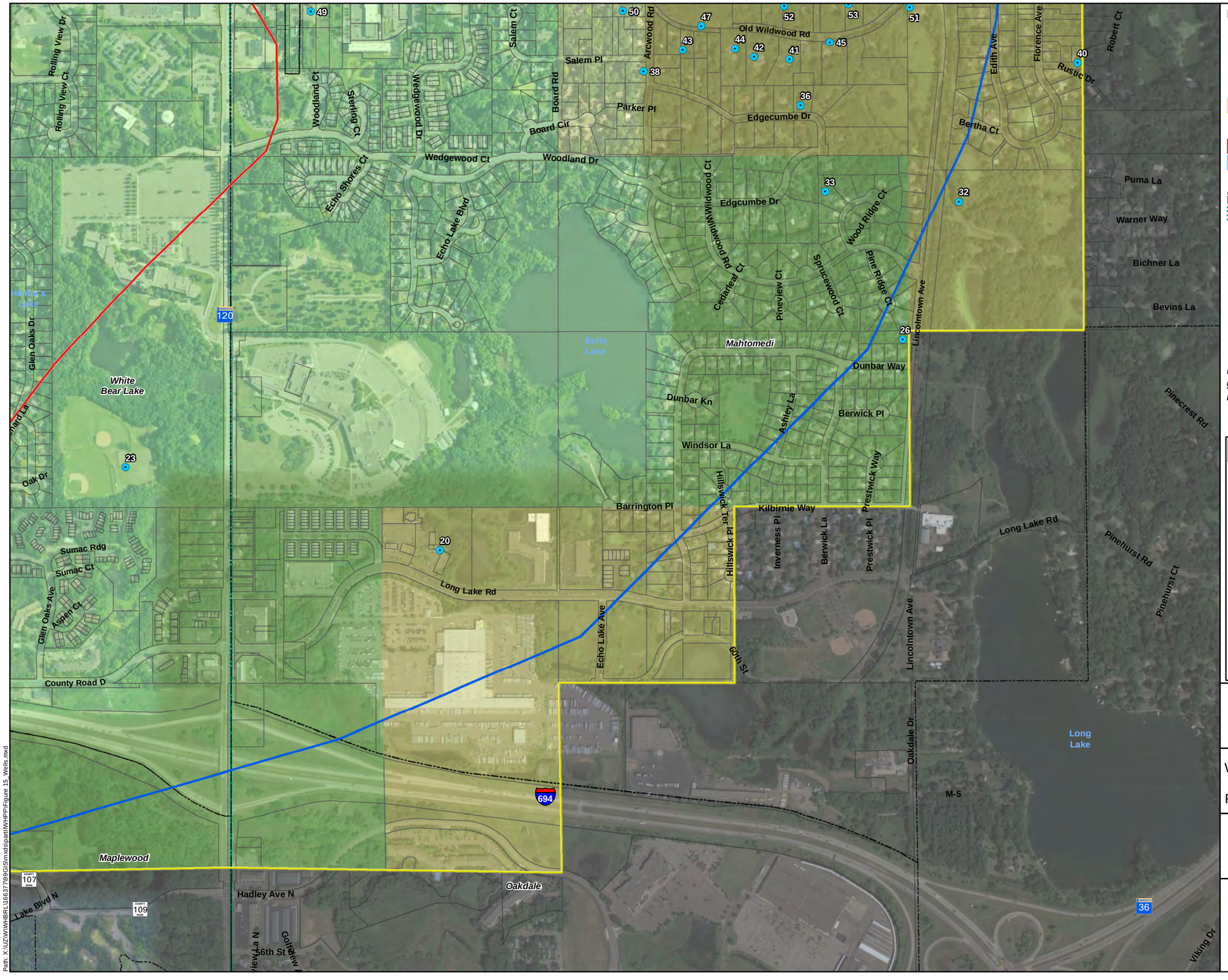
Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

Project: WHBRL 166377
Print Date: 5/2/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 15-1

Path: X:\UZ\WV\WHBRL\166377\99GIS\mxds\part\WHPP\Figure 15_Wells.mxd



Legend

Public Water Supply Well Locations
- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries
- Municipal Boundry
- County Boundry

DWSMA Vulnerability
- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

EPA Class V Well
- Other Class V Well

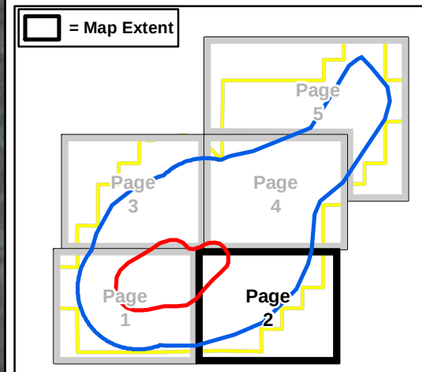
Minnesota Well Index
- Minnesota Well Index Well

Note: MDH Scoping notice requires only wells greater than 100 feet in depth to be inventoried in low vulnerability portions of the DWSMA.

0 430 860
Feet

N

= Map Extent



PCSI - Wells

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 5/2/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 15-2

Path: X:\UZ\WW\WHBRL\166377\99GIS\mxd\sp\ant\WHPP\Figure 15_Wells.mxd

Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

DWSMA Vulnerability

- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

EPA Class V Well

- Other Class V Well

Minnesota Well Index

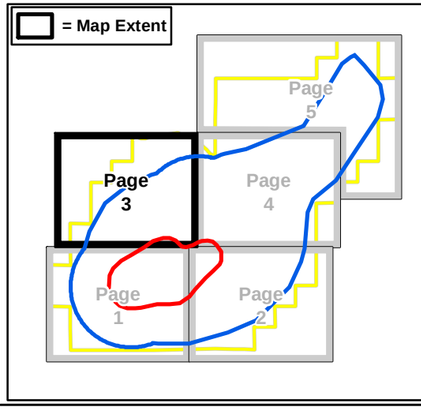
- Minnesota Well Index Well

Note: MDH Scoping notice requires only wells greater than 100 feet in depth to be inventoried in low vulnerability portions of the DWSMA.

0 430 860
Feet

N

= Map Extent



PCSI - Wells

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

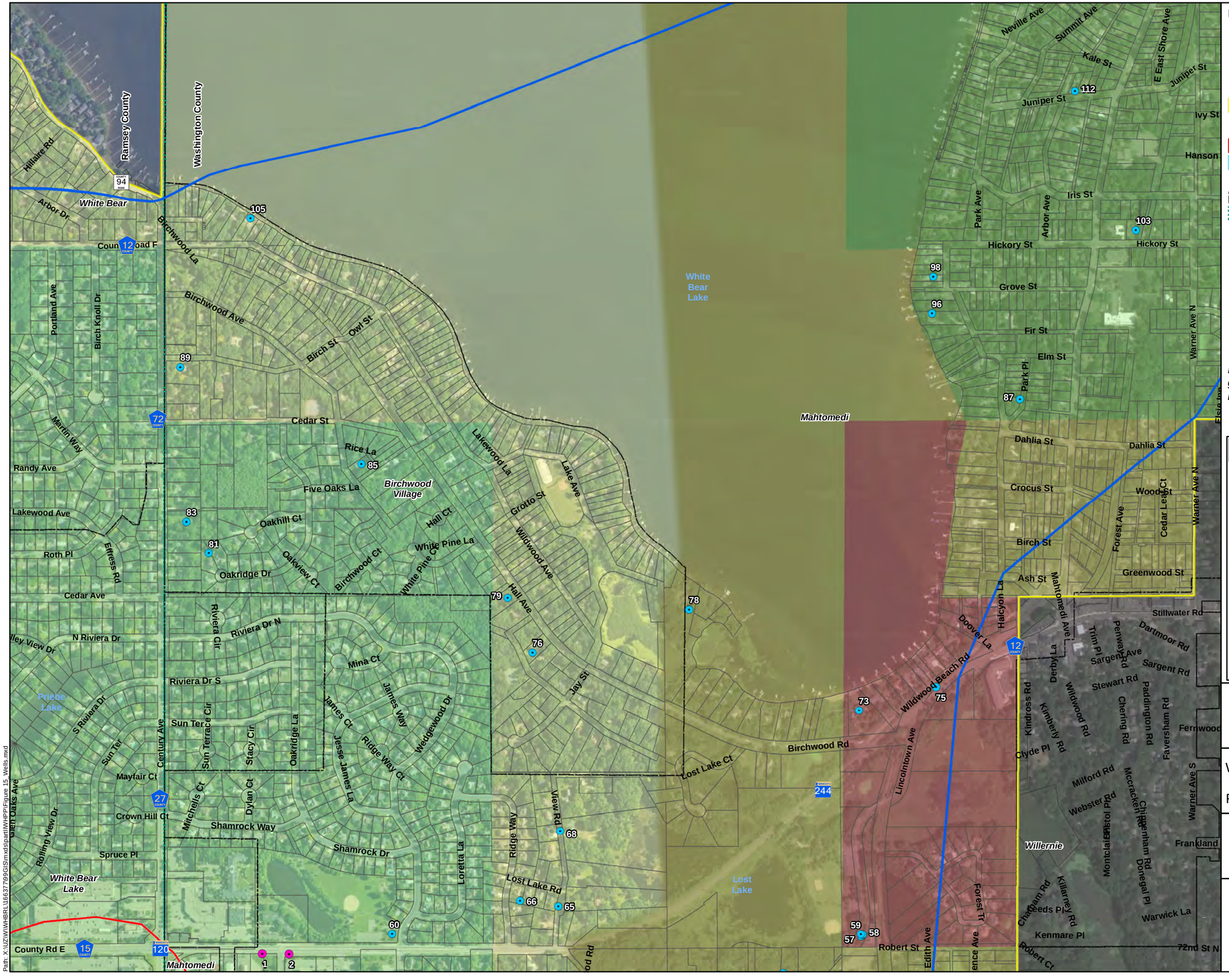
SEH

Project: WHBRL 166377
Print Date: 5/2/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 15-3

Path: X:\UZ\WI\WHBRL\166377\99GIS\mxd\sp\atl\WHPP\Figure 15_Wells.mxd



Legend

Public Water Supply Well Locations
- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries
- Municipal Boundry
- County Boundry

DWSMA Vulnerability
- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

EPA Class V Well
- Other Class V Well

Minnesota Well Index
- Minnesota Well Index Well

Note: MDH Scoping notice requires only wells greater than 100 feet in depth to be inventoried in low vulnerability portions of the DWSMA.

0 430 860 Feet

= Map Extent

PCSI - Wells

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 5/2/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 15-4

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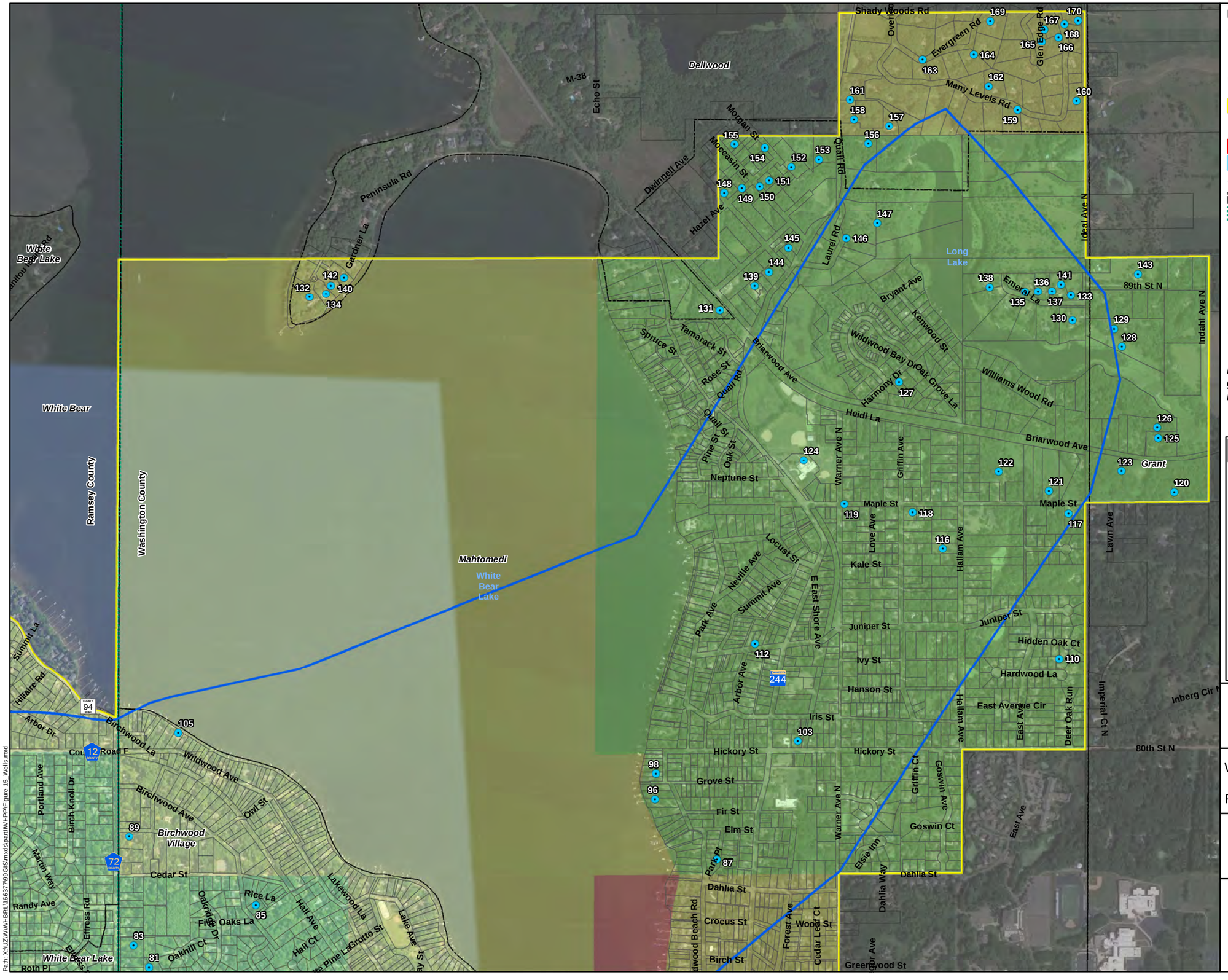


Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area (WHPA)
- Emergency Response Area (ERA)
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

DWSMA Vulnerability

- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

EPA Class V Well

- Other Class V Well

Minnesota Well Index

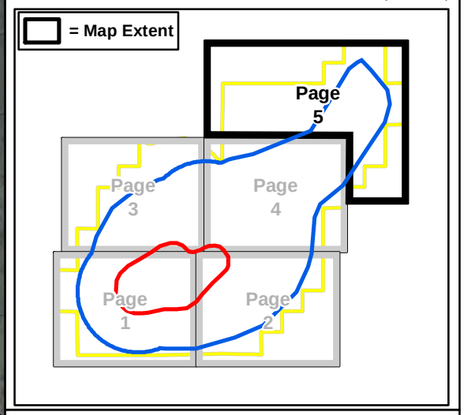
- Minnesota Well Index Well

Note: MDH Scoping notice requires only wells greater than 100 feet in depth to be inventoried in low vulnerability portions of the DWSMA.

0 620 1,240 Feet

N

= Map Extent



PCSI - Wells

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

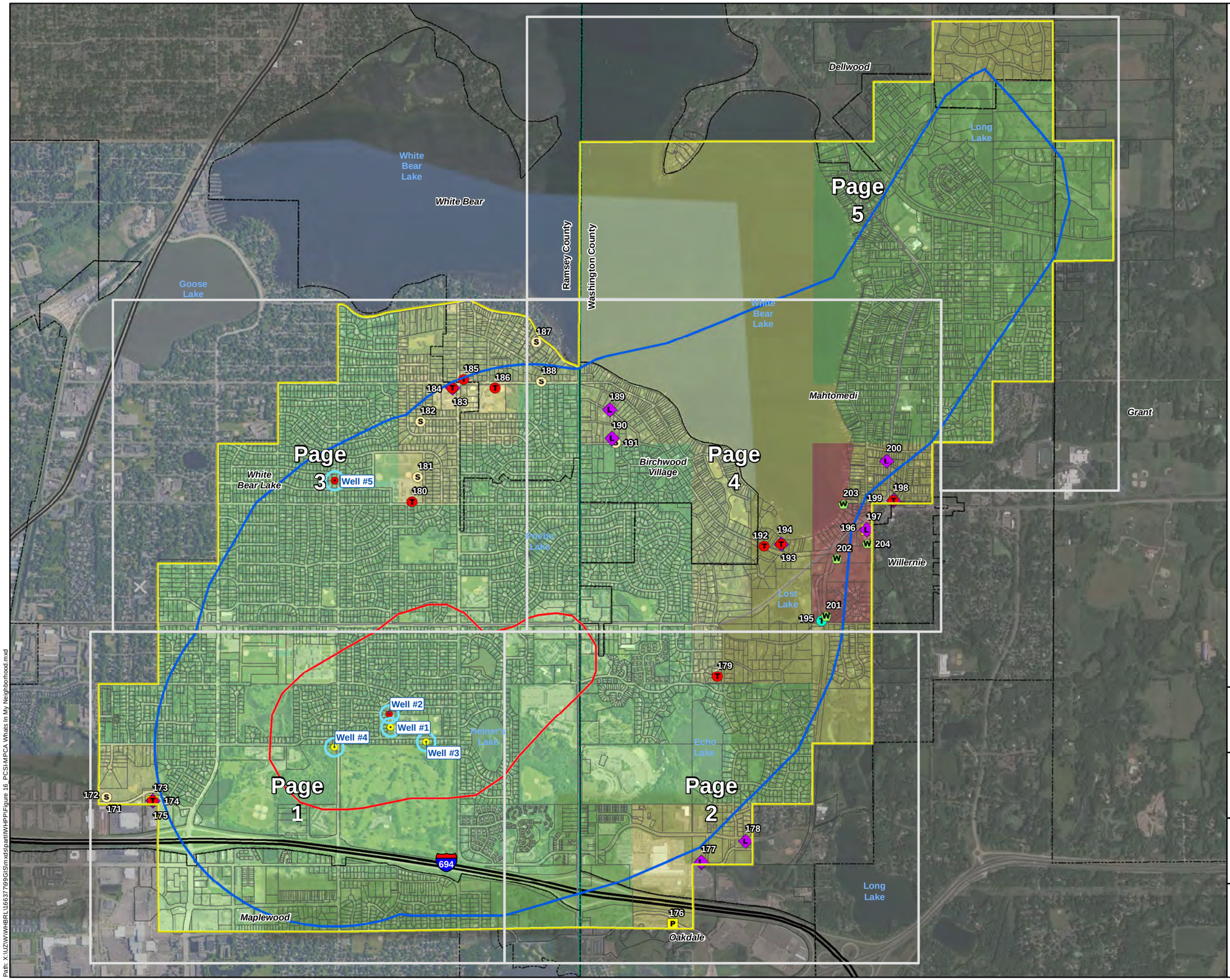
SEH

Project: WHBRL 166377
Print Date: 5/2/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 15-5

Path: X:\UZ\WWHBRL\166377\99GIS\mxd\sjnat\WHPP\Figure 15_Wells.mxd



Legend

Public Water Supply Well Locations
- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area
- Emergency Response Area
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries
- Municipal Boundry
- County Boundry

DWSMA Vulnerability
- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

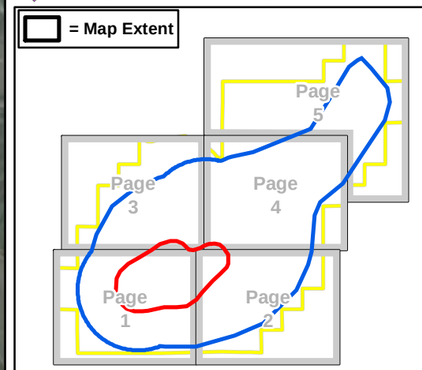
Stormwater Utility
- Stormwater Outlet

0 1,250 2,500 Feet

Minnesota Department Of Agriculture or MPCA Incident Report
- Spill

MPCA What's in my Neighborhood
- Potential Contamination Sites
- Aboveground Storage Tank
- Underground Storage Tank
- Leaking Underground Storage Tank

= Map Extent



PCSI - Other

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

Project: WHBRL 166377
Print Date: 5/3/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 16-Index

Path: X:\UZ\WW\WHBRL\166377\99GIS\mxd\part\WHPP\Figure 16_PCSI-MPCA Whats In My Neighborhood.mxd

Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area
- Emergency Response Area
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

DWSMA Vulnerability

- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

Stormwater Utility

- Stormwater Outlet

0 430 860 Feet

Minnesota Department Of Agriculture or MPCA Incident Report

- Spill

MPCA What's in my Neighborhood

- Potential Contamination Sites
- Aboveground Storage Tank
- Underground Storage Tank
- Leaking Underground Storage Tank

= Map Extent

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PCSI - Other

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

Project: WHBRL 166377
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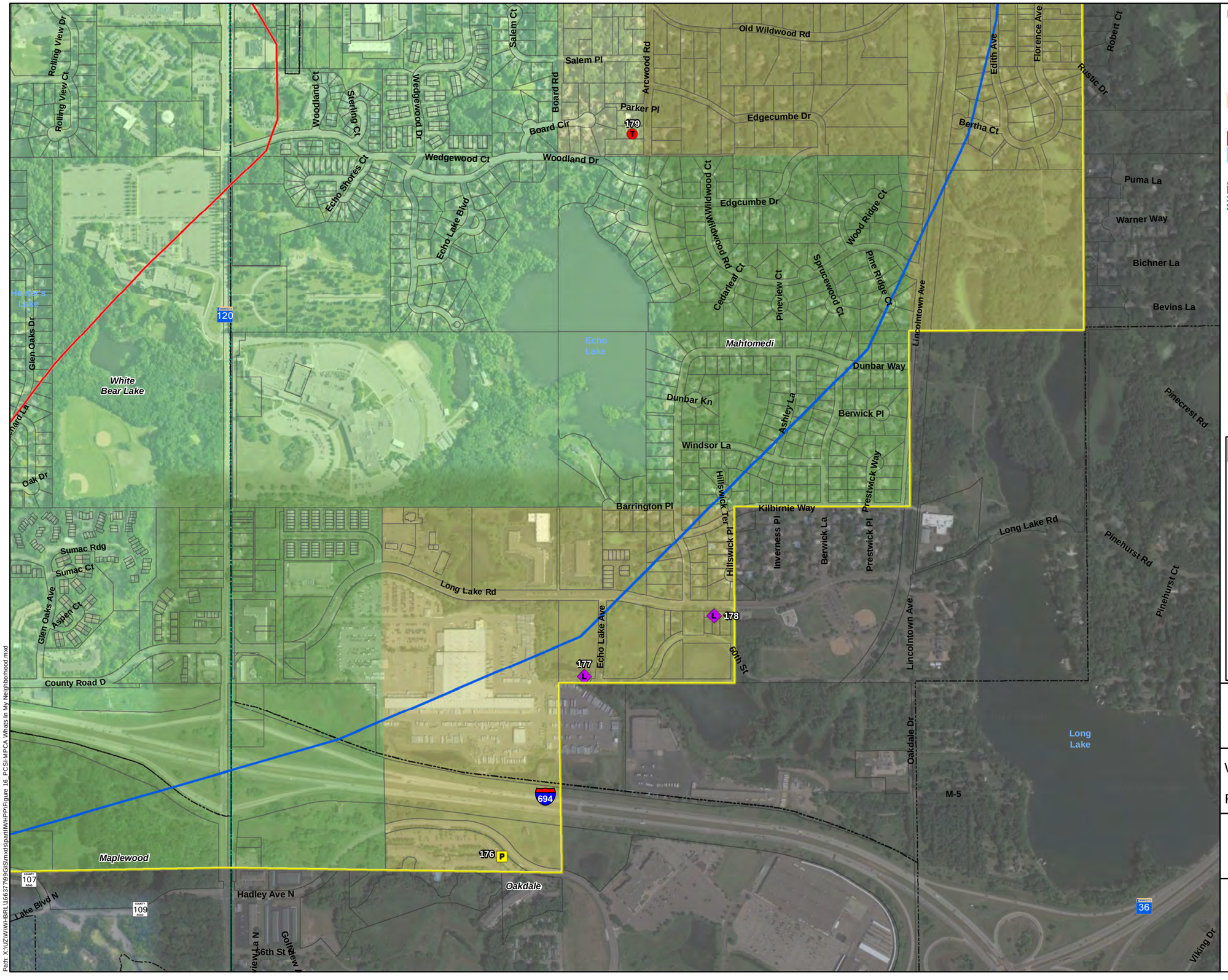
Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 16-1

Path: X:\IZ\WI\WHBRL\166377\99GIS\mxds\partII\WHPP\Figure 16_PCSI-MPCA Whats In My Neighborhood.mxd



Path: X:\IUZ\WW\WHBRL\166377\99GIS\mxd\part\WHPP\Figure 16_PCSI-MPCA Whats In My Neighborhood.mxd

Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area
- Emergency Response Area
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

DWSMA Vulnerability

- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

Stormwater Utility

- Stormwater Outlet

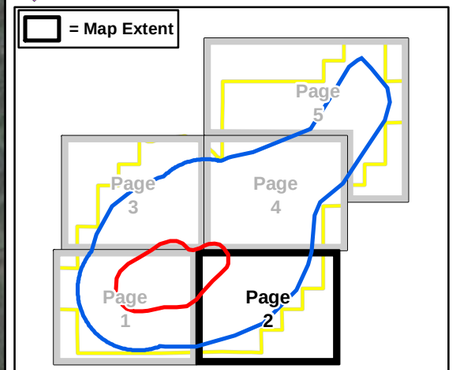
0 430 860 Feet

Minnesota Department Of Agriculture or MPCA Incident Report

- Spill

MPCA What's in my Neighborhood

- Potential Contamination Sites
- Aboveground Storage Tank
- Underground Storage Tank
- Leaking Underground Storage Tank



PCSI - Other

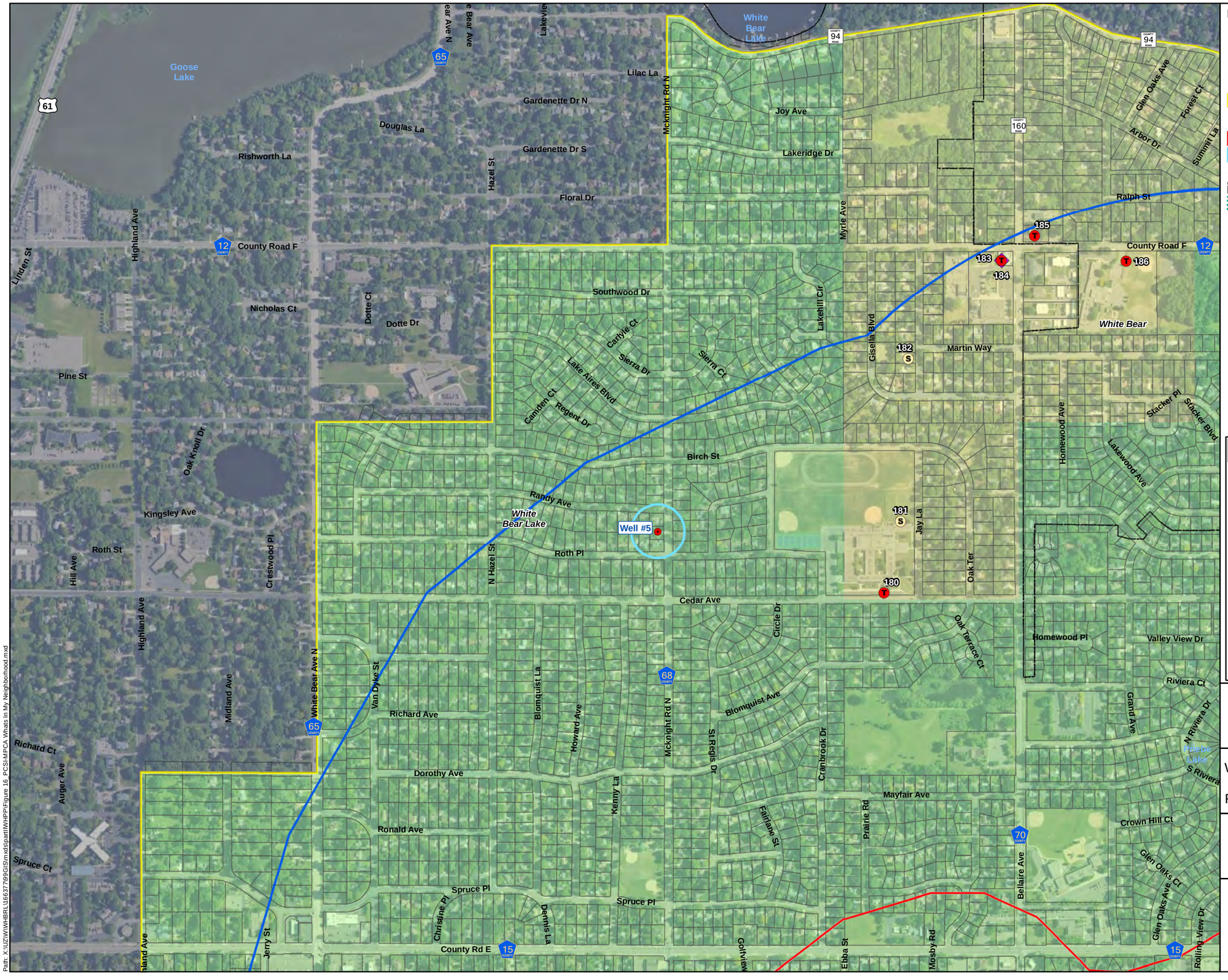
Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 5/3/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 16-2



Legend

Public Water Supply Well Locations

- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries

- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area
- Emergency Response Area
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries

- Municipal Boundry
- County Boundry

DWSMA Vulnerability

- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

Stormwater Utility

- Stormwater Outlet

0 430 860 Feet

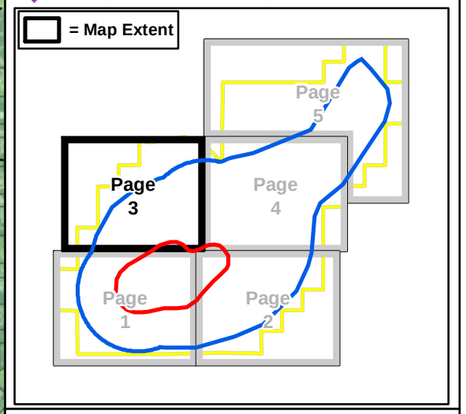
Minnesota Department Of Agriculture or MPCA Incident Report

- Spill

MPCA What's in my Neighborhood

- Potential Contamination Sites
- Aboveground Storage Tank
- Underground Storage Tank
- Leaking Underground Storage Tank

= Map Extent



PCSI - Other

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 5/3/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 16-3

Path: X:\UZ\WI\WHBRL\166377\99GIS\mxd\sp\atl\WHPP\Figure 16_PCSI-MPCA Whats In My Neighborhood.mxd

Legend

Public Water Supply Well Locations
- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area
- Emergency Response Area
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries
- Municipal Boundry
- County Boundry

DWSMA Vulnerability
- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

Stormwater Utility
- Stormwater Outlet

0 430 860 Feet

Minnesota Department Of Agriculture or MPCA Incident Report
- Spill

MPCA What's in my Neighborhood
- Potential Contamination Sites
- Aboveground Storage Tank
- Underground Storage Tank
- Leaking Underground Storage Tank

= Map Extent

Page 1 | Page 2 | Page 3 | Page 4 | Page 5

PCSI - Other

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

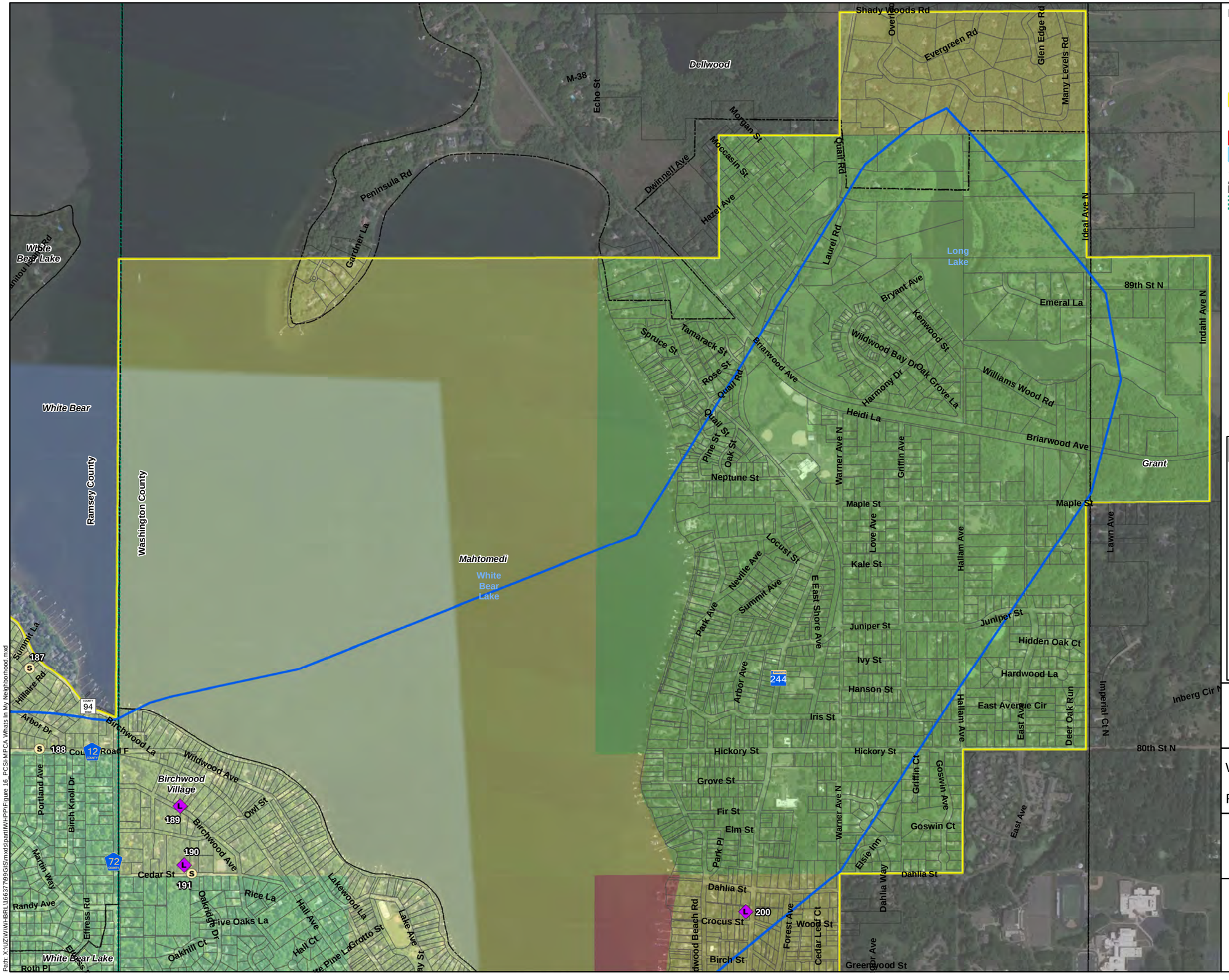
SEH

Project: WHBRL 166377
Print Date: 5/3/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 16-4

Path: X:\UZ\WM\WHBRL\166377\99GIS\mxd\[path]\MHPP\Figure 16_PCSI-MPCA Whats In My Neighborhood.mxd



Legend

Public Water Supply Well Locations
- Emergency Well
- Primary Well

Wellhead Protection Plan - Boundaries
- Drinking Water Supply Management Area (DWSMA)
- Wellhead Protection Area
- Emergency Response Area
- Inner Wellhead Management Zone (IWMZ)

Jurisdictional Boundaries
- Municipal Boundry
- County Boundry

DWSMA Vulnerability
- High Vulnerability
- Moderate Vulnerability
- Low Vulnerability

Stormwater Utility
- Stormwater Outlet

0 620 1,240 Feet

Minnesota Department Of Agriculture or MPCA Incident Report
- Spill

MPCA What's in my Neighborhood
- Potential Contamination Sites
- Aboveground Storage Tank
- Underground Storage Tank
- Leaking Underground Storage Tank

= Map Extent

PCSI - Other

Wellhead Protection Plan Part II Amendment
City of White Bear Lake
Ramsey and Washington County, Minnesota

SEH

Project: WHBRL 166377
Print Date: 5/3/2022

Map by: Mark Sherrill
Projection: UTM Zone 15N
Source: SEH Digi, Ramsey County, ESRI MnDOT, City of White Bear Lake Washington County, FSA Aerial, MnDNR, ESRI Baselayers/Aerial

Figure 16-5

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Appendix A

Scoping Decision Notice and Assessment of Data Elements

DEPARTMENT OF HEALTH

Protecting, Maintaining and Improving the Health of All Minnesotans

January 10, 2022

Mr. Paul Kauppi, P.E., Public Works Director/City Engineer
City of White Bear Lake
4701 Highway 61 North
White Bear Lake, Minnesota 55110

Subject: Scoping 2 Decision Notice and Meeting Summary – City of White Bear Lake – PWSID 1620024

Dear Mr. Kauppi,

This letter provides notice of the results of a virtual scoping meeting held with you and Nate Christensen (city of White Bear Lake) and me on December 16, 2021, 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 White Bear Lake has met the requirements to distribute copies of the first part of the WHP plan to local units of government but has not met the requirements to hold an informational meeting for the public. The city of White Bear Lake will have until September 15, 2022, 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 john.freitag@state.mn.us or by phone at 651-201-4669.

Sincerely,

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

JF:ds-b

Enclosures: Scoping 2 Decision Notice, PCSI Requirements, WHP Planning Issues Summary

cc: Lucas Martin, MDH Engineer, Metro District Office
Luke Stuewe, Minnesota Department of Agriculture

Date: January 10, 2022

Name of Public Water Supply: City of White Bear Lake

PWSID: 1620024

Name of the Wellhead Protection Manager: Mr. Paul Kauppi

Address: 4701 Highway 61 North

City: White Bear Lake

Zip: 55110

Phone: 651-429-8563

Primary Unique Well Numbers: 014005 (Well #1), 205733 (Well #3), 226566 (Well #4)

DWSMA Vulnerability: ☒ Low ☒Moderate ☒ High

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 PHYSICAL ENVIRONMENT –

Soils

- ☐ *Existing maps of the soils and a description of soil infiltration characteristics.
- ☐ *A description or an existing map of known eroding lands that are causing sedimentation problems.

Technical Assistance Comments: Infiltration characteristics and active erosion sites, along with land cover/land use and potential contaminant source information, should be assessed to determine the potential for the transport of contaminants into vulnerable areas of a DWSMA. The review of soils, infiltration, and erosion characteristics may identify opportunities for management strategies or targeted practices that reduce contaminant migration into groundwater.

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 a 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 low vulnerability inventory wells greater than 100 feet in depth. Also, inventory wells of undocumented or unknown depths.}
    - If DWSMA contains moderate and/or high 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.

DATA ELEMENTS ABOUT THE LAND USE –

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.

☐ *An existing map or list of public drainage systems.

Technical Assistance Comments: Public drainage systems can help mobilize and transport contaminants. Use the Department of Natural Resources Buffer Protection Map and/or other available maps of ditches that have been publicly recorded (county/judicial ditches). These public drainage systems should be assessed to determine the level of risk they pose in the DWSMA. Identify land uses that could contribute contaminants to the public drainage system and identify any ongoing remediation activities.

Required to be discussed in the 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 MDH hydrogeologist to be not 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 –

Surface Water Quantity

- An existing description of known water-use conflicts, including those caused by groundwater pumping.

Technical Assistance Comments: Provide a summary from Part 1 in the plan narrative about the interactions between surface water features and the groundwater and if there are water use or pumping conflicts. Contact MDH hydro if need additional technical assistance.

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

City of White Bear Lake Scoping 2 Meeting

Wellhead Protection (WHP) Planning Issues Summary

NOTE: This document is intended to be a summary of issues identified to date and is **not intended to replace the required data elements identified in the Scoping 2 Decision Notice** nor is it intended to be an exhaustive list of all potential drinking water issues.

Drinking Water Protection Issues Identified to Date:

Surface water groundwater interaction needs to continue to be monitored.

Water Quality Detections and Implications:

N/A

Old Municipal Well Information:

The Minnesota Department of Health has compiled historical information for use in the planning process.

Sanborn Maps:

☐ Sanborn Maps are available for this area.

☒ Sanborn Maps are not available for this area.

Recommended WHP Measures:

The WHPA delineations for the city wells were created using maximum pumping rates and conservative assumptions in the fracture flow delineation. These factors combine to 'build in' a safety factor, which is necessary when attempting to simulate natural systems and their inherent heterogeneity. While the delineations are considered to be conservative and are based on the best available data, there is some information that could improve the quality of any future re-evaluations. The standard assessment monitoring package (Chloride + Bromide, Nitrate + nitrite N, Tritium) should be analyzed during year six for Well #1 (14005), Well #2 (222880), Well #3(205733), and Well #4 (226566), 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

Other: Special consideration needs to be given for stormwater practices in the highly vulnerable area.

Appendix B

Part I Wellhead Protection Plan (WSP, 2021)

PART I WELLHEAD PROTECTION AMENDMENT

CITY OF WHITE BEAR LAKE, MINNESOTA

CITY OF WHITE BEAR LAKE

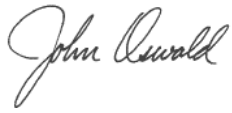
PROJECT NO.: 31401409.007
DATE: JUNE 2021

WSP
SUITE 800
520 NICOLLET MALL
MINNEAPOLIS, MN 55402

TEL.: +1 612 371-0443
FAX: +1 612 371-4410
WSP.COM

SIGNATURES

PREPARED BY



6/24/2021

John Oswald
Lead Environmental Engineer

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

1 EXECUTIVE SUMMARY

WSP USA Inc. (WSP) developed a Part 1 Wellhead Protection Plan (WHP) Amendment for the City of White Bear Lake, Minnesota (City). The work was performed in accordance with the Minnesota WHP Minnesota Rule (MR), parts 4720.5100 to 4720.5590.

The results of the development of this WHP Plan Amendment are presented in the following text, Tables 1 through 6, Figures 1 through 11, and Appendices A through C.

This report presents delineations of the wellhead protection area (WHPA) and drinking water supply management area (DWSMA), as well as the vulnerability assessments for the public water supply wells and DWSMA. Figure 9 shows the boundaries of the WHPA and the DWSMA. These are based on WHPAs for the City's four wells that are defined by a 10-year time of travel. Figure 9 also shows the emergency response areas (ERA), which are defined by a 1-year time of travel. Definitions of rule-specific terms that are used are provided in the "Glossary of Terms".

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

Information about the City's wells and the hydrogeology in the area were obtained from the City or from other studies in the area. This information and the numerical groundwater modeling code, MODFLOW, were used to complete the delineation of the recommended WHPA, which was determined by combining the modeled or simulated groundwater capture zones for a 10-year time of travel over several sets of model boundary conditions and combining those with capture zones representing the fracture-flow capture area for each well. All completed work inside the model domain, referred to hereafter as the study area, resulted in the creation of composite capture zones, which are the boundaries of the recommended WHPA.

The City gets its water from the Prairie du Chien (OPDC), Jordan (CJDN), Wonewoc (CWOC), and Mt. Simon (CMTS) aquifers. Well No. 1 is completed solely in the CJDN aquifer, Well No. 2 is completed in the CWON and CMTS aquifers and Wells No. 3 and 4 are competed in both the OPDC and CJDN aquifers. In the model area, the flow direction is generally from east northeast toward west southwest.

The City Wells are in an area where the long-term direction of groundwater flow is unlikely to change significantly. Groundwater flow across the area is primarily from recharge areas northeast of the study area toward the Mississippi River. Even under extreme conditions, this general flow direction would likely remain the same. The capture zones produced in this study substantially agree with those from the earlier Part 1 wellhead protection model. The primary uncertainties associated with the water supply are related to the amount of fracture flow within the OPDC aquifer and the variability in the hydraulic conductivity of OPDC and CJDN of the aquifers.

To help understand these uncertainties, a sensitivity and uncertainly assessment was also completed and is included in this report. The vulnerability of the aquifers, as determined by the geologic sensitivity analysis, is low to moderate near the City. The presence of low conductivity layers near the surface in the area of the City Wells provides some protection, but relatively high tritium detections at Wells 1, 3, and 4 indicate higher vulnerability than would be expected. Well No.2, in the much deeper Mt. Simon aquifer, has many more protective barriers between the aquifer and the surface and vulnerability of that aquifer is considered very low.

It is recommended that the City continue to sample all of their wells for tritium. This will indicate the relative age of the water each of the wells is producing and provide information as to its source.

2 INTRODUCTION AND BACKGROUND

WSP USA Inc. (WSP) has developed a Part 1 Wellhead Protection (WHP) Plan Amendment for the City of White Bear Lake (City), public water supply identification number 1620024). The work was performed in accordance with the Minnesota WHP Minnesota Rule (MR), parts 4720.5100 to 4720.5590.

The City's wells included in the WHP Plan are listed in Table 1. Only wells listed as primary are required to be included in the WHP Plan.

Table 1 - Water Supply Well Information

Local Well Name	Unique Number	Type	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed/ Reconstructed	Well Vulnerability	Aquifer
Well No. 1	14005	Primary	22 x 16	390	490	1959	Vulnerable	CJDN
Well No. 2	222880	Primary	30 x24 x16	700	970	1962	Not Vulnerable	CWMS
Well No. 3	205733	Primary	30 x 20	289	513	1966	Vulnerable	OPCJ
Well No. 4	226566	Primary	30 x 20	267	476	1969	Vulnerable	OPCJ
Well No. 5	226567	Emergency	20 x 16 x 12	371	463	1956	Not Vulnerable	CJDN

CJDN – Jordan Sandstone.
CWMS – Wonewoc- Mt. Simon.
OPCJ – Prairie du Chien-Jordan Group.

3 ASSESSMENT OF THE DATA ELEMENTS

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

Table 2 - Assessment of Data Elements

Data Element	Present and Future Implications				Data Source
	Use of the Well (s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Precipitation	H	H	H	H	MN Climatology Office, Metropolitan Council (Metromodel)
Geology					
Maps and geologic descriptions	M	H	H	H	MGS, DNR, USGS
Subsurface data	M	H	H	H	MGS, MDH, MPCA, USGS
Borehole geophysics	M	H	H	H	No relevant data available
Surface geophysics					No relevant data available
Maps and soil descriptions	L	H	M	L	No relevant data available
Eroding lands					
Water Resources					
Watershed units	L	H	L	L	National Hydrography Dataset (USGS)
List of public waters	L	H	L	L	DNR, National Hydrography Dataset (USGS)
Shoreland classifications					
Wetlands map					
Floodplain map					
Land Use					
Parcel boundaries map	L	H	L	L	County GIS Data
Political boundaries map	L	H	L	L	ESRI Data
Public Land Survey map	L	H	L	L	ESRI Data
Land use map and inventory					
Comprehensive land use map					
Zoning map					
Public Utility Services					
Transportation routes and corridors	L	H	L	L	ESRI Data

Data Element	Present and Future Implications				Data Source
	Use of the Well (s)	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Storm/sanitary sewers and PWS system map	L	L	L	L	City, County
Oil and gas pipelines map					
Public drainage systems map or list	L	M	L	L	City, County, DNR
Records of well construction, maintenance, and use	H	H	H	H	City, Minnesota Well Index (MWI)
Surface Water Quantity					
Stream flow data	L	M	M	M	DNR, USGS
Ordinary high-water mark data	L	M	L	L	No relevant data available
Permitted withdrawals	L	M	L	L	DNR
Protected levels/flows	L	H	L	L	No relevant data available
Water use conflicts	L	H	L	L	DNR
Groundwater Quantity					
Permitted withdrawals	H	H	H	H	DNR
Groundwater use conflicts	H	H	H	H	No relevant data available
Water levels	H	H	H	H	DNR, MPCA, MDH, City
Surface Water Quality					
Stream and lake water quality management classification					
Monitoring data summary	L	H	L	L	MDH, USGS
Groundwater Quality					
Monitoring data	H	H	H	H	MPCA, MDH
Isotopic data	H	H	H	H	MDH
Tracer studies					No relevant data available
Contamination site data	M	M	M	M	MPCA, MDA
Property audit data from contamination sites					
MPCA and MDA spills/release reports	H	H	H	H	No relevant data available

Definitions Used for Assessing Data Elements:

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

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

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

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

4 GENERAL DESCRIPTIONS

4.1 DESCRIPTION OF THE WATER SUPPLY SYSTEM

The City obtains its drinking water supply from Wells No. 1 through 4 with an additional well, Well No. 5, designated only for emergency backup use. The wells are shown on Figure 1 and Table 1 summarizes their construction details.

4.2 DESCRIPTION OF THE HYDROGEOLOGIC SETTING

The hydrogeologic settings for the bedrock aquifers pumped by the City's wells are described in detail in the previous Part 1 Wellhead Protection Plan (Champion, 2009).

The geology in the vicinity of the City consists of Quaternary-age glacial and post-glacial deposits that are underlain by Paleozoic-aged bedrock. Overburden in the area surrounding White Bear Lake consists of glacial deposits associated with the Superior Lobe overlying Wisconsinan Lobe till. The Superior Lobe deposits consist primarily of till with large areas of outwash sands and gravels. The Wisconsinan deposits are primarily glacial till. The City's wells are bedrock wells completed primarily in the Prairie du Chien Formation (OPDC) and the Jordan Sandstone (CJDN). The OPDC and CJDN bedrock units are underlain by the St. Lawrence Formation, which is a low-conductivity layer and is considered an aquitard. Appendix C includes a surficial bedrock map and shows the distribution of bedrock units in the area of the City and also includes hydrogeologic cross sections A-A' and B-B' from Champion, 2009.

Table 3a - Description of the Hydrogeologic Setting in Prairie du Chien Aquifer

Aquifer	Attribute	Descriptor	Data Source
Prairie du Chien Group (OPDC)	Aquifer Material	Shale, Dolomite	City Well Logs
	Primary Porosity	0.056	MDH (2012)
	Aquifer Thickness	124 - 129 feet	City Well Logs
	Stratigraphic Top Elevation	722 - 737 feet AMSL	City Well Logs
	Stratigraphic Bottom Elevation	596 - 613 feet AMSL	City Well Logs
	Hydraulic Confinement	Confined	City Well Logs
	Transmissivity (T)	Reference Value 9,324 ft^2/day	The reference value for the transmissivity of the Prairie du Chien Aquifer was determined by multiplying the reference hydraulic conductivity, discussed below, by the aquifer thickness.
	Hydraulic Conductivity (K)	Reference Value/Range 74 ft/day Range: 30 – 500 ft/day	The reference value for the hydraulic conductivity of the Prairie du Chien Aquifer was determined from pumping tests at White Bear Township Well No. 3 and City Well No. 4, as well as specific capacity data from wells in the area as listed in the DAP-ATP.
	Groundwater Flow Field	Flow generally to the southwest. Hydraulic Gradient: 0.0014	Based on mathematical analysis of measured heads. Flow west and south toward the Mississippi River.

Table 3b - Description of the Hydrogeologic Setting in Jordan Aquifer

Aquifer	Attribute	Descriptor	Data Source
Jordan Sandstone (CJDN)	Aquifer Material	Sandstone	City Well Logs
	Primary Porosity	0.2	MDH (2012)
	Aquifer Thickness	97 ft	City Well Logs
	Stratigraphic Top Elevation	596-614 feet AMSL	City Well Logs
	Stratigraphic Bottom Elevation	500-520 feet AMSL	City Well Logs
	Hydraulic Confinement	Confined	City Well Logs
	Transmissivity (T)	Reference Value 2,436 ft^2/day	The reference value for the transmissivity of the Jordan Aquifer was determined by multiplying the reference hydraulic conductivity, discussed below, by the aquifer thickness.
	Hydraulic Conductivity (K)	Reference Value: 28 ft/day Range: 10 – 63 ft/day	The reference value for the hydraulic conductivity of the Jordan Aquifer was determined from pumping tests at White Bear Township Wells No. 1 and 4, as well as specific capacity data from wells in the area as listed in the DAP&ATP.
	Groundwater Flow Field	Flow generally to the west and southwest. Hydraulic Gradient: 0.0014	Based on mathematical analysis of measured heads. Flow west and south toward the Mississippi River.

Table 3c - Description of the Hydrogeologic Setting in Mt. Simon Aquifer

Aquifer	Attribute	Descriptor	Data Source
Mt. Simon Sandstone (CMTS)	Aquifer Material	Sandstone	City Well Logs
	Primary Porosity	0.2	MDH (2012)
	Aquifer Thickness	165 ft	City Well Logs
	Stratigraphic Top Elevation	180 feet AMSL	City Well Logs
	Stratigraphic Bottom Elevation	15 feet AMSL	City Well Logs
	Hydraulic Confinement	Confined	City Well Logs
	Transmissivity (T)	Reference Value 2,359 ft^2/day	The reference value for the transmissivity of the Mt. Simon Aquifer was determined by multiplying the reference hydraulic conductivity, discussed below, by the aquifer thickness.
	Hydraulic Conductivity (K)	Reference Value: 15 ft/day Range: 4.5 – 20.3 ft/day	The reference value for the hydraulic conductivity of the Mount Simon Aquifer was determined from specific capacity data from City Well No. 2 and other wells in the region as listed in the DAP&ATP.
	Groundwater Flow Field	Flow generally to the west and southwest. Hydraulic Gradient: 0.0014	Based on mathematical analysis of measured heads. Flow west and south toward the Mississippi River.

Annual precipitation for the area is approximately 32.42 inches per year (in/yr) (National Oceanic and Atmospheric Administration Resources ([NOAA] 2020). Recharge to the surficial layers in the model is approximately 6 in/yr.

Groundwater flow in the area of the City is generally to the southwest toward the Mississippi River. The Mississippi River is the primary discharge location for local groundwater. White Bear Lake and other water bodies are also included in the model.

5 DELINEATION OF THE WELLHEAD PROTECTION AREA

5.1 DELINEATION CRITERIA

Table 4 provides descriptions of how the delineation criteria that are specified under MR, part 4720.5510 were included in the model.

Table 4 - Description of WHPA Delineation Criteria

Criterion	Descriptor	How the Criterion was Addressed
Flow Boundary	Mississippi River; White Bear and Bald Eagle Lakes, and smaller streams and lakes	These features are used to define the flow field. Surface water features are represented using the MODFLOW river package.
Flow Boundary	Other High-Capacity Wells	The pumping amounts at wells within two miles were determined based on the averaged 2015-2019 pumped volumes. The pumping amounts of the other wells in the Metro Model were not modified.
Daily Volume of Water Pumped	See Table 5	Pumping information was obtained from DNR Appropriations Permits 1969-0174 and the City. The annual pumped volumes were converted to an average daily volume pumped by a well.
Groundwater Flow Field	See Figure 6	The model calibration process addressed the relationship between the calculated versus observed groundwater flow field.
Aquifer Transmissivity	9,324 ft^2/day-OPDC 2,436 ft^2/day-CJDN 2,359 ft^2/day-CMTS	The reference values for transmissivity were calculated using the hydraulic conductivity values determined in the DAP-ATP and multiplied by the average thickness of each aquifer in the area of the City's wells.
Time of Travel	10 years	The public water supplier selected a 10-year time of travel.

Information provided by the City and from the Minnesota Department of Natural Resources (DNR) Permit and Reporting System (MPARS) database was used to identify the maximum volume of water pumped annually by each well over the previous 5-year period. The volumes pumped from the wells over the previous 5 years are summarized in Table 5. Summing the highest pumping value from each of the City wells totaled over 1,319 million gallons per year (MGY). The value used in the model is the highest value for each well over the past 5 years or the projected value for 5 years in the future. Since the City has had

stable to decreasing water use over the recent past, and the City does not expect any significant increase in future use, the total volume pumped from the City's wells used in the model is high-5 value of 1,319 MGY. This value is significantly higher than any individual year and is the same value that was used in the previous Part 1. These pumping rates represent conservative values. The daily volume of discharge used as an input parameter in the model was calculated by dividing the annual withdrawal volume by 365 days.

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

Well Name	Unique Number	Total Annual Withdrawal (million gallons/year [MGY])					Withdrawal used in Previous WHP Plan (MGY)	Withdrawal used in Current WHP Plan (MGY)	Withdrawal used in Current WHP Plan (m^3/d)
		2015	2016	2017	2018	2019			
Well No. 1	14005	18.2	86.1	11.4	**87.2**	63.6	156.1	87.2	904.4
Well No. 2	222880	**2.9**	0.6	0.5	0.6	0.02	111.0	2.9	30.1
Well No. 3	205733	359.3	**393.5**	362.4	210.8	374.3	445.7	393.5	4081.0
Well No. 4	226566	397.6	334.8	**438.7**	432.5	279.8	606.7	428.7	4549.8
Well No. 5	226567	0.0	0.0	0.0	0.0	0.0	0	0	0.0
Totals		778.0	815.1	813.1	731.1	717.1	922.3	1,319.5	9,565.2

Sources: DNR MPARS Permit Numbers 1969-0174 and City
Bolding indicates greatest annual pumping volume of the last five years

Table 6 – High Capacity Wells within 2.0 Miles

Well Number	Name	Permit Number	Aquifer	Use Category	2015-2019 Average Use (MGY)	Average Daily Use (m^3/d)
151596	White Bear Township	1984-6121	OPDCCJDN	Municipal/Public Water Supply	135.3	1,403.1
676446	White Bear Township	1984-6120	CJDN	Municipal/Public Water Supply	24.4	253.0
226570	White Bear Township	1984-6120	CJDN	Municipal/Public Water Supply	5.7	59.1
205744	City of North St. Paul	1977-6176	CJDN	Municipal/Public Water Supply	61.3	635.7
208223	City of North St. Paul	1977-6176	OPDCCJDN	Municipal/Public Water Supply	46.3	480.1
208222	City of North St. Paul	1977-6176	OPDCCJDN	Municipal/Public Water Supply	41.8	433.5
112222	Vadnais Heights, City Of	1980-6153	OPCJ	Municipal/Public Water Supply	0.1	1.0
233149	Saputo Dairy Foods USA, LLC	1986-6316	CJDN	Agricultural/Food Processing	151.115	1,567.1
753675	Mahtomedi, City of	1969-0163	CJDN	Municipal/Public Water Supply	62.845	651.7
433255	Mahtomedi, City of	1969-0163	OPDCCSTL	Municipal/Public Water Supply	20.761	215.3
655934	Ind School District 624	2004-3020	OPDC	Landscaping/Athletic Field Irrigation	3.1	32.1
127293	RAMSEY COUNTY PARKS and RECREATION	1987-6205	OPDC	Golf Course Irrigation	14.008	145.3
151584	Gem Lake Hills Inc	1986-6211	OPDCCJDN	Golf Course Irrigation	12.844	133.2
151575	Oakdale Public Works	1978-6197	CJDNCSTL	Municipal/Public Water Supply	0.02	0.2

- Source: DNR MPARS

5.2 METHOD USED TO DELINEATE THE WELLHEAD PROTECTION AREA

The final WHPA consists of areas determined through a porous media delineation, a fracture flow delineation, and, if necessary, a conjunctive area delineation. The WHPA is a composite of all the areas identified using methods described in this report that potentially contribute recharge to the aquifer used by the City's wells within a 10-year time of travel.

5.2.1 POROUS MEDIA DELINEATIONS

The porous media delineations of the WHPA for the City's wells were completed using an existing regional MODFLOW-NWT model, Metromodel 3.0, which was provided by the Metropolitan Council (Metropolitan Council, 2014). MODFLOW-NWT is a 3D, cell-centered, finite difference, saturated flow model developed by the USGS (Niswonger et al., 2011).

The regional Metromodel consists of nine layers that represent the major aquifers and aquitards within the seven-county metropolitan area. These layers represent, from top to bottom, the following units: (1) surficial aquifer of glacial deposits; (2) St. Peter Sandstone or Quaternary Buried Artesian Aquifer; (3) Prairie du Chien Group; (4) Jordan Sandstone; (5) St. Lawrence Formation (aquitard); (6) Tunnel City Group; (7) Wonewoc Sandstone; (8) Eau Claire Formation (aquitard); and, (9) Mt. Simon Sandstone. The regional groundwater model was calibrated to steady-state water levels and river base flows.

A local-scale model, limited to the northeastern portion of the Metromodel, was extracted from the regional model and is shown on Figure 1. The local model and all of the modeling for this amendment was completed using GMS (Aquaveo, 2016), a pre- and post-processor for MODFLOW. The local model was created using the technique of local grid refinement where a smaller, more refined grid is used within the regional model. The heads computed from the regional model then provide some of the boundary conditions for the local model as specified heads. The size of the domain and the general flow-field characteristics of the model were based on the Metromodel and the results of the original delineation.

The local model domain was divided into a three-dimensional, non-uniform grid with nine layers. The details of the Metromodel were translated to the local-scale model using GMS. Finer grid spacing was applied around the in the local model with telescopic mesh refinement used in the area of the site where the City's wells are located. This grid spacing (1.5 meters in the area of the City's wells) provides better definition in the area of the flow field where simulating the influence of pumping from the wells is critical. The base of the model is variable at an elevation of approximately 5 meters above mean sea level in the area of the City's wells. The nine layers in the local model represent the bedrock units and unconsolidated materials just as in the Metromodel. These layers correspond to the approximate vertical extent of the various stratigraphic units observed in the vicinity of the City. Layer 1 represents the unconsolidated materials, primarily clay till and sand units. Layer 2 represents unconsolidated materials in some areas and St. Peter Sandstone, where present. Layers 3 and 4 are comprised primarily of either unconsolidated material or the Prairie du Chien Group and Jordan Sandstone, respectively. Layer 5 is the St. Lawrence Formation, which is an aquitard that effectively eliminates any influence from the lower layers on the upper four layers of the model in the area of interest. Layers 6 and 7 represent the Tunnel City Group and Wonewoc aquifers, respectively. Layer 8 is the Eau Claire confining unit and the base layer, Layer 9, represents the Mt. Simon aquifer.

Changes were made to the original Metromodel defined characteristics in the area of interest around the City's wells. Site specific information allowed for more accurate definition of aquifer characteristics and to alter defined properties in the Metromodel. The alterations were to the bed conductance of several lakes in the southeastern portion of the local model. Excessive and unrealistic infiltration from these lakes was producing an area of artificially increased head. The remaining changes were confined primarily to the OPDC, CJDN, and CMTS aquifers in the area of the City. The conductivity of the CJDN, OPDC, and CMTS were modified to align with the values reported in the DAP-ATP for each aquifer. Zones were created in Layers 3, 4. and 9 of the model for modifying the horizontal conductivity of the aquifer in the vicinity of the City's wells and their capture zones. These conductivities replaced those defined in the Metromodel for that area.

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

- The pumping rates from Table 5 were assigned to the City's wells.
- The pumping rates from Table 6 were assigned to the permitted high-capacity wells located within approximately 2 miles of the City's wells (Figure 2).

The model is used to determine the groundwater head and flow direction throughout the domain (Figure 3). As part of the delineation, groundwater pathline analyses were performed to determine the 1-, 5- and 10-year capture zones and ultimately the WHPA. The pathline analysis consisted of using MODPATH, a flowpath calculation program (Pollack, 1994), to determine the capture zone for each of the City's wells. This was completed by tracing 36 flow paths from each cell for a 10-year travel time. A porosity of 20 percent was used for CJDN and CMTS, and a value of 5.6 percent was applied to the OPDC, consistent with the MDH guidelines and slightly conservative for the aquifers (MDH, 2012).

As part of the uncertainty analysis, additional groundwater pathline analyses, each consisting of 36 pathlines per cell containing a well for a 10-year time-of-travel, were performed to delineate the 1-, 5- and 10-year capture zones and ultimately porous media portion of the WHPA.

The resulting area is a composite of the 10-year time of travel capture zones calculated using this model for the base case parameters and the parameter values used in the uncertainty analysis that is discussed in the following section. The model input files are available upon request from the MDH.

5.2.2 RESULTS OF MODEL CALIBRATION AND SENSITIVITY ANALYSIS

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

5.2.3 CALIBRATION

The calibration plots, showing measured versus simulated hydraulic head values, for the model are illustrated on Figures 4, 5, and 6. The plots show that the simulated values and measured head values generally compare quite favorably and have a normalized root mean squared (NRMS) error of approximately 4.8 percent for observation points in layer 3, 5.1 percent for points in layer 4, and 6.6 percent in layer 9 of the model representing the OPDC, CJDN, and CMTS aquifers, respectively. The calibration data sets are subsets of the one created for Metromodel 3 corresponding to each layer.

The groundwater hydraulic head in the area of the City, simulated in the calibrated model, is shown on Figure 3. The 1-, 5-, and 10-year capture zones, predicted using the calibrated model, are shown on Figure 7. However, due to the amount of variability associated with the physical characteristics of the aquifer, sensitivity and uncertainty analyses were completed as part of the modeling effort.

5.2.4 SENSITIVITY ANALYSIS

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

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

- **Results –** The pumping rates for the City's wells were defined by the Minnesota Rules are not considered variables for this analysis.

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

- **Results** – The regional flow direction and gradient were determined through the modeling process and resemble the flow direction and gradient determined through mathematical analysis of the measured heads in the area. The model was calibrated to hydraulic heads, and the calibration mirrored regional head data. Based on the regional observation

data, the characteristics of the flow field, and the use of the aquifers of interest, there is not likely to be a significant change to the flow field.

The **hydraulic conductivity** influences the size and shape of the capture zone. In the presence of a gradient, higher conductivities will result in long, narrow capture zones extending upgradient. Lower conductivities will result in shorter, wider capture zones. As there is nearly always a large amount of uncertainty associated with this parameter, most analyses will consider a range of conductivities. All of the transmissivity and conductivity data and analyses can be found in the DAP-ATP documentation from the MDH.

- **Results** – The representative conductivities as well as the range for each aquifer were determined by analyzing data from pumping tests on City and other municipal wells in the area as well as specific capacity data from high-capacity wells in the study area. The analysis indicates that the range of potential conductivities for the CJDN aquifer is 10.1 to 63 feet per day (ft/d) with a geometric mean of 28.6 ft/d. The model was completed using a representative value of 28 ft/d and a range of 10-63 ft/d. The results also indicate that the range of potential conductivities for the OPDC aquifer is from 12 to over 1,200 ft/d with a mean value of 115 ft/d. The model was completed with a representative value of 74 ft/d. Since 12 ft/d is anomalously low and 1,200 ft/d is anomalously high, an uncertainty range of 30 to 500 ft/d was used for the OPDC aquifer. The range used for the Mt. Simon aquifer was 2.3 to 20.3 ft/d with a representative value of 15 ft/d.

  The Metromodel also employs what are known as "quasi 3-d" confining layers between some of the layers in the model. These are used to represent thin layers that act as confining units between the aquifer layers without actually having to define another layer in the model. The Oneota portion of the Prairie du Chien Group, which directly overlies the Jordan Sandstone, is represented using one of these quasi layers. The vertical hydraulic conductivity of this layer was increased two orders of magnitude in the uncertainty analysis and showed no discernable effect.

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

- **Results** - The thicknesses of the CJDN and OPDC aquifers within the model vary. The thickness values for the aquifers in the area of the City's wells were similar to be the thickness as specified in the stratigraphy database of the well log information. Therefore, aquifer thickness is not considered a variable for this study. The porosity for the CJDN and CWMS aquifers was chosen to be 0.2 based on MDH recommendations. The porosity of the OPDC aquifer was defined to be 0.056, also consistent with the value in MDH, 2012. The porosity is also not considered a variable.

5.2.5 ADDRESSING MODEL UNCERTAINTY

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

MODFLOW models were used to delineate capture zones for the aquifers that supply water to the City's wells. As described previously, the hydraulic conductivity was the primary variable identified that would potentially cause the greatest change in the WHPAs for the City's wells. Capture areas were delineated for the assessed range of conductivities for a time-of-travel period of 10 years and the resulting concatenated capture zones define the WHPAs, shown on Figure 7.

The WHPAs for the City's wells (Figure 7) consist of composites of the porous media aquifer delineations for the different hydraulic conductivity values used in the sensitivity analyses. To complete the DWSMA delineation, the results of the fracture flow delineation described in the following section were concatenated with these results. This provides a conservative approach to addressing porous media model uncertainty and produces a WHPA that is protective of public health.

5.3 FRACTURE FLOW DELINEATION

The second WHPA delineation (the first is the Porous Media Delineation discussed in section 5.2) for the City's wells was determined using the "Guidance for Delineating Wellhead Protection Areas in Fractured and Solution-Weathered Bedrock in Minnesota" (MDH, 2012). This guidance was developed by MDH to address the increased variability in flow velocities and directions in geologic settings with secondary porosity. The OPDC aquifer is considered to have secondary porosity while the CJDN does not. The guidance is a modified volumetric analysis and does not use a model based on flow equations.

In accordance with the guidance, Delineation Techniques 3 and 4 were used to delineate the WHPA. These techniques were chosen, in part, because it is recommended for aquifers characterized by locally confined conditions where the ratio of the well discharge to the discharge vector is less than 3,000. Wells No. 3 and 4 are open to both the OPDC and CJDN aquifers, and Well No. 1 is completed exclusively in the CJDN aquifer. Parameters used in the fracture flow analysis are summarized in Appendix A. The flow rates used for the wells were determined from the rates calculated for well conditions in layer 3 of the model. The amount of groundwater flow that moved across the boundary from layer 3 to layer 4 within the capture zone of each well was then added to the layer 3 flow quantity to get the total daily flow for each well. As Wells No. 1, 3, and 4 are all in the vicinity of each other, the flow from the OPDC into the CJDN aquifer near Well No. 1 was split between Wells No. 3 and 4 and the 2-well GIS tool was used to encompass all three wells.

The fracture-flow analysis is a method that establishes a calculated fixed-radius (CFR) capture zone based on the 5-year volume of water pumped for a given well. The CFRs were calculated using the MDH Arcmap Add-In tool for creating one- and two-well capture areas. Special consideration had to be made due to significant overlap of between the Wells No. 3 and 6 CFRs. The final resulting combined upgradient fracture flow delineation accounts for the initial CFR overlapping areas. The flow direction was determined by reviewing the upgradient capture direction determined from the 10-year capture zones in the groundwater flow model.

Appendix A presents the input and output from the tool used to determine the fracture flow delineation. Figure 8 shows the fracture flow WHPA delineations and the 6-month fracture zones with 6-month upgradient extensions used in delineating the emergency response area (ERA) for each well.

5.4 CONJUNCTIVE DELINEATION

A conjunctive delineation involving the consideration of surface waters in making the final wellhead protection area delineation was not considered necessary for the City. Guidance from the MDH states that a conjunctive delineation is required if the 1-year capture zone of a well intersects an area of high vulnerability. That area can be increased to the 3-year capture zone at the discretion of the project hydrogeologist. As discussed in the following section, there are no high vulnerability areas within the 1- or 3-year capture zones of the wells.

6 DELINEATION OF THE WELLHEAD PROTECTION AND DRINKING WATER SUPPLY MANAGEMENT AREAS

After the porous media flow, uncertainty analyses, and fracture flow analysis, the capture zones delineated for each of them were plotted together. The outline of this concatenation created the final 10-Year composite WHPA capture zone, shown on Figure 9, for use in delineating the DWSMA.

The boundary of the DWSMA was defined by WSP using roads and Public Land Survey System (MDH, 2020) coordinates (Figure 9).

6.1 VULNERABILITY ASSESSMENTS

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

6.1.1 ASSESSMENT OF WELL VULNERABILITY

The City's well vulnerability assessment was conducted in accordance with the MDH guidance document, *Assessing Well Vulnerability for Wellhead Protection* (MDH, 1997). Vulnerability assessment rating sheets and vulnerability scores for City Wells No. 1 through 4 were obtained from the MDH and reviewed by WSP. The vulnerability of a well is scored based on the following six categories: DNR geologic sensitivity rating, casing integrity, casing depth, pumping rate, isolation distance from contaminant sources, and chemical and isotopic information.

The DNR geologic sensitivity rating is an empirical value determined by dividing the cumulative thickness of low permeability units (e.g. clay) above the aquifer by 10 (DNR, 1991). The resulting score is termed the "L-score". A higher L-score indicates more low-permeability material above the aquifer, and therefore a lower vulnerability. A low L-score represents higher vulnerability. For example, a rating of L-1 has a higher vulnerability than L-9, because there is less low-permeability material present above the aquifer. This type of assessment is defined by the DNR as Level 3. A Level 3 assessment was conducted for the City wells since the aquifer is overlain by varying thicknesses of clay. As mentioned above, points are also assigned to casing integrity and depth, pumping rate, isolation distance to contaminant sources, and chemical data, in addition to the geologic sensitivity.

Vulnerability assessment worksheets and the total score of the six vulnerability categories for Wells No. 1 through 5 are presented in Appendix B. Per MDH guidance, any well that receives an assessment rating of 45 points or greater is considered a vulnerable well. Wells No. 1 and 3 had vulnerability scores or 45 and Well No. 4 had a score of 50. Well No. 2, being in the deeper, more protected Mt. Simon aquifer had a vulnerability score of 0. Wells No. 1, 3, and 4 are considered vulnerable due to the tritium detections in area groundwater. Tritium has been detected in Wells No. 1, 3, and 4. Tritium in ground water is a result of nuclear testing and is used as an indicator of post-1953 recharge. Nitrate was detected at low concentration in Wells No. 3 and 4 and tested for but not detected in the remaining wells.

6.1.2 ASSESSMENT OF DRINKING WATER SUPPLY MANAGEMENT AREA SENSITIVITY

The assessment of geologic sensitivity is a useful metric when estimating the relative vertical downward travel time of contaminants from grade level to the water table or source aquifer. A Level-2 DNR geologic sensitivity assessment was used

for the City's wells. The Level-3 DNR geologic sensitivity rating is an empirical value determined by dividing the cumulative thickness of low permeability units above the aquifer by 10 (DNR, 1991). A Level-3 assessment was conducted since the aquifers utilized by the City's wells are confined.

The geologic sensitivity within the Washington County portion of the DWSMA was determined by examining the ratings of the geologic sensitivity of the bedrock surface as defined by the DNR (Berg, 2019) within each PLSS-defined 40-acre parcel and assigning the parcel the majority sensitivity value. This value was then upgraded in areas where bedrock confining layers (the Basal St. Peter Sandstone and Oneota member of the OPDC) provide additional protection. In the portion of the DWSMA in Ramsey County, MDH applied a GIS tool to MWI lithology log data to calculate L-scores for each well extending at least to bedrock within the DWSMA. Areas were also upgraded to account for bedrock confining layers where they were present, for example in the southwest portion of the DWSMA where the aquifers are overlain by a shale confining unit as shown on the geologic data in Appendix C. Zones containing wells with generally similar ratings within the DWSMA were then delineated. The geologic sensitivity delineations and ratings within the DWSMA are illustrated on Figure 10.

6.1.3 ASSESSMENT OF THE DRINKING WATER SUPPLY MANAGEMENT AREA VULNERABILITY

In the DWSMA, the ground water that supplies the City Wells is from the OPDC, CJDN, CWON, and CMTS aquifers that underlie glacial deposits (Ramsey and Washington County Atlas Series, Atlas C-7 and C-5, respectively). The glacial deposits are composed of Superior Lobe sand and silt lacustrine deposits, till, and outwash. Deposits also consist of Pre-Late Wisconsinan Keewatin and Grantsburg Sublobe till, outwash and sandy lacustrine sediment. The Superior Lobe, due to its higher sand content, is generally not considered an effective barrier to the downward migration of contaminants from grade. Underlain deposits, however, do act as effective barriers where till is present or where Glenwood or basal St. Peter shales are present (Appendix C).

As discussed in Section 6.1.2 the DNR geologic sensitivity rating is an empirical value determined by dividing the cumulative thickness of low permeability units (e.g. clay) above the aquifer by 10 (DNR, 1991). The L-score results ranged from 0 to 21. This indicates much of the DWSMA is underlain by low-permeable material creating hydraulic separation from grade.

For the DWSMA vulnerability assessment, and pursuant to MDH guidance (MDH, 1997), geologic sensitivity classifications of low to very low sensitivity would be automatically increased to a classification of moderate vulnerability due to the presence of tritium, which has been detected at all of the City Wells except Well No. 2 (Figure 11). However, the area around the City Wells has retained a vulnerability rating of low due to the presence of the Glenwood Formation, that can be seen on Figure C1 in Appendix C, that is known to be an effective barrier to downward migration in those areas.

7 COMPARISON OF AMENDED PART 1 TO ORIGINAL PART 1

The primary changes between the original Part 1 and this Amendment are a better understanding of the geology, an improved regional model providing better boundary conditions to the local model, and updated pumping rates from the original model rates.

The Amendment model incorporates updated pumping rates, as well as simulating the influence of the low vertical conductivity layer at the base of the Prairie du Chien Group that limits flow between it and the Jordan Sandstone. The current model uses a larger range for conductivities in the OPDC aquifer which results in the capture zones extending further upgradient than the previous model. The use of 5-year pumping volume calculated fixed radius (CFR) and a 5-year upgradient extension, as opposed to 10-year rates used in the previous model reduced the size of the fracture flow zone. In general, however, the previous and currently delineated DWSMAs are much the same.

8 RECOMMENDATIONS

The WHPA delineations for the City Wells were created using maximum pumping rates and conservative assumptions in the fracture flow delineation. These factors combine to 'build in' a safety factor, which is necessary when attempting to simulate natural systems and their inherent heterogeneity.

While the delineations are considered to be conservative and are based on the best available data, there is some information that could improve the quality of any future re-evaluations. The standard assessment monitoring package (Chloride + Bromide, Nitrate + nitrite N, Tritium) should be analyzed during year six for Well No. 1 (14005), Well No. 2 (222880), Well No. 3 (205733), and Well No. 4 (226566), contingent on funding assistance from MDH for sampling and analysis. The city may need to collect the samples and ship them to MDH. Information generated by this sampling will be used to refine vulnerability assessments for the next amendment

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GLOSSARY OF TERMS

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

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

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

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

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

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

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

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

ACRONYMS

CFR - Calculated Fixed Radius

DAP-ATP – Determination of Aquifer Properties - Aquifer Test Plan

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

MPARS – Minnesota DNR Permitting and Reporting System

MWI – Minnesota Well Index

MPCA - Minnesota Pollution Control Agency

NRCS - Natural Resource Conservation Service

SWCD - Soil and Water Conservation District

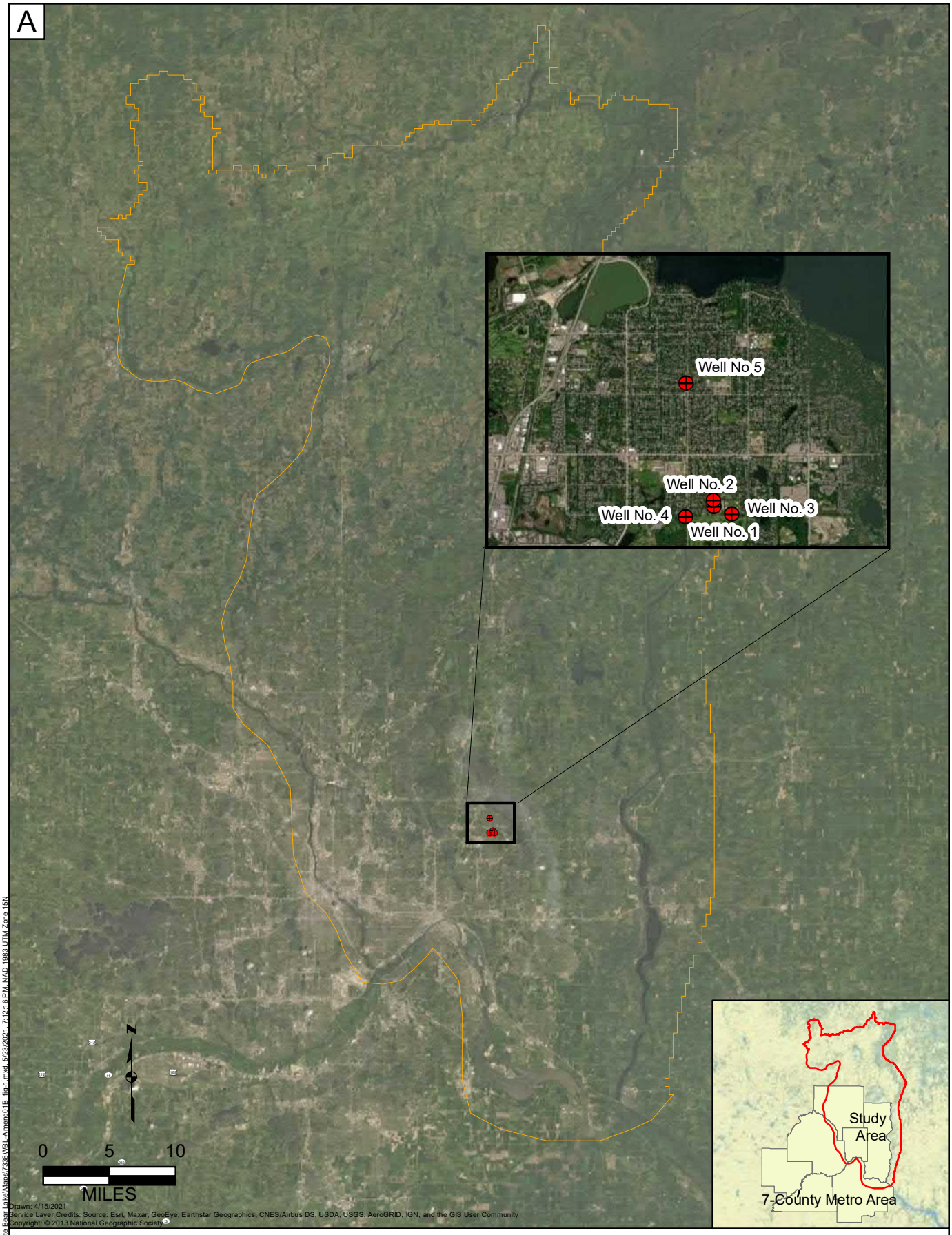
UGE - Upgradient Extensions

UMN - University of Minnesota

USDA - United States Department of Agriculture

USGS - United States Geological Survey

FIGURES



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WBL_City_Wells_pts

Local Model Boundary

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WHITE BEAR LAKE, MINNESOTA

PREPARED FOR

City of White Bear Lake, Minnesota

FIGURE 1

SITE LOCATION AND MODEL BOUNDARY

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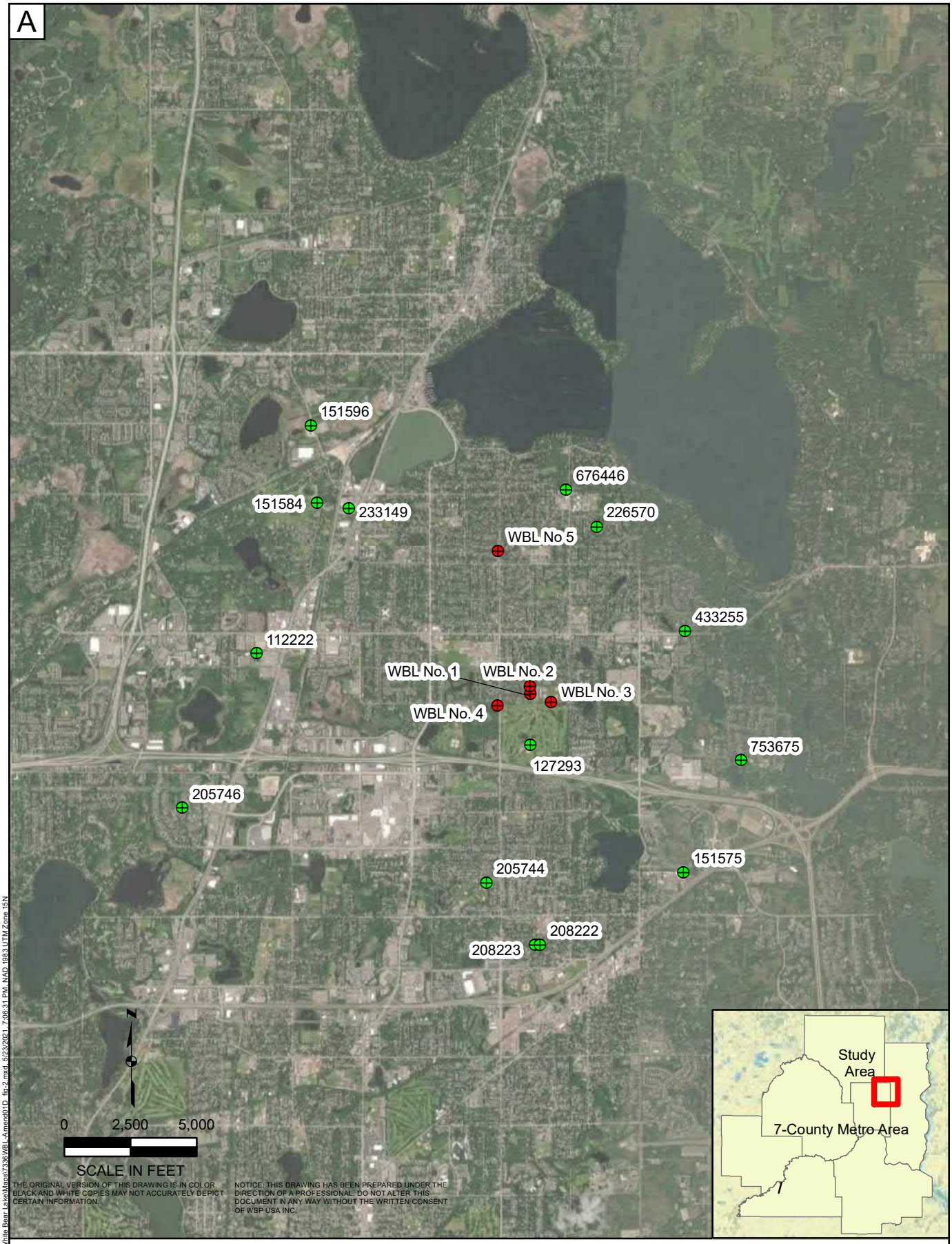

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- High Capacity Wells (Unique ID Num)
- City Wells

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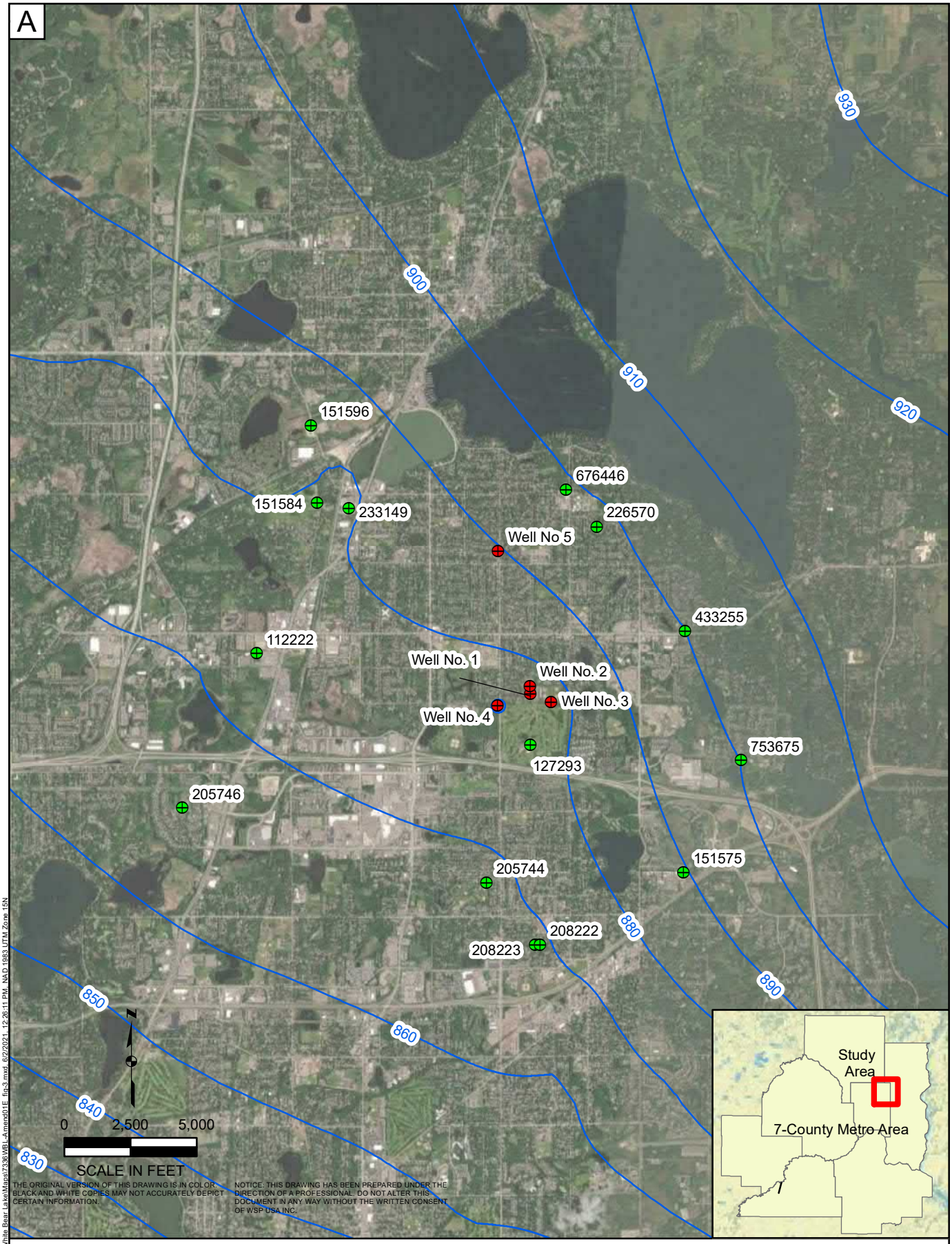
FIGURE 2

LOCATION OF CITY AND SURROUNDING HIGH CAPACITY WELLS MODIFIED IN THE GROUNDWATER FLOW MODEL

WSP Office: Minneapolis, MN | Source: G:\GIS\White Bear Lake\Maps\7336\WBL_Amend01D_fig-2.mxd, 5/29/2021, 7:06:31 PM, NAD 1983 UTM Zone 15N



City Wells

Jordan Aquifer Head (ft-amsl)

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FIGURE 3

SIMULATED JORDAN GROUNDWATER EQUIPOTENTIAL CONTOURS

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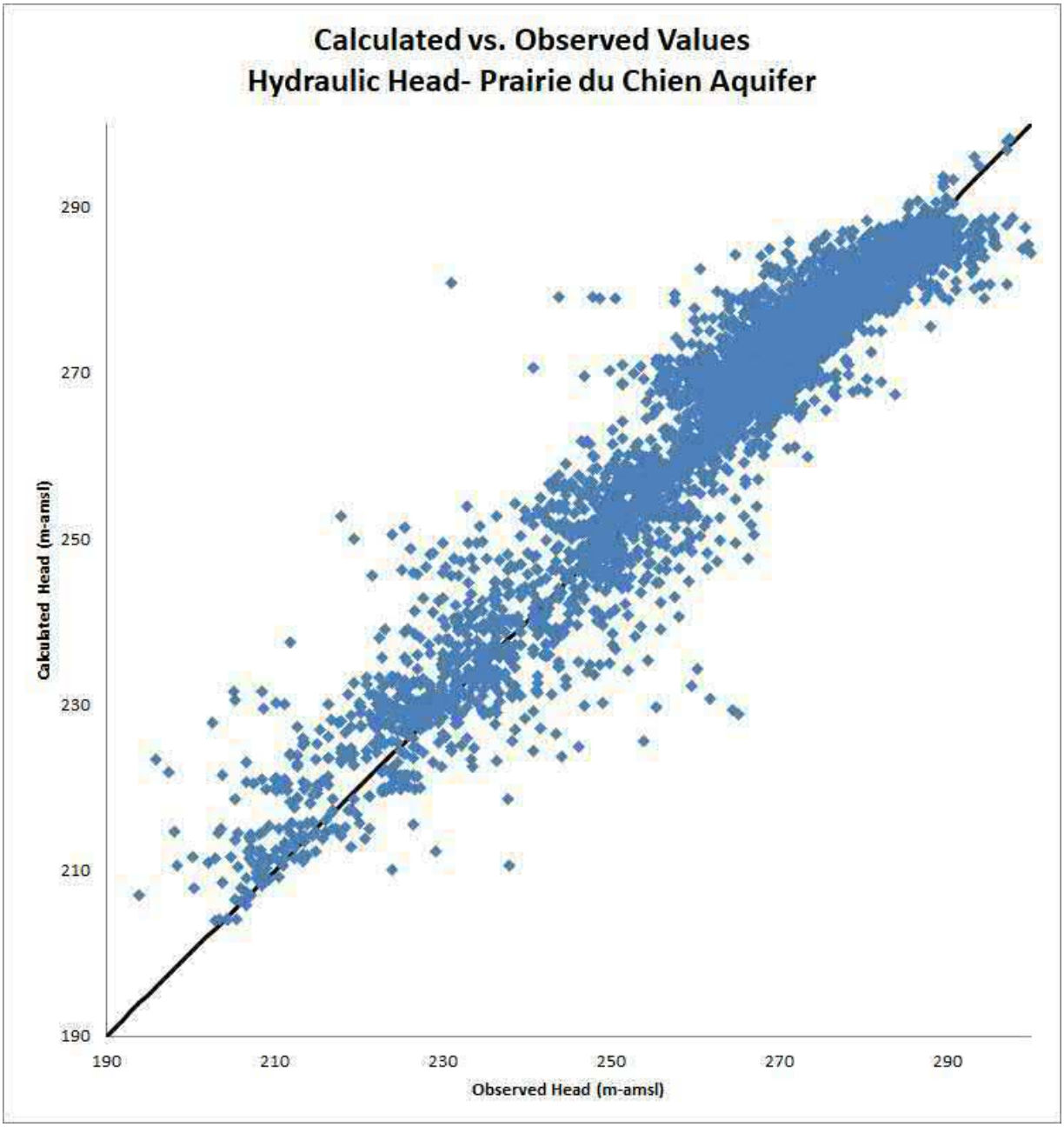
A



MEAN RESIDUAL = -2.06 m
MEAN ABSOLUTE RESIDUAL = 3.75 m
ROOT MEAN SQUARED ERROR = 5.22 m
NORMALIZED RMS = 4.8%

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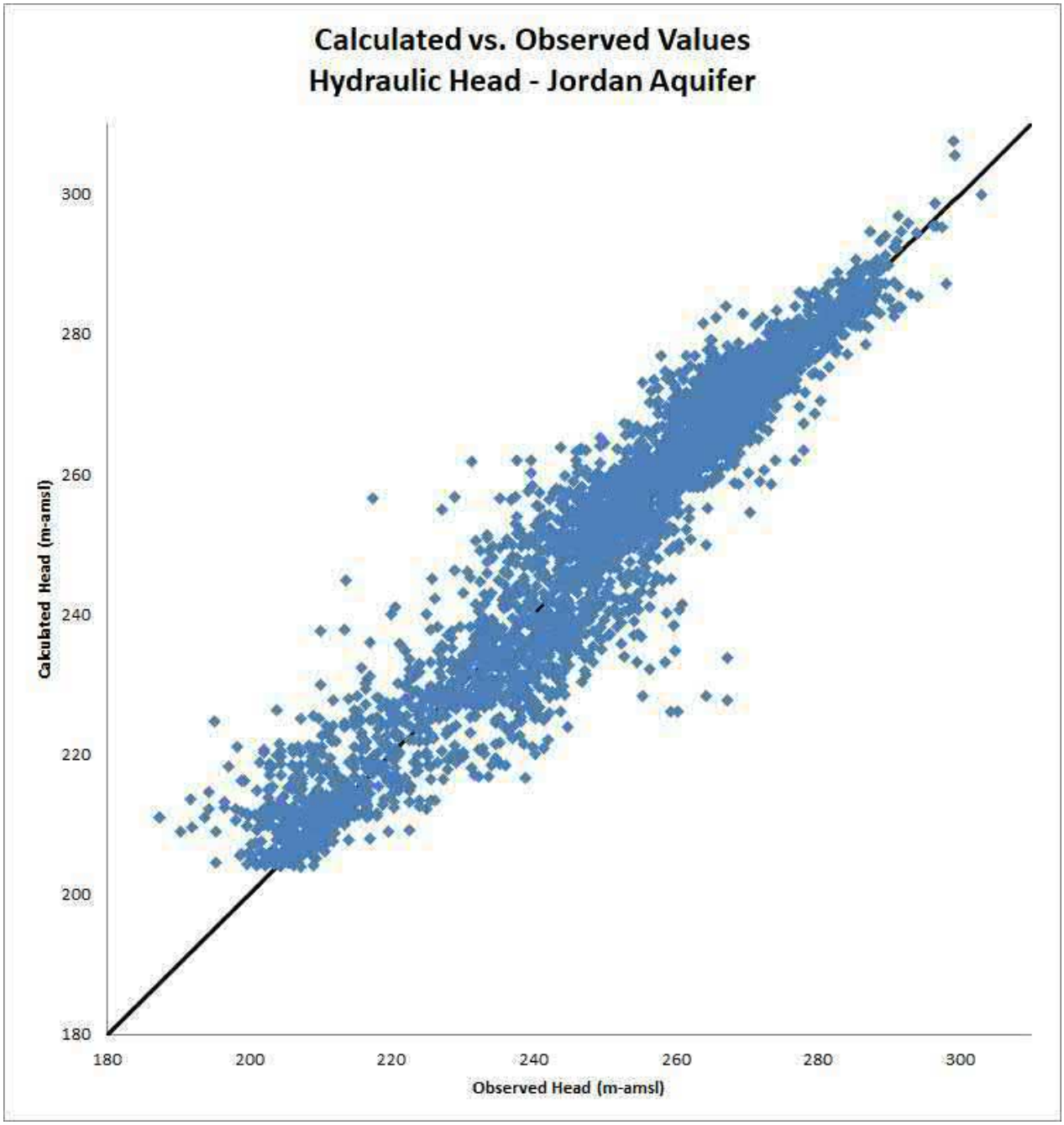
FIGURE 4

STEADY-STATE MODEL CALIBRATION DATA
AND MODEL STATISTICS - OPDC

A



MEAN RESIDUAL = -1.69 m
MEAN ABSOLUTE RESIDUAL = 4.23 m
ROOT MEAN SQUARED ERROR = 5.87 m
NORMALIZED RMS = 5.1%

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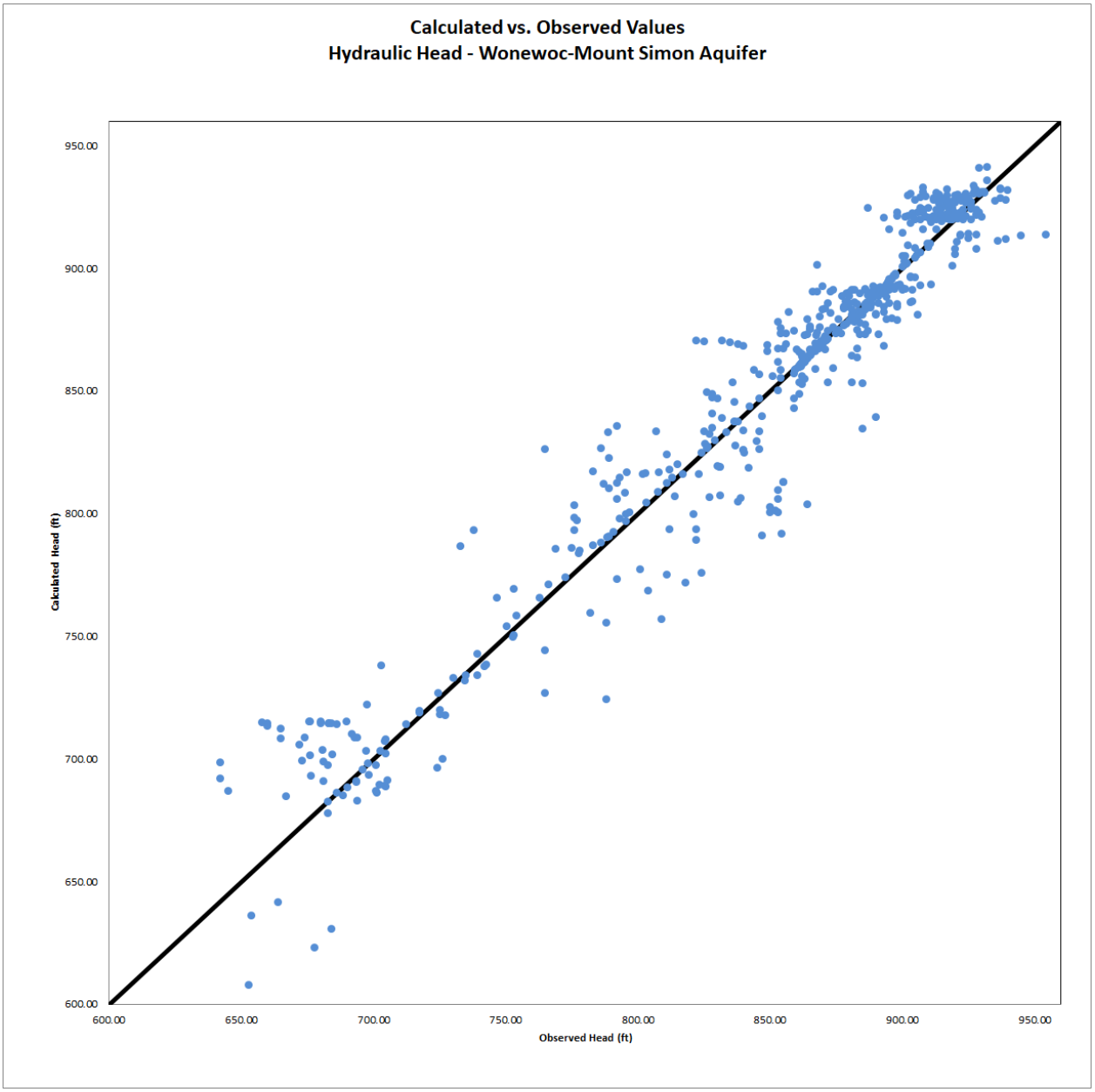
FIGURE 5

STEADY-STATE MODEL CALIBRATION DATA
AND MODEL STATISTICS - CJDN

A



MEAN RESIDUAL = -1.53 ft
MEAN ABSOLUTE RESIDUAL = 10.73 ft
ROOT MEAN SQUARED ERROR = 17.41 ft
NORMALIZED RMS = 4.75%

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FIGURE 6

STEADY-STATE MODEL CALIBRATION DATA AND MODEL STATISTICS - CWMS

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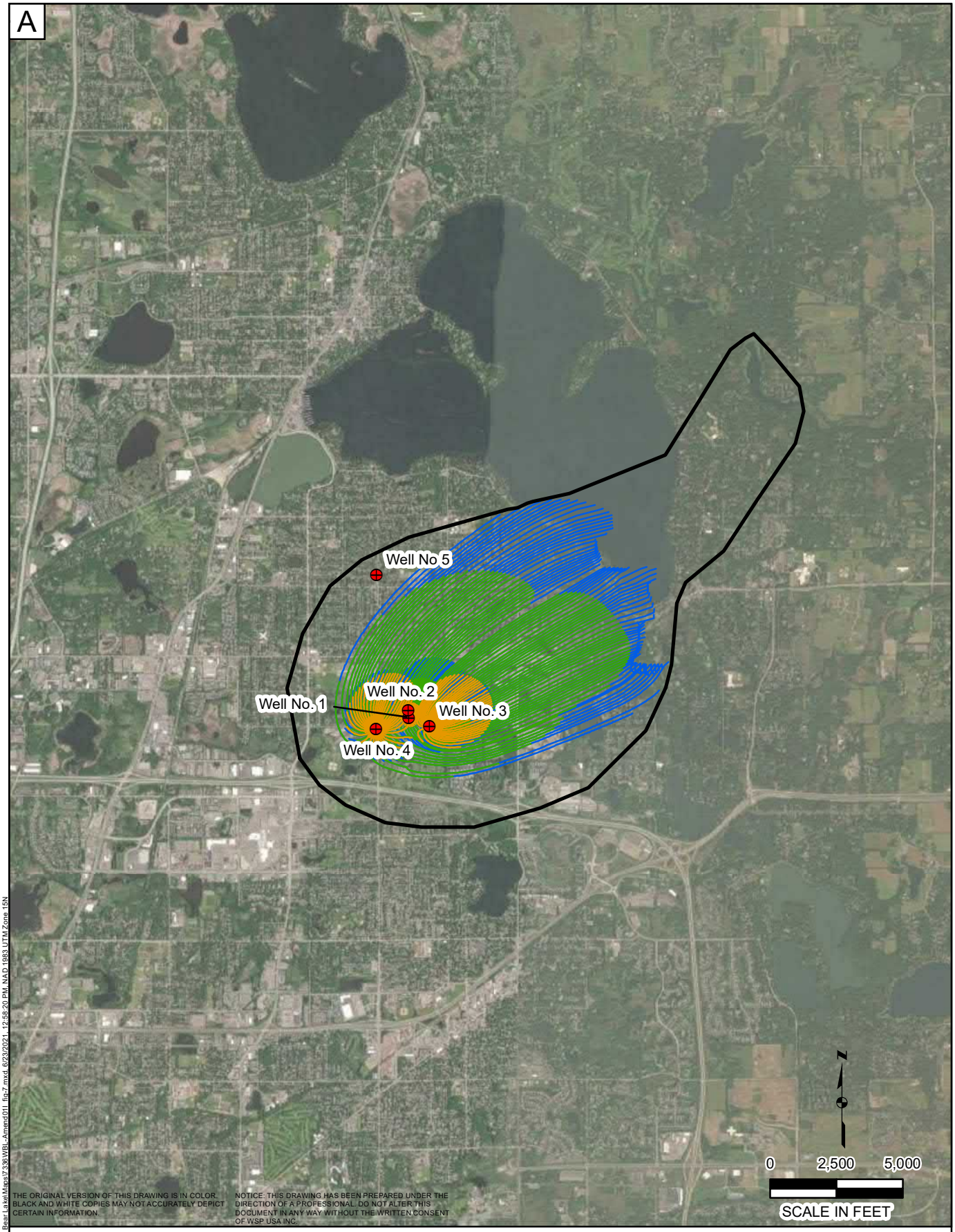

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1-Year Pathlines
5-Year Pathlines
10-Year Pathlines
Composite 10-Year Capture Zone
City Wells

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FIGURE 7

1-, 5-, AND 10-YEAR FLOWPATHS AND 10-YEAR COMPOSITE CAPTURE ZONE (POROUS FLOW)

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FIGURE 8

FRACTURE FLOW DELINEATION BOUNDARIES

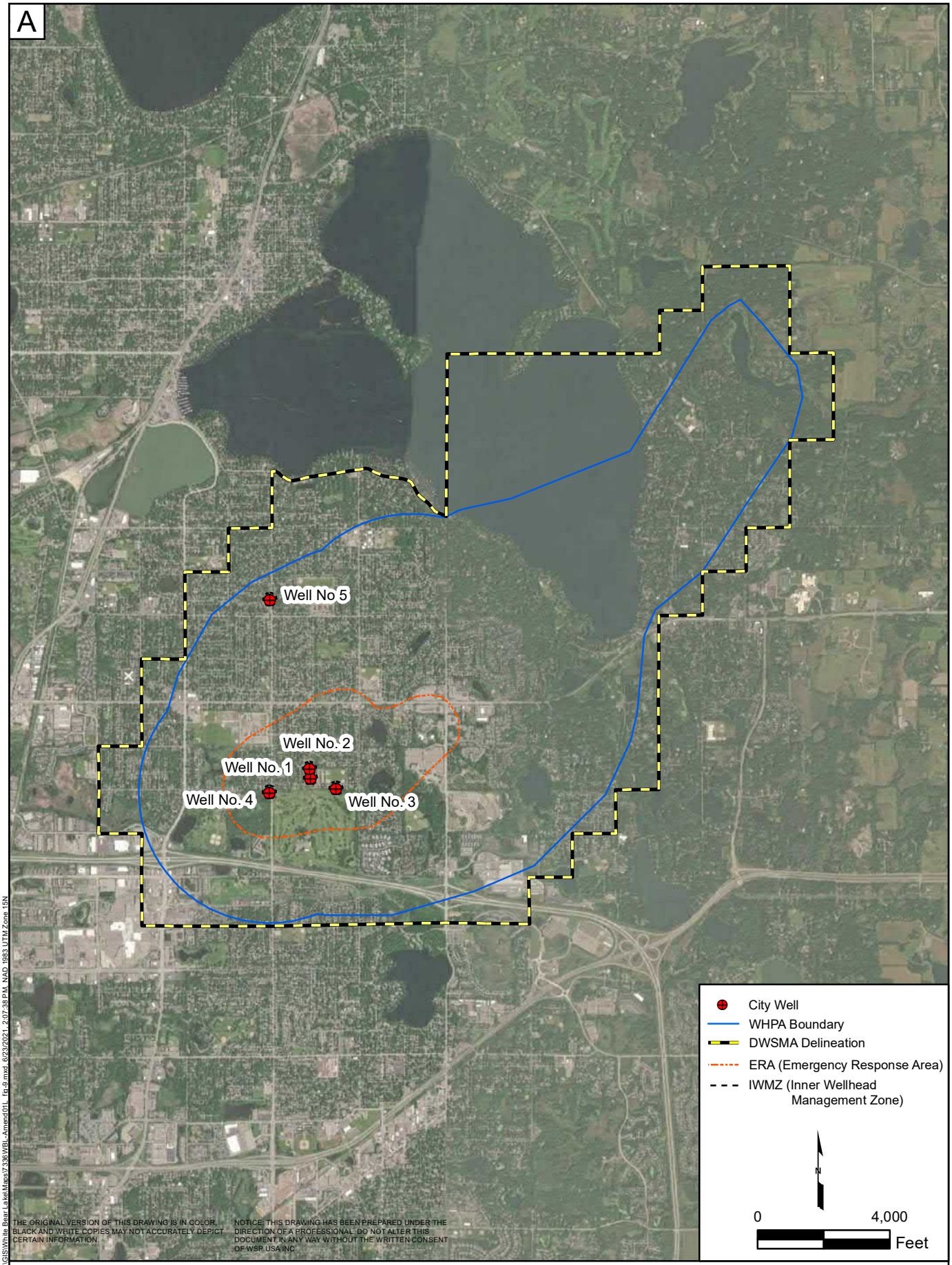

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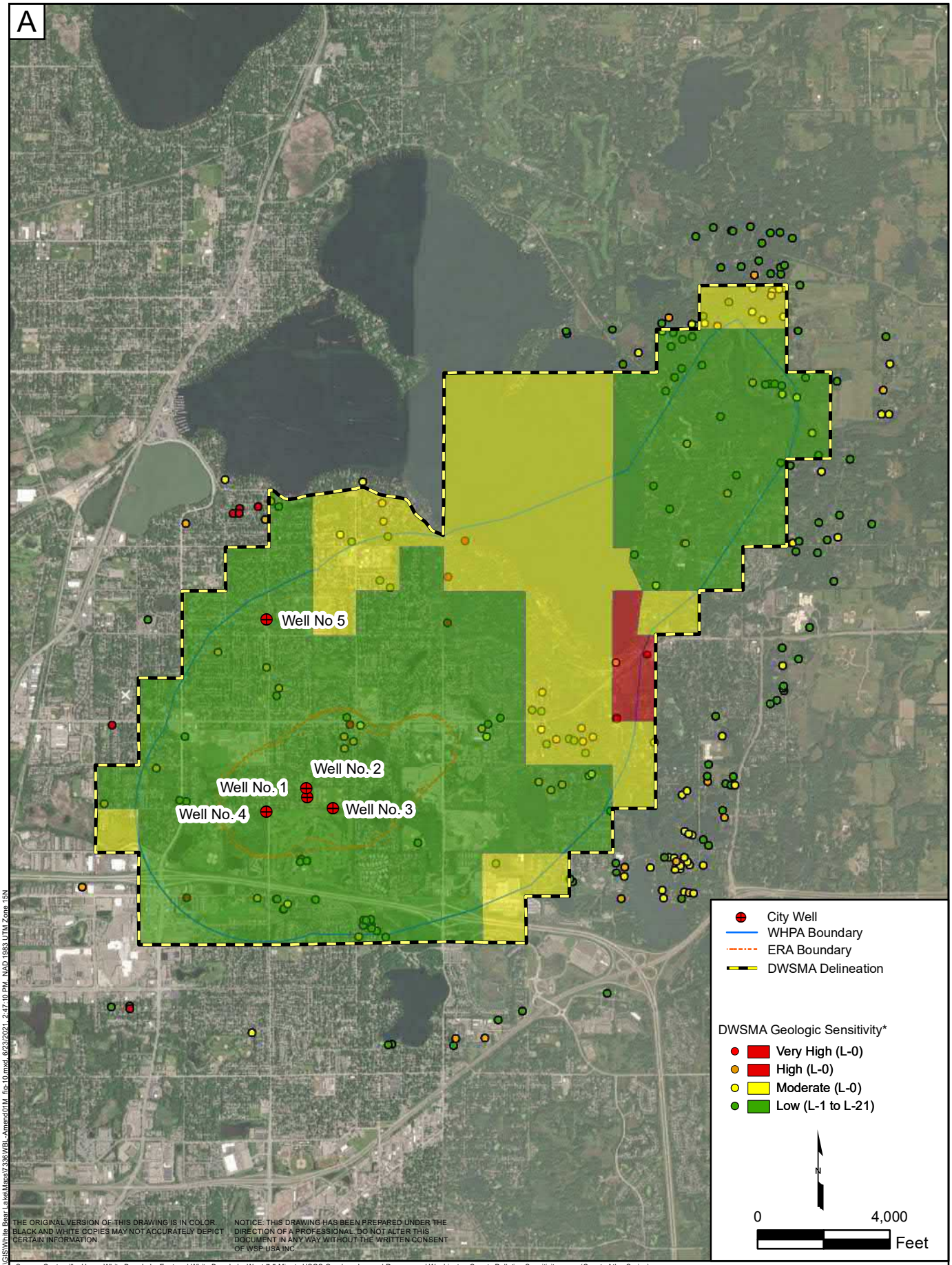
FIGURE 9

COMBINED WELLHEAD PROTECTION AREA BOUNDARIES AND DRINKING WATER SUPPLY MANAGEMENT AREA BOUNDARY



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Source: Centerville, Hugo, White Bear Lake East and White Bear Lake West 7.5-Minute USGS Quadrangles, and Ramsey and Washington County Pollution Sensitivity maps (County Atlas Series).
*: DWSMA geologic sensitivity (L-scores) as determined by MDH using MN CWI data.

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Source: G:\GIS\White Bear Lake\Maps\7336WBL-Amend01M_fig-10.mxd, 6/23/2021, 2:47:10 PM, NAD 1983 UTM Zone 15N

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FIGURE 10

DRINKING WATER SUPPLY MANAGEMENT
AREA GEOLOGIC SENSITIVITY ASSESSMENT

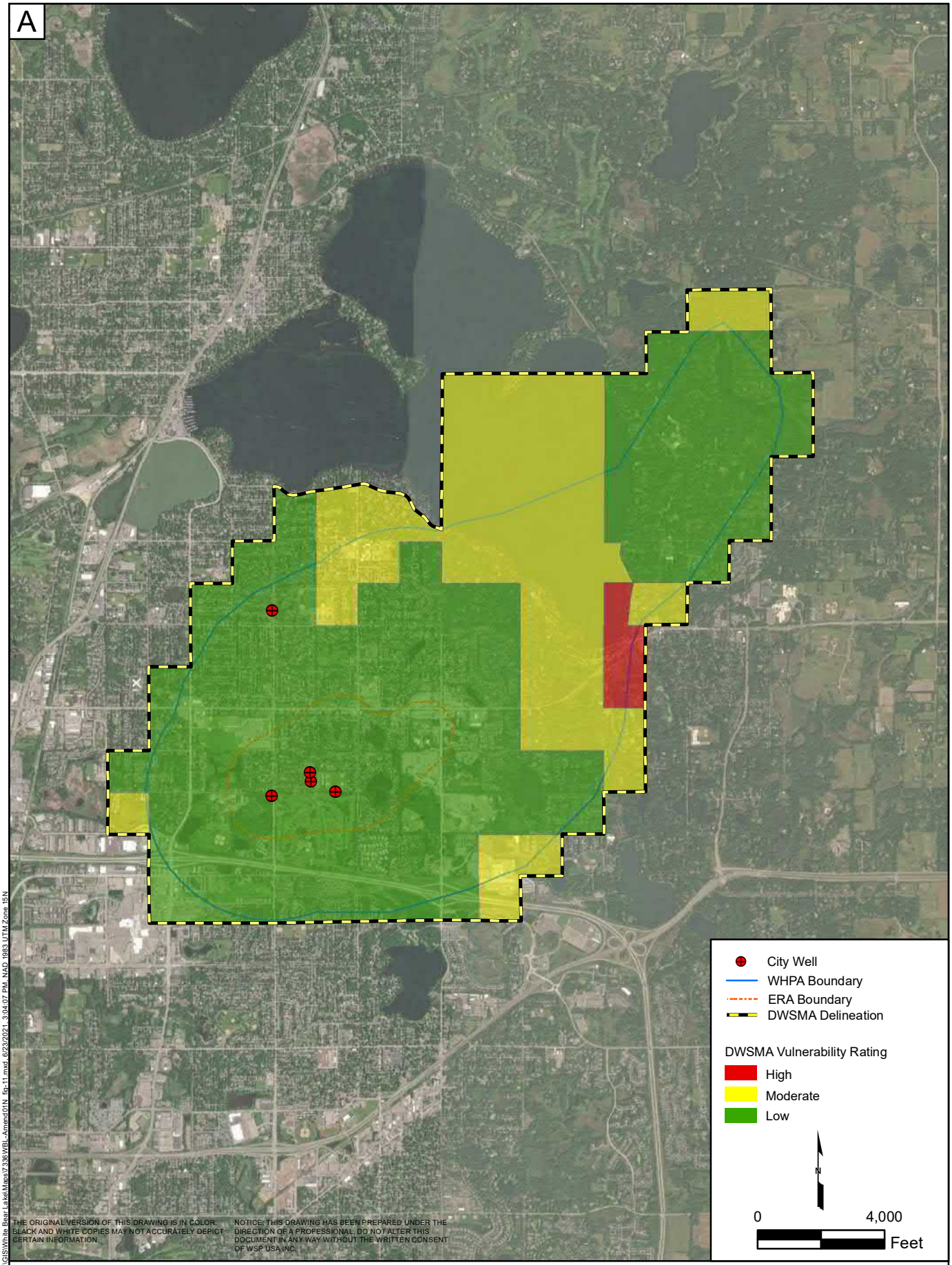

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FIGURE 11

DRINKING WATER SUPPLY MANAGEMENT AREA VULNERABILITY ASSESSMENT

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APPENDIX

A FRACTURE FLOW DELINEATION INFORMATION

Unique Well# =
Well No. 4
X = 499,567.000, Y = 4,987,709.000

5 Year Pumping Volume (1825 days)					
Pumping Volume (Q):	3,653.00 m3/day	129,004.48 cu.ft./day	670.153 gal./min.	965,020.50 gal./day	
Water Producing Zone Thickness (L):	38.4 m	125.984 ft.			
Effective Porosity (n):	0.05				
Original (CFR) Radius:	1,051.31 m	3,449.18 ft.			
New Radius:	1,203.99 m	3,950.10 ft.			
New Pumping Volume (Q): *	4,791.09 m3/day	169,195.61 cu.ft./day	878.938 gal./min.	1,265,671.06 gal./day	

Unique Well# =
Well No. 3
X = 500,180.000, Y = 4,987,745.000

5 Year Pumping Volume (1825 days)					
Pumping Volume (Q):	3,294.00 m3/day	116,326.51 cu.ft./day	604.294 gal./min.	870,182.74 gal./day	
Water Producing Zone Thickness (L):	38.4 m	125.984 ft.			
Effective Porosity (n):	0.05				
Original (CFR) Radius:	998.315 m	3,275.31 ft.			
New Radius:	1,143.30 m	3,750.98 ft.			
New Pumping Volume (Q): *	4,320.24 m3/day	152,567.84 cu.ft./day	792.56 gal./min.	1,141,286.74 gal./day	

OVERLAP SUMMARY INFORMATION

Original (CFR) Area for Well# :	3,472,252.60 m2	37,374,979.81 sq.ft.
New (CFR) Area for Well# :	4,554,027.22 m2	49,019,093.54 sq.ft.
Original (CFR) Area for Well# :	3,131,015.63 m2	33,701,939.09 sq.ft.
New (CFR) Area for Well# :	4,106,478.41 m2	44,201,723.00 sq.ft.
Overlap Area to Well# :	1,081,774.61 m2	11,644,113.73 sq.ft.
Overlap Area to Well# :	975,462.79 m2	10,499,783.91 sq.ft.
Total Overlap Area:	2,057,237.40 m2	22,143,897.65 sq.ft.

* = New Pumping Volumes (Q) if needed for additional
overlap computations with another well.

UP-GRADIENT EXTENSION (UGE)
(area beyond the New Areas of both Wells)
(area beyond the New Areas of both Wells)
Bearing from Well# = 54° from North +/- 10°.
Bearing from Well# = 54° from North +/- 10°.

Up-Gradient Extension Area:	3,408,190.13 m2	36,685,417.74 sq.ft.
Up-Gradient Intersection Area:	2,598,929.40 m2	27,974,616.12 sq.ft.

Unique Well# =
Well No. 4
X = 499,567.000, Y = 4,987,709.000

6 Month Pumping Volume (182 days)								
Pumping Volume (Q):	3,653.00	m3/day	129,004.48	cu.ft./day	670.153	gal./min.	965,020.50	gal./day
Water Producing Zone Thickness (L)	38.4	m	125.984	ft.				
Effective Porosity (n):	0.05							
Original (CFR) Radius:	331.998	m	1,089.23	ft.				
New Radius:	333.143	m	1,092.99	ft.				
New Pumping Volume (Q): *	3,678.25	m3/day	129,896.25	cu.ft./day	674.786	gal./min.	971,691.43	gal./day

Unique Well# =
Well No. 3
X = 500,180.000, Y = 4,987,745.000

6 Month Pumping Volume (182 days)								
Pumping Volume (Q):	3,294.00	m3/day	116,326.51	cu.ft./day	604.294	gal./min.	870,182.74	gal./day
Water Producing Zone Thickness (L)	38.4	m	125.984	ft.				
Effective Porosity (n):	0.05							
Original (CFR) Radius:	315.262	m	1,034.33	ft.				
New Radius:	316.35	m	1,037.89	ft.				
New Pumping Volume (Q): *	3,316.77	m3/day	117,130.65	cu.ft./day	608.471	gal./min.	876,198.08	gal./day

OVERLAP SUMMARY INFORMATION

Original (CFR) Area for Well# :	346,273.96	m2	3,727,258.26 sq.ft.
New (CFR) Area for Well# :	348,667.66	m2	3,753,023.80 sq.ft.
Original (CFR) Area for Well# :	312,243.75	m2	3,360,960.50 sq.ft.
New (CFR) Area for Well# :	314,402.21	m2	3,384,193.92 sq.ft.
Overlap Area to Well# :	2,393.70	m2	25,765.54 sq.ft.
Overlap Area to Well# :	2,158.46	m2	23,233.42 sq.ft.
Total Overlap Area:	4,552.16	m2	48,998.96 sq.ft.

* = New Pumping Volumes (Q) if needed for additional
overlap computations with another well.

UP-GRADIENT EXTENSION (UGE)
(area beyond the New Areas of both Wells)
(area beyond the New Areas of both Wells)
Bearing from Well# = 54° from North +/- 10°.
Bearing from Well# = 54° from North +/- 10°.

Up-Gradient Extension Area:	644,424.34	m2	6,936,519.18 sq.ft.
Up-Gradient Intersection Area:	4,444.68	m2	47,842.08 sq.ft.

APPENDIX

B CITY WELL VULNERABILITY WORKSHEETS

625 Robert St. N. St. Paul MN 55155
P.O. Box 64975 St. Paul MN 55164 - 0975

MINNESOTA DEPARTMENT OF HEALTH
SECTION OF DRINKING WATER PROTECTION
SWP Vulnerability Rating

PWSID: 1620024 TIER: 2
SYSTEM NAME: White Bear Lake WHP RANK:
WELL NAME: Well #1 UNIQUE WELL #: 00014005

COUNTY: Ramsey TOWNSHIP NUMBER: 30 RANGE: 22 W SECTION: 36 QUARTERS: BCDA

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Jordan	
DNR Geologic Sensitivity Rating	:	Low	20
L Score	:	0	
Geologic Data From	:	Well Record	
Year Constructed	:	1959	
Construction Method	:	Cable Tool/Bored	0
Casing Depth	:	390	5
Well Depth	:	490	
Casing grouted into borehole?		Unknown	0
Cement grout between casings?		Yes	0
All casings extend to land surface?		Yes	0
Gravel - packed casings?		No	0
Wood or masonry casing?		No	0
Holes or cracks in casing?		Unknown	0
Isolation distance violations?			0
Pumping Rate	:	1100	20
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	<.4	0
Maximum tritium detected	:	7.87 04/06/2015	VULNERABLE
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		45
Wellhead Protection Vulnerability Rating	:		VULNERABLE
Vulnerability Overridden	:		

COMMENTS
Very low rating was determined by the presence of the Glenwood and basal St. Peter shale beds, Previous tritium result 14.2 TU on 07/29/1991.

625 Robert St. N. St. Paul MN 55155
P.O. Box 64975 St. Paul MN 55164 - 0975

MINNESOTA DEPARTMENT OF HEALTH
SECTION OF DRINKING WATER PROTECTION
SWP Vulnerability Rating

PWSID: 1620024 TIER: 2
SYSTEM NAME: White Bear Lake WHP RANK:
WELL NAME: Well #2 UNIQUE WELL #: 00222880

COUNTY: Ramsey TOWNSHIP NUMBER: 30 RANGE: 22 W SECTION: 36 QUARTERS: BCDA

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Wonewoc-Mt.Simon	
DNR Geologic Sensitivity Rating	:	Very low	0
L Score	:	0	
Geologic Data From	:	Well Record	
Year Constructed	:	1962	
Construction Method	:	Cable Tool/Bored	0
Casing Depth	:	700	0
Well Depth	:	970	
Casing grouted into borehole?		Unknown	0
Cement grout between casings?		Yes	0
All casings extend to land surface?		Yes	0
Gravel - packed casings?		No	0
Wood or masonry casing?		No	0
Holes or cracks in casing?		Unknown	0
Isolation distance violations?			0
Pumping Rate	:	1650	20
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	<.4	0
Maximum tritium detected	:	Unknown	0
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	A	-20
Wellhead Protection Score	:		0
Wellhead Protection Vulnerability Rating	:		NOT VULNERABLE
Vulnerability Overridden	:		

COMMENTS
Very low rating was determined by the presence of the Glenwood, basal St. Peter shale beds, and the St. Lawrence confining layers.

625 Robert St. N. St. Paul MN 55155
P.O. Box 64975 St. Paul MN 55164 - 0975

MINNESOTA DEPARTMENT OF HEALTH
SECTION OF DRINKING WATER PROTECTION
SWP Vulnerability Rating

PWSID: 1620024 TIER: 2
SYSTEM NAME: White Bear Lake WHP RANK:
WELL NAME: Well #3 UNIQUE WELL #: 00205733

COUNTY: Ramsey TOWNSHIP NUMBER: 30 RANGE: 22 W SECTION: 36 QUARTERS: BDCD

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Prairie Du Chien-Jordan	
DNR Geologic Sensitivity Rating	:	Low	20
L Score	:	2	
Geologic Data From	:	Well Record	
Year Constructed	:	1966	
Construction Method	:	Cable Tool/Bored	0
Casing Depth	:	289	5
Well Depth	:	513	
Casing grouted into borehole?		Unknown	0
Cement grout between casings?		Yes	0
All casings extend to land surface?		Yes	0
Gravel - packed casings?		No	0
Wood or masonry casing?		No	0
Holes or cracks in casing?		Unknown	0
Isolation distance violations?			0
Pumping Rate	:	2400	20
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	.4 08/05/2014	0
Maximum tritium detected	:	7.5 02/19/2013	VULNERABLE
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		45
Wellhead Protection Vulnerability Rating	:		VULNERABLE
Vulnerability Overridden	:		

COMMENTS
vulnerable based on tritium result from well 014005.

625 Robert St. N. St. Paul MN 55155
P.O. Box 64975 St. Paul MN 55164 - 0975

MINNESOTA DEPARTMENT OF HEALTH
SECTION OF DRINKING WATER PROTECTION
SWP Vulnerability Rating

PWSID: 1620024 TIER: 2
SYSTEM NAME: White Bear Lake WHP RANK:
WELL NAME: Well #4 UNIQUE WELL #: 00226566

COUNTY: Ramsey TOWNSHIP NUMBER: 30 RANGE: 22 W SECTION: 35 QUARTERS: ADDD

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Prairie Du Chien-Jordan	
DNR Geologic Sensitivity Rating	:	Low	20
L Score	:	0	
Geologic Data From	:	Well Record	
Year Constructed	:	1969	
Construction Method	:	Cable Tool/Bored	0
Casing Depth	:	267	5
Well Depth	:	476	
Casing grouted into borehole?		Unknown	0
Cement grout between casings?		Unknown	5
All casings extend to land surface?		Yes	0
Gravel - packed casings?		No	0
Wood or masonry casing?		No	0
Holes or cracks in casing?		Unknown	0
Isolation distance violations?			0
Pumping Rate	:	2400	20
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	.17 08/05/2014	0
Maximum tritium detected	:	7.32 03/24/2014	VULNERABLE
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		50
Wellhead Protection Vulnerability Rating	:		VULNERABLE
Vulnerability Overridden	:		

COMMENTS

Low rating was determined by the presence of the Glenwood andl basal St. Peter shale layers
VULNERABLE BASED ON TRITIUM RESULT FROM WELL 014005.

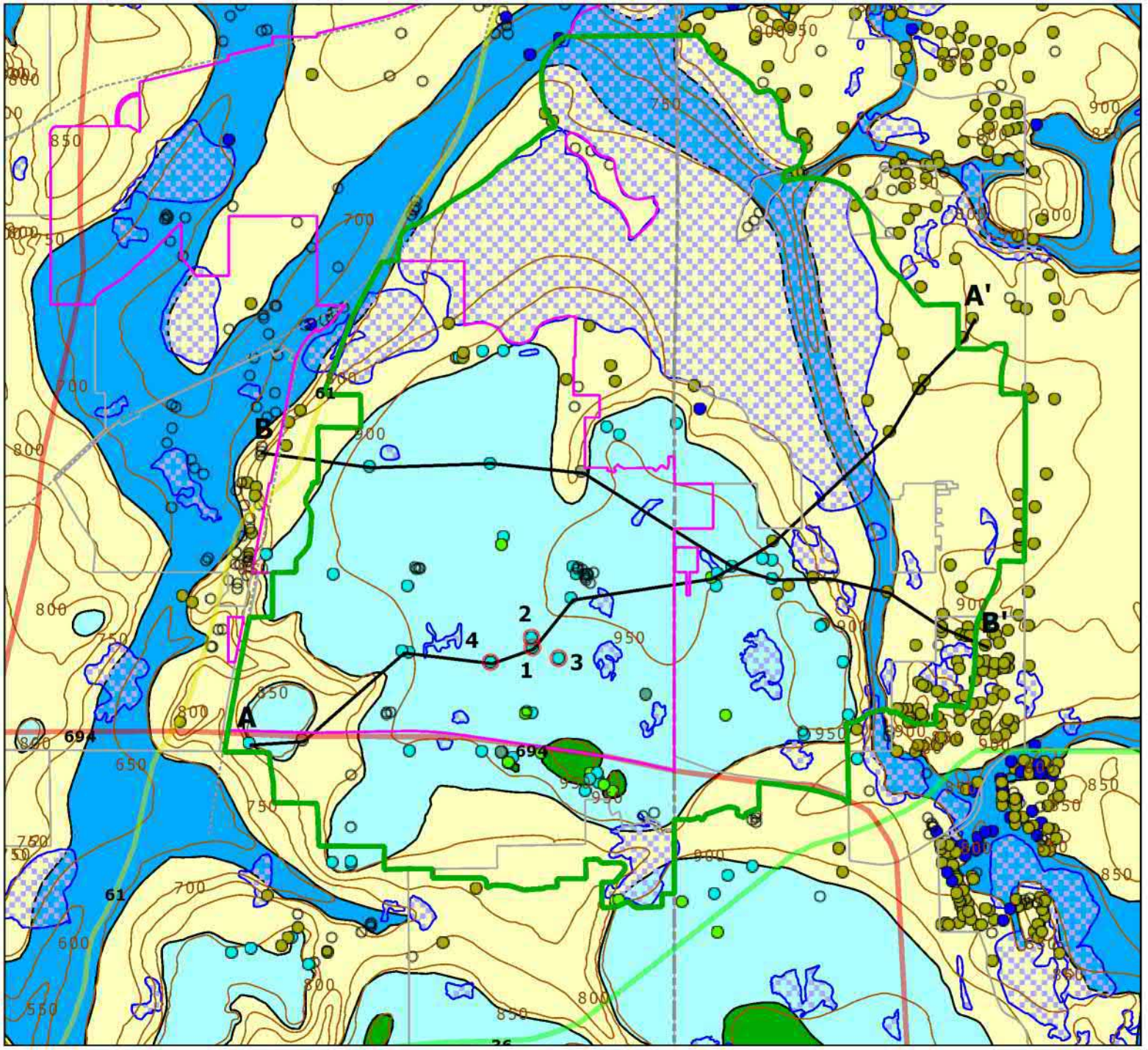
APPENDIX

C GEOLOGIC CROSS-SECTIONS

Figure C1

Figure 3 Bedrock Geology

City of White Bear Lake
Phase I Wellhead Protection Plan



Legend

Bedrock
- DECORAH SHALE
- JORDAN SANDSTONE
- PLATTEVILLE-GLENWOOD FRMS.
- PRAIRIE DU CHEIN GROUP
- PRAIRIE DU CHIEN GROUP
- ST. PETER SANDSTONE
- ST.LAWRENCE-FRANCONIA Fm
- Water Body
- Bedrock Elevation (ft)

Wells - 1st Bdrk
- Unconsolidated
- Not Recorded
- Decorah
- Decorah-Platteville
- Glenwood-St Peter
- Prairie du Chien
- Platteville-Glenwood
- Platteville
- St Peter
- Sec_Trace
- CTU
- County line
- Railroads

Highways
- County Road
- Interstate
- State Highway
- US Highway
- City Limits
- City Wells
- DWSMA

N

Figure C2 - Geologic Cross Section A – A' (a) stratigraphic codes and (b) cross section (*on next page*)

(a)

Surficial Geology

Qno	New Ulm Formation outwash
Qna	New Ulm Formation sandy till
Qnd	Twin Cities Member of New Ulm Formation (diamicton of mixed provenance)
Qcl	Cromwell Formation lake sand and clay
Qco	Cromwell Formation ouwash
Qcs	Cromwell Formation complex of sand and gravel and till
Qct	Cromwell Formation till

Well Log Stratigraphic Units

The four letter codes applied in CWI are used.

The first letter indicates the geological period: Q – Quaternary, O – Ordovician, and C – Cambrian.

Quaternary Deposits

The second letter indicates lithology:

C	Clay
F	Sand
G	Gravel
L	Sandy clay
P	Pebbly clay or pebbly, sandy clay
T	Till (diamicton)
U	Unknown / not recorded

The third letter isn't used, and the fourth letter indicates color

B	Brown
G	Gray
R	Red
Y	Yellow

Bedrock

PVL	Platteville Formation
GWD	Glenwood Formation
STP	St. Peter Sandstone
PDC	Prairie du Chien Group
JDN	Jordan Sandstone
STL	St. Lawrence Formation

City of White Bear Lake

Phase I Wellhead Protection Plan

Figure C2 - Cross Section A - A'

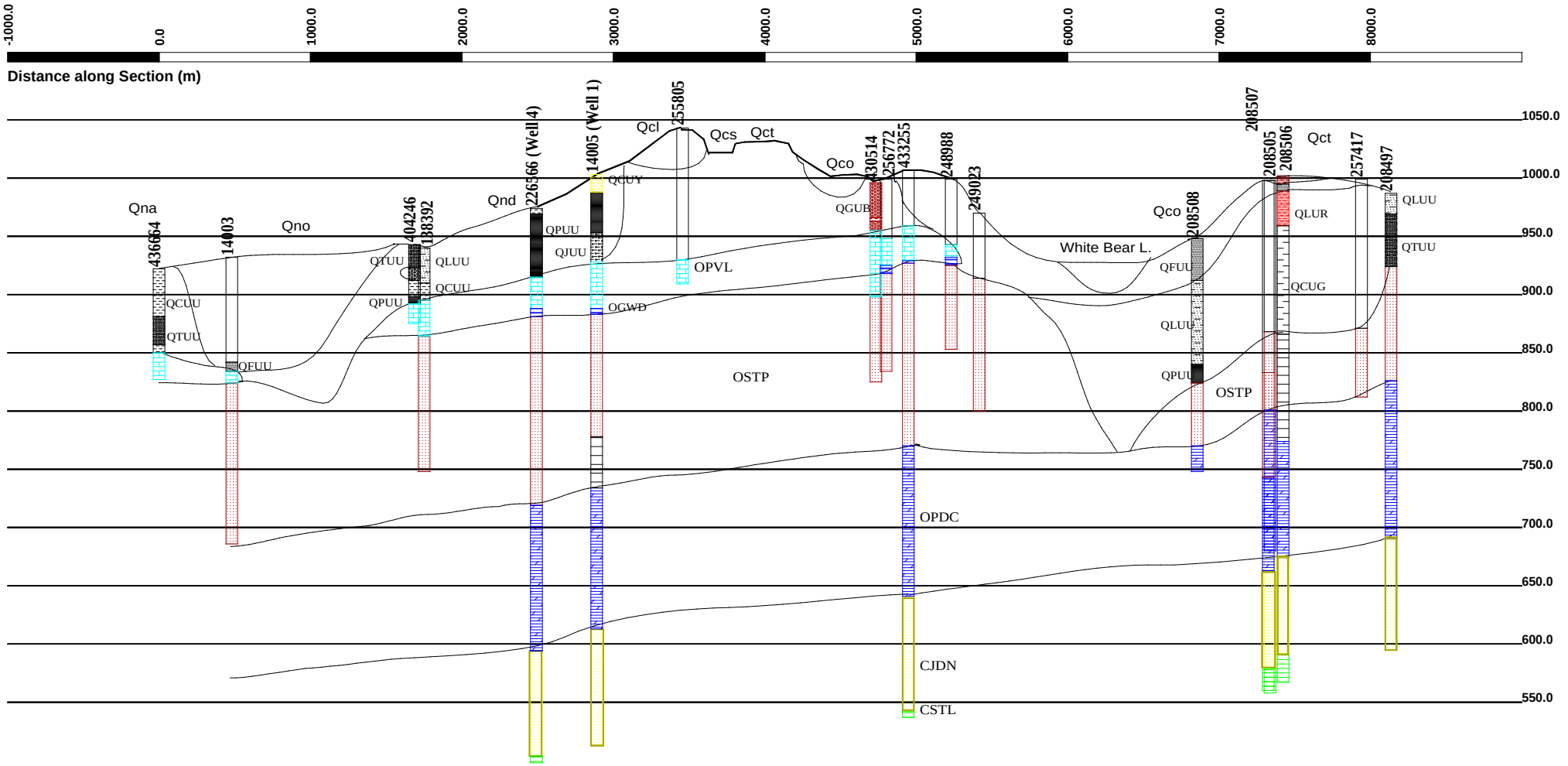


Figure C3 - Geologic Cross Section B – B' (a) stratigraphic codes and (b) cross section (*on next page*)

(a)

Surficial Geology

Qno	New Ulm Formation outwash
Qnd	Twin Cities Member of New Ulm Formation (diamicton of mixed provenance)
Qco	Cromwell Formation ouwash
Qct	Cromwell Formation till

Well Log Lithologic Units

The four letter codes applied in CWI are used.

The first letter indicates the geological period: Q – Quaternary, O – Ordovician, and C – Cambrian.

Quaternary Deposits

The second letter indicates lithology:

C	Clay
F	Sand
G	Gravel
H	Sand, gravel, and larger
L	Sandy clay
P	Pebbly clay or pebbly, sandy clay
U	Unknown / not recorded

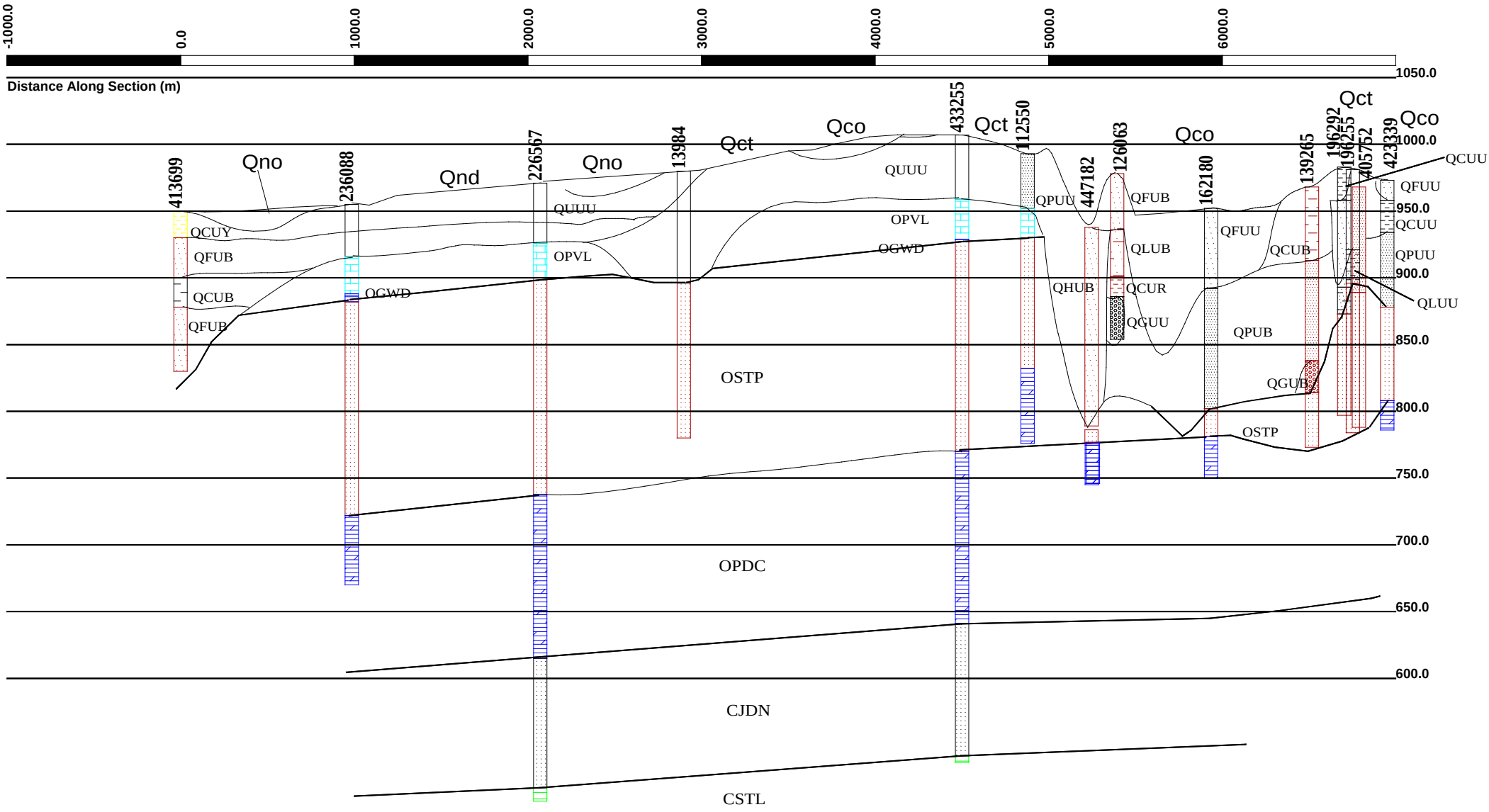
The third letter isn't used, and the fourth letter indicates color

B	Brown
G	Gray
R	Red
Y	Yellow

Bedrock

PVL	Platteville Formation
GWD	Glenwood Formation
STP	St. Peter Sandstone
PDC	Prairie du Chien Group
JDN	Jordan Sandstone
STL	St. Lawrence Formation

City of White Bear Lake
Phase I Wellhead Protection Plan
Figure C3 - Cross Section B - B'



Appendix C

Potential Contaminant Source Inventory Data

Appendix C

Potential Contaminant Source Inventory

Part II Wellhead Protection Plan Update
City of White Bear Lake, Minnesota
Drinking Water Supply ID 1620024

PCSI ID	Depicted on Figure	PIN	Facility Name	Program ID	Address	City	Zip Code	PCSI Code	Status	Material	Total	Groundwater Vunerability	Comment
1	Figure 15-4	3103021220010	NET LEASE DEVELOPMENT, LLC	MN-163-5D2-0004	Mahtomedi	805 WILDWOOD ROAD, WHITE BEAR LAKE, MN, 55110	55115	CVWEL	U	-	1	Low	Proposed Class V Well of Unknown Use Type
2	Figure 15-4	ROW	VSI CONSTRUCTION	MN-163-5D2-0003	Mahtomedi	730 WILDWOOD ROAD, MAHTOMEDI, MN, 55115	55115	CVWEL	U	-	1	Low	Proposed Class V Well of Unknown Use Type
3	Figure 15-1	012922120028	MANTHEI, MICK	00110569	Maplewood	2573 LYDIA AV	55109	WEL	A	-	1	Low	MDH Located well to 120 ft below ground surface.(OPVL)
4	Figure 15-1	012922120010	BAILEY, FLOYD	00233796	Maplewood	3012 BELLAIR AV	55109	WEL	A	-	1	Low	MDH Located well to 135 ft below ground surface.(INDT)
5	Figure 15-1	ROW	RECKOW, ALBERT	00280280	Maplewood	-	55109	WEL	U	-	1	Low	MDH Located well to 180 ft below ground surface.
6	Figure 15-1	012922120024	LINDEAU, MARLOWE	00205739	Maplewood	3028 LAKE ST	55109	WEL	A	-	1	Low	MDH Located well to 130 ft below ground surface.
7	Figure 15-1	012922120015	SMITH, G. S.	00279851	Maplewood	3035 LAKE ST N	55109	WEL	A	-	1	Low	MDH Unlocated well to 132 ft below ground surface.
8	Figure 15-1	012922120023	BENICK	00280459	Maplewood	3036 LAKE ST	55109	WEL	U	-	1	Low	MDH Located well to 121 ft below ground surface.
9	Figure 15-1	012922120015	RUSSEL CONLIN	00205735	Maplewood	3035 LAKE ST	55109	WEL	A	-	1	Low	MDH Located well to 135 ft below ground surface.
10	Figure 15-1	012922120016	JIM CONLIN	00205734	Maplewood	3043 LAKE	55109	WEL	A	-	1	Low	MDH Located well to 134 ft below ground surface.
11	Figure 15-1	012922120006	JIM CONLIN	00205738	Maplewood	3044 BELLAIRE	55109	WEL	A	-	1	Low	MDH Located well to 135 ft below ground surface.(OPVL)
12	Figure 15-1	012922120018	JIM COLIN	00205736	Maplewood	2520 WOODLYNN	55109	WEL	A	-	1	Low	MDH Located well to 125 ft below ground surface.
13	Figure 15-1	012922120019	JIM CONLIN	00211848	Maplewood	2530 WOODLYNN	55109	WEL	A	-	1	Low	MDH Located well to 125 ft below ground surface.
14	Figure 15-1	012922120004	JIM CONLIN	00205737	Maplewood	2514 WOODLYNN	55109	WEL	A	-	1	Low	MDH Located well to 130 ft below ground surface.(OPVL)
15	Figure 15-1	012922220002	SUSSELL HOMES	00194494	Maplewood	2373 GALL AV	55110	WEL	A	-	1	Low	MDH Located well to 240 ft below ground surface.(OSTP)
16	Figure 15-1	012922220061	BEDARD, BRIAN & ANDRA	00628759	Maplewood	2280 D CR	55110	WEL	A	-	1	Low	MDH Located well to 150 ft below ground surface.(ODPL)
17	Figure 15-1	ROW	SEIDEL, DAVID	00151757	Maplewood	2370 D CR	55110	WEL	A	-	1	Low	MDH Located well to 265 ft below ground surface.(MTPL)
18	Figure 15-1	012922220062	BOGART, STUART	00127634	Maplewood	2278 D CR	55110	WEL	A	-	1	Low	MDH Located well to 100 ft below ground surface.(ODCR)
19	Figure 15-1	ROW	CROES, FRED	00280427	White Bear Lake	-	55110	WEL	U	-	1	Low	MDH Unlocated well to 110 ft below ground surface.
20	Figure 15-2	3103021340015	VL-921	00249970	Mahtomedi	12 LONG LAKE RD	55115	WEL	A	-	1	Moderate	MDH Located well to 160 ft below ground surface.
21	Figure 15-1	363022310001	MANITOU RIDGE GOLF	00127293	White Bear Lake	3200 MCKNIGHT RD	55110	WEL	A	-	1	Low	MDH Located well to 397 ft below ground surface.(OPDC)
22	Figure 15-1	363022310001	RAMSEY COUNTY PARKS	00541676	White Bear Lake	3200 MCKNIGHT RD	55110	WEL	A	-	1	Low	MDH Located well to 330 ft below ground surface.(OPDC)
23	Figure 15-2	363022140001	LAKEWOOD COLLEGE	00415901	White Bear Lake	3401 CENTURY AV	55110	WEL	A	-	1	Low	MDH Located well to 320 ft below ground surface.(OPDC)
24	Figure 15-1	353022310002	KARINEMI	00280422	White Bear Lake	1920 ORCHARD LN	55110	WEL	U	-	1	Low	MDH Located well to 213 ft below ground surface.
25	Figure 15-1	353022410003	WHITE BEAR LAKE 4	00226566	White Bear Lake	3359 MCKNIGHT RD	55110	WEL	A	-	1	Low	MDH Located well to 476 ft below ground surface.(OPCJ)
26	Figure 15-2	3103021410001	-	00255943	Mahtomedi	1011 LINCOLNTOWN AV	55115	WEL	I	-	1	Low	MDH Located well to 198 ft below ground surface.(OSTP)
27	Figure 15-1	ROW	CALLS MUNI. GOLF C.	00233148	White Bear Lake	-	55110	WEL	A	-	1	Low	MDH Unlocated well to 397 ft below ground surface.
28	Figure 15-1	363022240074	WHITE BEAR LAKE 3	00205733	White Bear Lake	ORCHARD LA	55110	WEL	A	-	1	Low	MDH Located well to 513 ft below ground surface.(OPCJ)
29	Figure 15-1	353022130011	ROBERTS, DARRELL	00138392	White Bear Lake	3390 WHITE BEAR AV	55110	WEL	A	-	1	Low	MDH Located well to 192 ft below ground surface.(OSTP)
30	Figure 15-1	363022230012	WHITE BEAR LAKE 1	00014005	White Bear Lake	2401 ORCHARD LA	55110	WEL	A	-	1	Low	MDH Located well to 490 ft below ground surface.(CJDN)
31	Figure 15-1	363022230012	WHITE BEAR LAKE 2	00222880	White Bear Lake	2401 ORCHARD LA	55110	WEL	A	-	1	Low	MDH Located well to 970 ft below ground surface.(CWMS)
32	Figure 15-2	3203021230004	JENSEN, L. D.	00279900	Mahtomedi	600 STILLWATER RD	55115	WEL	A	-	1	Moderate	MDH Unlocated well to 152 ft below ground surface.
33	Figure 15-2	3103021140025	DOUGHERTY, DENNIS	00178277	Mahtomedi	81 EDGECUMBE DR	55115	WEL	A	-	1	Low	MDH Located well to 230 ft below ground surface.(OSTP)
34	Figure 15-1	ROW	-	00271855	White Bear Lake	3531 WHITE BEAR AV	55110	WEL	U	-	1	Low	MDH Unlocated well to unknown depth
35	Figure 15-1	363022220108	-	1000025626	White Bear Lake	3497 EMERALD DR	55110	WEL	U	-	1	Low	MDH Located well to unknown depth
36	Figure 15-2	3103021110015	MCCARTHY, BILL	00589194	Mahtomedi	145 EDGECUMBE DR	55115	WEL	A	-	1	Moderate	MDH Located well to 201 ft below ground surface.(OSTP)
37	Figure 15-1	353022210035	HAYS	00280425	White Bear Lake	1950 DELL ST	55110	WEL	U	-	1	Low	MDH Located well to 108 ft below ground surface.
38	Figure 15-2	3103021120020	DIETHELM, PAUL	00485927	Mahtomedi	383 ARCWOOD RD	55115	WEL	A	-	1	Moderate	MDH Located well to 221 ft below ground surface.(OSTP)
39	Figure 15-1	353022210037	HAYS	00280426	White Bear Lake	1976 DELL ST	55110	WEL	U	-	1	Low	MDH Located well to 100 ft below ground surface.
40	Figure 15-2	ROW	PFEFFER, GERALD H.	00162180	Mahtomedi	598 FLORENCE AV	55115	WEL	A	-	1	Moderate	MDH Located well to 202 ft below ground surface.(OPDC)
41	Figure 15-2	3103021110029	-	00609468	Mahtomedi	160 OLD WILDWOOD RD	55115	WEL	A	-	1	Moderate	MDH Located well to 200 ft below ground surface.(OSTP)
42	Figure 15-2	3103021110028	-	00652485	Mahtomedi	180 OLD WILDWOOD RD	55115	WEL	A	-	1	Moderate	MDH Located well to 200 ft below ground surface.(OSTP)
43	Figure 15-2	3103021120006	LIESENFELD, CHUCK	00710146	Mahtomedi	328 OLD WILDWOOD RD	55115	WEL	A	-	1	Moderate	MDH Located well to 160 ft below ground surface.(OSTP)
44	Figure 15-2	3103021110001	HAMERNICK, BRIAN	00705331	Mahtomedi	250 OLD WILDWOOD RD	55115	WEL	A	-	1	Moderate	MDH Located well to 196 ft below ground surface.(OSTP)
45	Figure 15-2	3103021110031	-	00652486	Mahtomedi	120 OLD WILDWOOD RD	55115	WEL	A	-	1	Moderate	MDH Located well to 205 ft below ground surface.(OSPC)
46	Figure 15-1	353022210022	HAYES	00280423	White Bear Lake	3563 JERRY ST	55110	WEL	U	-	1	Low	MDH Located well to 104 ft below ground surface.
47	Figure 15-2	3103021120003	HAYS, CHUCK	00280913	Mahtomedi	1008 W 1ST ST # 516	55115	WEL	U	-	1	Moderate	MDH Unlocated well to 160 ft below ground surface.
48	Figure 15-1	363022220013	-	1000025627	White Bear Lake	2347 JANSEN AVE	55110	WEL	U	-	1	Low	MDH Located well to unknown depth
49	Figure 15-2	3103021220011	MAHTOMEDI DAIRY QUEEN 1	00267648	Mahtomedi	12096 EVERTON AVE N	55115	WEL	A	-	1	Low	MDH Located well to unknown depth
50	Figure 15-2	3103021120007	FREEMAN, CHARLES R.	00112550	Mahtomedi	416 WILDWOOD RD	55115	WEL	A	-	1	Moderate	MDH Located well to 217 ft below ground surface.(OSTP)
51	Figure 15-2	3203021220001	LAKESIDE CLUB	00277275	Mahtomedi	10 OLD WILDWOOD RD	55115	WEL	U	-	1	Moderate	MDH Located well to unknown depth
52	Figure 15-2	3103021110003	WILLIAMS, CLARENCE	00447182	Mahtomedi	185 OLD WILDWOOD RD	55115	WEL	A	-	1	Moderate	MDH Located well to 166 ft below ground surface.(OPDC)
53	Figure 15-2	3103021110006	STEARNS, REX A.	00126063	Mahtomedi	83 OLD WILDWOOD RD	55115	WEL	A	-	1	Moderate	MDH Located well to 124 ft below ground surface.(QBAA)
54	Figure 15-3	363022220007	-	1000025625	White Bear Lake	2332 COUNTRY ROAD E E	55110	WEL	U	-	1	Low	MDH Located well to unknown depth
55	Figure 15-3	363022120027	STANDARD STN.-H. ROSENWO	00208060	White Bear Lake	E CR	55110	WEL	A	-	1	Low	MDH Located well to 245 ft below ground surface.(OSTP)
56	Figure 15-3	ROW	MARTENS GREENHOUSE	00233542	White Bear Lake	-	55110	WEL	A	-	1	Low	MDH Located well to 109 ft below ground surface.

Appendix C

Potential Contaminant Source Inventory

Part II Wellhead Protection Plan Update
City of White Bear Lake, Minnesota
Drinking Water Supply ID 1620024

PCSI ID	Depicted on Figure	PIN	Facility Name	Program ID	Address	City	Zip Code	PCSI Code	Status	Material	Total	Groundwater Vunerability	Comment
57	Figure 15-4	ROW	DNR OB 82067	00825069	Mahtomedi	-	55115	WEL	A	-	1	High	MDH Located well to 210 ft below ground surface.(OPSH)
58	Figure 15-4	ROW	DNR OB 82066	00825068	Mahtomedi	1200 WARNER RD	55115	WEL	A	-	1	High	MDH Located well to 350 ft below ground surface.(CJDN)
59	Figure 15-4	ROW	WS-3 (DNR OB 83067)	00797201	Mahtomedi	N/A OLD WILDWOOD RD	55115	WEL	A	-	1	High	MDH Located well to 154 ft below ground surface.
60	Figure 15-4	3003021340002	MAHTOMEDI 5	00433255	Mahtomedi	600 STILLWATER RD	55115	WEL	A	-	1	Low	MDH Located well to 470 ft below ground surface.(OPCJ)
61	Figure 15-3	263022340023	MCCOLLAR, MAURICE	00413687	White Bear Lake	3563 WHITE BEAR AV	55110	WEL	A	-	1	Low	MDH Located well to 130 ft below ground surface.
62	Figure 15-3	253022340103	BELAIRE BAPTIST CHURCH	00013986	White Bear Lake	2445 E CR	55110	WEL	A	-	1	Low	MDH Located well to 172 ft below ground surface.(OSTP)
63	Figure 15-3	ROW	LEFEBORE	00280067	White Bear Lake	-	55110	WEL	U	-	1	Low	MDH Unlocated well to 178 ft below ground surface.
64	Figure 15-3	ROW	PRICE, STAN	00279835	White Bear Lake	-	55110	WEL	A	-	1	Low	MDH Unlocated well to 166 ft below ground surface.
65	Figure 15-4	ROW	MINK FARM 2	00248987	Mahtomedi	-	55115	WEL	I	-	1	Moderate	MDH Located well to 147 ft below ground surface.(OSTP)
66	Figure 15-4	3003021430049	MINK FARM 1	00248988	Mahtomedi	140 RIDGE WAY	55115	WEL	I	-	1	Moderate	MDH Located well to 146 ft below ground surface.(OSTP)
67	Figure 15-3	253022330072	HOUGHTON, DAVID	00255686	White Bear Lake	3675 ST. REGIS DR	55110	WEL	I	-	1	Low	MDH Located well to 157 ft below ground surface.(OSTP)
68	Figure 15-4	ROW	MINK FARM NO.3	00249023	Mahtomedi	-	55115	WEL	I	-	1	Moderate	MDH Located well to 170 ft below ground surface.(OSTP)
69	Figure 15-3	263022440068	BACCHUS	1000025633	White Bear Lake	3700 HAZEL ST N	55110	WEL	U	-	1	Low	MDH Located well to unknown depth
70	Figure 15-3	263022410109	BACCHUS	1000025634	White Bear Lake	3744 HAZEL ST N	55110	WEL	U	-	1	Low	MDH Located well to unknown depth
71	Figure 15-3	263022410110	BACCHUS	1000025635	White Bear Lake	3750 HAZEL ST N	55110	WEL	U	-	1	Low	MDH Located well to unknown depth
72	Figure 15-3	263022410111	BACCHUS	1000025636	White Bear Lake	4801 HIGHWAY 61 SUITE 100	55110	WEL	U	-	1	Low	MDH Located well to unknown depth
73	Figure 15-4	2903021320007	ALTSTATT, RAY	00208510	Mahtomedi	107 BIRCHWOOD RD	55115	WEL	A	-	1	High	MDH Located well to 170 ft below ground surface.(OPDC)
74	Figure 15-3	263022410114	BACCHUS	1000025637	White Bear Lake	3780 HAZEL ST N	55110	WEL	U	-	1	Low	MDH Located well to unknown depth
75	Figure 15-4	ROW	WILDWOOD PARK	00279466	Mahtomedi	-	55115	WEL	U	-	1	High	MDH Unlocated well to 570 ft below ground surface.( )
76	Figure 15-4	3003021420032	-	00277918	Birchwood Village	612 HALL AV	55090	WEL	A	-	1	Moderate	MDH Located well to unknown depth
77	Figure 15-3	263022420021	SWANSON, RICHARD	1000025631	White Bear Lake	2127 BLOMQUIST AVE	55110	WEL	U	-	1	Low	MDH Located well to unknown depth
78	Figure 15-4	3003021410002	JOHNSON, DALE	00745072	Mahtomedi	3 BIRCHWOOD RD	55115	WEL	A	-	1	Moderate	MDH Located well to 147 ft below ground surface.(QWTA)
79	Figure 15-4	3003021420017	SHIPSTED, HARRY	00272974	Birchwood Village	538 HALL AVE	55090	WEL	A	-	1	Moderate	MDH Unlocated well to 70 ft below ground surface.
80	Figure 15-3	253022240024	HANSEN	00013984	White Bear Lake	3865 BELLAIRE	55110	WEL	A	-	1	Moderate	MDH Located well to 200 ft below ground surface.(OSTP)
81	Figure 15-4	3003021230006	KAYE, JIM	00280911	Birchwood Village	31 OAKRIDGE DR	55110	WEL	U	-	1	Low	MDH Unlocated well to 105 ft below ground surface.
82	Figure 15-3	263022140089	BACCHUS WELL	00226567	White Bear Lake	4701 HIGHWAY 61	55110	WEL	A	-	1	Low	MDH Located well to 463 ft below ground surface.(CJSL)
83	Figure 15-4	3003021230053	BURNS	1000025747	Birchwood Village	3850 E COUNTY LINE N	55110	WEL	U	-	1	Low	MDH Located well to 100 ft below ground surface.
84	Figure 15-3	253022240059	WHITE BEAR LAKE AREA SCH	00655934	White Bear Lake	2399 CEDAR AV	55110	WEL	A	-	1	Moderate	MDH Located well to 350 ft below ground surface.
85	Figure 15-4	3003021240069	RANKIN	00280288	Birchwood Village	405 BIRCHWOOD AVE	55110	WEL	U	-	1	Low	MDH Located well to 164 ft below ground surface.
86	Figure 15-3	253022120039	WHITE BEAR TOWNSHIP 1	00226570	White Bear Township	1281 HAMMOND RD	55110	WEL	A	-	1	Moderate	MDH Located well to 445 ft below ground surface.(CJDN)
87	Figure 15-4	2903021220042	BEVINS, ROBERT	00208508	Mahtomedi	436 PARK PL	55115	WEL	A	-	1	Low	MDH Located well to 200 ft below ground surface.(OPDC)
88	Figure 15-3	253022210086	BREAM & SON	00280063	White Bear Lake	2465 GISELLA BLVD E	55110	WEL	U	-	1	Moderate	MDH Located well to 118 ft below ground surface.
89	Figure 15-4	3003021220058	MILLER, M.W.	00233729	Birchwood Village	4000 EASTCO. LINE	55110	WEL	A	-	1	Moderate	MDH Located well to 225 ft below ground surface.(INDT)
90	Figure 15-3	253022210080	BREEM & SON	00280060	White Bear Lake	2442 MARTIN WAY	55110	WEL	U	-	1	Moderate	MDH Located well to 44 ft below ground surface.
91	Figure 15-3	253022210029	WALBERG	00280059	White Bear Lake	4015 JAY LN	55110	WEL	U	-	1	Moderate	MDH Located well to 45 ft below ground surface.
92	Figure 15-3	253022210011	BREEM & SON	00279834	White Bear Lake	2437 MARTIN WAY	55110	WEL	A	-	1	Moderate	MDH Unlocated well to 44 ft below ground surface.
93	Figure 15-3	253022210015	BREEM & SON	00280061	White Bear Lake	5789 LAKE AVE	55110	WEL	U	-	1	Moderate	MDH Located well to 56 ft below ground surface.
94	Figure 15-3	253022210013	BREEM & SON	00280065	White Bear Lake	2451 MARTIN WAY	55110	WEL	U	-	1	Moderate	MDH Located well to 50 ft below ground surface.
95	Figure 15-3	253022210012	BREEM & SON	00280064	White Bear Lake	2443 MARTIN WAY	55110	WEL	U	-	1	Moderate	MDH Located well to 48 ft below ground surface.
96	Figure 15-4	2903021220015	-	1000020331	Mahtomedi	625 PARK AV	55115	WEL	U	-	1	Low	MDH Located well to unknown depth
97	Figure 15-3	253022210008	BREAM & SON	00280062	White Bear Lake	4042 JAY LN	55110	WEL	U	-	1	Moderate	MDH Located well to 47 ft below ground surface.
98	Figure 15-4	2903021220062	YRIGOYEN, DANIEL	00112412	Mahtomedi	709 PARK AV	55115	WEL	A	-	1	Low	MDH Located well to 172 ft below ground surface.(OSPC)
99	Figure 15-3	253022210021	BREEM AND SON	00280066	White Bear Lake	4065 JAY LN	55110	WEL	U	-	1	Moderate	MDH Located well to 64 ft below ground surface.
100	Figure 15-3	253022210002	BEAUDRY, KEN	00566853	White Bear Lake	2490 F CR	55110	WEL	A	-	1	Moderate	MDH Located well to 36 ft below ground surface.
101	Figure 15-3	ROW	BEAUDRY, KEN	00566854	White Bear Lake	2490 F CR	55110	WEL	A	-	1	Moderate	MDH Located well to 36 ft below ground surface.
102	Figure 15-3	253022210001	BEAUDRY, KEN	00566852	White Bear Lake	2490 F CR	55110	WEL	A	-	1	Moderate	MDH Located well to 38 ft below ground surface.
103	Figure 15-4	2003021340010	MAHTOMEDI 4	00208506	Mahtomedi	118 HICKORY ST	55115	WEL	A	-	1	Low	MDH Located well to 435 ft below ground surface.(CJDN)
104	Figure 15-3	243022340015	WHITE BEAR TOWNSHIP 2A	00676446	White Bear Township	1281 HAMMOND RD	55110	WEL	A	-	1	Moderate	MDH Located well to 420 ft below ground surface.(OPCJ)
105	Figure 15-4	1903021330007	NORTON, DON	00233922	Birchwood Village	117 WILDWOOD AV	55110	WEL	A	-	1	Moderate	MDH Located well to 126 ft below ground surface.(INDT)
106	Figure 15-3	243022430076	FRANZMIER, ART	00013982	White Bear Township	2582 RALPH ST	55110	WEL	A	-	1	Moderate	MDH Located well to 144 ft below ground surface.(OSTP)
107	Figure 15-3	243022430075	ANDERSON, R.C.	1000025638	White Bear Township	2576 RALPH ST	55110	WEL	U	-	1	Moderate	MDH Located well to unknown depth
108	Figure 15-3	243022340023	JOHNSON	00013985	White Bear Lake	4116 MOSBY RD	55110	WEL	A	-	1	Moderate	MDH Located well to 68 ft below ground surface.
109	Figure 15-3	243022430059	SAARI, TED	00013981	White Bear Township	2590 ARBOR DR	55110	WEL	A	-	1	Moderate	MDH Located well to 165 ft below ground surface.(OSTP)
110	Figure 15-5	2003021440028	LANDIN	00280910	Mahtomedi	433 HARDWOOD LN E	55115	WEL	U	-	1	Low	MDH Unlocated well to 167 ft below ground surface.
111	Figure 15-3	243022330024	NUTGE, JEN	00280392	White Bear Lake	2316 LILAC LN	55110	WEL	U	-	1	Low	MDH Located well to 181 ft below ground surface.

Appendix C

Potential Contaminant Source Inventory

Part II Wellhead Protection Plan Update
City of White Bear Lake, Minnesota
Drinking Water Supply ID 1620024

PCSI ID	Depicted on Figure	PIN	Facility Name	Program ID	Address	City	Zip Code	PCSI Code	Status	Material	Total	Groundwater Vunerability	Comment
112	Figure 15-4	2003021340096	KEEN, ADOLPH	00208496	Mahtomedi	386 ARBOR ST	55115	WEL	A	-	1	Low	MDH Located well to 141 ft below ground surface.(OSTP)
113	Figure 15-3	243022330021	-	00255915	White Bear Lake	2286 LILAC LA	55110	WEL	I	-	1	Low	MDH Located well to 205 ft below ground surface.(OSTP)
114	Figure 15-3	243022320023	HAYS CONSTRUCTION	00280391	White Bear Lake	2305 LILAC LN	55110	WEL	U	-	1	Low	MDH Located well to 162 ft below ground surface.
115	Figure 15-3	243022420051	-	00272129	White Bear Township	4208 LAKEWOOD AV	55110	WEL	I	-	1	Moderate	MDH Located well to 120 ft below ground surface.(OSTP)
116	Figure 15-5	2003021420064	MAHTOMEDI 3	00208497	Mahtomedi	600 STILLWATER RD	55115	WEL	A	-	1	Low	MDH Located well to 392 ft below ground surface.(OPCJ)
117	Figure 15-5	2003021410041	KRIEGLMEIR, JOSEPH	00170569	Mahtomedi	394 MAPLE	55115	WEL	A	-	1	Low	MDH Located well to 200 ft below ground surface.(OSPC)
118	Figure 15-5	2003021420057	-	1000032910	Mahtomedi	204 MAPLE ST	55115	WEL	I	-	1	Low	MDH Located well to unknown depth
119	Figure 15-5	ROW	ACKERMAN, KEITH	00139008	Mahtomedi	PENNINGTON AV	55115	WEL	A	-	1	Low	MDH Unlocated well to 140 ft below ground surface.
120	Figure 15-5	2103021230008	MATHISON, TOM	00437340	Grant	469 MAPLE ST	55115	WEL	A	-	1	Low	MDH Located well to 185 ft below ground surface.(OPDC)
121	Figure 15-5	2003021140033	KEISTER, KENNETH	00208494	Mahtomedi	BEACONFIELD RD	55115	WEL	A	-	1	Low	MDH Located well to 175 ft below ground surface.(OSTP)
122	Figure 15-5	2003021140021	BACCHUS CONSTRUCTION	00280909	Mahtomedi	1340 HALLAM AVE	55115	WEL	U	-	1	Low	MDH Unlocated well to 158 ft below ground surface.
123	Figure 15-5	2103021230008	LANNIER, MICHAEL	00780089	Grant	3753 BRIARWOOD AV	55115	WEL	A	-	1	Low	MDH Unlocated well to 170 ft below ground surface.
124	Figure 15-5	2003021240066	MAHTOMEDI MIDDLE SCHOOL	00208495	Mahtomedi	1520 MAHTOMEDI AV	55115	WEL	A	-	1	Low	MDH Located well to 272 ft below ground surface.(OPDC)
125	Figure 15-5	2103021230009	CAMPBELL, CRAIG	00257977	Grant	3765 BRIARWOOD AV	55115	WEL	U	-	1	Low	MDH Located well to unknown depth
126	Figure 15-5	2103021230006	DAVIS, JOE	00208500	Grant	3753 BRIARWOOD AVE	55115	WEL	A	-	1	Low	MDH Located well to 200 ft below ground surface.(OPDC)
127	Figure 15-5	2003021130070	LETOURNEAU, JERRY & SUE	00153493	Mahtomedi	1420 HARMONY ST	55115	WEL	A	-	1	Low	MDH Located well to 155 ft below ground surface.(OSTP)
128	Figure 15-5	2103021220003	HAGE HOMES	00840724	Grant	8861 IDEAL AVE N	55115	WEL	A	-	1	Low	MDH Unlocated well to 180 ft below ground surface.
129	Figure 15-5	2103021220003	OESTREICH, MERRIL	00420312	Grant	8861 IDEAL AV	55115	WEL	A	-	1	Low	MDH Located well to 170 ft below ground surface.(OPDC)
130	Figure 15-5	2003021110010	HILL, BILL / MORNINGSTAR	00665320	Mahtomedi	450 EMERALD LA	55115	WEL	A	-	1	Low	MDH Located well to 187 ft below ground surface.(OPDC)
131	Figure 15-5	2003021220011	SHERBEL, DAVID	00469804	Dellwood	1651 BRIARWOOD	55115	WEL	A	-	1	Low	MDH Located well to 125 ft below ground surface.(QBAA)
132	Figure 15-5	1903021210004	NICHOLSON, FORD J.	00566130	Dellwood	54 PENINSULA RD	55110	WEL	A	-	1	Moderate	MDH Located well to 127 ft below ground surface.(QBAA)
133	Figure 15-5	2003021110012	EXCEL HOMES, INC.	00672869	Mahtomedi	431 EMERALD LA	55115	WEL	A	-	1	Low	MDH Located well to 168 ft below ground surface.(OPDC)
134	Figure 15-5	1903021210003	HART, KEVIN	00487536	Dellwood	53 PENNSYLVANIA RD	55110	WEL	A	-	1	Moderate	MDH Located well to 128 ft below ground surface.(QBAA)
135	Figure 15-5	2003021110015	-	00652483	Mahtomedi	401 EMERALD LA	55115	WEL	A	-	1	Low	MDH Located well to 145 ft below ground surface.(OSTP)
136	Figure 15-5	2003021110014	ROBERT HOMES, INC.	00652474	Mahtomedi	411 EMERALD	55115	WEL	A	-	1	Low	MDH Located well to 141 ft below ground surface.(OSTP)
137	Figure 15-5	2003021110013	EXCEL HOMES	00672855	Mahtomedi	421 EMERALD LA	55115	WEL	A	-	1	Low	MDH Located well to 183 ft below ground surface.(OSPC)
138	Figure 15-5	2003021110016	JOHNSON, GREG	00678107	Mahtomedi	400 EMERALD LA	55115	WEL	A	-	1	Low	MDH Located well to 130 ft below ground surface.(OSTP)
139	Figure 15-5	2003021210067	MARKELL, BRADY & LAUREN	00820287	Mahtomedi	3511 LAKE ELMO AVE N	55115	WEL	A	-	1	Low	MDH Unlocated well to 175 ft below ground surface.
140	Figure 15-5	1903021210007	JOHNSON, JOE E.	00280908	Dellwood	PO BOX 117508	55110	WEL	U	-	1	Moderate	MDH Unlocated well to 148 ft below ground surface.
141	Figure 15-5	2003021110013	DEGEZELLE, KEVIN & KELLY	00811798	Mahtomedi	421 EMERALD LN	55115	WEL	A	-	1	Low	MDH Unlocated well to 140 ft below ground surface.
142	Figure 15-5	1903021210006	MATSON, JAMES & BECKY	00546333	Dellwood	15 GARDNER LA	55110	WEL	A	-	1	Moderate	MDH Located well to 157 ft below ground surface.(QBAA)
143	Figure 15-5	2103021220001	ROHRER, ANTHONY J.	00112536	Grant	8144 89TH ST	55115	WEL	A	-	1	Low	MDH Located well to 172 ft below ground surface.(OSPC)
144	Figure 15-5	2003021210026	BARTHOLDI, CHARLES	00182803	Mahtomedi	231 QUAIL RD	55115	WEL	A	-	1	Low	MDH Located well to 290 ft below ground surface.(OPDC)
145	Figure 15-5	1703021340050	LA ROCHE	00424143	Mahtomedi	251 QUAIL	55115	WEL	A	-	1	Low	MDH Located well to 250 ft below ground surface.(OPDC)
146	Figure 15-5	1703021430006	DERRICK CONSTRUCTION	00558221	Mahtomedi	290 LAUREL AV	55115	WEL	A	-	1	Low	MDH Located well to 280 ft below ground surface.(OPDC)
147	Figure 15-5	1703021430011	BREAM	00280906	Mahtomedi	354 QUAIL RD	55115	WEL	U	-	1	Low	MDH Unlocated well to 207 ft below ground surface.
148	Figure 15-5	1703021340032	WECHSLER, TIBIE	00577023	Mahtomedi	219 HAZEL AV	55115	WEL	A	-	1	Low	MDH Located well to 100 ft below ground surface.(QBAA)
149	Figure 15-5	ROW	-	00785310	Mahtomedi	235 HAZEL AV	55115	WEL	A	-	1	Low	MDH Located well to 160 ft below ground surface.(QBAA)
150	Figure 15-5	ROW	MEYER, JEFF	00464656	Mahtomedi	240 HAZEL ST	55115	WEL	A	-	1	Low	MDH Located well to 300 ft below ground surface.(OPDC)
151	Figure 15-5	1703021340037	JOHNSON, WILLIAM	00767947	Mahtomedi	260 HAZEL AV	55115	WEL	A	-	1	Low	MDH Located well to 176 ft below ground surface.(QBAA)
152	Figure 15-5	1703021340004	BLANSKI, SAM	00404204	Mahtomedi	357 QUAIL RD	55115	WEL	A	-	1	Low	MDH Located well to 290 ft below ground surface.(OPDC)
153	Figure 15-5	1703021340006	-	00565231	Mahtomedi	370 QUAIL RD	55115	WEL	A	-	1	Low	MDH Located well to 210 ft below ground surface.(OPDC)
154	Figure 15-5	ROW	LEKO, PETER & KAREN	00544266	Mahtomedi	835 MORGAN ST	55110	WEL	A	-	1	Low	MDH Located well to 244 ft below ground surface.(OPDC)
155	Figure 15-5	1703021340059	WITTENBEL, JEFF	00432979	Mahtomedi	2139	55110	WEL	A	-	1	Low	MDH Located well to 190 ft below ground surface.(OPDC)
156	Figure 15-5	1703021430002	-	00575039	Dellwood	352 QUAIL RD	55110	WEL	A	-	1	Low	MDH Located well to 120 ft below ground surface.(QBAA)
157	Figure 15-5	1703021420002	LILLIE, JOHN	00678101	Dellwood	368 QUAIL ST	55110	WEL	A	-	1	Moderate	MDH Located well to 242 ft below ground surface.(OPDC)
158	Figure 15-5	1703021420004	MILLER, BOB	00135322	Dellwood	360 QUAIL AV	55110	WEL	A	-	1	Moderate	MDH Located well to 200 ft below ground surface.(OPDC)
159	Figure 15-5	ROW	DIEH, J.R.	00112314	Dellwood	82 MANYLEVELS RD	55110	WEL	A	-	1	Moderate	MDH Located well to 245 ft below ground surface.(OPDC)
160	Figure 15-5	1703021410004	SHROYER, ARCH	00112331	Dellwood	76 MANYLEVELS RD	55110	WEL	A	-	1	Moderate	MDH Located well to 245 ft below ground surface.(OSTP)
161	Figure 15-5	1703021420004	MILLER, BOB	00135314	Dellwood	362 QUAL AV	55110	WEL	A	-	1	Moderate	MDH Located well to 220 ft below ground surface.(OPDC)
162	Figure 15-5	1703021410025	-	00208491	Dellwood	MANYLEVELS RD	55110	WEL	A	-	1	Moderate	MDH Located well to 240 ft below ground surface.(OPDC)
163	Figure 15-5	ROW	-	00208492	Dellwood	47 EVERGREEN RD	55110	WEL	A	-	1	Moderate	MDH Located well to 217 ft below ground surface.(INDT)
164	Figure 15-5	1703021410027	-	00542585	Dellwood	43 EVERGREEN	55110	WEL	A	-	1	Moderate	MDH Located well to 130 ft below ground surface.(QBAA)
165	Figure 15-5	1703021410019	WALLIS, GERALD	00617654	Dellwood	63 GLENEDGE RD	55110	WEL	A	-	1	Moderate	MDH Located well to 295 ft below ground surface.(OSPC)
166	Figure 15-5	1703021410019	FOX, LEONARD	00280905	Dellwood	63 GLEN EDGE RD	55110	WEL	U	-	1	Moderate	MDH Unlocated well to 270 ft below ground surface.
167	Figure 15-5	1703021410017	ROSANDER, DARREL	00411631	Dellwood	61 GLENEDGE RD	55110	WEL	A	-	1	Moderate	MDH Located well to 290 ft below ground surface.(OPDC)
168	Figure 15-5	1703021410001	SEIDENKRANZ, ED	00208490	Dellwood	GLENEDGE RD	55110	WEL	A	-	1	Moderate	MDH Located well to 380 ft below ground surface.(CJDN)

Appendix C

Potential Contaminant Source Inventory

Part II Wellhead Protection Plan Update
City of White Bear Lake, Minnesota
Drinking Water Supply ID 1620024

PCSI ID	Depicted on Figure	PIN	Facility Name	Program ID	Address	City	Zip Code	PCSI Code	Status	Material	Total	Groundwater Vunerability	Comment
169	Figure 15-5	1703021410016	DOYLE	00124400	Dellwood	41 EVERGREEN RD	55110	WEL	A	-	1	Moderate	MDH Located well to 217 ft below ground surface.(OSTP)
170	Figure 15-5	1703021140016	SEIDENKRANZ, ED	00208489	Dellwood	57 GLEN EDGE RD	55110	WEL	A	-	1	Moderate	MDH Located well to 270 ft below ground surface.(OPDC)
171	Figure 16-1	353022320035	COMSTOCK AND SONS	CF-8312	White Bear Lake	4701 HIGHWAY 61 N	55110	SPL	C	C010	1	Moderate	MDA Spill of Pesticides.
172	Figure 16-1	353022320035	COMSTOCK AND SONS	CF-8312	White Bear Lake	1818 BUERKLE RD	55110	SPL	C	C010	1	Moderate	MDA Spill of Pesticides.
173	Figure 16-1	353022340018	Kmart Store 3034	LS0019749	White Bear Lake	3201 White Bear Ave N	55110	LUST	A	C000	1	Moderate	Leak Site Preferred ID
174	Figure 16-1	353022340018	Kmart Property Redevelopment	PB4747	White Bear Lake	3201 White Bear Ave N	55110	PCS	A	-	1	Moderate	Brownfields Preferred ID
175	Figure 16-1	353022340018	K Mart #3034	TS0003887	White Bear Lake	3201 White Bear Ave N	55110	UST	A	F000	1	Moderate	Underground 3 tank(s) up to 8000 gallons with Used or waste oil, Fuel Oil
176	Figure 16-2	0602921210007	Greens North	VP9880	Oakdale	See location description	55128	PCS	A	C000	1	Moderate	Brownfields Preferred ID
177	Figure 16-2	3103021430091	Farmstead	LS0008551	Mahtomedi	Echo Lake Ave & 60th St N	55115	LUST	A	C000	1	Moderate	Leak Site Preferred ID
178	Figure 16-2	3103021430074	Frank Bastyer Residence	LS0004887	Mahtomedi	3498 Long Lake Rd	55115	LUST	A	C000	1	Moderate	Leak Site Preferred ID
179	Figure 16-2	3103021120029	Bailey Residence	TS0130662	Mahtomedi	655 Arcwood Rd	55115	UST	A	F000	1	Moderate	Underground 1 tank(s) up to 550 gallons with Fuel Oil #2
180	Figure 16-3	253022240059	Sunrise District Center	TS0003451	White Bear Lake	2399 Cedar Ave	55110	UST	A	F000	1	Moderate	Underground 1 tank(s) up to 12000 gallons with Fuel Oil
181	Figure 16-3	253022240059	WHITE BEAR SCHOOLS	4995	White Bear Lake	2399 Cedar Ave MN 55110	55110	SPL	C	C000	1	Moderate	MPCA Incidident Report Other substance
182	Figure 16-3	253022210030	NSP	28510	White Bear Lake	4007 JAY Ln MN 55110	55110	SPL	C	F000	1	Moderate	MPCA Incidident Report 14 gallons Mineral Oil
183	Figure 16-3	253022210001	Phillips 66	LS0008252	White Bear Lake	2490 County Road F E	55110	LUST	A	C000	2	Moderate	Leak Site Preferred ID
184	Figure 16-3	253022210001	Freedom Valu Center #56	TS0004265	White Bear Lake	2490 County Road F E	55110	UST	A	F000	3	Moderate	Underground 10 tank(s) up to 10000 gallons with Used or waste oil, Gasoline, Fuel Oil, E-10 - 10% ethanol & 90% gas
185	Figure 16-3	243022430046	Formerly Bel Aire Motor Repair	TS0010959	White Bear Township	2501 E County Road F	55110	UST	I	F000	1	Moderate	Underground 5 tank(s) up to 3000 gallons with Used or waste oil, Gasoline
186	Figure 16-3	253022120001	Bellaire Elementary School	TS0003475	White Bear Township	2540 E County Road F	55110	UST	I	F000	1	Moderate	Underground 1 tank(s) up to 8000 gallons with Fuel Oil
187	Figure 16-4	243022440035	-	13512	White Bear Township	2674 S SHORE Blvd MN	55110	SPL	C	F000	1	Moderate	MPCA Incidident Report Petroleum Other
188	Figure 16-4	ROW	White Bear Township	89472	White Bear Township	Portland Ave and CR F MN	55110	SPL	C	S000	1	Low	MPCA Incidident Report 50000 gallons Sewage
189	Figure 16-4	3003021220042	Skibble Estate	LS0010614	Birchwood Village	110 Birchwood Ave	55110	LUST	A	C000	1	Moderate	Leak Site Preferred ID
190	Figure 16-4	3003021220059	Haus Residence	LS0012193	Birchwood Village	175 Cedar St	55110	LUST	A	C000	1	Moderate	Leak Site Preferred ID
191	Figure 16-4	ROW	Joanne Haus	29574	Birchwood Village	175 Cedar St	55110	SPL	C	F000	1	Moderate	MPCA Incidident Report Diesel Fuel
192	Figure 16-4	3003021410010	John James	TS0019697	Mahtomedi	13 Birchwood Rd	55115	UST	I	F000	1	Moderate	Underground 1 tank(s) up to 1500 gallons with Fuel Oil
193	Figure 16-4	3003021410018	Campbell Residence	LS0021359	Mahtomedi	39 Birchwood Rd	55115	LUST	I	C000	1	Moderate	Leak Site Preferred ID
194	Figure 16-4	3003021410018	Campbell Phyllis J	TS0012649	Mahtomedi	39 Birchwood Rd	55115	UST	I	F000	2	Moderate	Underground 2 tank(s) up to 1000 gallons with Fuel Oil
195	Figure 16-4	2903021330005	Mahtomedi Lift Station L-7	TS0124710	Mahtomedi	455 Lincoln Town Ave	55115	AST	A	F000	1	High	Aboveground 1 tank up to 525 gallons with Diesel Fuel
196	Figure 16-4	2903021320014	Piccadilly Restaurant	VP28250	Mahtomedi	70 Mahtomedi Ave	55115	PCS	A	C000	1	High	Brownfields Preferred ID
197	Figure 16-4	2903021320014	Piccadilly Restaurant	LS0016670	Mahtomedi	70 Mahtomedi Ave	55115	LUST	A	C000	1	High	Leak Site Preferred ID
198	Figure 16-4	2903021310004	Mahtomedi Cashway	LS0004780	Mahtomedi	110 Mahtomedi Ave	55115	LUST	I	C000	1	Moderate	Leak Site Preferred ID
199	Figure 16-4	2903021310004	Mahtomedi Cashway	TS0004272	Mahtomedi	110 Mahtomedi Ave	55115	UST	I	F000	1	Moderate	Underground 6 tank(s) up to 4000 gallons with Gasoline and Fuel Oil
200	Figure 16-4	2903021240027	Rhonda Grimes Residence	LS0017635	Mahtomedi	91 Crocus St	55115	LUST	A	C000	1	Moderate	Leak Site Preferred ID
201	Figure 16-4	3103021440007	Mahtomedi Stormwater Outlet	-	Mahtomedi	-	55115	SROUT	A	-	1	High	Stormwater outlet in City of Mahtomedi
202	Figure 16-4	2903021320015	Mahtomedi Stormwater Outlet	-	Mahtomedi	-	55115	SROUT	A	-	1	High	Stormwater outlet in City of Mahtomedi
203	Figure 16-4	-	Mahtomedi Stormwater Outlet	-	Mahtomedi	-	55115	SROUT	A	-	1	High	Stormwater outlet in City of Mahtomedi
204	Figure 16-4	2903021320014	Mahtomedi Stormwater Outlet	-	Mahtomedi	70 Mahtomedi Ave	55115	SROUT	A	-	1	High	Stormwater outlet in City of Mahtomedi

Notes:
Items listed are depicted on Figure 15 and 16
PCSI - Potential Contaminant Source Iventory
A- Active
I - Inactive
U - Unknown
See MDH Scoping Notice for all codes and definitions

Appendix D

Inner Well Management Zone

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

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1620024 **COMMUNITY**
NAME	White Bear Lake
ADDRESS	White Bear Lake Water Superintendent, Public Works Department, 3950 Hoffman Road, White Bear Lake, MN 551103277

FACILITY (WELL) INFORMATION

NAME	Well #1
SAMPLE POINT ID	S01
UNIQUE WELL NO.	14005
COUNTY	Ramsey

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1620024 S01	**UNIQUE WELL NO.**	14005

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	1620024 S01	UNIQUE WELL NO.	14005

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	200	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		Y	200	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		Y	200	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		Y	50	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	1620024 S01	UNIQUE WELL NO.	14005

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		Y	50	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.

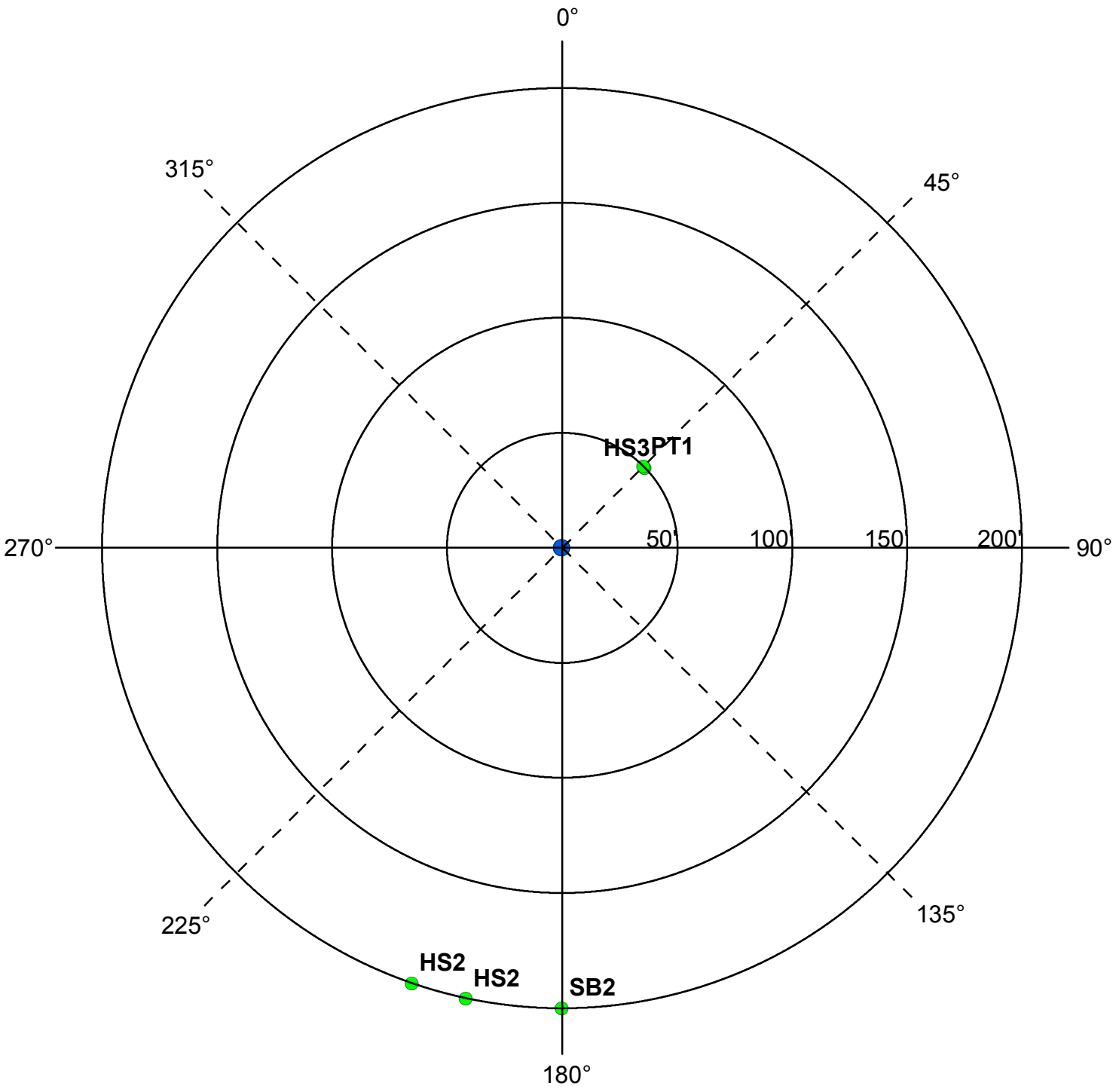
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1620024 S01	UNIQUE WELL NO.	14005

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

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



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

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

INSPECTOR	Freitag, John	DATE	4 - 14 - 2022

PWS ID / SAMPLE POINT ID	1620024 S01	UNIQUE WELL NO.	14005

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

COMMENTS

Lime and liquid fluoride stored 200 feet SW of well. Tanker truck with spent lime parked 50 feet NW of well. Petroleum noted is fuel tank for truck.

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	1620024 **COMMUNITY**
NAME	White Bear Lake
ADDRESS	White Bear Lake Water Superintendent, Public Works Department, 3950 Hoffman Road, White Bear Lake, MN 551103277

FACILITY (WELL) INFORMATION

NAME	Well #2
SAMPLE POINT ID	S02
UNIQUE WELL NO.	222880
COUNTY	Ramsey

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1620024 S02	**UNIQUE WELL NO.**	222880

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	1620024 S02	UNIQUE WELL NO.	222880

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	200	N
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	200	N
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	60	N
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		N		
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		

PWS ID / SAMPLE POINT ID	1620024 S02	UNIQUE WELL NO.	222880

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.

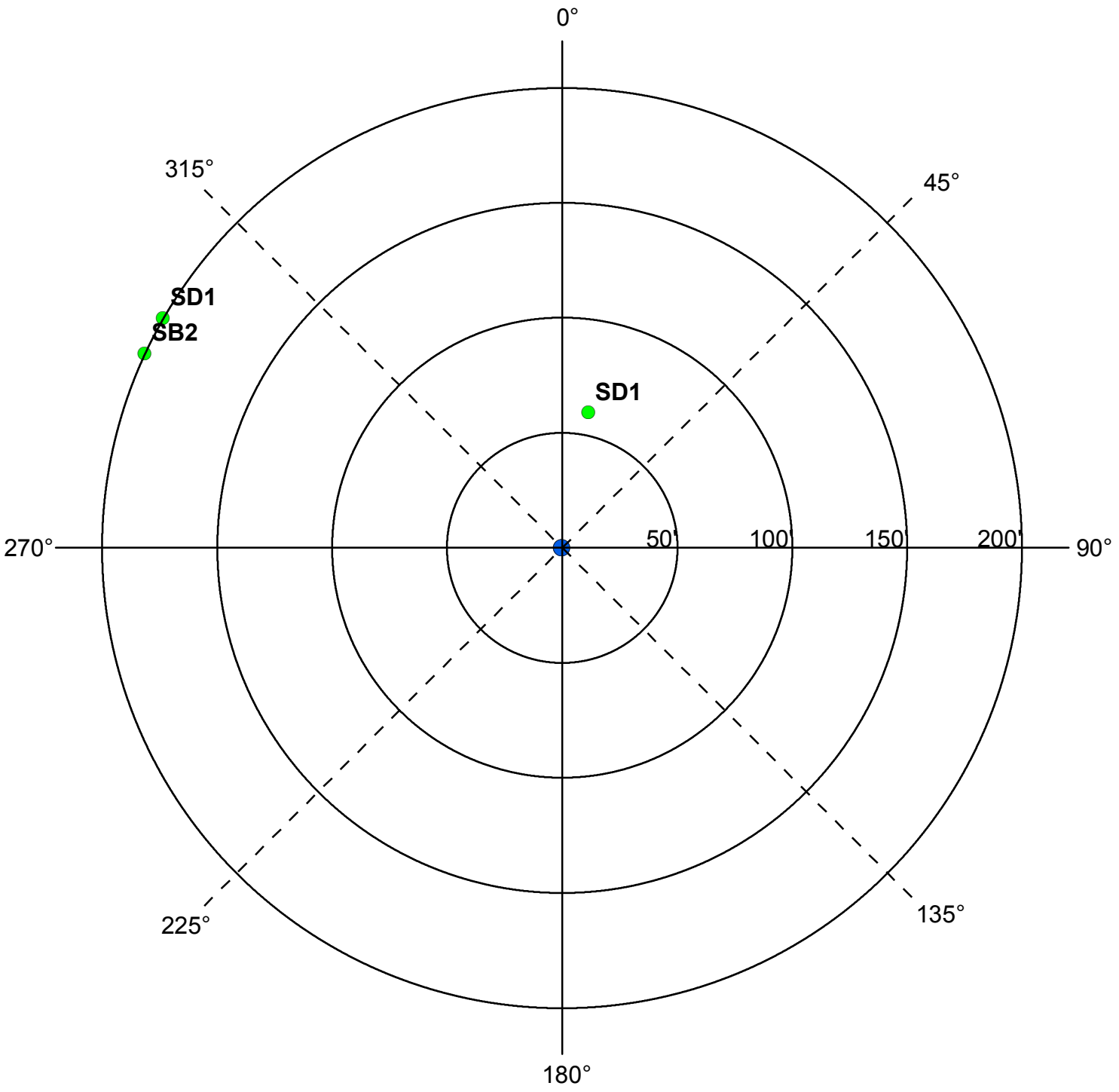
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1620024 S02	UNIQUE WELL NO.	222880

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

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



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

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

INSPECTOR	Freitag, John	DATE	4 - 14 - 2022

PWS ID / SAMPLE POINT ID	1620024 S02	UNIQUE WELL NO.	222880

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

COMMENTS

For further information, please contact:

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

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

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

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1620024 **COMMUNITY**
NAME	White Bear Lake
ADDRESS	White Bear Lake Water Superintendent, Public Works Department, 3950 Hoffman Road, White Bear Lake, MN 551103277

FACILITY (WELL) INFORMATION

NAME	Well #3
SAMPLE POINT ID	S03
UNIQUE WELL NO.	205733
COUNTY	Ramsey

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1620024 S03	**UNIQUE WELL NO.**	205733

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	1620024 S03	UNIQUE WELL NO.	205733

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	30	N
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		Y	80	N
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	50	N
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	30	N
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	110	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		

PWS ID / SAMPLE POINT ID	1620024 S03	UNIQUE WELL NO.	205733

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				
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		
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		Y	25	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.

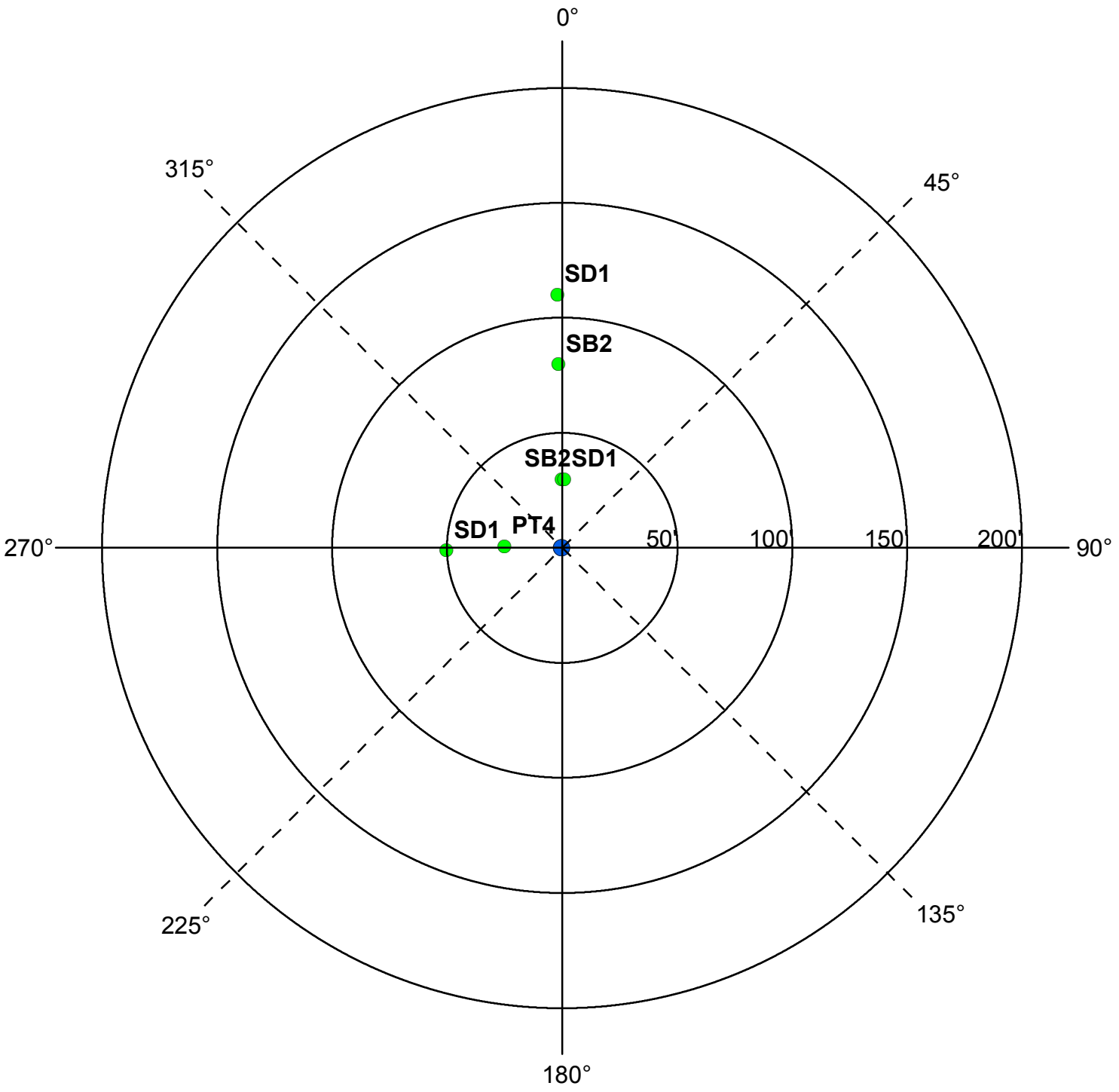
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1620024 S03	UNIQUE WELL NO.	205733

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

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



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

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

INSPECTOR	Freitag, John	DATE	4 - 14 - 2022

PWS ID / SAMPLE POINT ID	1620024 S03	UNIQUE WELL NO.	205733

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

COMMENTS

PT4 - Gas tank for back-up generator

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	1620024 **COMMUNITY**
NAME	White Bear Lake
ADDRESS	White Bear Lake Water Superintendent, Public Works Department, 3950 Hoffman Road, White Bear Lake, MN 551103277

FACILITY (WELL) INFORMATION

NAME	Well #4
SAMPLE POINT ID	S04
UNIQUE WELL NO.	226566
COUNTY	Ramsey

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1620024 S04	**UNIQUE WELL NO.**	226566

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	1620024 S04	UNIQUE WELL NO.	226566

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	200	N
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	125	N
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		Y	200	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	1620024 S04	UNIQUE WELL NO.	226566

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		Y	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.

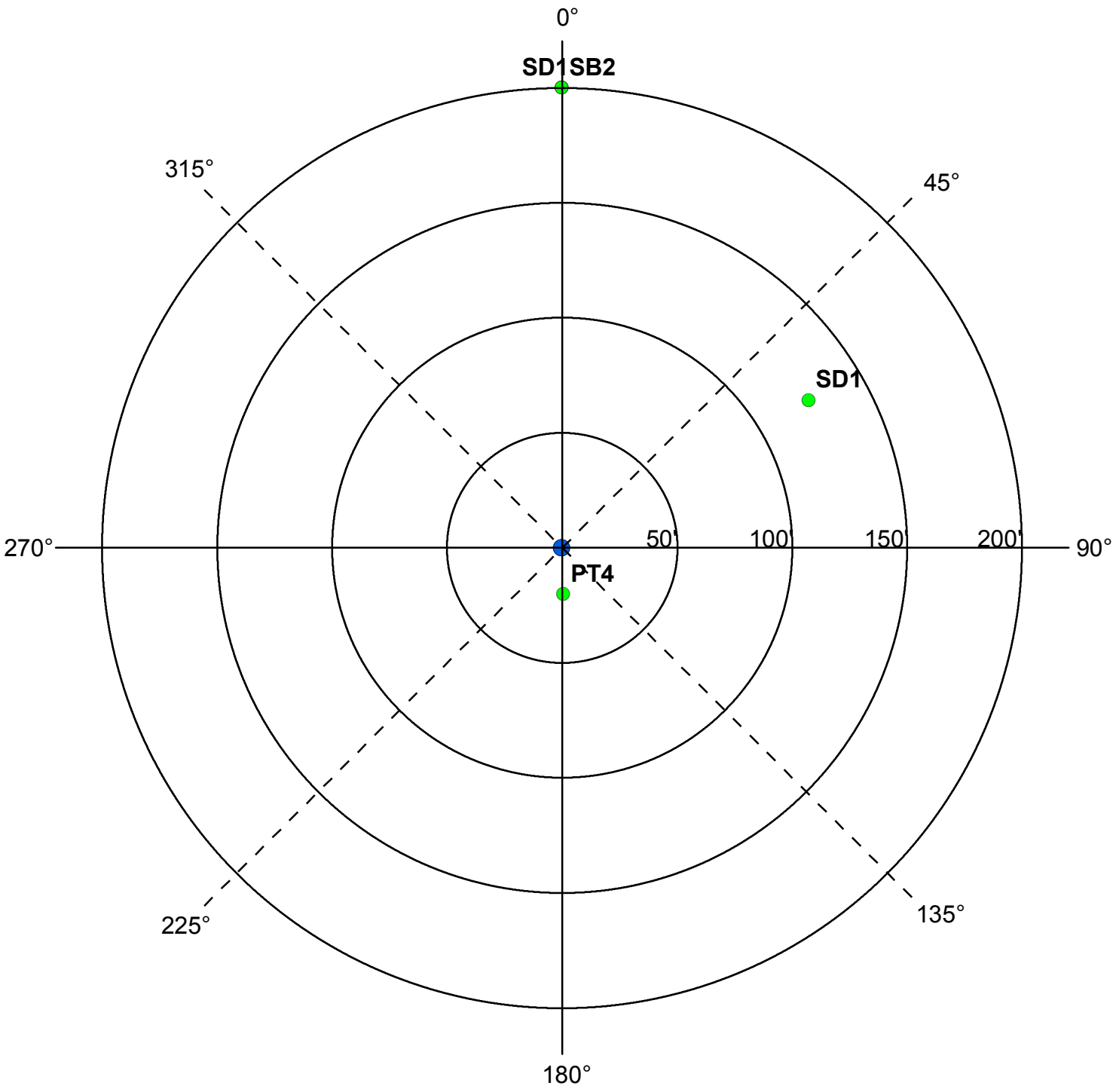
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; 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	1620024 S04	UNIQUE WELL NO.	226566

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

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



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

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

INSPECTOR	Freitag, John	DATE	4 - 14 - 2022

PWS ID / SAMPLE POINT ID	1620024 S04	UNIQUE WELL NO.	226566

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

COMMENTS

PT4 is a back-up generator

For further information, please contact:

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

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

Appendix E

Old Municipal Well Report

DEPARTMENT OF HEALTH

Protecting, Maintaining and Improving the Health of All Minnesotans

Old Municipal Well Report for White Bear Lake

PWSID: 1620024

MDH

May 2019

Minnesota Department of Health
Environmental Health in Minnesota

MDH Public Water Supply Sources Report

PWSID: **1620024**
PWS Name: **White Bear Lake**
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 #1**	GW	Primary	Active	14005 **O***	07/26/1999 (B. Banat)	1959	490	390	16	08-14-1959	490	390	16
S02	**Well #2**	GW	Primary	Active	222880 **O***	07/26/1999 (B. Banat)	1962	970	700	16	10-15-1962	970	700	16
S03	**Well #3**	GW	Primary	Active	205733 **O***	12/29/1994 (B. Banat)	1966	513	289	20	03-31-1966	513	289	20
S04	**Well #4**	GW	Primary	Active	226566 **O***	05/27/1999 (R. Smude)	1969	476	267	20	00-00-1969	476	267	20
S07	**Well #5**	GW	Emergency	Out Long Term	226567 **O***	05/27/1999 (R. Smude)	1956	463	371		06-00-1956	463	371	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						Before 1943					Municipal building.	
Well B	Well No. 2						1946						
Well C	Well No. 3												
Well D	Golfview Well No. 1	14005 **S***	490	490	400	16	1959	Cable Tool/Bored				Golfview Heights, No. 2, Sec 36, T30, R22, at Elm Drive and Ebba Street.	Active.
Well E	Golfview Well No. 2	222880 **S***	963		700	16	1962	Cable Tool/Bored				Golfview Heights, No. 2, Sec 36, T30, R22, at Elm	Active.

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
												Drive and Ebba Street.	
Well F	Bacchus Well		463		371	12	1964					Lot 32, Block 7 of Lake Aires Addition No. 2.	
Well G	West Park Well No. 1		375		306	12	1964					Block 11 of Aurebach's Rearrangement.	
Well H	West Park Well No. 2		375		306	12	1964					Block 11 of Aurebach's Rearrangement.	
Well I	Golfview Well No. 3	205733 S*	513	513	289	20	1966	Cable Tool/Bored					Active.
Well J	Golfview Well No. 4	226566 S*	476	476	267	20	1969	Cable Tool/Bored					Active.

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: **5/10/2019 3:05:28 PM**

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							Pre-1941	Drilled	1964			*In the Municipal Building (City Hall)	
2							1946						
3							Pre-1952						
4	Golfview Well No.1 WBL Well No.1 (IN SERVICE)	14005 S*	490 feet		0-280 feet 280-400 feet	22 inch 16 inch	1959	Drilled				*Golfview Heights No. 2; Sec. 36, Town. 30, Range 22; at Elm and Ebba Street	
5	Golfview Well No.2 WBL Well No.2 (IN SERVICE)	222880 S*	969 feet		0-60 feet 60-265 feet 265-700 feet	30 inch 24 inch 16 inch	1962	Drilled				*Golfview Heights No. 2; Sec. 36, Town. 30, Range 22; at Elm and Ebba Street	
6	Bacchus Well	226567 S*	463 feet		0-50 feet 0-249 feet 233-371 feet	20 inch 16 inch 12 inch	1964	Drilled	1990			*Lot 32, Block 7 of Lake Aires Addition, No. 2	

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
7	West Park Well No.1		375 feet		0-169 feet 157-306 feet	16 inch 12inch	1964	Drilled	1981			*Block 11 of Aurebach's Rearrangement	
8	West Park Well No.2 (Test Well)		375 feet		0-306 feet	6 inch	1964	Drilled	1981			*Block 11 of Aurebach's Rearrangement	
9	Golfview Well No.3 WBL Well No.3 (IN SERVICE)	205733 S*	513 feet		0-97 feet 0-289 feet	30 inch 20 inch	1966						
10	Golfview Well No.4 WBL Well No.4 (IN SERVICE)	226566 S*	476 feet		0-267 feet	20 inch	1969						

Databases Searched	Remarks
Old Municipal Well Data Compiled By: **Amal Djerrari** Compiled Date: **10/8/2008**	

Source: MN Dep't. of Health - 5/10/2019

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

White
Bear Lake

4/3/41

to

~~8/2/11~~ 80
1/27/83

MINNESOTA DEPARTMENT OF HEALTH
Division of Sanitation

Report on Investigation of Water Supply
White Bear Lake, Minnesota
July 23, 1943

Well A

The water supply for this city is obtained from a drilled well which is located in the municipal building. The water is pumped directly into the distribution system for public consumption without treatment while the overflow collects in an elevated steel tank.

Data on this supply are contained in the reports of previous investigations made by this Division. The last investigation was undertaken on April 3, 1941, at which time the sanitary aspect of the supply was considered unsatisfactory.

Sanitary Defects

The sanitary aspect of this supply is unsatisfactory because of the following defects:

1. The well is closely surrounded by sanitary sewers. The toilets in the church to the north are located approximately fifteen feet from the well. One of the toilets in the jail is about twelve feet away from the well. There are two sewer stacks that enter the ground at a point 24 feet to 30 feet from the well and the pumproom floor drain is directly connected with the sewer. These distances are not considered sufficient to remove contamination by filtration through the soil before the water reaches the well.

2. The well is not provided with a casing vent. Leaks tend to develop around the baseplate of the pump to relieve the air pressure caused by the changing water level in the well.

3. Some old water services and house sewers are laid in the same trench without adequate protection of the water main against leakage.

4. There are water and sewer crossings where adequate protection against leakage has not been provided.

MINNESOTA DEPARTMENT OF HEALTH
Division of Sanitation

Report on Investigation of Water Supply
White Bear Lake, Minnesota
December 3, 1946

The water supply for this city is obtained from a drilled well which is located in the municipal building. The water is pumped directly into the distribution system while the overflow collects in an elevated steel tank.

Data on this supply are contained in the reports of previous investigations made by this Division. The last investigation was undertaken on July 23, 1943, at which time the sanitary aspect of the supply was considered unsatisfactory.

Improvements:

Well B. new well has been constructed and will be connected to the distribution system as soon as the new pump is received.

Sanitary Defects:

The sanitary aspect of the present supply is unsatisfactory because of the following defects:

1. The well is closely surrounded by sanitary sewers. The toilets in the church to the north are located approximately fifteen feet from the well. One of the toilets in the jail is about twelve feet from the well. There are two soil stacks that enter the ground at points 24 to 30 feet from the well and the pump-room floor drain is directly connected with the sanitary sewer. These distances are not considered sufficient to remove contamination by filtration through the soil before the water reaches the well.

2. The well is not provided with a casing vent. Leaks tend to develop around the baseplate of the pump to relieve air pressure caused by the changing water level in the well.

3. Some old water services and house sewers are laid in the same trench without adequate protection of the water main against leakage.

4. There are water and sewer crossings where adequate protection against

MINNESOTA DEPARTMENT OF HEALTH
Division of Sanitation

Sanitation Rating of White Bear Lake Water Supply

Owner City of White Bear Lake Date December 5, 1946

	Perfect Score	As Found	As Recommended	See Recommendation No. in Attached Report
(A) Source				
Bacteriological safety) Adequacy of treatment)	30	0	30	Recom. No. 1
Physical quality	2	2	2	
Chemical quality	4	4	4	
Biological quality	2	2	2	
Adequacy of quantity	2	1	2	
Sub-total	40			
Hazard adjustment factor deducted	0			
Total	40	9	40	
(B) Prime Moving Equipment				
Well or intake	8	6	8	Recom. No. 1
Pumps	7	7	7	
Piping arrangement	5	5	5	
Reservoirs	7	7	7	
Equipment housing	3	3	3	
Sub-total	30			
Hazard adjustment factor deducted	0			
Total	30	28	30	
(C) Distribution System				
Street mains	5	2	4	Recom. No. 3 & 4
Building services	2	1	2	Recom. No. 2
Plumbing	3	0	3	Recom. No. 5
Hydrants	1	1	1	
Storage	4	4	4	
Pressure	2	2	2	
Tap-water quality	3	3	3	
Sub-total	20			
Hazard adjustment factor deducted	0			
Total	20	14	19	
(D) Operation and Operators				
Control of plant	5	4	4	
Condition of plant	3	3	3	
Training and experience	2	1	1	
Sub-total	10			
Hazard adjustment factor deducted	0			
Total	10	8	8	
GRAND TOTAL AND RATING	100	58	97	

Grade A: Ratings from 90 and upward Indicates a high degree of safety.

Grade B: Ratings from 80 to 90. Indicates a reasonable degree of protection

Grade C: Ratings from 70 to 80. Indicates that there are serious hazards in the supply that demand attention. Any grade below "C" portrays a dangerous condition of the supply from which serious consequences can develop. Emergency measures for immediate protection of the supply are recommended under these circumstances and prompt action should be taken to provide a permanent remedy of the defects

MINNESOTA DEPARTMENT OF HEALTH

Division of Water Supply and Plumbing

Sanitation Rating of White Bear Lake Water Supply

Owner Municipality Date Nov. 12, 1947

	Perfect Score	As Found	As Recommended	See Recommendation No. In Attached Report
(A) Source				
Bacteriological safety)				
Adequacy of treatment)	30	0	30	Recom. No. 1
Physical quality	2	2	2	
Chemical quality	4	4	4	
Biological quality	2	2	2	
Adequacy of quantity	2	1	1	
Sub total	40			
Hazard adjustment factor deducted	0			
Total	40	9	40	
(B) Prime Moving Equipment				
Well or intake	8	6	8	Recom. No. 1
Pumps	7	7	7	
Piping arrangement	5	5	5	
Reservoirs	7	7	7	
Equipment housing	3	3	3	
Sub-total	30			
Hazard adjustment factor deducted	0			
Total	30	28	30	
(C) Distribution System				
Street mains	5	2	4	Recom. No. 3 and 4
Building services	2	1	1.5	Recom. No. 2
Plumbing	3	0.5	2.5	Recom. No. 5
Hydrants	1	1	1	
Storage	4	4	4	
Pressure	2	2	2	
Tap-water quality	3	3	3	
Sub-total	20			
Hazard adjustment factor deducted	0			
Total	20	13.5	18	
(D) Operation and Operators				
Control of system	5	4	4	
Condition of system	3	3	3	
Training and experience	2	1	2	Attend Dept. Water School.
Sub-total	10			
Hazard adjustment factor deducted	0			
Total	10	8	9	
GRAND TOTAL AND RATING	100	58.5	97	

Grade A: Ratings from 90 and upward. Indicates a high degree of safety.

Grade B: Ratings from 80 to 90. Indicates a reasonable degree of protection.

Grade C: Ratings from 70 to 80. Indicates that there are serious hazards in the supply that demand attention. Any grade below "C" portrays a dangerous condition of the supply from which serious consequences can develop. Emergency measures for immediate protection of the supply are recommended under these circumstances and prompt action should be taken to provide a permanent remedy of the defects.

MINNESOTA DEPARTMENT OF HEALTH

DIVISION OF WATER SUPPLY AND PLUMBING

Sanitation Rating of Municipal Water Supply

Owner White Bear Lake Date November 7, 1950

	Perfect Score	As Found	As Recommended	See Recommendation No. In Attached Report
(A) Source				
Sanitary Safety / Adequacy of treatment	30	15	30	a
Physical quality	2	2	2	
Chemical quality	4	2	3	
Biological quality	2	3	2	
Adequacy of quantity	2	2	2	
Sub-total	40			
Hazard adjustment factor deducted	0			
Total	40	24	39	
(B) Prime Moving Equipment				
Well or intake	8	8	8	
Pumps	7	6	7	e
Piping arrangement	5	5	5	
Reservoirs	7	7	7	
Equipment housing	3	3	3	
Sub-total	30			
Hazard adjustment factor deducted	0			
Total	30	29	30	
(C) Distribution System				
Street mains	5	3	4	c
Building services	2	1	1½	b
Plumbing	3	1	2½	
Hydrants	1	1	1	
Storage	4	4	4	
Pressure	2	2	2	
Tap water quality	3	0	3	coliform free samples
Sub-total	20			
Hazard adjustment factor deducted	0	5	0	d
Total	20	7	16	
(D) Operation and Operators				
Control of system	5	4	4	
Condition of system	3	2	2	
Training and experience	2	2	2	
Sub-total	10			
Hazard adjustment factor deducted	0			
Total	10	8	8	
GRAND TOTAL AND RATING	100	68	95	

Grade A: 90 and upward - high degree of safety.
Grade B: 85 to 89 - moderately high degree of safety.
Grade C: 80 to 84 - improvement needed.
Grade D: 70 to 79 - improvement urgent.
Grade E: 69 and lower - very dangerous condition, emergency measures recommended.

MINNESOTA DEPARTMENT OF HEALTH

DIVISION OF WATER SUPPLY AND PLUMBING

Sanitation Rating of White Bear Lake Water Supply

Owner Municipal Date December 12, 1951

	Perfect Score	As Found	As Recommended	See Recommendation No. In Attached Report
(A) Source				
Sanitary Safety / Adequacy of treatment	30	15	30	a
Physical quality	2	2	2	
Chemical quality	4	2	3	
Biological quality	2	3	2	
Adequacy of quantity	2	2	2	
Sub-total	40			
Hazard adjustment factor deducted	0			
Total	40	24	39	
(B) Prime Moving Equipment				
Well or intake	8	8	8	
Pumps	7	6	7	d
Piping arrangement	5	5	5	
Reservoirs	7	7	7	
Equipment housing	3	3	3	
Sub-total	30			
Hazard adjustment factor deducted	0			
Total	30	29	30	
(C) Distribution System				
Street mains	5	3	4	b
Building services	2	1½	1½	
Plumbing	3	1½	2½	
Hydrants	1	1	1	
Storage	4	4	4	
Pressure	2	2	2	
Tap water quality	3	3	3	
Sub-total	20	16	18	
Hazard adjustment factor deducted	0	5	0	c
Total	20	11	18	
(D) Operation and Operators				
Control of system	5	4	4	
Condition of system	3	2	2	
Training and experience	2	2	2	
Sub-total	10			
Hazard adjustment factor deducted	0			
Total	10	8	8	
GRAND TOTAL AND RATING	100	72	95	

Grade A: 90 and upward - high degree of safety.
Grade B: 85 to 89 - moderately high degree of safety.
Grade C: 80 to 84 - improvement needed.
Grade D: 70 to 79 - improvement urgent.

MINNESOTA DEPARTMENT OF HEALTH

DIVISION OF MUNICIPAL WATER SUPPLY

Sanitation Rating of White Bear Lake Water Supply

Owner Municipal Date November 12, 1952

	Perfect Score	As Found	As Recommended	See Recommendation No. In Attached Report
(A) Source				
Sanitary Safety / Adequacy of treatment	30	15	30	a
Physical quality	2	2	2	
Chemical quality	4	3	3	
Biological quality	2	2	2	
Adequacy of quantity	2	2	2	
Sub-total	40			
Hazard adjustment factor deducted	0			
Total	40	24	39	
(B) Prime Moving Equipment				
Well or intake	8	8	8	
Pumps	7	6	7	d
Piping arrangement	5	5	5	
Reservoirs	7	7	7	
Equipment housing	3	3	3	
Sub-total	30			
Hazard adjustment factor deducted	0			
Total	30	29	30	
(C) Distribution System				
Street mains	5	3	4	b
Building services	2	1½	1½	
Plumbing	3	1½	2½	
Hydrants	1	1	1	
Storage	4	4	4	
Pressure	2	2	2	
Tap water quality	3	3	3	
Sub-total	20	16	18	
Hazard adjustment factor deducted	0	5	0	c
Total	20	11	18	
(D) Operation and Operators				
Control of system	3 3	2	3	
Condition of system	2 2	2	2	
Operator qualifications	5 5	4	5	
Sub-total	10			
Hazard adjustment factor deducted	0			
Total	10	8	10	
GRAND TOTAL AND RATING	100	72	97	

Grade A: 90 and upward - high degree of safety.
Grade B: 85 to 89 - moderately high degree of safety.

Grade C: 70 to 84 - poor to dangerous condition.
Grade D: 69 and lower - very dangerous condition, emergency measures recommended.

MINNESOTA DEPARTMENT OF HEALTH

Section of Municipal Water Supply

Sanitation Safety Rating of White Bear Lake Water Supply

Date December 1, 1953

	Perfect Score	As Found	As Recommended	See Recommendation No. In Attached Report
(A) Source				
Sanitary Safety / Adequacy of treatment	20	10	20	a, b
Bacteriological Quality	10	10	10	
Physical quality	2	2	2	
Chemical quality	4	3	3	
Biological quality	2	2	2	
Adequacy of quantity	2	2	2	
Sub-total	40			
Hazard adjustment factor deducted	0			
Total	40	29	39	
(B) Prime Moving Equipment				
Well or intake	8	8	8	
Pumps	7	5	7	c, e
Piping arrangement	5	5	5	
Reservoirs	7	7	7	
Equipment housing	3	3	3	
Sub-total	30			
Hazard adjustment factor deducted	0			
Total	30	28	30	
(C) Distribution System				
Street mains	5	3	4	
Building services	2	1½	1½	
Plumbing	3	1½	2½	
Hydrants	1	1	1	
Storage	4	4	4	
Pressure	2	2	2	
Tap water quality	3	3	3	
Sub-total	20	16	18	
Hazard adjustment factor deducted	0	5	0	d
Total	20	11	18	
(D) Operation and Operators				
Control of system	3	2	2	
Condition of system	2	2	2	
Operator qualifications	5	4	5	
Sub-total	10			
Hazard adjustment factor deducted	0			
Total	10	8	9	
GRAND TOTAL AND RATING	100	76	96	

90 and upward - high degree of safety. Watchful maintenance needed.

85 to 89 - moderately high degree of safety. Correction and maintenance program continued.

70 to 84 - poor to dangerous condition. Prompt corrective action urgently needed.

MINNESOTA DEPARTMENT OF HEALTH

Section of Municipal Water Supply

Sanitation Safety Rating of White Bear Lake Water Supply

Date December 8, 1954

	Perfect Score	As Found	As Recommended	See Recommendation No. In Attached Report
(A) Source				
Sanitary Safety / Adequacy of treatment	20	15	20	a, b
Bacteriological Quality	10	5	10	a, b
Physical quality	2	2	2	
Chemical quality	4	3	3	
Biological quality	2	2	2	
Adequacy of quantity	2	2	2	
Sub-total	40			
Hazard adjustment factor deducted	0			
Total	40	29	39	
(B) Prime Moving Equipment				
Well or intake	8	8	8	
Pumps	7	6	7	c
Piping arrangement	5	5	5	
Reservoirs	7	7	7	
Equipment housing	3	3	3	
Sub-total	30			
Hazard adjustment factor deducted	0			
Total	30	29	30	
(C) Distribution System				
Street mains	5	3	4	
Building services	2	1½	1½	
Plumbing	3	1½	2½	
Hydrants	1	1	1	
Storage	4	4	4	
Pressure	2	2	2	
Tap water quality	3	2	3	a, b
Sub-total	20	15	18	
Hazard adjustment factor deducted	0	5	0	d, e
Total	20	10	18	
(D) Operation and Operators				
Control of system	3	2	2	
Condition of system	2	2	2	
Operator qualifications	5	4	5	
Sub-total	10			
Hazard adjustment factor deducted	0			
Total	10	8	9	
GRAND TOTAL AND RATING	100	76	96	

90 and upward - high degree of safety. Watchful maintenance needed.

85 to 89 - moderately high degree of safety. Correction and maintenance program continued.

70 to 84 - poor to dangerous condition. Prompt corrective action urgently needed.

5-15-64

Minnesota Department of Health
District VI
Minneapolis Minnesota

Report on Investigation of Municipal Water Supply
White Bear Lake, Minnesota
February 19 and March 10, 1964

This water supply is obtained from five drilled wells: Golfview Wells Nos. 1 and 2, Bacchus Well and West Park Wells Nos. 1 and 2. The West Park wells are reportedly for standby use only. The water from the wells is pumped directly into the distribution system. A three million gallon ground level steel reservoir accumulates the overflow and maintains pressure on the distribution system.

Well A? The well at the old city hall has been abandoned and filled in accordance with recommendations of this Department.

Location of Sources

Golfview Wells Nos. 1 and 2 are located in Golfview Heights, No. 2, Section 36, T30, R22 at Elm Drive and Ebba Street. The Bacchus well is located in Lot 32, Block 7 of Lake Aires Addition No. 2. The West Park wells are located in Block 11 of Aurebach's Rearrangement.

Wells, Pumps and Pumphouses

Well D Golfview Well No. 1 is 22 by 16 inches in diameter, drilled to a depth of 490 feet. The 22-inch casing extends to a depth of 280 feet and the 16-inch inner casing extends 10 feet into the Jordan sandstone and is grouted in place. A 16-inch open hole extends to a total depth of 490 feet. The reported log of the well is as follows:

	Depth (ft.)	Thickness (ft.)
Drift	0 - 75	75
Platteville	75 - 120	45
St. Peter	120 - 225	105
Shakopee Oneota	225 - 390	165
Jordan	390 - 490	100

Water is drawn from the well by means of a submersible pump which is rated at approximately 1,000 gallons per minute and is powered by a 150 horsepower electric motor. The static water level is reported to be 117 feet and the draw down 84 feet. The well is provided with a screened casing vent. The discharge vent, located in a pit adjacent to the well, lacks a screen. The well has been provided with a properly constructed concrete platform. The pumphouse for Golfview Wells Nos. 1 and 2 has been constructed with a concrete floor entirely above grade. The door to the pumphouse opens outward and the floor drain in the pumphouse discharges to a gravel pocket located at least 30 feet from the well.

Well E Golfview Well No. 2 is 30 by 24 by 16 inches in diameter, drilled to a depth of 963 feet. The 30-inch casing extends to a depth of 60 feet, the 24-inch casing continues for an additional 205 feet and the 16-inch inner casing extends to a depth of 700 feet and is grouted in place. A 16-inch open hole extends to the total depth of 963 feet. The reported log of the well is as follows:

	Depth (ft.)	Thickness (ft.)
Drift	0 - 59	59
Platteville	59 - 94	35
St. Peter	94 - 251	157
Shakopee Oneota	251 - 380	129
Jordan	380 - 475	95
St. Lawrence	475 - 504	29
Franconia	504 - 625	121
Dresbach	625 - 815	190
Hinckley	815 - 963	148

Water is drawn from the well by means of a submersible pump which is rated at approximately 1500 gallons per minute and is powered by a 250 horsepower electric motor. The static water level is reported to be 251 feet and the draw down 150 feet at a pumping rate of 1600 gallons per minute. The well is provided with a properly screened casing vent. The discharge vent lacks

a screen. The well has not been provided with a concrete platform.

Well F The Bacchus Well is 20 by 16 by 12 inches in diameter drilled to a depth of 463 feet. The 20-inch casing extends to a depth of 50 feet, a grouted 16-inch casing extends to a depth of 249 feet, and a 12-inch grouted inner casing extends from 233 feet below the surface to a depth of 371 feet. An open hole extends to a total depth of 463 feet. The reported log of the well is as follows:

	Depth (ft.)	Thickness (ft.)
Drift	0 - 45	45
Platteville	45 - 71	26
St. Peter	71 - 233	162
Shakopee-Oneota	233 - 356	123
Jordan	356 - 453	97
St. Lawrence	453 - 463	10

Water is drawn from the well by means of a vertical turbine pump which is rated at 575 gallons per minute. The well has no casing vent and the discharge vent lacks a screen. The pumphouse has been constructed with a concrete floor entirely above grade. The door to the pumphouse opens outward and the floor drain in the pumphouse discharges to a gravel pocket located at least 30 feet from the well.

Well G The West Park Well No. 1 is 16 by 12 inches in diameter drilled to a depth of 375 feet. The 16-inch casing extends to a depth of 169 feet and the 12-inch inner casing extends from 157 feet below the surface to a depth of 306 feet. A 12-inch open hole extends to the total depth of 375 feet. Water is drawn from the well by means of a vertical turbine pump which is rated at 750 gallons per minute and is powered by a 100 horsepower electric motor. Actual pumping rate has been adjusted to 600 gallons per minute. There was an accumulation of dirt and water on the baseplate of the pump.

Well H West Park Well No. 2 is reported to be 6 inches in diameter originally drilled as a test well. The depth and log of the well correspond with that for West Park Well No. 1.

MINNESOTA DEPARTMENT OF HEALTH

Section of Water Supply and General Engineering

Sanitation Safety Rating of White Bear Lake Municipal Water Supply

Date February 19 and March 10, 1964

	Perfect Score	As Found	As Recommended	See Recommendation No. in Attached Report
(A) Source				
Sanitary Safety / Adequacy of treatment	20	19	20	1,8
Bacteriological Quality	10	9	10	1,8
Physical quality	2	2	2	
Chemical quality	4	2	3	Iron removal
Biological quality	2	2	2	
Adequacy of quantity	2	2	2	
Sub-total	40			
Hazard adjustment factor deducted	0			
Total	40	36	39	
(B) Prime Moving Equipment				
Well or intake	8	8	8	
Pumps	7	3	7	2,3,4,5,6
Piping arrangement	5	5	5	
Reservoirs	7	7	7	
Equipment housing	3	2	3	7
Sub-total	30			
Hazard adjustment factor deducted	0			
Total	30	25	30	
(C) Distribution System				
Street mains	5	4	4	
Building services	2	1.5	1.5	
Plumbing	3	2.5	2.5	
Hydrants	1	1	1	
Storage	4	4	4	
Pressure	2	2	2	
Tap water quality	3	3	3	
Sub-total	20			
Hazard adjustment factor deducted	0			
Total	20	18	18	
(D) Operation and Operators				
Control of system	3	1	2	1,8
Condition of system	2	2	2	
Operator qualifications	5	3	5	9
Sub-total	10			
Hazard adjustment factor deducted	0			
Total	10	6	9	
GRAND TOTAL AND RATING	100	85	96	

90 and upward - high degree of safety. Watchful maintenance needed.

85 to 89 - moderately high degree of safety. Correction and maintenance program continued.

Minnesota Department of Health
District VI
Minneapolis Minnesota

Report on Investigation of Municipal Water Supply
White Bear Lake, Minnesota
June 4, 1971

Date of Last Investigation - February 19 and March 10, 1964

Rating at Last Investigation - 85

Changes Since Last Investigation -

1. A new Water Superintendent has been employed to supervise the operation and maintenance of this water supply.

2. Two new wells, Wells Nos. 3 and 4 have been constructed and put into operation. Well I Well No. 3 (1966) is provided with 97 feet of 30-inch outer casing and 289 feet of 20-inch liner pipe and is grouted in place. The total well depth is 513 feet. The reported log os the well is as follows:

Lithology	Depth (Ft.)
Pipe above ground	0- 1
Sandy clay	1- 53
Sand & Gravel	53- 64
Clay	64- 86
Limerock	86-122
Sandrock	122-281
Shakopee	281-338
Sandstone	338-349
Shakopee	349-409
Jordan	409-513

Water is drawn from the well by means of a submersible pump which is rated at approximately 2600 gallons per minute. The static water level is reported to be 135 feet and the draw down 34 feet-10 inches at a pumping rate of 2010 gallons per minute. Well J Well No. 4 (1969) is provided with 267 feet of 20-inch liner pipe. A 19-inch open hole extends to a total well depth of 476 feet. The reported log of the well is as follows:

Lithology	Depth (Ft.)
Clay	0- 5
Sand & Gravel & Clay	5- 55

MINNESOTA DEPARTMENT OF HEALTH

Section of Water Supply and General Engineering

Sanitation Safety Rating of White Bear Lake Municipal Water Supply

Date June 4, 1971

	Perfect Score	As Found	As Recommended	See Recommendation No. In Attached Report
(A) Source				
Sanitary Safety / Adequacy of treatment	20	20	20	1 & 5
Bacteriological Quality	10	10	10	1 & 5
Physical quality	2	2	2	
Chemical quality	4	3	3	
Biological quality	2	2	2	
Adequacy of quantity	2	2	2	
Sub-total	40			
Hazard adjustment factor deducted	0			
Total	40	39	39	
(E) Prime Moving Equipment				
Well or intake	8	8	8	2 & 3
Pumps	7	5	7	2 & 3
Piping arrangement	5	5	5	
Reservoirs	7	7	7	
Equipment housing	3	3	3	4
Sub-total	30			
Hazard adjustment factor deducted	0			
Total	30	28	30	
(C) Distribution System				
Street mains	5	4	4	
Building services	2	1.5	1.5	
Plumbing	3	2.5	2.5	
Hydrants	1	1	1	
Storage	4	4	4	
Pressure	2	2	2	
Tap water quality	3	3	3	
Sub-total	20			
Hazard adjustment factor deducted	0			
Total	20	18	18	
(D) Operation and Operators				
Control of system	3	1	2	1 & 5
Condition of system	2	2	2	
Operator qualifications	5	3	5	6
Sub-total	10			
Hazard adjustment factor deducted	0			
Total	10	6	9	
GRAND TOTAL AND RATING	100	91	96	

90 and upward - high degree of safety. Watchful maintenance needed.

85 to 89 - moderately high degree of safety. Correction and maintenance program continued.

MINNESOTA DEPARTMENT OF HEALTH

Section of Water Supply and General Engineering

Sanitation Safety Rating of White Bear Lake Municipal Water Supply

Date November 6, 1972

	Perfect Score	As Found	As Recommended	See Recommendation No. In Attached Report
(A) Source				
Sanitary Safety / Adequacy of treatment	20	20	20	1 & 3
Bacteriological Quality	10	10	10	1 & 3
Physical quality	2	2	2	
Chemical quality	4	3	3	
Biological quality	2	2	2	
Adequacy of quantity	2	2	2	
Sub-total	40			
Hazard adjustment factor deducted	0			
Total	40	39	39	
(B) Prime Moving Equipment				
Well or intake	8	8	8	
Pumps	7	7	7	
Piping arrangement	5	5	5	
Reservoirs	7	7	7	
Equipment housing	3	3	3	2
Sub-total	30			
Hazard adjustment factor deducted	0			
Total	30	30	30	
(C) Distribution System				
Street mains	5	4	4	
Building services	2	1.5	1.5	
Plumbing	3	2.5	2.5	
Hydrants	1	1	1	
Storage	4	4	4	
Pressure	2	2	2	
Tap water quality	3	3	3	
Sub-total	20			
Hazard adjustment factor deducted	0			
Total	20	18	18	
(D) Operation and Operators				
Control of system	3	0	2	1 & 3
Condition of system	2	2	2	
Operator qualifications	5	5	5	
Sub-total	10			
Hazard adjustment factor deducted	0			
Total	10	7	9	
GRAND TOTAL AND RATING	100	94	96	

90 and upward - high degree of safety. Watchful maintenance needed.

85 to 89 - moderately high degree of safety. Correction and maintenance program continued.

MINNESOTA DEPARTMENT OF HEALTH

REPORT ON INVESTIGATION OF PUBLIC WATER SUPPLY

Name of Water Supply: White Bear Lake Municipal Water Supply	PWS ID Number: 1620024
Street: City Hall	Telephone Numbers: City: 429-8526; Operator: 777-404; Engineer: 429-8526; Other: 429-8508 (Public Ut.
City: White Bear Lake; State: MN; Zip Code: 55110	
County: Ramsey & Washington; District: Metropolitan	
Water Superintendent: Harold Mueller; Classification: B	Plant Classification: B; Owner Type: Municipal
Other Operators: Roger Bacon, David Dudeck; Classification: C, B	Plant Type: Community; Plumbing Permits and Inspections Required: [X] Yes [ ] No
	Date of Previous Survey: 5/30/79; Date of Survey: 8/21/80
City Engineer: Steve Gatlin	

SERVICE AREA CHARACTERISTICS:

- [X] Municipal
- [ ] Mobile Home Park
- [ ] Company Town
- [ ] Institution
- [ ] School or College
- [ ] Hotel/Motel
- [ ] Resort
- [ ] Restaurant
- [ ] Recreation Area
- [ ] Campground
- [ ] Housing Development
- [ ] Other

Population Served: 24,000 (including Birchwood)	Service Connections: 6,000 (lead-o)	Storage Capacity: (List Separately) 3,000,000 gal. ground; 1,000,000 gal. clear well
Design Capacity (gal/day): 10,000,000	Average Daily Production (gal/day): 1,700,000	
Emergency Capacity (gal/day): 0	Highest Daily Production (gal/day): 6,400,000	Total: 4,000,000 gallons

Source Name	Source Code	Availability	TREATMENT: Disinfection	Aeration	Coagulation *	Sedimentation	Filtration	Corrosion Con. Stabilization	Softening	Taste & Odor	Ammoniation	Fluoridation	Other	WELL DATA: Year Installed	Casing Diameter	Casing Depth	Screen Length	Well Depth	Water Bearing Formation	Static Level	Drawdown	Pump Type
Well G: West Park #1	G	X													12	306		375				
Well H: West Park #2	G	X													6	306		375				
Well F: Bacchus	G	E													12	371		463	Jordan			Vt. 475
Well D: Well 1	G	P	Dc		Ca	Sv	Fl	K r.c	Hc			Va			16	400		490	Jordan			sub 1100
Well E: Well 2	G	P	Dc		Ca	Sv	Fl	K rc	Hc			Va			16	700		963	Dresbach Hinckley			sub 1300
Well I: Well 3	G	P	DC		Ca	Sv	Fl	K rc	Hc			Va		1966	20	289		513	Shakopee Jordan			sub 2300
Well J: Well 4	G	P	Dc		Ca	Sv	Fl	K rc	Hc			Va		1969	20	267		476	Shakopee Jordan			Vt. 2400

Remarks: * Ca - Aluminum Sulfate

Surveyed by: David Engstrom

Approved by:

HE-00842-02

MINNESOTA DEPARTMENT OF HEALTH

Section of Water Supply and General Engineering

Sanitation Safety Rating of White Bear Lake Water Supply

Date August 21, 1980

	Perfect Score	As Found	As Recommended	See Recommendation No. In Attached Report
(A) Source				
Sanitary Safety / Adequacy of treatment	20	20	20	
Bacteriological Quality	10	10	10	
Physical quality	2	2	2	
Chemical quality	4	4	4	
Biological quality	2	2	2	
Adequacy of quantity	2	2	2	
Sub-total	40			
Hazard adjustment factor deducted	0			
Total	40	40	40	
(B) Prime Moving Equipment				
Well or intake	8	8	8	
Pumps	7	7	7	
Piping arrangement	5	4	5	1,2
Reservoirs	7	7	7	
Equipment housing	3	3	3	
Sub-total	30			
Hazard adjustment factor deducted	0			
Total	30	29	30	
(C) Distribution System				
Street mains	5	5	5	
Building services	2	1.5	1.5	
Plumbing	3	2	2.5	3
Hydrants	1	1	1	
Storage	4	4	4	
Pressure	2	2	2	
Tap water quality	3	3	3	
Sub-total	20			
Hazard adjustment factor deducted	0			
Total	20	18.5	19	
(D) Operation and Operators				
Control of system	3	1.5	3	4,5,6,7
Condition of system	2	2	2	
Operator qualifications	5	5	5	8
Sub-total	10			
Hazard adjustment factor deducted	0			
Total	10	8.5	10	
GRAND TOTAL AND RATING	100	96	99	

90 and upward - high degree of safety. Watchful maintenance needed.

85 to 89 - moderately high degree of safety. Correction and maintenance program continued.

70 to 84 - poor to dangerous condition. Prompt corrective action urgently needed.

(3311)
(12 Sheets)

1

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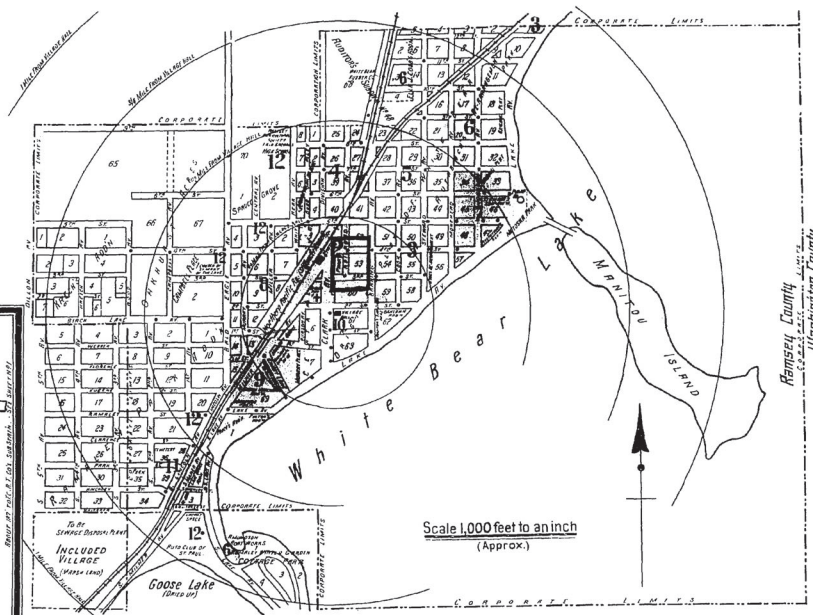

DEC 12 27

Including
Willernie or Wildwood Manor & Wildwood Amusement Park
Located in Washington County

Water Facilities: Municipal - Source: One 340' deep well at Fire Station (Sheet No 2) & one 750' deep well at 6th St & Lake Av (Sheet No 2) - System: Gravity - 15,000 Gal steel tank on 92' steel trestle & one 1½ stage centrifugal pump, 10" motor driven, 650 - 600 gal's per min are desired. At Fire Station - One deep 6" & 8" three cylinder dbl motor driven pump, 650 - 750 to 900 Gal. per min. is located in Pump Ho at 6th St & Lake Av. This pump is used as an auxiliary, its primary use being to pump water to help maintain the level of White Bear Lake. About 11 miles 6" & 8" mains & 2 fire hydrants of 6" mains. - 1st triple hyd's. Average daily consumption - 350,000 Gal's in winter, 650,000 Gal's in summer. Pressure 50 to 75 lbs.

Fire Dept.: Volunteer - One Fire Station - The truck driver who also attends the Water Works system, is fully paid - One chief receives $5 per hour & 25 members receive $1 per hour for attendance on alarm call - Equipment - 1 Studebaker auto truck (combination 140 Gal. chemical & 1 carrying One 24' Ladder & one 35' extension ladder & one 12' roof ladder, & 1 - 4 Gal. chemical extgrs. - One 3 wheel Ford 40 Gal. chem. cart, hand drawn, but can be used as a fire truck - 2 2 wheel hand drawn hose carts which can also be used as fire lifts - Total - 2,300' 2½" cotton hose - General alarm, Motor driven siren on fire Dept. Station, with alarm button at Telephone Exchange office, & at Fire Station, tested daily at noon. - 8 Fire bell, hand or motor operated is reserve on fire Station.

All streets paved except Birch Lake Rd. & Miller Ave. - The latter is to be paved in the autumn of 1927. Ground elevations Level. Public lighting - Elec -

Map Division DEC 20 1927 Library of Congress

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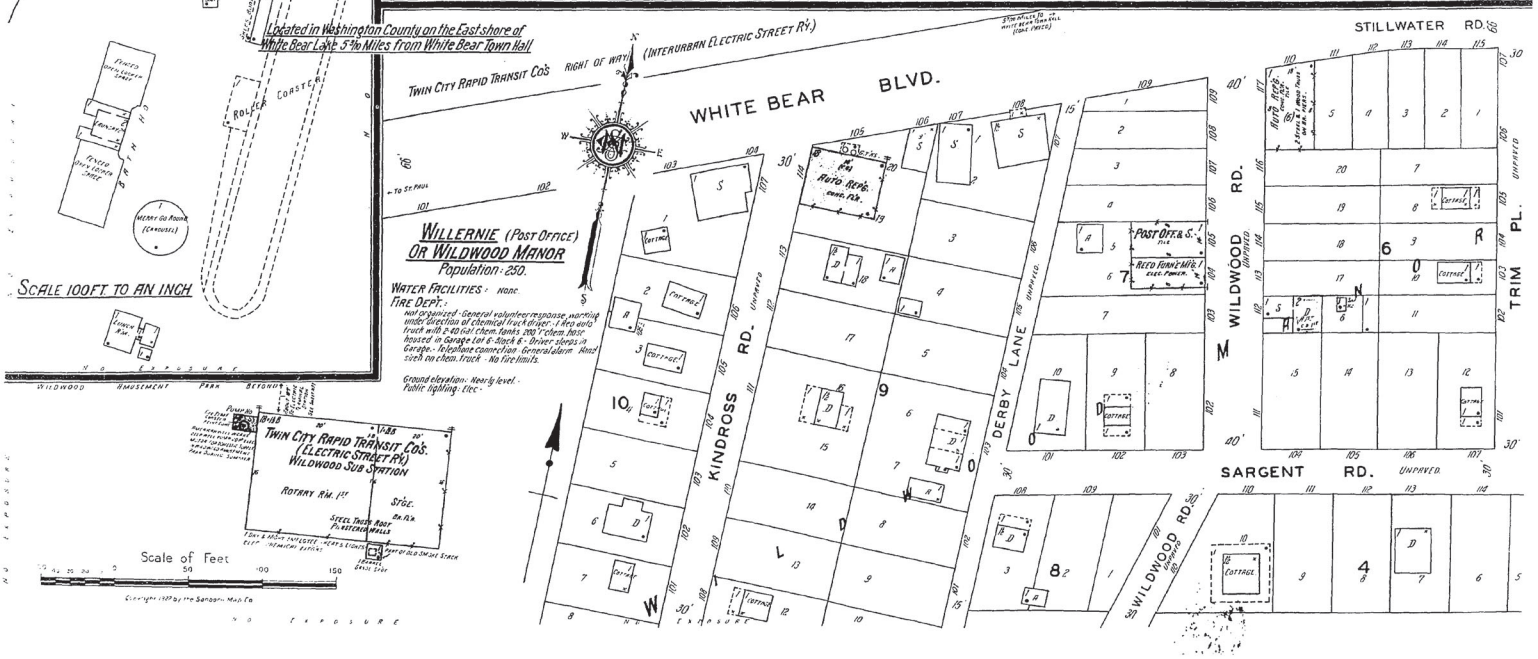
* Indicates only one side of Street shown.



Unique Well Number 14005

County Ramsey
Quad White Bear Lake West
Quad Id 119D

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
MINNESOTA STATUTES CHAPTER 1031

Entry Date 1991/08/14
Update Date 2018/06/26
Received Date

Well Name WHITE BEAR LAKE 1 Well D

Township	Range	Dir	Section	Subsection	Field Located Elevation
30	22	W	36	BCDACD	MDH 990.00 ft.

well address WHITE BEAR LAKE 1
2401 ORCHARD LA
WHITE BEAR LAKE MN 55110 Changed

contact address CITY OF WHITE BEAR LAKE
WHITE BEAR LAKE MN 55110

Description	Color	Hardness	From	To (ft.)
CLAY	YELLOW		0	15
CLAY AND GRAVEL			15	50
SILTY CLAY			50	75
PLATTEVILLE LIMESTONE			75	77
PLATTEVILLE LIMESTONE			77	105
PLATTEVILLE LIMESTONE			105	110
PLATTEVILLE LIMESTONE			110	115
GRAY SHALE GLENWOOD			115	120
SANDSTONE			120	225
GREEN SHALE			225	228
SHALE SANDSTONE			228	253
GRAY SHALE			253	256
HARD SANDSTONE			256	261
SHALEY SANDSTONE			261	268
SHALEY SANDSTONE			268	269
HARD LIMESTONE			269	370
SANDSTONE HARD LIME&SHAL			370	375
SHALEY SANDSTONE			375	390
SANDSTONE			390	394
SANDSTONE			394	440
SANDSTONE WITH HARD LEDG			440	479
SANDSTONE WITH GREEN SHA			479	490

Remarks
GWQ NO. 0220. OLD P.A. NO. 59-0640. FORMERLY GOLFVIEW NO. 1. GAMMA AND MULTI TOOL LOGGED 4-6-2015. LOGGED FOR MDH. TV AND HYDROLAB 4-6-2015 BY MDH.

First Bedrock OPVL
Last Strat CJDN
Aquifer Jordan
Depth to Bedrock 75.00 ft.

Well Depth 490.00 ft
Depth Completed 490.00 ft
Date Well Completed 1959/08/14

Drillhole Angle

Drilling Method Cable Tool

Drilling Fluid

Well Hydrofractured? ☐ YES ☐ NO
From ft. to

Use community supply(municipal)

Casing Type Steel (black or low Drive Shoe? ☐ YES ☐ NO
Diameter 16 Depth 390
22.00 in. from 0.00 to 280.00 ft. lbs/ft
16.00 in. from 0.00 to 390.00 ft. lbs/ft

Hole Diameter (in.)

Screen No
Make Type
Diamter Slot Length Set

Open Hole(ft.) From 390.0 to 490.0

Static Water Level (Multiple SWL)
117.50 ft. land surface Date measured 1959/08/14

Pumping Level (below land surface)
201.50 ft. after hrs. pumping 1045.00 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grate (Environmental Wells and Borings ONLY) ☐ Basement offset

Grouting Information Well grouted? ☑ YES ☐ NO ☐ NOT SPECIFIED
Material neat cement From 6.0 To 390.0 ft. 0.00

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ YES ☐ NO

Pump
☐ Not Installed Date Installed 1959/08/00
Manufacture's name BYRON-JACKSON
Model number HP 150.00 Volts 440
Length of drop pipe 240.0 Material S Capacity 1000 g.p.m
Type Submersible

Abandoned Wells
Does property have any not in use and not sealed well(s)? ☐ YES ☐ NO

Variance
Was a variance granted from the MDH for this well? ☐ YES ☐ NO

Well Contractor Cerfication
Tri-state Well Co. 27118
License Business Name **Lic. or Reg No.**
BERTHIAUME, M
Name of Driller **Date**

Unique Well Number 222880

County Ramsey
Quad White Bear Lake West
Quad Id 119D

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
MINNESOTA STATUTES CHAPTER 1031

Entry Date 1991/08/14
Update Date 2014/08/18
Received Date

Well Name WHITE BEAR LAKE 2 Well E

Township	Range	Dir	Section	Subsection	Field Located Elevation	MDH
30	22	W	36	BCADDC	985.00	ft.

well address WHITE BEAR LAKE 2
2401 ORCHARD LA
WHITE BEAR LAKE MN 55110 Changed

contact address CITY OF WHITE BEAR LAKE
WHITE BEAR LAKE MN 55110

Description	Color	Hardness	From	To (ft.)
DRIFT			0	59
PLATTEVILLE LIMESTONE			59	94
GLENWOOD SHALE			94	96
ST. PETER SANDSTONE			96	251
SHAKOPEE & ONEOTA DOLOMI			251	300
JORDAN SANDSTONE			300	377
JORDAN SANDSTONE			377	475
ST. LAWRENCE SHALE			475	504
HARD SANDSTONE			504	530
HARD SANDSTONE			530	625
FINE, SHALEY SANDSTONE			625	647
FINE, SHALEY SANDSTONE			647	717
FINE SHALEY SANDSTONE			717	720
SHALEY SANDSTONE			720	740
STICKY SHALE			740	772
FINE, DIRTY SANDSTONE			772	780
FINE SANDSTONE			780	805
FINE SANDSTONE			805	815
CLEAN, COARSE SANDSTONE			815	850
FINE SANDSTONE			850	860
COARSE SANDSTONE			860	888
FINE TO MEDIUM SANDSTONE			888	895
CLEAN, COARSE SANDSTONE			895	941
COARSE SANDSTONE			941	970

Remarks
M.G.S. NO. 260. OLD P.A. NO. 63-0090. FORMERLY GOLVIEW NO. 2.

First Bedrock OPVL
Last Strat CMTS
Aquifer Wonewoc-Mt.Simon
Depth to Bedrock 59.00 ft.

Well Depth 970.00 ft
Depth Completed 970.00 ft
Date Well Completed 1962/10/15

Drillhole Angle

Drilling Method Cable Tool

Drilling Fluid

Well Hydrofractured? ☐ YES ☐ NO
From ft. to

Use community supply(municipal)

Casing Type Steel (black or low Drive Shoe? ☐ YES ☐ NO

Diameter				Depth	
30.00	in. from	0.00	to 60.00 ft.		lbs/ft
24.00	in. from	0.00	to 205.00 ft.		lbs/ft
16.00	in. from	0.00	to 700.00 ft.		lbs/ft

Hole Diameter (in.)

Screen No
Make Type
Diamter Slot Length Set

Open Hole(ft.) From 700.0 to 970.0

Static Water Level
251.00 ft. land surface Date measured 1962/10/15

Pumping Level (below land surface)
371.00 ft. after hrs. pumping 1600.00 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grate (Environmental Wells and Borings ONLY) ☐ Basement offset

Grouting Information Well grouted? ☑ YES ☐ NO ☐ NOT SPECIFIED
Material neat cement From 0.0 To 700.0 ft. 0.00

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ YES ☐ NO

Pump
☐ Not Installed Date Installed
Manufacture's name
Model number HP 0.00 Volts
Length of drop pipe Material Capacity g.p.m
Type

Abandoned Wells
Does property have any not in use and not sealed well(s)? ☐ YES ☐ NO

Variance
Was a variance granted from the MDH for this well? ☐ YES ☐ NO

Well Contractor Cerfication
Tri-state Well Co. 27118
License Business Name Lic. or Reg No.

Name of Driller Date

Unique Well Number 205733

County Ramsey
Quad White Bear Lake East
Quad Id 118C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
MINNESOTA STATUTES CHAPTER 1031

Entry Date 1991/08/14
Update Date 2017/01/24
Received Date

Well Name WHITE BEAR LAKE 3 Well I

Township	Range	Dir	Section	Subsection	Field Located Elevation
30	22	W	36	BDCDCD	MDH 1014.00 ft.

well address WHITE BEAR LAKE 3
ORCHARD LA
WHITE BEAR LAKE MN 55110 Changed

contact address CITY OF WHITE BEAR LAKE
WHITE BEAR LAKE MN 55110

Description	Color	Hardness	From	To (ft.)
SANDY CLAY			0	53
SAND & GRAVEL			53	64
CLAY			64	86
LIMEROCK			86	100
LIMEROCK			100	118
LIMEROCK			118	122
SANDROCK			122	281
SHAKOPEE			281	338
SANDSTONE			338	349
SHAKOPEE			349	409
JORDAN			409	410
JORDAN			410	513

Remarks
GAMMA & MULTI TOOL LOGGED 2-20-2013. LOGGED FOR MDH. M.G.S. NO. 426. TV BY MDH ON 2-20-2013. WELL HYDROLAB BY MDH.

First Bedrock OPVL
Last Strat CJDN
Aquifer Prairie Du Chien-Jordan
Depth to Bedrock 100.00 ft.

Well Depth 513.00 ft
Depth Completed 513.00 ft
Date Well Completed 1966/03/31

Drillhole Angle

Drilling Method Cable Tool

Drilling Fluid

Well Hydrofractured? ☐ YES ☐ NO From ft. to

Use community supply(municipal)

Casing Type Steel (black or low Drive Shoe? ☐ YES ☐ NO
Diameter 20 Depth 289
30.00 in. from 0.00 to 97.00 ft. lbs/ft
20.00 in. from 0.00 to 289.00 ft. lbs/ft

Hole Diameter (in.)
24.0(To 287.0
19.0(To 513.0

Screen No
Make Type
Diamter Slot Length Set

Open Hole(ft.) From 289.0 to 513.0

Static Water Level
135.00 ft. land surface Date measured 1966/03/31

Pumping Level (below land surface)
166.00 ft. after hrs. pumping 2303.00 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☑ 12 in. above grade
☐ At-grate (Environmental Wells and Borings ONLY) ☐ Basement offset

Grouting Information Well grouted? ☑ YES ☐ NO ☐ NOT SPECIFIED
Material neat cement From 6.0 To 289.0 ft. 22.00 Cubic yards

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ YES ☐ NO

Pump
☐ Not Installed Date Installed
Manufacture's name
Model number HP 0.00 Volts
Length of drop pipe Material Capacity g.p.m
Type

Abandoned Wells
Does property have any not in use and not sealed well(s)? ☐ YES ☐ NO

Variance
Was a variance granted from the MDH for this well? ☐ YES ☐ NO

Well Contractor Cerfication
Keys Well Co. 62012
License Business Name **Lic. or Reg No.**
SITTIG, R.

Name of Driller **Date**

Unique Well Number 226566

County Ramsey
Quad White Bear Lake West
Quad Id 119D

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING RECORD
MINNESOTA STATUTES CHAPTER 1031

Entry Date 1991/08/14
Update Date 2017/03/01
Received Date

Well Name WHITE BEAR LAKE 4 Well J

Township	Range	Dir	Section	Subsection	Field Located Elevation
30	22	W	35	DAAAAB	MDH 971.00 ft.

well address WHITE BEAR LAKE 4
3359 MCKNIGHT RD
WHITE BEAR LAKE MN 55110 Changed

contact address CITY OF WHITE BEAR LAKE
WHITE BEAR LAKE MN 55110

Description	Color	Hardness	From	To (ft.)
CLAY			0	5
SAND & GRAVEL & CLAY			5	55
BROKEN LIME			55	59
HARD LIMEROCK			59	86
LIMEROCK & SHALE			86	89
LIMEROCK & SHALE			89	93
SANDROCK & ST. PETER			93	205
SANDROCK & SHALE			205	252
SANDROCK & SHALE			252	255
LIMEROCK & SHALE			255	256
LIMEROCK			256	376
LIMEROCK			376	380
JORDAN SANDROCK			380	470
GREEN SHALE			470	476

Remarks
FORMERLY GOLFVIEW NO. 4. G.W.Q. NO. 0220. MDH TV'D 3-12-2014 NOTED 20" CASING TO 263'; SWL 102'; BOTTON AT 431 FEET. LARGE CAVERN 377-431 FT. MUELLER BROS. PROPOSED TO REMOVE 4,000 CUBIC YARDS OF SANDSTONE. GAMMA, CALIPER, & MULTI TOOL LOGGED 3-21-2014. LOGGED FOR MDH. MDH HYDROLAB 3-24-2014.

First Bedrock OPVL
Last Strat CSTL
Aquifer Prairie Du Chien-Jordan
Depth to Bedrock 55.00 ft.

Well Depth 476.00 ft
Depth Completed 476.00 ft
Date Well Completed 1969/00/00

Drillhole Angle

Drilling Method Cable Tool

Drilling Fluid

Well Hydrofractured? ☐ YES ☐ NO
From ft. to

Use community supply(municipal)

Casing Type Steel (black or low Drive Shoe? ☐ YES ☐ NO
Diameter 20 Depth 267
30.00 in. from 0.00 to 55.00 ft. lbs/ft
20.00 in. from 0.00 to 267.00 ft. lbs/ft

Hole Diameter (in.)
24.0(To 267.0
19.0(To 476.0

Screen No
Make Type
Diamter Slot Length Set

Open Hole(ft.) From 267.0 to 476.0

Static Water Level (Multiple SWL)
107.00 ft. land surface Date measured 1969/00/00

Pumping Level (below land surface)
162.00 ft. after hrs. pumping 3000.00 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grate (Environmental Wells and Borings ONLY) ☐ Basement offset

Grouting Information Well grouted? ☐ YES ☐ NO ☐ NOT SPECIFIED

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ YES ☐ NO

Pump
☐ Not Installed Date Installed
Manufacture's name JOHNSTON
Model number HP 200.00 Volts 480
Length of drop pipe 210.0 Material Capacity g.p.m
Type Turbine

Abandoned Wells
Does property have any not in use and not sealed well(s)? ☐ YES ☐ NO

Variance
Was a variance granted from the MDH for this well? ☐ YES ☐ NO

Well Contractor Cerfication

License Business Name MUELLER BROS.
Lic. or Reg No.

Name of Driller **Date**

County Well Index v.5 **REPORT** **Printed on** 5/10/2019 HE-01205-07 (Rev. 2/99)

Appendix F

Public Comments

June 28th, 2022

Paul Kauppi
Wellhead Protection Manager
City of White Bear Lake
4701 Highway 61
White Bear Lake, MN 55110

Re: White Bear Lake Wellhead Protection Plan, Part 2
Metropolitan Council Districts 10, 11, & 12
Referral File No. 22775-1

Dear Mr. Kauppi,

Thank you for submitting Part 2 of the White Bear Lake wellhead protection plan (WHPP). Metropolitan Council (Council) staff review completed plans under the provisions of Minnesota Rules, Chapter 4720.

The Council evaluates wellhead protection plans in comparison with information reported in the Council's Master Water Supply Plan including population and water demand information, predicted issues associated with water supply development, and identified opportunities for inter-jurisdictional cooperation. This wellhead protection plan provides a useful overview of the supply sources and protection measures. Council staff offer the following comments to highlight how the plan could be made even stronger.

The White Bear Lake WHPP provides sound information regarding wellhead protection (WHP) issues and identifies high-level objectives to be addressed through the plan implementation process. The extension of the White Bear Lake drinking water supply management area (DWSMA) into neighboring communities creates an opportunity for the sharing of ideas and resources that will promote coordinated WHP activities. Similarly, DWSMAs for Vadnais Heights, North St. Paul, Mahtomedi, and White Bear Township extend into White Bear Lake and intersect with the White Bear Lake DWSMA. White Bear Lake may want to consider the formation of a wellhead protection coordinating committee with DWSMA-overlapping governmental units to facilitate communication and source water protection planning activities. This group would support the goals outlined in Chapter 8 and could aid wellhead protection managers in their efforts to identify issues, share information, and communicate source water protection activities. The Anoka County Municipal Wellhead Protection Group could serve as a model for these activities.

White Bear Lake could also consider adding 'success criteria' to the plan objectives identified in section 9, and further specifying what the activities associated with the plan objectives in section 9.2. Doing so would support the plan evaluation program and could be included in wellhead protection progress reports. Some examples that would strengthen both the WHPP and support the White Bear Lake Water Supply Plan include: recording the number of residents participating in education and outreach activities, logging the number of abandoned wells identified and sealed based on official city building records, documenting the number of emergency response agencies and industrial partners engaged around spill response, tracking coordinated source water protection activities with surrounding units of government, etc.

The integration of the WHPP with the City's planning process is a critical task in strengthening source water protection. There are several resources available to communities to aid in the wellhead and source water planning and protection effort. Some examples include:

- White Bear Lake Systems Statement
- Master Water Supply Plan
- Water Conservation Toolbox
- Stormwater Reuse Guide
- Council Reports on Groundwater and Surface Water Interactions (2010, 2020)
- The Minnesota Technical Assistance Program
- University of Minnesota Extension: Lawn and Turfgrass Management Program

Please let us know if you are interested in learning more about these tools or any other Council resources. Council staff are available to aid White Bear Lake's efforts to collaborate with surrounding communities and water management organizations around wellhead protection activities.

This letter completes the Council's review process. On behalf of the Council, I thank you for your efforts in preparing this plan. Please send us a copy of the finalized WHPP if any revisions are made. Should any questions arise regarding the Council's review comments, please feel free to contact John Clark of the Council's Environmental Services Division at (651) 602-1452 or johnd.clark@metc.state.mn.us.

Sincerely,

Sam Paske
Assistant General Manager Environmental Quality Assurance

cc: Peter Lindstrom, Metropolitan Council Member, District 10
Susan Vento, Metropolitan Council Member, District 11
Francisco J. Gonzalez, Metropolitan Council Member, District 12
Patrick Boylan, Sector Representative, Metropolitan Council Community Development
Raya Esmaeili, Sector Representative, Metropolitan Council Community Development
Eric Wojchik, Sector Representative, Metropolitan Council Community Development
John Freitag, Planner, Minnesota Department of Health

Appendix G

Water Supply Plan Approvals

Ecological and Water Resources
1200 Warner Road
St. Paul, MN 55106

November 5, 2020

White Bear Lake City Council
c/o Ellen Hiniker
4701 Highway 61
White Bear Lake, MN 55110

RE: Water Supply Plan Approval, City of White Bear Lake, Appropriation Permit No. 1969-0174

Dear Ms. Hiniker,

In accordance with Minnesota Statutes, Section 103G.291, Subdivision 3, and on behalf of the Commissioner of the DNR, I hereby **approve your Water Supply Plan received 10/30/2020.**

Please complete the following action items to complete the water supply planning process:

Certificate of Adoption

We encourage the City to complete the attached "Certification of Adoption" form. Please upload the form to MPARS as an attachment as soon as the City officially adopts the Plan.

Critical Water Deficiency Ordinance/Official Control

According to MN Statute 103G.291, it is required for all communities to adopt and enforce water conservation restrictions in the event of a critical water deficiency declaration by the governor. Please adopt a Critical Water Deficiency Ordinance (or other official control) that includes provisions to restrict water use during an emergency, and submit a copy to the DNR within 6 months of this approval (May 2021).

DNR and Metropolitan Council Comments

Attached to this letter is a copy of a Water Supply Plan Review checklist containing comments from both the DNR and the Metropolitan Council. These comments should be used to improve the management of the City of White Bear Lake water supply system and improve the next City of White Bear Lake Water Supply Plan.

Monitoring

The DNR is pleased to see the statement of intention for submitting the water level information in the future. Please complete the attached site establishment form to report information about the wells you will be submitting data for, and return this form to the DNR Region 3-South water data coordinator at region3s_waterdata.dnr@state.mn.us. We ask that the data be submitted to the same email address in the attached Ground Water Level Monitoring Spreadsheet (also available on the DNR Water Appropriations webpage) on an annual basis.

Thank you for your efforts in planning for the future of the City of White Bear Lake water supply and for conserving the water resources of the State of Minnesota. If you have any questions or need additional assistance with the City's water appropriation permit, please contact me at (651) 259 - 5877.

Sincerely,

Joseph D. Richter

Joe Richter
District Appropriations Hydrologist
Minnesota Department of Natural Resources
joe.richter@state.mn.us

CC: Sara Mielke, DNR Groundwater Hydrologist
Connie Taillon, City of White Bear Lake
Nate Christensen, City of White Bear Lake
Raya Esmaeili, Metropolitan Council Reviews Coordinator
Lanya Ross, Metropolitan Council
Carmelita Nelson, DNR Water Supply Plan Coordinator
Jack Gleason, EWR South District Hydrologist Supervisor
Dan Scollan, Acting DNR Area Hydrologist

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