Hibbing Wellhead and Source Water Protection –

Part 2: Wellhead Protection Plan Amendment

Prepared for

Hibbing Public Utilities

June 27, 2024

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Public Water Supply Profile

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General Information

UNIQUE WELL NUMBER(S) 147463, 716190, 233054, 792077, 233056, 271992, 233058, 233061, 778015, 791017

SIZE OF POPULATION SERVED 16,310 (HPUC data)

COUNTY St. Louis

Documentation List

Step	Date Performed
Scoping Meeting 2 Held (4720.5340, subp. 1)	April 13, 2022
Scoping 2 Decision Notice Received (4720.5340, subp. 2)	April 29, 2022
Remaining Portion of Plan Submitted to Local Units of Government (LUGs) (4720.5350)	February 9, 2024
Review Received From Local Units of Government (4720.5350, subp. 2)	April 9, 2024
Review Comments Considered (4720.5350, subp. 3)	April 12, 2024
Public Hearing Conducted (4720.5350, subp.4)	April 30, 2024
Remaining Portion WHP Plan Submitted (4720.5360, subp. 1)	June 27, 2024
Final WHP Plan Review Received (4720.5360, subp. 4)	

Certification

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

Katrina Marini	June 27, 2024
Katrina Marini PG #: 60564	Date

Acronyms

DWSMA	Drinking Water Supply Management Area
ERA	Emergency Response Area
GWCA	Groundwater Contribution Area
HEDA	Hibbing Economic Development Authority
HPU	Hibbing Public Utilities
ISTS	Individual Sewage Treatment System
IWMZ	Inner Wellhead Management Zone
LGU	Local Government Unit
MGD	Million Gallons per Day
MGY	Million Gallons per Year
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MDNR	Minnesota Department of Natural Resources
MGS	Minnesota Geological Survey
MnOPS	Minnesota Office of Pipeline Safety
MnTAP	Minnesota Technical Assistance Program
MPCA	Minnesota Pollution Control Agency
PCSI	Potential Contaminant Source Inventory
SSTS	Subsurface Sewage Treatment System
SWCA	Surface Water Contribution Area
USEPA	U.S. Environmental Protection Agency
WHPA	Wellhead Protection Area
WHPP	Wellhead Protection Plan

Executive Summary

The Wellhead and Source Water Protection Plan (the Plan) for Hibbing Public Utilities (HPU) addresses the ten municipal water supply wells currently operated by HPU. Hibbing's previous Wellhead Protection Plan was approved by the Minnesota Department of Health (MDH) in 2008. This Plan amendment was prepared in accordance with the applicable portions of the State of Minnesota Wellhead Protection Rules (Minnesota Rules 4720.5100 through 4720.5590) due to the age of the Plan.

HPU currently has 10 municipal water supply wells. Wells 1C, 2B, 3A, 4A, 8A, 11C, 17, and 18 (unique numbers 233054, 792077, 233056, 271992, 233058, 233061, 778015, and 791017, respectively) are completed in the glaciofluvial outwash aquifer. The Airport Well (unique number 716190) is completed in the Virginia Formation. The Scranton well (unique number 147463) is completed in the Biwabik Iron Formation. Well 18 and the Scranton well are classified as emergency wells, though the Scranton well was classified as a primary well prior to 2023. All of the wells are classified as vulnerable based on criteria that include geology at the well, well construction, pumping rate, and water quality.

The Plan amendment consists of two parts. In Part 1 of the Plan amendment, five wellhead protection areas (WHPAs) for the City's water supply wells were delineated as were the associated drinking water supply management areas (DWSMAs). The WHPA for the Scranton Well has two parts: 1) the groundwater catchment area (GWCA), which is the composite 10-year groundwater time of travel zone around the well and 2) the surface water contribution area (SWCA), which includes areas from which surface drainage can flow into the areas of High aquifer vulnerability. The DWSMAs encompass the WHPAs and are defined using geographically identifiable boundaries (quarter-quarter section lines). Since Well 18 was classified as an emergency well during development of the Part 1 amendment, WHPA and DWSMA delineations were not completed for Well 18. Five DWSMAs were delineated for the HPU wells (Figure 1).

- Scranton Well DWSMA extends beyond the Hibbing city limits into Balkan Township.
- The remaining DWSMAs are entirely within the Hibbing city limits.

In Part 1 of this Plan amendment, an assessment of geologic conditions in and around Hibbing's DWSMAs and available water quality data for HPU's wells was done to determine the vulnerability to contamination of the source aquifers. The aquifer vulnerability in approximately 68 percent of the area encompassed by the DWSMAs is classified as High. Aquifer vulnerability in approximately 30 percent of the area in the DWSMAs is classified as Moderate. Approximately 2 percent of the area in the DWSMAs has an aquifer vulnerability classification of Low. In keeping with MDH policy, the vulnerability of the Scranton Well SWCA is classified as High.

This document comprises Part 2 of the Plan amendment and includes the following information:

- A review of data elements identified by the MDH as applicable to the DWSMAs.
- Results of an inventory of potential contaminant sources within the DWSMAs.

- A review of changes, issues, problems, and opportunities related to the public water supply and the identified potential contaminant sources.
- A discussion of potential contaminant source management strategies and the goals, objectives, and action plans associated with these management strategies.
- An overview of HPU's Wellhead and Source Water Protection evaluation program.
- Identification of the City's alternative water supply contingency strategy specified in HPU's Water Supply Plan (incorporated by reference).

A potential contaminant source inventory (PCSI) was performed in accordance with MDH requirements. Potential point and non-point sources of contamination that could affect the source water aquifer were identified during the PCSI. Per MDH guidance, the types of potential contaminant sources required to be inventoried varies throughout each DWSMA based on the aquifer vulnerability classification (see Appendix C).

HPU's historical water quality monitoring results indicate that sampled constituents do not exceed the U.S. Environmental Protection Agency (USEPA) Maximum Contaminant Level (MCL) or MDH Health Risk Limit (HRL). Groundwater pumped from the source water aquifers by the HPU wells is also currently free of pathogens and disease-causing organisms.

The goals and objectives of this WHPP focus on reducing the potential contaminant pathways to the source water aquifers that may be provided by private wells, educating property owners and water supply users, and working with St. Louis County, and other local government units (LGUs) whose jurisdictions overlap the DWSMAs, to the extent practicable, to ensure proper management of the DWSMAs.

The following goals have been identified for implementation of this WHPP:

- Work to maintain or improve the current level of water quality so that the municipal water supply will continue to meet or exceed all applicable state and federal water quality standards.
- Work with the St. Louis County and appropriate State agencies to protect the source water aquifers.
- Provide information and promote activities that protect the source water aquifers that provide water to the municipal system. This will include increasing public awareness of the Wellhead and Source Water Protection Program and groundwater-related issues, as well as management of the identified potential contaminant sources within the DWSMAs.
- Continue to collect data to support future wellhead and source water protection efforts.

Management actions identified to accomplish these goals include the following:

- Perform select environmental audits of facilities with environmental concerns, with particular attention to sanitary sewer treatment systems (SSTS), the City of Hibbing wastewater treatment plant, and local industrial sites.

- Continue the removal and safe upgrading of leaded water mains throughout the City.
- Coordinate with St. Louis County and MDH to raise awareness and provide assistance to homeowners for sealing of inactive drinking water wells.
- Identify and implement data management solutions for water supply groundwater analytical data and pumping data.

Implementation of the management actions will be prioritized based on the risk to the municipal water supply wells and the source water aquifers posed by the potential contaminant source properties (including their locations relative to the water supply wells). The priority assigned to potential contaminant sources is summarized in Table 3.

1.0 Introduction

1.1 Background

Hibbing currently has ten municipal water supply wells. Eight of the wells are classified as primary water supply wells; Well 18 and the Scranton Well are classified as emergency-use-only wells, though the Scranton Well was classified as a primary well prior to 2023. In total, these wells pump from the following three aquifers: glaciofluvial outwash aquifer, Biwabik Iron Formation, and Virginia Formation. Minnesota unique well number along with well construction, well status, aquifer(s), and well vulnerability classification for each of the City's municipal water supply wells are presented in Table 1. Well locations and the Drinking Water Supply Management Areas (DWSMAs), are shown on Figure 1. Minnesota Department of Health (MDH) well records for all the water supply wells are presented in Appendix A.

The previous Hibbing Wellhead Protection Plan (WHPP) Part 1 was completed in 2004 and Part 2 was prepared in 2008. In accordance with the Minnesota Wellhead Protection Rules (Minnesota Rules 4720.5100 through 4720.5590), amendment of the City's WHPP was initiated based on the age of the Plan. In 2016, the MDH and HPU agreed to delay the completion of the next wellhead protection plan by a few years to allow HPU to develop a strategy for meeting water demand if future mining activities limit the pumping capacity of the Scranton Well. The Part 1 WHPP amendment (Barr, 2021) was approved by the MDH in April 2021 (MDH, 2021). A public information meeting on the Part 1 WHPP amendment was held on September 14, 2021.

In the Part 1 WHPP amendment, five DWSMAs were delineated for HPU water supply wells. The Scranton Well DWSMA encompasses the groundwater catchment area (GWCA) and surface water contribution areas (SWCA) delineated for the well. When combined, the GWCA and SWCA define the wellhead protection areas (WHPAs) for the water supply wells (see Figures 10-12 in Appendix B). In addition to the delineation of the WHPAs and DWSMAs, Part 1 of the WHPP amendment includes an assessment of the vulnerability to contamination of the municipal wells and the source water aquifers in the associated DWSMAs. As shown in Table 1, all of HPU's wells are classified as vulnerable to contamination. In the Part 1 amendment report, the vulnerability to contamination of the source water aquifer within each DWSMA was classified as High, Moderate, or ranging from Low or Moderate to High (Barr, 2021). Figure 1 shows the aquifer vulnerability zones in the DWSMAs. Hibbing's Part 1 WHPP amendment is presented in Appendix B.

1.2 Description of the Public Water Supply System

Hibbing is located in St. Louis County. HPU currently has eight primary water supply wells in the municipal water supply and distribution system for Public Water Supply #1690022. Locations of the wells are shown on Figure 1 and general construction details for the municipal wells are summarized in Table 1. Copies of the MDH well records for the City municipal wells are presented in Appendix A.

The 2020 census counted 16,214 people in Hibbing. The U.S. Census Bureau estimated the 2021 population of Hibbing to be 16,077.

Under Minnesota Department of Natural Resources (MDNR) Appropriation Permit 1975-2222, HPU's municipal water supply wells have a maximum permitted annual pumping volume of 1.0 billion gallons per year (BGY). The maximum operating capacity of the wells is 3,225 gallons per minute (4.8 MGD). Current daily water demand (based on the period 2005-2021) averages approximately 1.98 million gallons per day (MGD). Maximum day demand (the largest daily water use in a given year) ranged from approximately 3.08 MGD during the regular season to 3.49 MGD during "watermain break season" (February through May) in the period 2017-2021.

Currently, HPU has 2,000,000-gallon storage capacity in elevated facilities and 1,000,000-gallon storage capacity in a ground storage facility. At the existing treatment plant, water is treated for iron and manganese, then chlorinated and fluoridated prior to being placed in the 1,000,000-gallon ground reservoir.

As discussed by Barr (2021), pumping information from HPU for the period 2014 through 2018 and HPU water use projections were used to develop pumping rate projections used in delineating the WHPAs. The annual volume of water pumped by each of the municipal water supply wells during the period 2014 through 2018 is shown in Table 2.

1.3 DWSMAs

The DWSMAs delineated in the Part 1 WHPP amendment encompass the 10-year groundwater time of travel WHPAs around HPU's wells and the SWCA around the Scranton Well. The DWSMAs overlap all or parts of multiple public land survey (PLS) townships, ranges, and sections (Figure 1). As shown on Figure 1, the Scranton Well DWSMA extends beyond the Hibbing city limits into Balkan Township and the remaining DWSMAs are entirely within the Hibbing city limits. The HPU DWSMAs do not overlap any other DWSMAs.

In Part 1 of this Plan amendment report, the aquifer vulnerability in approximately 68 percent of the area encompassed by the DWSMAs is classified as High. Aquifer vulnerability in approximately 30 percent of the area in the DWSMAs is classified as Moderate. Approximately 2 percent of the area in the DWSMAs has an aquifer vulnerability classification of Low. In keeping with MDH policy, the vulnerability of the Scranton Well SWCA is classified as High.

2.0 Identification and Assessment of Data Elements

The Minnesota Wellhead Protection Rules specify data elements that must be addressed in wellhead protection plans. For the WHPP amendment, MDH staff met with HPU staff on two occasions to discuss the data elements that are specified in the Minnesota Rules 4720.5400. Results of these scoping meetings were transmitted to HPU via two Scoping Decisions dated September 12, 2019 (MDH, 2019) and April 29, 2022 (MDH, 2022).

The first Scoping Meeting, held on September 12, 2019, included a discussion of the data elements related to delineation of the WHPAs and DWSMAs and assessment of well and aquifer vulnerability. The second Scoping Meeting was held on April 13, 2022, to discuss the data elements required to support development of Part 2 of the WHPP amendment (this document), which identifies potential contaminant sources within the DWSMAs and identifies management strategies to help safeguard the municipal water supply from identified potential contaminants. HPU performed a Potential Contaminant Source Inventory (PCSI) within the DWSMAs per the requirements outlined in the April 29, 2022 Scoping 2 Decision Notice No. 2.

An assessment of these data elements, as required by the Minnesota Wellhead Protection Rules, is presented in Appendix C.

3.0 Inventory of Potential Contaminant Sources

In Part 1 of this WHPP amendment, the GWCAs, SWCA, and DWSMAs for HPU's wells were delineated. The GWCA and SWCA for the Scranton Well were combined to delineate the Scranton Well WHPA; the GWCAs from other wells were used to delineate the remaining WHPAs. The DWSMAs encompass the WHPAs around HPU's water supply wells (Barr, 2021). As discussed above and shown on Figure 1, the DWSMAs are spread across the City of Hibbing and extend into Balkan Township.

Current zoning in the DWSMAs is shown on Figure 2 and in Appendix C Figure C-6. Numerous land use zones are found within the DWSMAs, including residential, commercial, industrial, and agricultural zones (Appendix C Figure C-5). A figure depicting the future land use is not included in this plan; as of the issuance of this plan, the City is undergoing a revision of its Comprehensive Plan, which will include updated information with respect to future land use.

3.1 Inventory Process

At Scoping Meeting No. 2, the types of potential contaminant sources that must be inventoried in the HPU's DWSMAs were discussed. The types of potential contaminant sources that must be inventoried vary by vulnerability classification. As discussed in the Part 1 WHPP amendment (Barr, 2021), the aquifer vulnerability in approximately 68 percent of the area encompassed by the DWSMAs is classified as High. Aquifer vulnerability in approximately 30 percent of the area in the DWSMAs is classified as Moderate. Approximately 2 percent of the area in the DWSMAs has an aquifer vulnerability classification of Low. In keeping with MDH policy, the vulnerability of the Scranton Well SWCA is classified as High.

Sources of data accessed for the potential contaminant source inventory (PCSI) include:

- HPU
- St. Louis County
- Minnesota Department of Agriculture (MDA)
- MDH
- Minnesota Pollution Control Agency (MPCA)
- U.S. Environmental Protection Agency (USEPA)

The first step in the inventory was to determine if there are any potential contaminant sources in the Inner Wellhead Management Zone (IWMZ) or the Emergency Response Area (ERA) around each of HPU's water supply wells. The IWMZ is defined as the area within a 200-foot radius of a municipal well. An inventory to determine if there are any potential contaminant sources in the IWMZ around each HPU well was completed in January 2024 (Appendix C, Attachment C-2). The inventory identified unsealed wells in the IWMZs for wells 1C, 3A, 4A, 11C, and 17, along with an unsealed exploration borehole in the IWMZ for the Scranton Well. The inventory did not identify any potential contaminant sources within the IWMZs of wells 2B, 8A, 18, and the Airport Well.

As shown in Table 3, potential contaminant sources were assigned a management priority based on the relative risk they pose to the public water supply. The evaluation of risk related to a potential contaminant source type is based on the locations of potential contaminant sources of that type, the aquifer vulnerability classification, and available water quality information for HPU's wells. Higher priority was assigned to those potential contaminant sources that would pose the highest risk to the municipal water supply should a contaminant release occur.

3.2 Inventory Results

As noted above, potential contaminant sources within the DWSMAs are presented in Appendix C. The inventory results are summarized in Table 3.

During the preparation of this Plan amendment, all identified potential contaminant source locations within the DWSMA limits were verified to the extent possible (see Appendix C). Location verification procedures used included matching mapped locations with addresses on MDH Well Records, State/County-issued permits, in County/State/Federal databases, published business addresses, property parcel addresses, local knowledge of HPU staff, or information from HPU files (note that not all verification procedures were used for each type of potential contaminant source). New information developed on contaminant sources in the future will be verified as they are discovered as part of the WHPP implementation.

4.0 Impact of Changes to the Public Water Supply Wells

In accordance with the requirements of Minnesota Rules 4720.5220, anticipated changes in the physical environment, land use, surface water, and groundwater in the DWSMAs within the next ten years and the impact of these changes on the source water aquifers are discussed in this section.

4.1 Potential Changes Identified

4.1.1 Physical Environment

Ongoing mining activity at Hibbing Taconite has the potential to alter the physical environment in the Scranton Well DWSMA; however, the Scranton Well has been reclassified as an emergency well since completion of the Part 1 report. Management of the Scranton Well DWSMA is included in the Plan amendment, but future amendments are anticipated to limit management to HPU's primary wells. Currently, substantial or large-scale changes in the physical environment that might affect the remaining Hibbing DWSMAs are not anticipated in the next ten years. Any changes are expected to be the result of development or redevelopment of properties or localized infrastructure changes. Such changes would not be expected to significantly affect the source water aquifers. Any minor changes to the physical environment will likely not affect the management strategies for the DWSMAs presented in this WHPP. As of the issuance of this plan, HPU is working with their consultants to identify locations for additional wells, as well as an additional water treatment plant to meet current and future use needs.

4.1.2 Land Use

While projected population growth is uncertain for Hibbing, it is anticipated that there will likely be some changes in land use in the City during the life of this Plan. As noted above, a variety of land uses are currently present in Hibbing's DWSMAs (Appendix C, Figure C-5). Future land use in the DWSMAs is controlled by the City of Hibbing, Balkan Township, and St. Louis County. Three of Hibbing's planned development districts (PD07-1, PD-09-1, and PD10-1) overlie South Wellfield DWSMAs (Figure 2). Planned development districts PD07-1 and PD09-1 overlap high vulnerability areas near Wells 11C, 8A, and 4A. Planned development district PD10-1 overlaps a moderate vulnerability area northwest of Wells 11C and 8A. While a land use change such as a new industry located within a DWSMA could have the potential to introduce use and handling of a chemical not currently present in that DWSMA, management actions presented later in this Plan are considered to be sufficient to address such potential changes since planned future land uses, as last published in 2018, are consistent with land uses currently present in one or more of the DWSMAs (City of Hibbing, 2018). The HPU will cooperate and collaborate with other local government units (LGUs) to develop and implement wellhead and source water protection policies and strategies. Parcels and political boundaries are shown relative to the DWSMAs on Figure 3. Projected future land uses within the remaining DWSMAs are anticipated to be consistent with land uses currently present within those DWSMAs.

4.1.3 Surface Water

Hibbing is in the headwaters for the East Swan River, a tributary that enters the St. Louis River approximately 12 miles to the southeast of Hibbing's south wellfield (Figure 4). Hibbing is in the West Swan River-East Swan River portion of the North St Louis River Planning Region of the St. Louis River One Watershed, One Plan. There are surface water bodies and wetlands within the Hibbing DWSMAs. These water bodies include Dempsey Creek and unnamed tributaries to the East Swan River. The MPCA has identified the unnamed tributary to the East Swan River that flows through the DWSMAs for Wells 3B, 4A, and 17 as a category 4A impaired water. The unnamed creek is impaired for aquatic recreation due to elevated *E. coli*.

There appears to be a direct hydraulic connection between surface waters and the Scranton Well installed in the Biwabik Iron Formation. Therefore, changes to the conditions of surface waters within the pit complex adjacent to the Scranton Well may have an impact on the quality and/or quantity of this emergency well. A direct hydraulic connection between surface waters and the South Wellfield wells was not established during the Part 1. However, the groundwater flow model indicated that the ERAs for Wells 8A, 11C, and 17 may capture some surface water flow from an unnamed tributary to the East Swan River.

HPU is not aware of any plans to alter the course or location of any surface water bodies currently present within the DWSMAs in the next ten years.

4.1.4 Groundwater

The primary groundwater flow direction near Hibbing's wells is toward the southeast; additional discussion of groundwater flow is included in the Part 1 amendment (Appendix B). Ongoing mining activity at Hibbing Taconite has the potential to alter groundwater elevations and flow directions near the Scranton Well, as well as within the Biwabik Iron Formation throughout north Hibbing. HPU is currently operating the Scranton Well as an emergency well, and in 2022, the Scranton Well was only pumped during "watermain break season".

HPU staff inspect the municipal wells regularly. The MDH inspects all wells annually. This annual inspection includes sampling of the wells to ensure they comply with applicable regulatory standards. In addition, HPU uses a SCADA system to measure the volume of water pumped from a well, the instantaneous pumping rate for each well, and the water level (static or pumping) in each well. Well construction records are included in Appendix A and well maintenance records are included in HPU's Water Supply Plan (Appendix F).

The water provided to HPU's customers currently meets applicable drinking water standards. These standards include USEPA Maximum Contaminant Levels (MCLs) and the MDH Health Risk Limit (HRLs). MCLs and HRLs are regulatory levels specified by the USEPA as part of the Safe Drinking Water Act and health-based guidelines provided by the State of Minnesota, respectively. The 2022 Consumer Confidence Report (see Appendix D) indicates that reported concentrations of all monitoring parameters are below the applicable MCLs and HRLs. A link to the current Consumer Confidence Report can be found on HPU's website at https://hpuc.com/wp-content/uploads/2023/04/2022-MDH-Consumer-Confidence-Report.pdf.

HPU anticipates that future land uses in the DWSMAs will not adversely impact the quality of water pumped from Hibbing's water supply wells.

Available information from the MPARS database indicates that there is one high capacity well owned by others in addition to the ten active HPU water supply wells within and extending one mile beyond DWSMA boundaries. High-capacity wells are defined as wells that pump more than 1,000,000 gallons per year or more than 10,000 gallons per day. Owners of these wells are required to obtain a groundwater appropriation permit from the MDNR. High-capacity wells outside of the DWSMAs were identified because changes in operation of these wells could potentially affect the DWSMA boundaries. The only non-municipal high capacity well is used for golf course irrigation (Table C-4 and Figure C-4). Based on modeling performed during the WHPP Part 1 2022 update, golf course irrigation well pumping is not anticipated to affect the quantity or quality of waters within the South Wellfield WHPAs. Additional information on this well can be found in Appendix C.

4.2 Impact of Changes

4.2.1 Water Use

HPU's water distribution system is currently supplied with water from eight primary wells with a maximum operating capacity of 1,870 gpm (2.69 MGD). Including the two wells currently operated as emergency wells (Well 18 and Scranton Well), HPU's water supply has a maximum operating capacity of 3.92 MGD (2,725 gpm). The daily average water demand for the time period 2014-2021 was 1.73 MGD (approximately 1,200 gpm). Maximum daily demand varied from 3.08 MGD in the regular season to 3.49 MGD in "watermain break season". "Watermain break season" is defined as the period from February through June when the ground has shifted due to freezing and thawing conditions, causing the underground watermains to experience breaks. Assuming moderate to high growth, the projected daily water demand is approximately 2.19 MGD (approximately 1,520 gpm) to approximately 2.66 MGD (approximately 1,850 gpm) (Bolton & Menk, 2022).

Based on recent water demand and reclassification of the Scranton Well as an emergency well, HPU anticipates the need to install additional wells to meet future water demand. After new wells are put into operation, HPU will have to review, and likely update, the WHPAs and DWSMAs to take into account the effects of pumping from the new wells. Since it is possible that multiple wells may be installed over a few years, HPU will plan to discuss with the MDH the schedule for any needed updates to the WHPP.

In addition, the construction and operation of an additional high capacity well in or near the DWSMAs by another entity or significant changes in current groundwater appropriations by existing wells could have an impact on the source water aquifers and local water supplies. Such changes could also affect the WHPA and DWSMA boundaries identified for the existing HPU water supply wells or change the static water levels in the wells. HPU will work with the MDH Source Water Protection Unit and the MDNR to identify non-HPU proposed high-capacity wells in the vicinity of HPU DWSMAs and provide interaction, to the extent practicable, with the proposed well owner to minimize potential problems, should the potential for adverse well interference be identified.

4.2.2 Influence of Existing Water and Land Government Programs and Regulations

HPU provides water conservation information to customers via its website to assist residents and businesses with water conservation strategies through educational information.

The City of Hibbing manages storm water as specified in their small municipal separate storm sewer system (MS4) permit. The goals of the storm water management program include maintaining or improving water quality in surface water bodies in Hibbing. HPU believes that the City's current program is sufficient to meet the objectives of this WHPP.

County and city ordinances, the MDNR Division of Waters' appropriations permitting program, the MPCA's storage tank and hazardous waste permitting programs, the MPCA's Voluntary Investigation and Cleanup program, the MPCA's superfund program, the MDH's Well Management and Drinking Water Supply Programs, State and County feedlot and agriculture programs, St. Louis County's program for regulating subsurface sewage treatment systems (SSTS), and State rules regarding chemical handling and storage and SSTS will be relied upon for assistance in regulating the installation of new wells, the operation of wells, water appropriation permitting, the proper sealing of unused wells, proper operation and maintenance of storage tanks, proper storage of chemicals, proper handling of hazardous wastes, proper operation of animal feedlots, agricultural management practices, proper operation and maintenance of SSTS, and proper response to sites with soil and groundwater contamination. HPU believes that the current level of regulations and oversight by various governmental entities are adequate to address these issues.

Land use control and land disturbing activities outside of the Hibbing city limits, both inside and outside the DWSMAs, will be governed by the LGU with jurisdiction in a particular area. This WHPP has been developed to protect Hibbing interests and, to the extent practicable, to have no adverse effect on the plans and strategies developed for adjacent areas. Governmental units whose jurisdictions overlap the DWSMAs include St. Louis County, the City of Hibbing, and Balkan Township. This Plan will be provided to these other governmental units as a resource for future land development planning. Local ordinances and plans related to land use will be relied upon for the management of the portion of the Scranton Well DWSMA that extends beyond Hibbing city limits. The Wellhead Protection Manager will, to the extent feasible and practicable, communicate the goals and objectives of this Plan to the other LGUs whose jurisdictions overlap the DWSMAs.

HPU will continue to rely on Federal, State, County, and local agencies and regulations and programs to handle issues outside of HPU's purview and the Hibbing city limits regarding water conservation, water appropriations, water quality, and well drilling. HPU staff will look to the MDH for continued regulation of the installation of wells and proper sealing and abandonment of old wells. In addition, HPU recognizes that the MDNR plays a role in the approval of applications for construction of new high-capacity wells as well as administering water appropriations.

The programs identified above have proven to be effective. HPU staff will cooperate with the appropriate agencies, to the extent practicable, if issues arise in the future.

4.2.3 Administrative, Technical, and Financial Considerations

HPU expects to need additional resources over a multi-year period to manage the source water aquifers within the DWSMAs. Funds to support ongoing wellhead and source water protection efforts will come from HPU's water utilities budget and grant funding. Wellhead and source water protection activities will be evaluated periodically per MDH requirements and any changes in the focus of the tasks will also be evaluated to determine if additional funding will be necessary to accommodate the changes. When appropriate and to assist in funding of activities, HPU may apply for grants from the MDH Source Water Protection Grant Program, or other applicable grant programs, to fund implementation of management activities described later in this Plan.

For this WHPP to be effective, HPU will need to keep the public aware of the issues affecting the public water supply. Therefore, the wellhead and source water protection actions described later in this Plan include public education. Routine administrative duties will be directed or performed by the Wellhead Protection Manager. Specific tasks and strategies will be performed by the Wellhead Protection Manager or delegated by the Manager to HPU staff or outside resources.

HPU believes that additional plans and studies related to the water supply system will be needed to ensure that projected future water demands in Hibbing can be met sustainably. HPU has an ongoing maintenance program to ensure that the water supply system will continue to operate properly and be able to meet water demand in the future.

The installation and operation of any additional high-capacity wells in the source water aquifers in or near the DWSMAs would have the potential to affect the size and shape of the HPU WHPAs and DWSMAs. At a minimum, HPU will update its Wellhead Protection Plan every 10 years as required by the Wellhead Protection Rules. If new high-capacity wells are installed in the area, HPU will evaluate how the operation of such new wells may affect the WHPA and DWSMA boundaries and work with the MDH to develop a schedule for updating the WHPA and DWSMA delineations.

5.0 Issues, Problems, and Opportunities

In accordance with Minnesota Rules chapter 4720.5230, this section discusses issues, problems, and opportunities related to land use, comments from LGUs and the general public, the data elements and local, State, and Federal programs and regulations.

5.1 Land Use Issues, Problems, and Opportunities

This Plan amendment provides HPU with the opportunity to better focus wellhead and source water protection efforts on activities that are implementable with the available resources and that target those potential contaminant source types or land uses that may pose the most risk to HPU's wells.

5.1.1 Source Water Aquifers

As shown on Figure 1, the aquifer vulnerability classification in HPU's DWSMAs ranges from Low to High. Approximately 68 percent of the area encompassed by the DWSMAs is classified as High. Aquifer vulnerability in approximately 30 percent of the area in the DWSMAs is classified as Moderate. Approximately 2 percent of the area in the DWSMAs has an aquifer vulnerability classification of Low.

HPU currently has 10 water supply wells; the well vulnerability classification for each well is presented in Table 1..

The addition of high-capacity wells within or near the DWSMAs (either municipal wells or private wells) could produce changes in the groundwater flow system (e.g., flow direction or static water level) which may result in changes to the shape and extent of the WHPAs and DWSMAs delineated for this WHPP. HPU will work with the MDH to evaluate the WHPA and DWSMA delineations and amend this WHPP as necessary if and when additional high-capacity wells are installed within or near the DWSMAs.

As discussed elsewhere in this Plan amendment, potential sources of contamination that could affect the source water aquifers were identified during the PCSI. These potential contaminant sources include wells, a property where Class V wells may be or may have been present, storage tanks, chemical storage locations, a hazardous waste generator, locations where contaminants were spilled, SSTS, and potential contaminant source sites. Table 3 summarizes the results of the PCSI. As part of the PCSI, the risk to the HPU water supply wells posed by the identified potential contaminant source properties was assessed (see Appendix E for a description of the process used for assessing risk). The risk classifications applied to the potential contaminant source properties is shown on Table 3. There are two chemical storage sites located within the IWMZs around Hibbing's water supply wells. As indicated in Appendix C, these storage sites are associated with water supply system treatment at the wellheads for the Airport and Scranton Wells. As such, HPU maintains control over these sites and manages them appropriately.

Available records indicate the presence of nine historical municipal water supply and test wells in Hibbing, as well as a cross-connection with the Scranton Mine. MDH does not have records of the sealing of older municipal wells 1A, 1B, 2, Th2, 8A-Test, 9, 11B, 12A, and one unnamed well (unique numbers 233052, 226635, 229149, 239970, 784455, 233059 233060, 233063, and 229148, respectively). At the time this

WHPP was prepared, HPU had completed sealing of fourteen former municipal and test wells. HPU will continue to seal wells as needed during future well replacement or abandonment activities. Sealing of the old wells will eliminate potential pathways for contaminants to reach the source water aquifers.

The entities in the various potential contaminant source categories are regulated and tracked by County, State, or Federal programs. The lack of HPU jurisdiction over the potential contaminant source entities poses a potential problem for protection of the source water aquifers. However, the jurisdictional issues also provide HPU with an opportunity to develop working relationships with County and State agencies that regulate and track the potential contaminant source entities. Therefore, HPU will work with the appropriate County and State programs, to the extent practicable, to address the potential contaminant sources within the DWSMAs.

HPU will rely on the City of Hibbing plans and policies for managing growth of the City and the allowable land uses. HPU will work with appropriate City of Hibbing staff to ensure, to the extent practicable, that policies identified in the City's plans will protect HPU's source water aquifers. HPU has plans and policies in place to manage their wells and the Hibbing water supply system.

5.1.2 Groundwater Quantity and Quality

5.1.2.1 Groundwater Quantity

As of the issuance of this WHPP Part 2 Amendment, HPU has not identified an immediate need for additional pumping capacity due to low groundwater quantity, though the conversion of the Scranton Well to an emergency-only use status increased HPU's dependence on the South Wellfield. As discussed elsewhere in this Plan, population growth is uncertain, but moderate water use increase is projected for Hibbing in the next ten years. As indicated in HPU's 2022 Water System Analysis (Bolton & Menk, 2022), additional municipal wells will need to be installed to meet current design demand as well as projected future demand. HPU is proactively investigating areas with potentially favorable groundwater quantity to sustainably meet current design demand and future projected demand. A drilling investigation in 2023 eliminated the Carey Lake area from consideration due to lack of suitable aquifer material. Along with these investigations, HPU is preparing to change the status of Well 18 to a primary well with treatment for iron and manganese within the next few years.

In the next ten years it is possible that new business developments in or near the Hibbing DWSMAs may seek to construct privately-owned high-capacity wells completed in one of HPU's source water aquifers. Such wells could potentially affect Hibbing DWSMA boundaries, depending on their location and pumping rate. At the time this Plan was prepared, HPU was not aware of any proposed developments with plans for privately-owned high-capacity wells within or near any of the DWSMAs.

5.1.2.2 Groundwater Quality

HPU has always placed a high priority on the safety of the municipal water supply system. In order to safeguard the municipal water supply system, HPU strictly limits access to their wells and associated infrastructure to HPU staff.

Based on information from the MPCA, there are known contaminant releases in Hibbing. However, no property audits indicating the presence of groundwater contamination were available to HPU at the time this Plan amendment was prepared. As noted above, HPU's historical water quality monitoring results indicate that there have been some detections of a small number of regulated contaminants in water samples from the HPU wells. These detections have not exceeded applicable drinking water quality standards. In addition, no trend toward increasing contaminant concentrations has been identified to date. As shown in Appendix D, results of recent sampling of HPU's wells show no contaminants have been detected in water samples from HPU's wells at concentrations that exceed applicable Federal health-related standards. Groundwater pumped from the source water aquifers by the HPU wells is also currently free of pathogens and disease-causing organisms. HPU will continue to monitor water quality in the source water aquifers by working with the MDH to continue sampling of the water supply wells on the schedule required by applicable regulations.

Currently, HPU reviews laboratory results for samples from the water supply wells but does not maintain an electronic database of these data. In addition, data evaluation (including quality assurance/quality control review of data packages and assessment of water quality trends) and reporting are currently manual processes. At the time this WHPP was prepared, HPU was in the initial stages of planning to upgrade their management of water quality data. The objectives of the upgrade will be to maintain an electronic database, improve the process for quality assurance/quality control review of laboratory data packages, improve the process for data evaluation and assessment of any trends, and streamline reporting of water quality results out of the database.

Current system operations ensure that the water HPU supplies to its customers meets or exceeds the water quality requirements of the Federal Safe Drinking Water Act as documented in HPU's annual Consumer Confidence Reports (aka, Water Quality Reports). The 2021 Consumer Confidence Report is presented in Appendix D. A link to the current Consumer Confidence Report can be found on HPU's website at https://hpuc.com/wp-content/uploads/2023/04/2022-MDH-Consumer-Confidence-Report.pdf.

Potential contaminant sources identified in the HPU DWSMAs are identified above and shown in Appendix C. Table 3 provides a summary of the numbers of these potential contaminant sources identified in the DWSMAs during development of this Plan amendment and their associated vulnerability ratings. Development of this Plan amendment provides HPU with an opportunity to prepare and implement a program to track potential contaminant source locations within the DWSMAs and educate the public regarding source water protection.

5.1.3 DWMSAs

A variety of land uses are currently present within the DWSMAs. The vulnerability to contamination of the portions of the source water aquifers encompassed by the DWSMAs is classified as ranging from Low to High. Current and future land uses could potentially affect the management strategies for HPU's DWSMAs.

As indicated in Table 1 and discussed in the Part 1 WHPP amendment (Barr, 2021), HPU water supply wells have been classified as vulnerable to contamination.

This WHPP amendment identifies actions for managing the source water aquifers within the DWSMAs. These management actions are influenced by the land uses within the DWSMAs. Since the DWSMAs extend beyond the Hibbing city limits, it is logical that HPU would work with Balkan Township and St. Louis County, to the extent possible, to protect the source water aquifers in the township. The township and St. Louis County should have a shared interest in protecting the source water aquifers because private wells in the townships pump from some of the same source water aquifers as the HPU wells. A source water protection coordinating committee that includes representatives from the Balkan Township Board, Chisholm Public Works, Hibbing Economic Development Authority (HEDA), and St. Louis County would provide HPU with a vehicle for working with these LGUs on source water protection and issues associated with land uses in the DWSMAs.

No other issues, problems, or opportunities, beyond those discussed herein, have been identified regarding land uses in the DWSMAs.

Information gathered for this WHPP amendment provides HPU with the basis for tracking potential contaminant sources within the DWSMAs. Thus, HPU has an opportunity to catalog and track potential contaminant sources and stay informed of land use changes or potential future threats to the source water aquifers.

The presence of privately owned wells within the DWSMAs provides potential pathways for contaminants to reach the source water aquifers if the wells are not properly constructed, maintained, or, if not used, sealed. Locations of wells identified within the DWSMAs during the PCSI are shown in Appendix C.

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

At the beginning of this wellhead protection planning process, the HPU sent a notification to surrounding local units of government of its intention to initiate work on an amendment to its wellhead and source water protection plan. After approval by the MDH in April 2021 (MDH, 2021), HPU sent information on the WHPAs, DWSMAs, and aquifer and well vulnerability to the LUGs whose jurisdictions overlay some portion of the Hibbing DWSMAs.

HPU held a public information meeting on September 14, 2021 to receive comments from the general public regarding Part 1 of the WHPP. The LGUs whose jurisdictions overlay the DWSMAs were notified of the public information meeting. No comments on the Part 1 Wellhead Protection Plan were received from the LGUs or the general public at the Public Information Meeting.

As required by the Wellhead Protection Rules, HPU provided LGUs whose jurisdictions overlap the DWSMAs with a copy of the draft Part 2 WHPP amendment. In December 2023, Minnesota Rural Water and Minnesota Department of Health reviewers identified a few missing items from the scoping decision notice that were added prior to review by other LGUs. No formal, written comments were received.

HPU held a Public Hearing on the Part 2 WHPP amendment on April 30, 2024. The LGUs whose jurisdictions overlap the DWSMA were notified of the Public Hearing date, time, and location. No comments on the WHPP amendment were received at the public hearing.

5.3 Issues, Problems, and Opportunities Related to Data Elements

Beginning with the delineation of WHPAs and DWSMAs (i.e., Part 1 of the WHPP) and continuing in this document, the required data elements have been addressed. As noted in Appendix C, available local and regional information was used in compiling and assessing the data elements. No significant issues related to water quality for the HPU water supply wells have been identified. As noted elsewhere in this Plan, HPU is planning to install new municipal well(s) to improve current water supply system resiliency and to ensure that projected future water demand can be met sustainably. HPU intends to continue collecting data from the municipal wells as well as obtaining other applicable information from public data sources, as it becomes available, during the life of this Plan. This Plan will be revised/updated in ten years, as required by the Wellhead Protection Rules, unless the MDH directs HPU to update the Plan sooner. Each time this Plan is revised/updated HPU intends to use the most recent and accurate data available.

5.4 Issues, Problems, and Opportunities Related to Local, State, and Federal Programs and Regulations

The State of Minnesota and LGUs currently enforce land use ordinances, zoning laws, sewer ordinances, well permitting regulations, hazardous waste regulations, animal feed lot regulations, SSTS regulations, chemical storage regulations, storage tank regulations, and groundwater appropriation permit regulations. To the extent feasible, HPU will work to promote the use of best management practices for potential contaminant source properties within the DWSMAs. It is anticipated that local issues will be adequately addressed through these existing processes and adoption of best management practices.

6.0 Wellhead Protection Goals

In accordance with Minnesota Rules chapter 4720.5240, this section discusses the goals for present and future water use and land use to provide a framework for WHPP objectives and related actions.

Goals presented in this section were selected based on the information gathered and compiled from the data elements, delineations of the WHPAs and DWSMAs, results of the vulnerability assessments, results of the PCSI, expected changes in land and water uses, identified issues, problems, and opportunities, and evaluation of this information.

Through the years, HPU has met water demands with a sufficient and safe water supply. HPU intends to continue providing a safe water supply to its residents and businesses and other customers into the future. Implementation of this WHPP amendment will help ensure that HPU will meet this goal.

The vulnerability classifications of HPU's water supply wells are shown in Table 1. Figure 1 shows the aquifer vulnerability classifications of the uppermost source water aquifer within HPU DWSMAs range from Low to High.

The goals and objectives of this WHPP will focus on reducing the potential contaminant pathways to the source water aquifers that may be provided by private wells, educating property owners and water supply users, obtaining additional information on the groundwater system, and working with the City of Hibbing, St. Louis County, and other LGUs whose jurisdictions overlap the DWSMAs, to the extent practicable, to ensure proper management of the DWSMAs.

HPU has identified the following goals for implementation of this WHPP:

- HPU will work to maintain or improve the current level of water quality so that the municipal water supply will continue to meet or exceed all applicable state and federal water quality standards.
- Work with St. Louis County and appropriate State agencies to protect the source water aquifers.
- HPU will provide information and promote activities that protect the source water aquifers that provide water to the municipal system. This will include increasing public awareness of the Wellhead and Source Water Protection Program and groundwater-related issues and management of the identified potential contaminant sources within the DWSMAs.
- HPU will continue to collect data to support future wellhead and source water protection efforts.

7.0 Objectives and Plans of Action

In accordance with Minnesota Rules chapter 4720.5250, this section discusses the objectives and plans of action to goals for HPU's Wellhead and Source Water Protection Program.

7.1 Establishing Priorities

As discussed throughout this Plan, the vulnerability to contamination of the source water aquifers within the DWSMAs ranges from Low to High (Barr, 2021). The April 29, 2022 Scoping 2 Decision Notice from the MDH required HPU to perform a PCSI to evaluate the types of potential contaminant sources present in the DWSMAs. The results of the PCSI are summarized in Table 3.

HPU has identified the objectives and corresponding actions described in the following sections for accomplishing the wellhead and source water protection goals discussed above in Section 6.0. These goals for HPU's Wellhead and Source Water Protection Program will be achieved through the following existing and planned programs:

- Wells
  - Promoting proper management of existing active wells in the DWSMAs
  - Encouraging the proper sealing of all unused wells within the DWSMAs
  - Identifying new high-capacity wells in or near the DWSMAs
- Potential contaminant source properties
  - Encouraging proper handling of chemicals/wastes
  - Encouraging proper operation and maintenance of storage tanks
  - Periodically obtaining updated information on potential contaminant sources in the DWSMAs from the regulating agencies to maintain an up-to-date potential contaminant source database for the DWSMAs and allow timely recognition of potential issues that could affect HPU municipal water supply or DWSMAs
- Public education
  - Distributing HPU Annual Water Quality Report for the water supply system
  - Direct mailing of HPU's quarterly newsletter *HPU Utility Updater*
  - Posting Wellhead Protection Program information on the HPU website at https://www.HPU.org/education-environment/water-quality.php
  - Using HPU's social media outlets and other means of distribution to broadcast information related to wellhead protection

- Communicating with the City of Hibbing and St. Louis County Planning Departments to encourage inclusion of wellhead and source water protection in their planning processes
- Gaging the interest of Balkan Township, the City of Chisholm, and St. Louis County regarding creation of a source water protection coordinating committee to provide a vehicle for collaboration on activities that will protect the source water aquifers

- Continued data collection
  - Upgrading HPU's water quality data management system
  - Sampling HPU wells and nearby surface water bodies for indicator parameters to assess potential connection between water supply wells and surface water
  - Continued sampling of HPU water supply wells per regulatory requirements
  - Collection of additional local geologic and hydrogeologic data as they become available from public sources or from HPU-sponsored projects
  - Sampling HPU's municipal wells for tritium – per 10-year schedule (by year 7)

A proposed implementation schedule over the next ten years by proposed implementation strategy is included as Table 4.

7.2 Well Management

The well management objectives outlined in this section consist of promoting the proper sealing of any unused, unmaintained, damaged, or abandoned wells and promoting proper management of active wells within the DWSMAs. To achieve these objectives, HPU will work with the neighboring jurisdictions into which the DWSMAs extend. HPU will also construct additional municipal wells to ensure water quality and quantity needs are met for the future.

7.2.1 Distribution of Well Operation and Maintenance Information

The MDH has developed a handbook of information on proper well construction, operation, and maintenance titled "Well Owner's Handbook – A Consumer's Guide to Water Wells in Minnesota". This handbook is available on the MDH website. HPU will attempt to provide the handbook information to all owners of active wells within the DWSMAs. To accomplish this, a link to the MDH website page where the handbook can be found will be added to HPU's website and HPU will attempt to notify well owners within the DWSMAs via mail that the information is available through HPU's website. After this initial handbook information distribution, the City of Hibbing and Balkan Township will be asked to provide the handbook information to any new well owners that take up residence in the portions of the HPU DWSMAs within their jurisdictions. HPU staff will track the number of well owners to whom they provide information regarding the Well Owner's Handbook.

7.2.1.1 Source of Action

HPU staff will obtain the website information for the handbook from the MDH. HPU staff will then mail the website information to appropriate addresses within the DWSMAs, include a link to the MDH website on HPU's website, have a copy of the handbook available in a publicly accessible location in the HPU offices, and request that other entities within the DWSMAs provide a link to the MDH website page where the handbook can be found on their websites.

7.2.1.2 Cooperators

City of Hibbing and Balkan Township staff

7.2.1.3 Time Frame

Distribution of the information to owners of will be done within two years after approval of this WHPP.

7.2.1.4 Estimated Cost

Approximately $1,000 to $2,000. Costs will include HPU staff time, postcard printing and postage costs, and handbook printing costs.

7.2.1.5 Goals Achieved

Through the MDH handbook, well owners will be educated concerning the proper operation and maintenance of wells. Proper operation and maintenance of wells will reduce the potential risk of these wells becoming pathways for contaminants to travel from the ground surface to the source water aquifer.

Success criterion: Notification of well owners in the DWSMAs by mail that information on the proper operation and maintenance of private wells is available through HPU's website will be completed within two years of MDH approval of the WHPP and tracking of the number of well owners to whom the notification is sent.

7.2.2 Promote the Proper Sealing of Unused, Unmaintained, Damaged, or Abandoned Wells Within the DWSMAs

HPU staff will promote the proper sealing of unused, privately owned wells within the DWSMAs. As indicated in Table 3, the highest priority will be placed on those wells that are completed in the source water aquifer from which the HPU municipal wells pump and areas under current and near-term development. HPU will also complete a search for olde municipal wells for which sealing records are not available and, if found, seal the well(s).

HPU staff can promote proper sealing of unused wells by periodically mailing a reminder to owners of wells that unused wells should be properly sealed and/or by posting a reminder on HPU's website. The reminder will include a notification of the St. Louis County cost share program for the sealing of unused wells. Proper sealing of unused wells at properties on which new developments are built or as properties are redeveloped can be promoted as part of Hibbing's development approval process. HPU staff will work with staff from the other jurisdictions into which the DWSMAs extend, to the extent practicable, to promote the proper sealing of unused, privately owned wells in the portions of the DWSMAs within their jurisdictions.

7.2.2.1 Source of Action

HPU staff

7.2.2.2 Cooperators

City of Hibbing and Balkan Township staff

7.2.2.3 Time Frame

The Wellhead Protection Manager, or designated representative, will attempt to meet with or call representatives of the other entities within the DWSMAs to request their assistance in promoting proper sealing of unused wells and to invite their participation in a Wellhead Protection Coordination Committee within one year of approval of this WHPP.

The first reminders to owners of wells identified as high priority will occur within one to two years of approval of this Plan. Subsequent reminders will include owners of wells identified as high and moderate priority.

7.2.2.4 Estimated Cost

Approximately $1,000-$2,000 for each well sealing reminder mailing event. Costs will include HPU staff time and costs for preparing and mailing reminders to well owners.

7.2.2.5 Goals Achieved

As this action is implemented, HPU's goal of eliminating potential pathways for contaminants to travel from the ground surface to the source water aquifer will be realized.

Success criterion: The first reminder distributed to well owners in the DWSMAs within one year of MDH approval of the WHPP and subsequent reminders distributed every three years thereafter for the life of the Plan and tracking of the number of reminders distributed.

7.2.3 Identify New High-Capacity Wells Within or Near the DWSMA

With assistance from the MDH and MDNR, HPU staff will identify new high-capacity wells that are proposed for construction in or near HPU's DWSMAs, and/or major changes to groundwater appropriations for existing high-capacity wells, to determine whether the pumping of said wells will affect the groundwater flow direction, static water level, or groundwater availability within the DWSMAs or alter the current boundaries of the DWSMA delineations or other portions of HPU's WHPP.

HPU staff will request that the MDH and regional MDNR office provide information on any newly proposed/constructed high-capacity wells within or near the DWSMAs or any changes to existing appropriations permits for existing, nearby high-capacity wells. HPU staff will also request assistance from the Wellhead Protection Consultant and the MDH to evaluate whether proposed pumping (or changes to pumping) will change the boundaries of the DWSMAs delineated for HPU's wells.

HPU will also ask the other entities within the DWSMAs to notify them when new high-capacity wells are proposed in their jurisdictions.

7.2.3.1 Source of Action

HPU staff

7.2.3.2 Cooperators

MDH, MDNR, Balkan Township, and the Wellhead Protection Consultant.

7.2.3.3 Time Frame

Request information from the MDH and MDNR once during the life of the plan; evaluation of potential changes to the DWSMA boundaries as needed.

7.2.3.4 Estimated Cost

Approximately $3,000-$10,000 for each event of identifying new wells or changes to existing appropriations permits and evaluating how the changes may affect the DWSMA boundaries. Costs include HPU staff time and, potentially, Wellhead Protection Consultant time.

7.2.3.5 Goals Achieved

As this action is implemented, HPU's WHPA/DWSMA delineations will remain current. New well owners will also be identified, and educational materials identified/developed as part of other well management strategies can be provided to these new well owners.

Success criterion: Annual determination of whether there are new high-capacity wells in or near the DWSMAs and if there have been any major changes in permitted appropriations for existing high-capacity wells in or near the DWSMAs.

7.3 Potential Contaminant Source Properties

The management objectives outlined in this section consist of promoting proper operation of storage tanks; maintaining an up-to-date database of storage tank properties in the portions of the DWSMAs where aquifer vulnerability is classified as High or Moderate; providing owners of properties where Class V wells may be, or may have been, with information on Class V wells and associated regulations; promoting proper handling of chemicals and wastes; reducing of waste streams at potential contaminant source properties within the DWSMAs; promoting proper operation and maintenance of SSTS in the portions of the DWSMAs where aquifer vulnerability is classified as High; maintaining the IWMZ around each well so that potential contaminants are prevented from entering the IWMZs; and working with the City of Hibbing and Balkan Township, to the extent practicable, to promote similar activities at potential contaminant source properties within the portions of the HPU DWSMAs in these jurisdictions.

7.3.1 Information for Registered Storage Tank Owners

With the assistance of the MPCA, and possibly the Wellhead Protection Consultant, HPU will prepare an information packet for owners of properties within the High and Moderate vulnerability zones of the DWSMAs that have registered storage tanks. Information packets will not be sent to owners of properties for which available information indicates that the storage tanks have been removed. This information packet will likely include information on HPU's Wellhead and Source Water Protection Program and MPCA publications on proper operation and maintenance of storage tanks. Copies of the information packet materials will be retained by HPU.

HPU staff, possibly with the assistance of the Wellhead Protection Consultant, will obtain from the MPCA publications on proper storage tank operation and maintenance for the information packet. HPU staff, possibly with the assistance of the Wellhead Protection Consultant, will prepare general information regarding the Wellhead Protection Program and contact staff from the City of Hibbing for assistance in distributing the information packets to owners of storage tank properties in their jurisdiction.

7.3.1.1 Source of Action

HPU staff

7.3.1.2 Cooperators

City of Hibbing, MPCA and, possibly, the Wellhead Protection Consultant.

7.3.1.3 Time Frame

The information packet will be sent to owners of active tanks on properties where aquifer vulnerability is classified as High or Moderate within two years of approval of this Plan. HPU will request that the City of Hibbing provide the information packet to new registered storage tank owners within the targeted portions of the DWSMAs when identified. Updates to targeted registered storage tank owners will be provided five years after distribution of the initial information packet.

7.3.1.4 Estimated Cost

Approximately $1,000-$2,500 each time information packets are distributed to owners of registered tanks. Estimated costs include HPU staff time, MPCA staff time, information packet production and postage costs and, potentially, City of Hibbing time and Wellhead Protection Consultant costs.

7.3.1.5 Goals Achieved

Targeted property owners will be educated on the Wellhead and Source Water Protection program, on the issues associated with storage tanks, and on the requirements necessary to maintain a safe and secure system. Property owners will be encouraged to use best management practices regarding their storage tanks and to report any releases of contaminants to the City in which their property is located (in addition to any other actions required by applicable regulations). The property owners will also be educated about groundwater protection principles and steps that everyone can take to protect HPU's municipal water supply. This information packet provides HPU the opportunity to heighten the awareness of wellhead and source water protection with these property owners.

Success criterion: Distribution of information packets completed according to the schedule outlined in section 7.3.1.3 and tracking of the number of information packets distributed.

7.3.2 Tracking of Registered Storage Tanks

Periodically, HPU will request from the MPCA information on the status of registered storage tanks in those portions of the HPU DWSMAs in which the aquifer vulnerability is classified as High or Moderate. This information will allow HPU to update the PCSI database and maintain current information regarding these potential contaminant sources in the DWSMAs. This activity should also identify new registered storage tanks in the DWSMAs.

7.3.2.1 Source of Action

HPU staff, or the Wellhead Protection Consultant on behalf of HPU, will contact MPCA staff to obtain the information on the status of registered storage tanks.

7.3.2.2 Cooperators

MPCA and possibly the Wellhead Protection Consultant.

7.3.2.3 Time Frame

This information will be requested from the MPCA in years 1, 5, and 10 after approval of this Plan (2024, 2025, and 2033, respectively).

7.3.2.4 Estimated Cost

Approximately $500-$1,000 for each review and update. Estimated costs include HPU staff time and, possibly, Wellhead Protection Consultant time.

7.3.2.5 Goals Achieved

By tracking the status of registered storage tanks within the target areas, HPU will remain aware of the current status of these potential contaminant sources. This will allow HPU to identify potential impacts to the municipal water supply and give HPU time to determine the best response to any potential impacts before the municipal water supply is compromised.

Success criterion: Submittal of a biennial request to the MPCA for information regarding the status of registered storage tanks in those portions of the DWSMAs where aquifer vulnerability is classified as Moderate or High and completion of any updates to the PCSI database necessitated by the new information.

7.3.3 Information for Subsurface Sewage Treatment System Owners

There is only one operating SSTS in an area of High aquifer vulnerability within HPU limits (not counting those systems identified as Class V wells).

HPU staff will bi-annually request updates from St. Louis County on the status of SSTS within the DWSMAs. However, HPU staff will rely on St. Louis County Ordinance 61 and State rules for regulation of SSTS within the DWSMAs.

HPU will provide links on their website to SSTS information on the St. Louis County website.

HPU will send a postcard or letter notifying owners of SSTS of the website link to the St. Louis County website. The notification will include a request for the property owners to assist HPU in their efforts to protect their water supply by properly maintaining their septic system.

7.3.3.1 Source of Action

HPU staff, perhaps with the assistance of the Wellhead Protection Consultant, will prepare the mailing and send it to the appropriate addresses within the DWSMAs. HPU staff will request an update on the status of SSTS within the DWSMA from St. Louis County in year 5 of the Plan (2029).

7.3.3.2 Cooperators

HPU staff, St. Louis County, and, possibly, the Wellhead Protection Consultant

7.3.3.3 Time Frame

The informational mailing will be sent out within two years of approval of this Plan. Updates on the status of SSTS within the DWSMAs will be requested from St. Louis County five years after the initial informational mailing. If one of these updates from St. Louis County identifies a new owner of a property within the DWSMAs containing an SSTS, HPU will send a copy of the informational mailing to the new property owner.

7.3.3.4 Estimated Cost

HPU staff time, mailing preparation and postage costs, possibly Wellhead Protection Consultant costs. The cost of preparing and sending the initial mailing is estimated to be approximately $800 to $1,400. The estimated cost of review of SSTS information received from St. Louis County is approximately $200 to $600.

7.3.3.5 Goals Achieved

The primary goals are to make the SSTS owners aware of the issues related to system operation and maintenance and how these issues relate to wellhead protection, provide information on SSTS maintenance to the system owners, and to track the operational status of septic systems within the DWSMAs.

Success criterion: Distribution of information completed according to the schedule outlined in section 7.3.4.3 and tracking of the number of information packets distributed.

7.3.4 Information for Chemical Storage, Wastewater Treatment, and Hazardous Waste Generator Properties

Through direct mail contact, HPU will encourage the owners of the potential contaminant source properties associated with chemical storage, wastewater treatment, or hazardous waste generator permits within the high vulnerability zones within the main DWSMA to participate in audits of their chemical storage and waste generation and handling. The direct mail contact from HPU will also encourage these businesses to request a site visit from the Minnesota Technical Assistance Program (MnTAP). MnTAP helps Minnesota businesses implement industry tailored solutions that maximize resource efficiency, prevent pollution, and reduce costs to improve public health and the environment.

As noted on their website (www.mntap.umn.edu), MnTAP helps Minnesota businesses protect the environment and stay competitive by providing practical alternatives to prevent pollution of land, air, and water. By reducing waste and increasing efficiency, businesses can save on disposal and raw material costs, decrease the regulatory compliance burden, and make working conditions healthier and safer for their employees.

7.3.4.1 Source of Action

HPU staff will prepare and distribute the direct mail notice. HPU will coordinate with others to conduct audits.

7.3.4.2 Cooperators

MnTAP

7.3.4.3 Time Frame

Distribution of the direct mail notice will occur within 180 days of approval of this Plan. Biannually thereafter the direct mail notice will be sent to owners of any newly identified properties within the High vulnerability portions of the DWSMAs that are associated with chemical storage or hazardous waste generator permits.

7.3.4.4 Estimated Cost

Costs for the preparation of the direct mail notice will include HPU staff time, printing, and postage costs and are estimated to be $800 to $1,200.

7.3.4.5 Goals Achieved

Business owners and permitted-activity operators will become aware of issues related to their chemical storage, wastewater management, or waste generation and handling and learn of available assistance for identifying ways to minimize and properly dispose their hazardous waste.

Success criterion: Contact of property owners according to the schedule outlined in section 7.3.4.3.

7.3.5 Inner Wellhead Management Zone Management

The IWMZ is defined in the Minnesota Rules as that area within a 200-foot radius of a public water supply well. HPU will monitor setbacks in the IWMZs, possibly with the assistance of the MDH, to ensure that the IWMZ around each HPU municipal well remains free of potential contaminant sources.

7.3.5.1 Source of Action

HPU staff will document each IWMZ inspection, coordinate an update to the IWMZ report with MDH or MRWA, and document any actions taken to remove potential contaminant sources from an IWMZ.

7.3.5.2 Cooperators

MDH, MRWA

7.3.5.3 Time Frame

The monitoring of setbacks within the IWMZs will be done biannually after approval of this Plan.

7.3.5.4 Estimated Cost

Costs for monitoring the IWMZ setbacks include HPU staff time estimated as $500.

7.3.5.5 Goals Achieved

By monitoring the IWMZ setbacks, HPU will be able to keep the IWMZ around each well free of potential contaminant sources and ensure that any new regulated activities will meet required setbacks.

Success criterion: Completion of IWMZ potential contaminant source inventories keeping the IWMZ free of potential contaminant sources.

7.3.6 Transportation Corridors, Pipelines, and Emergency Response

Establish communication and create awareness among HPU staff about transportation corridor and pipeline issues that may affect the public water supply and the procedures in place to address spills and prevent released contaminants from entering the municipal water supply. HPU will also contact pipeline operators, emergency responders, and spill responders whose activities have the potential to impact Hibbing's DWSMAs.

7.3.6.1 Source of Action

The Wellhead Protection Manager will work with HPU staff to ensure that procedures that will protect the municipal water supply are part of HPU's emergency response program.

7.3.6.2 Cooperators

HPU staff, pipeline operators, emergency and spill responders

7.3.6.3 Time Frame

Within three years of approval of this Plan and evaluated for updates every three years for the duration of the Plan.

7.3.6.4 Estimated Cost

Costs for this action will include HPU staff time and is estimated to be $1,200.

7.3.6.5 Goals Achieved

Local emergency responders will work with and assist County and State first responders in the handling of spills in transportation corridors or from pipelines to ensure, to the extent possible, released contaminants are prevented from entering the environment and impacting the municipal water supply.

Success criterion: Emergency responder awareness of HPU's DWSMAs.

7.3.7 Sites Where Contaminant Releases May Have Occurred

During the PCSI, one brownfield site where contaminant releases may have occurred was identified in the DWSMA zone where aquifer vulnerability is classified as Moderate. Every four years HPU staff will request from the MPCA, St. Louis County, and the MPCA updates on the current status of these properties, including information on any groundwater contamination associated with these sites. Updated information will be reviewed to determine if any additional actions related to protection of HPU's water supply are warranted.

7.3.7.1 Source of Action

HPU staff

7.3.7.2 Cooperators

City of Hibbing, Balkan Township, St. Louis County, and MPCA.

7.3.7.3 Time Frame

Requests for updated data will be made every four years starting two years after approval of this Plan amendment.

7.3.7.4 Estimated Cost

Approximately $500 to $1,000 for each data update. Estimated costs include HPU staff time.

7.3.7.5 Goals Achieved

HPU will maintain current information on the status of the dump, spill, and brownfields sites and any groundwater contamination associated with these sites.

Success criterion: Data update requests according to the schedule outlined in section 7.3.7.3.

7.3.8 Annual Monitoring Criteria Updates

Advancements in our understanding of certain manufactured chemicals have helped identify potential new sources of groundwater contamination within public drinking water supplies such as per- and poly-fluorinated substances (PFAS), 1,4-dioxane, and leaded gasoline scavengers such as 1,2-dichloroethane (1,2-DCA) and ethylene dibromide (EDB). HPU will review local, State, and Federal guidance with respect to emerging drinking water contaminants of concern and sample HPU wells if likely sources of these emerging contaminants of concern are identified within the DWSMAs.

7.3.8.1 Source of Action

HPU staff

7.3.8.2 Cooperators

St. Louis County, MDH, MPCA, and USEPA

7.3.8.3 Time Frame

Ongoing

7.3.8.4 Estimated Cost

Approximately $500 annually to perform literature review. Additional costs to be incurred for additional water sampling criteria.

7.3.8.5 Goals Achieved

Performing review of emerging contaminants of concern with respect to HPU's PCSI for each DWSMA will enable HPU to anticipate and proactively identify new sources of groundwater contamination as they may arise, providing enhanced protection of public health.

Success criterion: Implementation of additional contaminant sampling upon publication of updated guidance or regulations by Federal, State, or County entities.

7.4 General Public Education

Public education concerning the DWSMAs associated with HPU's municipal wells will include: inclusion of Wellhead and Source Water Protection Program information in the *HPU Utility Updater* newsletter, distribution of the HPU Annual Water Quality Reports to residents of HPU, providing information on HPU's website at http://hpuc.com, and inclusion of wellhead and source water protection into HPU's planning process.

7.4.1 Wellhead Protection Information

HPU will develop information regarding the Wellhead and Source Water Protection Program for inclusion in the *HPU Utility Updater* newsletter. The newsletter is available to all HPU customers and residents within the DWSMAs.

HPU staff will prepare information on wellhead protection for HPU's newsletter one to two times per year. If necessary, the Wellhead Protection Consultant will be contacted for assistance in preparing this information for the newsletter. The newsletter is mailed to HPU residents and businesses 4 times per year and is available on HPU's website.

7.4.1.1 Source of Action

HPU staff

7.4.1.2 Cooperators

MDH, MRWA, and, if necessary, Wellhead Protection Consultant

7.4.1.3 Time Frame

At least annually upon approval of this WHPP.

7.4.1.4 Estimated Cost

Approximately $500 - $1,500 each time information is prepared for the newsletter. Costs will include HPU staff time for preparing the information and costs for Wellhead Protection Consultant assistance, as needed.

7.4.1.5 Goals Achieved

The information in the newsletter will be intended to educate owners of property within the DWSMAs and the general public about HPU's Wellhead and Source Water Protection Program, groundwater protection principles, and steps that everyone can take to protect HPU's municipal water supply.

Success criterion: At least annual distribution of information related to groundwater and wellhead protection via HPU's newsletter.

7.4.2 Drinking Water Quality Report

HPU will continue to annually prepare and distribute the Annual Water Quality Report to all HPU customers. The report provides HPU customers with information regarding HPU's municipal water supply and its water quality.

7.4.2.1 Source of Action

HPU staff

7.4.2.2 Cooperators

None

7.4.2.3 Time Frame

Annually as required by Federal regulations.

7.4.2.4 Estimated Cost

Costs include HPU staff time for preparation of the report and preparing a notification for inclusion with utility bills that the report is available on HPU's website and related expenses. Estimated annual cost for preparation and distribution of the report is $1,500.

7.4.2.5 Goals Achieved

HPU customers will become more aware of the federal water quality requirements for public water supplies. HPU customers will also become more aware of the overall water quality of HPU's municipal water supply.

Success criterion: Annual publication/distribution of the Annual Water Quality Report and tracking of the number of reports distributed.

7.4.3 HPU Website

HPU will post information on the Wellhead and Source Water Protection Program on HPU's website at https://hpuc.com/. If necessary, the Wellhead Protection Consultant will be asked to assist with the preparation of information to be posted on the website.

7.4.3.1 Source of Action

HPU staff

7.4.3.2 Cooperators

Wellhead Protection Consultant (as needed)

7.4.3.3 Time Frame

To begin within 120 days of approval of this WHPP. Information on the website will be updated periodically thereafter.

7.4.3.4 Estimated Cost

Approximately $500-$2,500. HPU staff time and, potentially, Wellhead Protection Consultant costs.

7.4.3.5 Goals Achieved

HPU customers will become more aware of wellhead and source water protection issues and the actions HPU is taking to protect the municipal water supply. Education of the residents should lead to a better awareness of pollution prevention among HPU's service area population.

Success criterion: Posting of Wellhead and Source Water Protection Program information on HPU's website according to the schedule identified in section 7.4.2.3.

7.4.4 Inclusion of WH and SWP in the Planning Process Within the DWSMAs

Copies of this WHPP will be supplied to the City of Hibbing Planner and Planning Division so that they are aware of the Wellhead Protection Program. The Wellhead Protection Manager will work with the City of

Hibbing Planner and Planning Division to determine the best way to ensure that the City of Hibbing's planning process is consistent with the goals and objectives of this WHPP. Options that may be discussed could include developing checklists related to wellhead protection for use in the planning review process, development of guidelines (based on MDH guidance) regarding when to allow storm water control facilities in the DWSMAs, adjustments to zoning, and amendments to the City Code.

7.4.4.1 Source of Action

HPU and City of Hibbing staff

7.4.4.2 Cooperators

St. Louis County, Balkan Township, as needed

7.4.4.3 Time Frame

The Wellhead Protection Manager and those responsible for City planning will determine, within one year of approval of this WHPP, how best to incorporate wellhead and source water protection into the normal zoning and planning review process.

7.4.4.4 Estimated Cost

Approximately $3,000-$4,000. Costs to complete this task will include staff time to develop a process for including wellhead protection in the planning process and to review proposals that could affect the municipal wells and associated DWSMAs.

Success criterion: Implementation of a method for incorporating wellhead and source water protection into the normal zoning and planning review process.

7.4.4.5 Goals Achieved

Wellhead and source water protection will be incorporated into future planning efforts. Potential pollution risks to the source water aquifers will be reduced.

7.4.5 Public Utility Upgrades

HPU has a total of 110 miles of water main and has been upgrading historical water supply main line pipes from leaded pipes to composite material. Some historically installed main line pipes are cast-iron and have shown to be susceptible breakage, particularly in "watermain break season" from February to June. Approximately 8,000 feet of pipeline were upgraded during the 2023 construction season and similarly sized projects are anticipated in 2024-2028. HPU will continue to upgrade water main lines until all historical mains have been replaced with inert materials.

7.4.5.1 Source of Action

HPU Commission and Staff.

7.4.5.2 Cooperators

City of Hibbing, Saint Louis County Community Development Block Grant, Iron Range Rehabilitation and Resource Board

7.4.5.3 Time Frame

Ongoing implementation and following approval of this plan.

7.4.5.4 Estimated Cost

Costs have been allocated within existing HPU budgets and are not anticipated to increase as a result of inclusion within this Plan. Additional notification to HPU customers through *HPU Utility Updater* newsletter and/or the HPU website is anticipated to cost less than $500 over the Plan implementation lifecycle.

7.4.5.5 Goals Achieved

HPU customers will better understand actions performed by HPU to ensure public health and wellbeing and benefit from removal of unsafe drinking water supply infrastructure.

Success criterion: continued removal and eventual replacement of all known leaded pipeline within HPU DWSMAs.

7.5 Data Collection

HPU will continue to collect and maintain local geologic and hydrogeologic data as it becomes available to improve and augment current information and to provide additional data for future revisions of this WHPP. To support potential future water needs, HPU will continue to research additional wellfield options. HPU will also continue to collect information on potential contaminant sources within the DWSMAs.

7.5.1 Monitoring Static and Pumping Levels in Municipal Wells

HPU will continue to routinely measure the static and pumping water levels in the municipal wells. These water levels will be recorded daily by the SCADA system and can be summarized in the reports obtained from the SCADA system.

7.5.1.1 Source of Action

HPU staff

7.5.1.2 Cooperators

None

7.5.1.3 Time Frame

Ongoing

7.5.1.4 Estimated Cost

Approximately $2,000-$4,000 annually

7.5.1.5 Goals Achieved

Routine collection of groundwater levels in the municipal wells will provide data for the evaluation of groundwater elevation trends over time. These data can also be used to verify the groundwater flow field in the source water aquifer.

Success criterion: Compilation of a long-term groundwater elevation dataset that can be used to evaluate groundwater elevation trends.

7.5.2 Water Quality Data Management System

At the issuance of this report, HPU does not have an established water quality data management system that is readily accessible to outside stakeholders within HPU's DWSMAs. To better respond to detections of groundwater quality parameters exceeding their respective State and/or Federal water quality criteria, HPU will attempt to implement new data management of routine groundwater analytical sampling data. New data will be provided by analytical laboratories to HPU in electronic format to be added to a licensed database for multiple uses. To aid in long-term trend analysis, historical data would be entered into the database from previous annual groundwater quality sampling events.

7.5.2.1 Source of Action

HPU staff

7.5.2.2 Cooperators

Private analytical laboratories, MDH environmental laboratory, Wellhead Protection Consultant (as needed)

7.5.2.3 Time Frame

Ongoing beginning with approval of this WHPP.

7.5.2.4 Estimated Cost

Approximately $1,000 to $1,500 annually.

7.5.2.5 Goals Achieved

Centralized and rapid access of groundwater analytical data from HPU's municipal wells will provide information for short-term response actions, as applicable, as well as enhanced trend analysis for long-term groundwater quality monitoring.

Success criterion: Electronic availability of annual HPU water quality data to all relevant HPU staff and local municipal planners.

7.5.3 Surface Water Data Collection

Previous investigations conducted at the Scranton Well and groundwater modeling of the ERAs surrounding Wells 3A, 4A, 8A, 11C, and 17 indicate that hydraulic connections may exist between HPU wells and nearby surface water bodies. In order to ensure adequate protection of all sources of HPUs drinking water sources, HPU will attempt to perform surface water characterization sampling concurrent with future ground water quality sampling from HPU's existing well network.

7.5.3.1 Source of Action

HPU staff

7.5.3.2 Cooperators

HPU staff, MDH, DNR, Wellhead Protection Consultant.

7.5.3.3 Time Frame

Within four years following approval of this Plan (2027), concurrent with annual water quality sampling.

7.5.3.4 Estimated Cost

Approximately $5,000 to $10,000 for surface water sample collection, analytical fees, and data analysis.

7.5.3.5 Goals Achieved

By performing surface water analytical parameter sampling, HPU will be able to better determine the existence of a direct hydrological connection between DWSMA surface water bodies and the underlying groundwater aquifer. Confirming surface water contribution will allow for necessary resource monitoring and protection activities to ensure the safety of HPU's drinking water resources.

Success criterion: Compilation of surface water sampling with analytical data meeting established data quality objectives comparable to groundwater sampling data from HPU wells.

7.5.4 Other Geologic and Hydrogeologic Data Collection

With assistance from HPU's consultants, HPU staff will continue proactive investigation for locations with favorable groundwater quantity to sustainably meet current design demand and future projected demand. HPU will attempt to collect local geologic and hydrogeologic data for the DWSMAs as it becomes available from other public sources or through City of Hibbing-sponsored projects. HPU will also support, whenever possible, future data collection efforts by other governmental entities (e.g., MGS, MDH, MDA, MDNR, MPCA, watershed management organizations, and St. Louis County). Future HPU investigations may be performed with respect to future water use expansion.

7.5.4.1 Source of Action

HPU staff

7.5.4.2 Cooperators

Wellhead Protection and Water Supply System Consultants, State and St. Louis County agencies conducting geologic and hydrogeologic studies, well drilling companies, and others.

7.5.4.3 Time Frame

Ongoing beginning with approval of this WHPP.

7.5.4.4 Estimated Cost

Approximately $1,000 for compiling data from other public sources. Costs to complete drilling investigations will vary with number and depth of locations, but would exceed $150,000.

7.5.4.5 Goals Achieved

More accurate hydrogeologic data will be available for use in siting future wells and for future revisions of the delineated WHPAs and the DWSMAs for existing and proposed municipal wells. Updated and more accurate vulnerability assessments may be possible as a result of new information.

Success criterion: Compilation of a geologic/hydrogeologic dataset that can be used in the future.

7.5.5 Updating of the Groundwater Model Used in the WHPA Delineation

Any new local geologic and hydrogeologic data for the HPU area will be periodically reviewed to determine if the groundwater model used in the WHPA delineations will need to be updated. In addition, pumping from high-capacity wells often changes over time. Changes in pumping from high-capacity wells in or near the HPU DWSMAs could affect the DWSMA boundaries. Therefore, HPU may work with the Wellhead Protection Consultant to review available information and during update(s) to the WHPP update the groundwater flow model so that future WHPA/DWSMA delineations will be consistent with available information.

7.5.5.1 Source of Action

HPU staff

7.5.5.2 Cooperators

The Wellhead Protection Consultant

7.5.5.3 Time Frame

Five to seven years after approval of this Plan (2030-2032).

7.5.5.4 Estimated Cost

Approximately $1,000 to $5,000 depending upon the magnitude of the revisions needed to make the groundwater flow model consistent with the most current available information.

7.5.5.5 Goals Achieved

The groundwater flow model used in the WHPA delineations will be consistent with available information. Since the groundwater flow model used to delineate the WHPAs will be consistent with current information, updating of the WHPAs in the future can be done more efficiently.

Success criterion: An updated groundwater flow model that can be used for future updates to Part 1 of HPU's WHPP.

7.5.6 Potential Contaminant Source Database

HPU will periodically update the information on potential contaminant sources within the DWSMAs collected during the development of this WHPP, perhaps with the assistance of the Wellhead Protection consultant, if needed. HPU will add information to the potential contaminant source database as additional potential contaminant source sites are identified or as sites are closed through working with the MPCA, the MDH, the MDNR, the USEPA, and St. Louis County. New information for the PCSI database will be obtained by contacting appropriate MPCA, MDH, MDNR, USEPA, and County programs on an annual basis regarding any new information on potential contaminant sources that may be available.

7.5.6.1 Source of Action

HPU staff

7.5.6.2 Cooperators

MPCA, MDH, MDNR, USEPA, St. Louis County staff, and the Wellhead Protection Consultant, if needed.

7.5.6.3 Time Frame

Within 2 to 4 years of approval of this Plan (2025-2027).

7.5.6.4 Estimated Cost

Approximately $500-$2,000 every two years. HPU staff time and, if needed, Wellhead Protection Consultant costs. Actual costs will depend upon the amount of new potential contaminant source location information that must be added to the potential contaminant source database and in any year could be higher than the estimated range shown.

7.5.6.5 Goals Achieved

This database will be a useful tool to track, catalog, and document the status of potential contaminant sources within the DWSMAs.

Success criterion: Maintaining an up-to-date potential contaminant source database.

7.5.7 Potential Contaminant Source Verification

Potential contaminant sources were identified within the DWSMAs during the PCSI. As part of the development of this WHPP, most locations of identified potential contaminant sources were verified by the Wellhead Protection Consultant to the extent possible based on the available data. Potential contaminant source locations not verified during development of this Plan and any new potential contaminant source locations identified during the implementation of this WHPP will be verified by HPU with the assistance of the Wellhead Protection Consultant, if needed.

7.5.7.1 Source of Action

HPU staff

7.5.7.2 Cooperators

The Wellhead Protection Consultant, if needed.

7.5.7.3 Time Frame

Within 5 to 7 years after approval of this Plan (2028-2030) and as new potential contaminant sources in the DWSMAs are identified.

7.5.7.4 Estimated Cost

Approximately $500-$3,000 including HPU staff time and Wellhead Protection Consultant, if needed. Actual costs will depend upon the number of new potential contaminant source locations that must be verified and in any update could be higher than the estimated range shown.

7.5.7.5 Goals Achieved

Completing verification of potential contaminant source locations not verified during development of this WHPP and verification of newly identified potential contaminant source locations within the DWSMAs will allow HPU to remain in compliance with the requirements of the State of Minnesota's Wellhead and Source Water Protection Program. Verification of the newly identified locations will also ensure that HPU uses the most accurate data on type and location of potential contaminant sources as implementation of this WHPP proceeds.

Success criterion: All potential contaminant source locations in the database are verified to the extent possible.

7.5.8 Tritium Sampling

Tritium (^3H), a radioactive isotope of hydrogen, whose atmospheric concentrations rose in the 1950s and early 1960s due to atmospheric hydrogen bomb testing, has been used extensively to date groundwater. Tritium activities peaked during atmospheric hydrogen bomb testing of the 1950s and 1960s, and values of ^3H in precipitation reached a maximum of approximately 10,000 T.U. (tritium units) in 1963 (Mazor, 2004). Natural production of ^3H in the upper atmosphere introduces approximately 5 T.U. to precipitation each year (Mazor, 2004). The presence of tritium at concentrations above 1 tritium unit in a groundwater sample indicates the presence of a significant fraction of post-1954 (i.e., recently infiltrated) water in the sample. The MDH sampled selected HPU wells for tritium in 2015. Sampling of HPU wells for tritium at regular intervals will allow for tracking of tritium concentrations over time. If a tritium concentration in a groundwater sample from a well is significantly higher than the concentration in a previous sample from the same well it could be an indication that there is a pathway such as an unused, unsealed well in the vicinity that allows water to move from the surface to the source water aquifer faster than before the pathway became available. HPU staff will ask the MDH to sample all primary wells (at the time of this Plan amendment: Wells 1C, 2B, 3A, 4A, 8A, 11C, and 17) in year 7 following approval of this Plan (2030). Since the MDH already has a program to sample municipal wells for tritium, HPU would rely on the MDH to collect the samples and have them analyzed for tritium.

7.5.8.1 Source of Action

HPU and MDH staff

7.5.8.2 Cooperators

MDH

7.5.8.3 Time Frame

Year 7 after approval of this Plan (2030).

7.5.8.4 Estimated Cost

At the time this plan was prepared, cities were not charged by the MDH for tritium sampling and analysis.

7.5.8.5 Goals Achieved

Obtaining data to evaluate if pathways that allow for relatively rapid movement of water from the surface to the source water aquifer are present.

Success criterion: Collection of groundwater samples from the selected HPU wells and analysis of these samples for tritium on the schedule outlined in section 7.5.8.3.

8.0 Evaluation Program

Per Minnesota Rule 4720.5270, the progress in implementing a WHPP must be evaluated routinely to determine the effectiveness of the WHPP in terms of accomplishment of goals. Monitoring and evaluation measures to ensure effectiveness of the management strategies are detailed below.

Evaluation activities discussed in this WHPP amendment include the following:

- Track the implementation of the objectives, activities, and tasks discussed above in Section 7.0.
- Determine the effectiveness of specific management strategies for the protection of the municipal water supply.
- Identify possible changes, if any, to the management strategies to improve overall effectiveness.
- Determine the adequacy of financial resources and staff availability to perform and implement the management strategies planned each year.
- Update the WHPP in the event that new wells are added to the municipal water supply system.

HPU will continue to cooperate with the MDH in the monitoring of HPU's municipal water supply to determine if the management strategies presented in this WHPP are having a positive effect on water quality and to identify any water quality problems that may arise and need to be addressed.

The Wellhead Protection Manager will strive to provide a report to the Public Utilities Commission every two years that summarizes the progress in implementing the management strategies and objectives in this WHPP. The report will be completed using the Wellhead Protection Program Evaluation form (Appendix E), with other documents attached to the report, as necessary. The report will be retained in HPU's Wellhead Protection file, and a copy of the report will be sent to the MDH Source Water Protection Unit in St. Paul. The intent of the bi-annual reports is to compile a comprehensive review of the implementation of the source water management strategies for use when HPU updates or revises this WHPP. As specified by the Wellhead Protection Rules, this WHPP will be updated at least every 10 years, or more often as required due to changes to the municipal water supply system.

9.0 Alternative Water Supply Contingency Strategy

The purpose of a contingency plan is to establish, provide, and keep updated certain emergency response procedures and information for the public water supply, which may become vital in the event of a partial or total loss of public water supply services because of natural disaster, chemical contamination, civil disorder, or human-caused disruptions. HPU's water supply plan, which includes contingency strategies, is included as Appendix F.

10.0References

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Tables

Table 1

Well Summary
Hibbing Part 2 WHPP Amendment

Local Well Name	Unique Number	Use/ Status[1]	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed/ Reconstructed	Aquifer[2]	Well Vulnerability
1C	233054	P	12	70	100	1973	QWTA	Vulnerable
2B	792077	P	16	70	103	5/10/2013	QBAA	Vulnerable
3A	233056	P	24x18	105	145	1934	QBAA	Vulnerable
4A	271992	P	36x24x16	53.5	79	1944	QBAA	Vulnerable
8A	233058	P	24x16	108	135	1944	QBAA	Vulnerable
11C	233061	P	12	112	142	1973	QBAA	Vulnerable
17	778015	P	12	95.5	139.5	5/20/2011	QBAA	Vulnerable
18	791017	E	12	59	96.5	3/26/2013	QWTA	Vulnerable
Airport	716190	P	6	89	255	3/5/2005	PEVR	Vulnerable
Scranton	147463	E	24x18	460	535	12/1984	PEBI	Vulnerable

Notes:

1. Primary (P), Emergency (E)
2. QBAA = Quaternary Buried Artesian Aquifer, QWTA = Quaternary Water Table Aquifer, PEBI = Biwabik Iron Formation, PEVR = Virginia Formation

Table 2

Annual and Projected Pumping Rates for Hibbing Wells
Hibbing Part 2 WHPP Amendment

Unique Number	Local Well Name	Total Annual Withdrawal (Million Gallons)					Total Projected Withdrawal (Million Gallons)		
		2014	2015	2016	2017	2018	Scenario 1	Scenario 2	Scenario 3
233054	1C	18.771	22.628	54.497	44.853	53.984	62.5	65.9	48.5
792077	2B	191.058	144.419	116.632	119.735	140.364	160.5	191	140
233056	3A	65.452	25.419	83.819	70.451	84.773	97.4	97.4	72.5
271992	4A	50.353	41.553	28.793	34.525	43.138	50.2	50.2	37
233058	8A	50.235	67.163	45.48	55.091	34.483	40.4	67.2	45
233061	11C	63.354	92.510	88.436	90.371	115.151	131.9	135.3	100
778015	17	79.659	77.760	67.800	58.417	70.414	81.1	84.6	60
791017	18	47.455	0.164	0	0	0	0	0	0
716190	Airport	46.199	45.210	28.436	23.614	16.553	20	23.4	15
147463	Scranton	176.763	197.771	139.214	145.333	71.473	71	0	197
	Total	**789.299**	**715.174**	**653.107**	**642.390**	**630.333**	**715**	**715**	**715**

Table 3

Summary of Potential Sources of Contaminants and Assigned Management Priority
Hibbing Part 2 WHPP Amendment

Potential Contaminant Source Category	Total Number in DWSMA[1]	Number Within IWMZ and Priority Assigned	Number Within ERA and Priority Assigned	Number Within Remainder of the DWSMA and Priority Assigned
Chemical Storage Sites - Non-Agricultural	5	**MVZ – 1; High** **HVZ – 1; High** SWCA – 0	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 3; Moderate HVZ – 0 SWCA – 0
Potential Class V Well Locations	1	LVZ – 0 MVZ – 0 HVZ – 0 SWCA – 0	LVZ – 0 MVZ – 0 HVZ – 0 SWCA – 0	LVZ – 0 MVZ – 1; Moderate HVZ – 0 SWCA – 0
Hazardous Waste Generators	1	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 0 **HVZ – 1; High** SWCA – 0	MVZ – 0 HVZ – 0 SWCA – 0
Potential Contaminant Source Locations (Brownfield Sites)	2	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 1; Moderate HVZ – 0 SWCA – 1; Low
Spill Locations	6	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 0 **HVZ – 1; High** SWCA – 0	MVZ – 5; Moderate HVZ – 0 SWCA – 0
SSTS Locations	3	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 1; Moderate HVZ – 1; Moderate SWCA – 1; Low
Wastewater Locations	1	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 1; Moderate HVZ – 0 SWCA – 0
Leaking Tank Sites				
Closed	5	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 5; Moderate HVZ – 0 SWCA – 0
Registered Storage Tank Sites				
Status = Active	1	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 1; Moderate HVZ – 0 SWCA – 0
Status = Closed or Removed	6	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 6; Moderate HVZ – 0 SWCA – 0
Status = Unknown	0	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 0 HVZ – 0 SWCA – 0	MVZ – 0 HVZ – 0 SWCA – 0
Wells				
Well Locations	41	LVZ – 0 MVZ – 0 HVZ – 0 SWCA – 0	LVZ – 0 MVZ – 1; Moderate HVZ – 0 SWCA – 0	LVZ – 0 MVZ – 19; Moderate HVZ – 2 SWCA – 19; Low

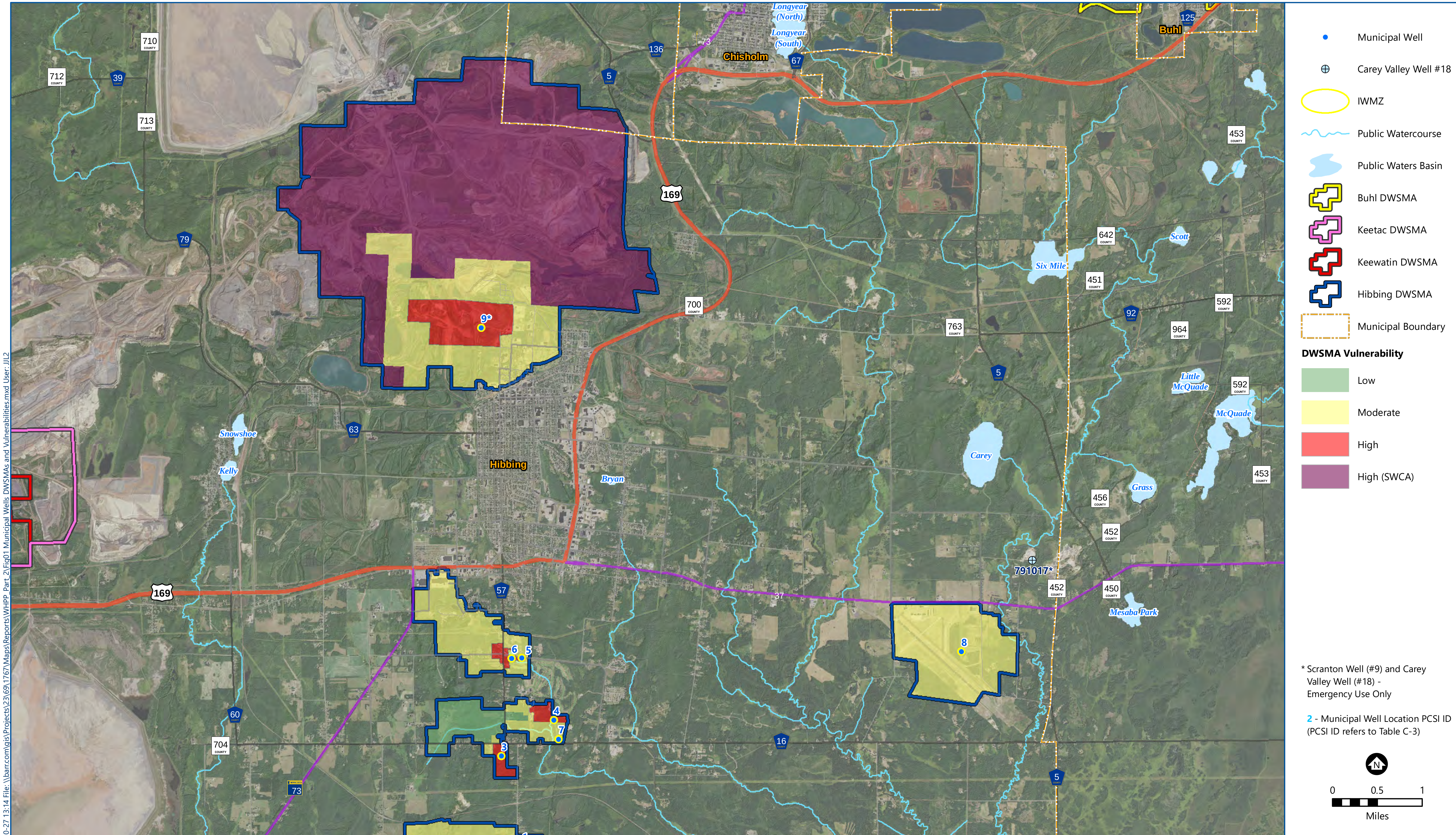
NA = Potential contaminant source type not required to be inventoried in zones of moderate aquifer vulnerability.
ERA = Emergency Response Area; defined as the portion of the WHPA within the 1-year groundwater time of travel area.
IWMZ = Inner Wellhead Management Zone: defined in MR4720.5100 subpart 19 as the area within 200 feet of a public water supply well.
[1]Total number of each potential contaminant source type identified during the PCSI.

Table 4
Management Action Implementation Schedule
Hibbing Part 2 WHPP Amendment

Management Action		Target Implementation/Completion Year									
		2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
7.2 Well Management											
7.2.1	Distribution of Well Operation and Maintenance Information		X								
7.2.2	Promote the Proper Sealing of Unused, Unmaintained, Damaged, or Abandoned Wells within the DWSMAs	X									X
7.3 Potential Contaminant Source Properties											
7.3.1	Information for Registered Storage Tank Owners		X					X			
7.3.2	Tracking of Registered Storage Tanks	X				X					X
7.3.3	Information for Subsurface Sewage Treatment System Owners		X					X			
7.3.4	Information for Chemical Storage and Hazardous Waste Generator Properties	X		X		X		X		X	
7.3.5	Inner Wellhead Management Zone Management		X		X		X		X		X
7.3.6	Transportation Corridors, Pipelines, and Emergency Response			X			X			X	
7.3.7	Sites Where Contaminant Releases May Have Occurred				X				X		
7.3.8	Annual Monitoring Criteria Updates	X									X
7.4 General Public Education											
7.4.1	Wellhead Protection Information	X									X
7.4.2	Drinking Water Quality Report	X									X
7.4.3	HPU Website	X									X
7.4.4	Inclusion of Wellhead and Source Water Protection in the Planning Process within the DWSMAs	X									X
7.4.5	Public Utility Upgrades	X									X
7.5 Data Collection											
7.5.1	Monitoring Static and Pumping Levels in HPU Wells	X									X
7.5.2	Water Quality Database Upgrade	X									
7.5.3	Surface Water Quality Data Collection				X						
7.5.4	Other Geologic and Hydrogeologic Data Collection	X									X
7.5.5	Updating HPU's Groundwater Model							X		X	
7.5.6	Potential Contaminant Source Database		X		X						
7.5.7	Potential Contaminant Source Verification					X		X			
7.5.8	Tritium Sampling							X			

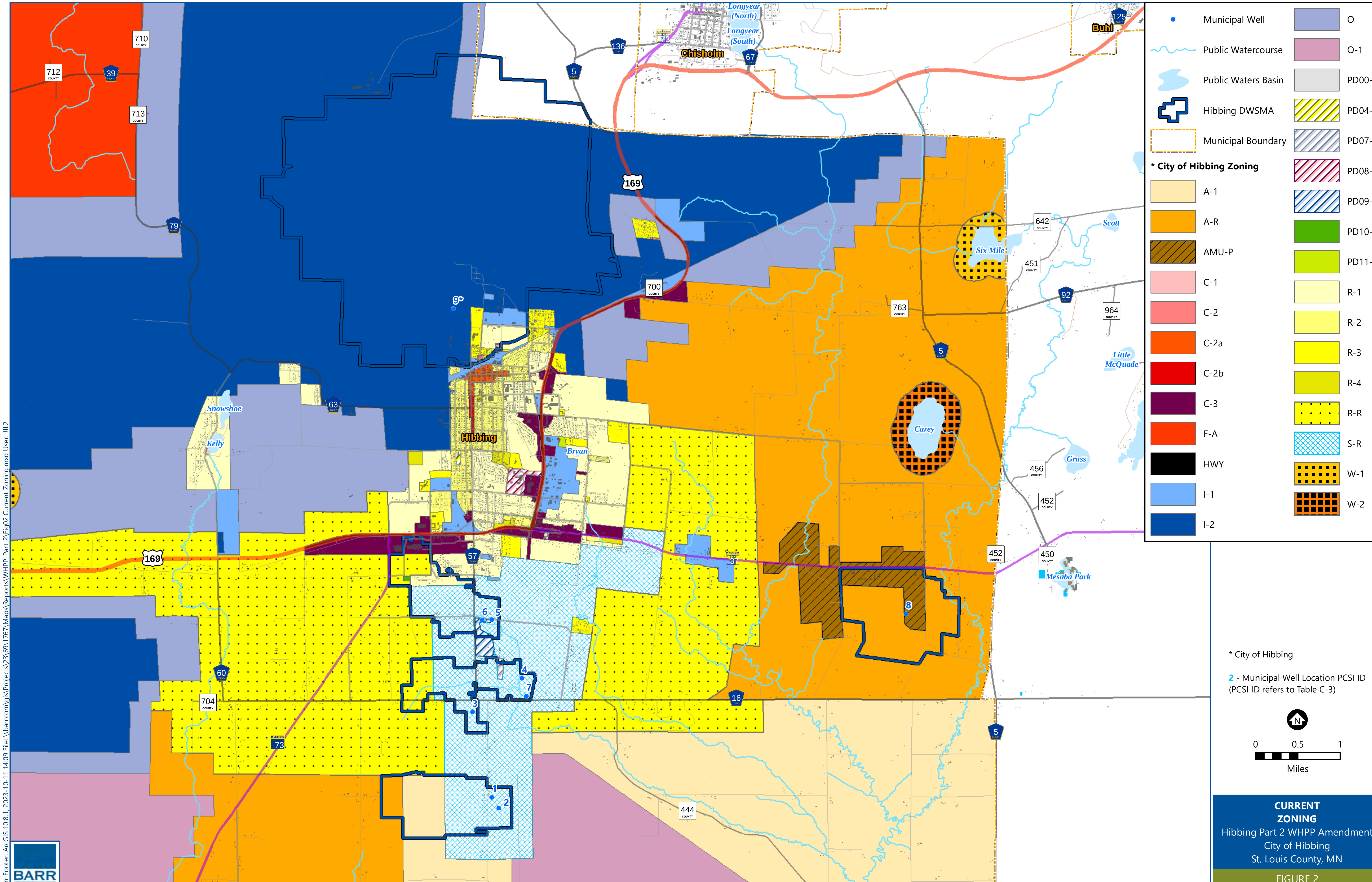
Notes:
Implementation schedule assumes Plan approval in late 2023
X—X Indicates that implementation of the management action will occur periodically or continuously through the indicated timeframe

Figures



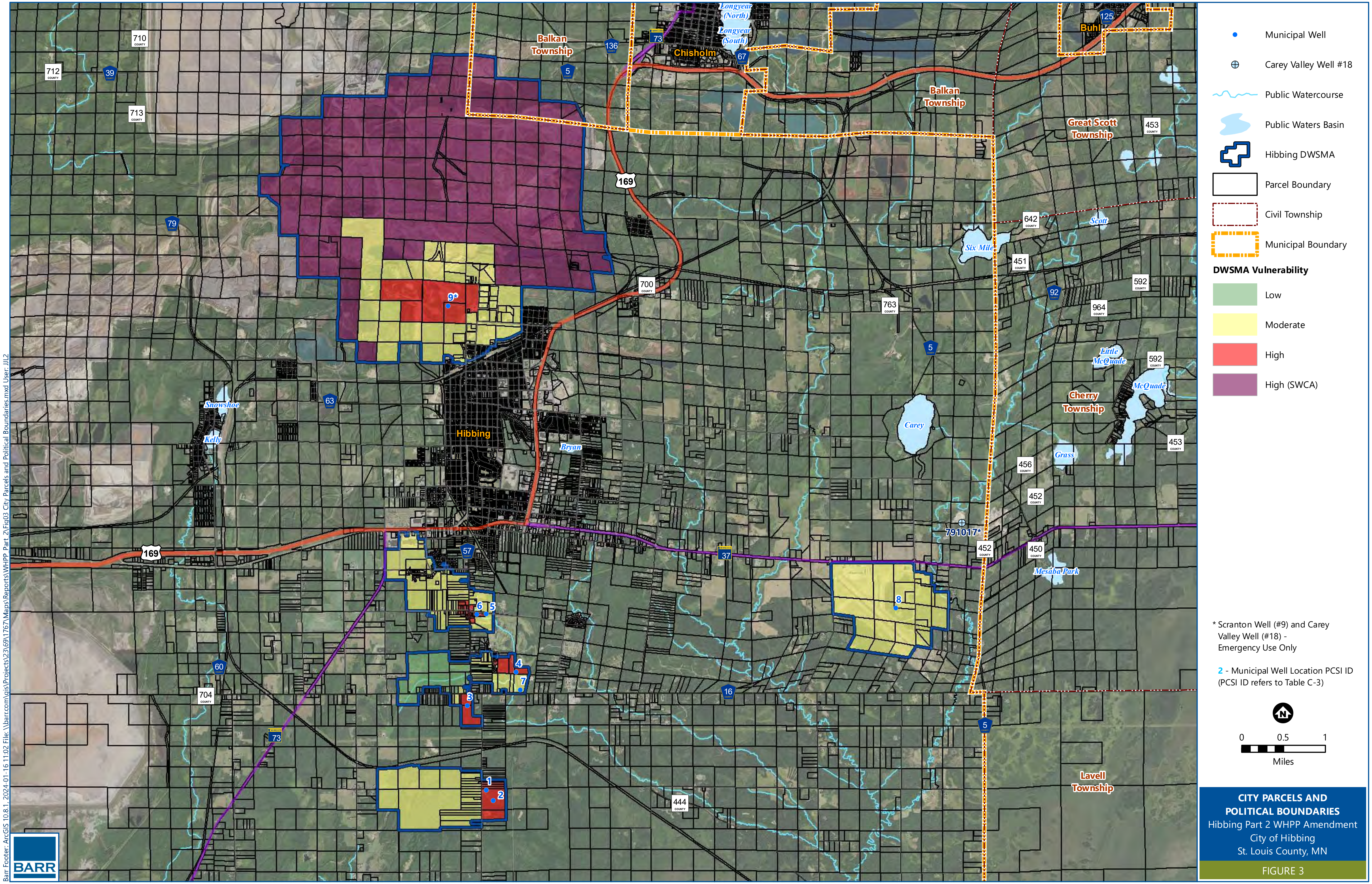
MUNICIPAL WELLS, DWSMA, AND VULNERABILITY
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE 1

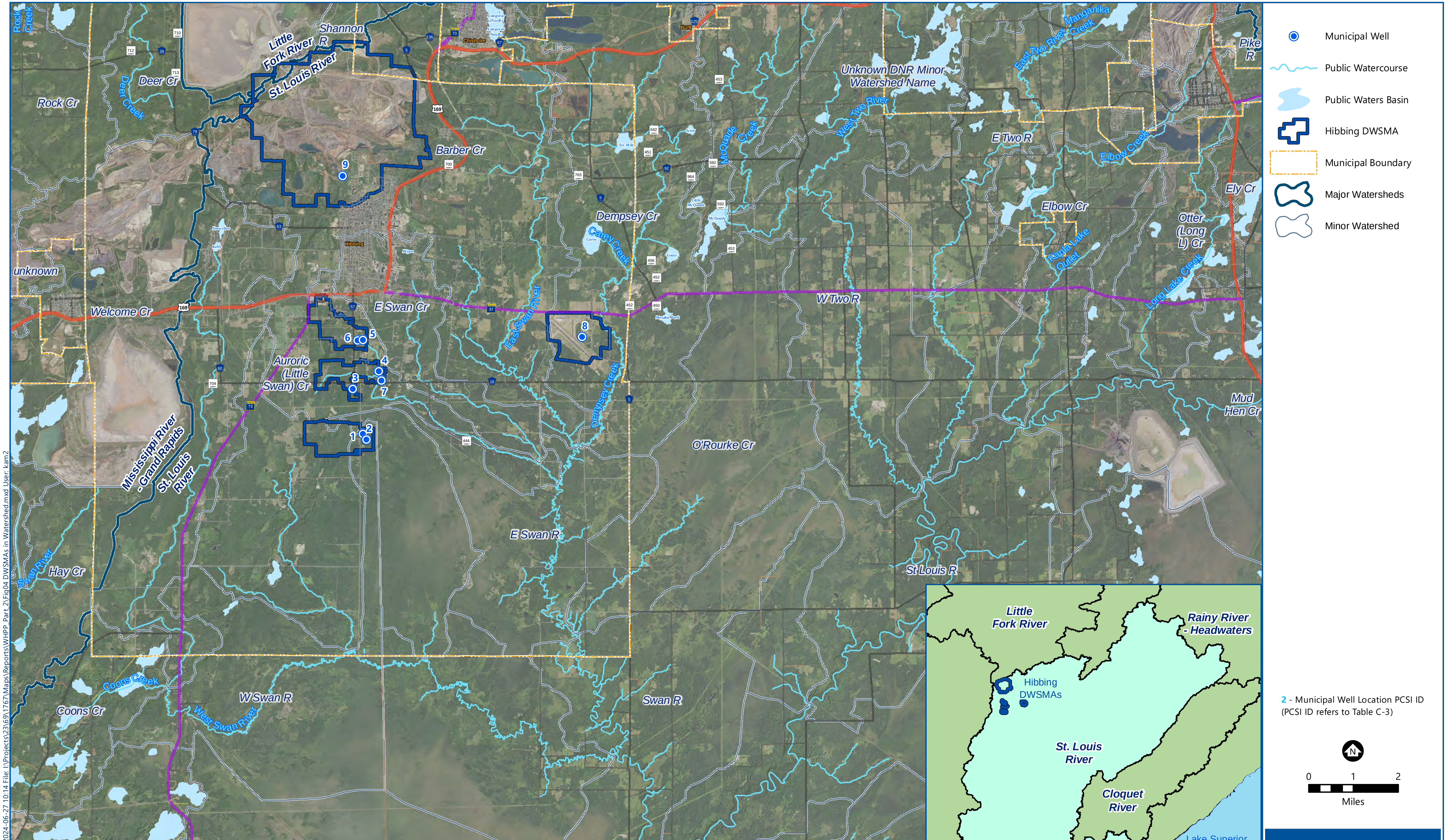


CURRENT ZONING
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE 2



CITY PARCELS AND POLITICAL BOUNDARIES
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN
FIGURE 3



DWSMA WATERSHEDS
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE 4

Appendix A

MDH Well Records

Minnesota Unique Well Number

233054

County St. Louis
Quad Riley
Quad ID 294C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 02/22/1988
Update Date 10/27/2014
Received Date

Well Name	Township	Range	Dir Section	Subsection
HIBBING 1C	56	20	W 7	BBBBAC

Elevation 1383 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 1832 6TH AV E HIBBING MN 55746
Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
FILL	0	4		
CLAY	4	15	YELLOW	
SAND	15	24		
SAND & COBBLES	24	27		
SAND, COARSE	27	43		
CLAY	43	49	BLUE	
GRAVEL W/BOULDERS	49	104		
SAND, CLAYEY	104	118		

Remarks
DRILLED BY THEIN WELL CO. CLARA CITY, MN.
GWQ NO. 0408.

Well Depth	Depth Completed	Date Well Completed
118 ft.	100 ft.	00/00/1973

Drill Method **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
12 in. To 70 ft. lbs./ft.

Open Hole From ft. To ft.
Screen? ☒ **Type** **Make**

Diameter	Slot/Gauze	Length	Set	
10 in.	60	30 ft.	70 ft.	100 ft.

Static Water Level

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

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
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ Turbine

Abandoned
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

Miscellaneous
First Bedrock Aquifer Quat. Water
Last Strat clay+sand Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:12,000) (>15 meters)
System UTM - NAD83, Zone 15, Meters X 504785 Y 5244612
Unique Number Verification Information from Input Date 03/29/1999

Angled Drill Hole

Well Contractor
Minnesota Dept. of Natural MNDNR
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

792077

County St. Louis
Quad Riley
Quad ID 294C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 09/27/2013
Update Date 03/20/2017
Received Date 08/23/2013

Well Name	Township	Range	Dir Section	Subsection
HIBBING 2-B	56	20	W 7	BBDBCB

Elevation 1375 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1902 6TH AV E HIBBING MN 55746

Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	6	BROWN	SOFT
SAND GRAVEL,	6	21		MEDIUM
GRAVEL/CLAY	21	63		MEDIUM
SAND/GRAVEL/SILT	63	65		SOFT
GRAVEL/CLAY	65	67		MEDIUM
FINE-MED SAND	67	94		SOFT
ROCK/FINE-MED SAND	94	97		MEDIUM
FINE SAND	97	103		SOFT
CLAY	103	105		MEDIUM

Remarks

DRILLERS: BRIAN TRAUT & JASON JOHNSON.

Well Depth	Depth Completed	Date Well Completed
105 ft.	103 ft.	05/10/2013

Drill Method Dual Rotary **Drill Fluid** Water

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☒ **From** **To**

Casing Type Single casing **Joint** Welded

Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter **Weight**

16 in. To 70 ft. 62.5 lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
16 in.	55	10 ft.	70 ft.	80 ft.
16 in.	40	13 ft.	80 ft.	93 ft.
16 in.	60	4 ft.	93 ft.	97 ft.
16 in.	20	6 ft.	97 ft.	103 ft.

Static Water Level

10 ft. land surface Measure 04/04/2013

Pumping Level (below land surface)

45 ft. 72 hrs. Pumping at 600 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
driven casing seal	3	Sacks	ft.	105 ft.

Nearest Known Source of Contamination

1000 feet West Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 05/17/2013

Manufacturer's name A.Y. MCDONALD

Model Number 650-3-A HP 50 Volt 460

Length of drop pipe 84 ft Capacity 750 g.p. Typ Submersible

Abandoned

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

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat clay Depth to Bedrock ft

Located by Minnesota Department of Health

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 504915 Y 5244407

Unique Number Verification Information from Input Date 07/20/2015

Angled Drill Hole

Well Contractor

Mark J Traut Wells, Inc.	1404	SEE REMARKS
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

233056

County: St. Louis
Quad: Riley
Quad ID: 294C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date: 02/22/1988
Update Date: 12/11/2019
Received Date:

Well Name	Township	Range	Dir Section	Subsection
HIBBING 3A	56	21	W 1	AACABB

Elevation 1418 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact: 1832 6TH AV E HIBBING MN 55746
Well: HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GLACIAL TILL, ROCKS,	0	40		
SAND, GRAVEL & CLAY	40	45		
SAND & GRAVEL	45	55		
SAND	55	60		
QUICKSAND	60	75		
SAND	75	95		
SAND & GRAVEL	95	100		
SAND	100	110		
SAND & GRAVEL,	110	115		
SAND, LITTLE CLAY	115	125		
QUICKSAND	125	135		
SAND	135	140		
GRAVEL	140	158		

Remarks

REHABED BY BERGERSON-CASWELL ON 9-1-1994.

Well Depth	Depth Completed	Date Well Completed
158 ft.	145 ft.	00/00/1934

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ From To

Casing Type Step down **Joint** Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below**

Casing Diameter **Weight**
24 in. To 81 ft. 94.6 lbs./ft.
18 in. To 105 ft. 70.5 lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
16 in.	80	42 ft.	105 ft.	145 ft.

Static Water Level
17 ft. land surface Measure 09/01/1994

Pumping Level (below land surface)
90 ft. 24 hrs. Pumping at 650 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement	7 Cubic yards	0 ft.	100 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
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

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat gravel (+larger) Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 504416 Y 5246234
Unique Number Verification Information from Input Date 03/29/1999

Angled Drill Hole

Well Contractor

Minnesota Geological Survey	MGS	EISINGER, D.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

271992

County St. Louis
Quad Hibbing
Quad ID 294B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 05/18/2011
Update Date 01/27/2017
Received Date

Well Name	**Township**	**Range**	**Dir Section**	**Subsection**
HIBBING 4A	57	20	W 31	DBCCCA

Elevation 1394 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1902 6TH AV E HIBBING MN 55746
Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
ROAD FILL	0	3		
SAND, GRAVEL	3	5		
CLAY TILL	5	15		
MED-COARSE SAND &	15	19		
CLAY SAND	19	20		
SAND COARSING	20	32		
SANDY SILTY TILL	32	40		
MEDIUM SAND	40	50		
FINE SILTY SAND	50	59		
MEDIUM SAND	59	63		
MEDIUM TO COARSE	63	64		
FINE SAND	64	79		
CLAY TILL	79	80		
NO RECORD	80	183		

Remarks

WELL RECONSTRUCTED BY MARK J. TRAUT WELLS, INC.
GEOLOGIC LOG GENERATED FROM NEARY ROTOSONIC HOLES.
DRILLERS: ED REIA & BUTCH GAUSTAD.

Well Depth	**Depth Completed**	**Date Well Completed**
183 ft.	79 ft.	00/00/1944

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Step down **Joint** Threaded
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**

36 in. To ft. 123. lbs./ft.
16 in. To 53.5 ft. 62.5 lbs./ft.
24 in. To ft. 94.6 lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** **Make** S

Diameter Slot/Gauze Length Set
in. ft. 53.5 ft. 79 ft.

Static Water Level

9 ft. land surface Measure 02/01/2011

Pumping Level (below land surface)

47.5 ft. 72 hrs. Pumping at 181 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
			ft.	ft.
neat cement	5.5	Cubic yards	ft. 43	ft.

Nearest Known Source of Contamination

1700 feet East Direction Body of water Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned

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

Miscellaneous

First Bedrock no record Aquifer
Last Strat indeterminate Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 505358 Y 5246880
Unique Number Verification Information from Input Date 07/20/2015

Angled Drill Hole

Well Contractor

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

233058

County St. Louis
Quad Hibbing
Quad ID 294B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/22/1988
Update Date 04/04/2017
Received Date

Well Name	**Township**	**Range**	**Dir Section**	**Subsection**
HIBBING 8A	57	20	W 31	BBAABC

Elevation 1425 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 1832 6TH AV E HIBBING MN 55746

Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SANDY TOP SOIL	0	3		
CLAY	3	23	RED	
SAND & GRAVEL	23	108		
SANDY CLAY	108	119		
COARSE GRAVEL &	119	138		

Remarks

DRILLED BY LAYNE WELL CO.

Well Depth	**Depth Completed**	**Date Well Completed**
138 ft.	135 ft.	00/00/1944

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Step down **Joint**

Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter	**Weight**
24 in. To 80 ft.	lbs./ft.
16 in. To 108 ft.	lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** **Make**

Diameter	Slot/Gauze	Length	Set	
in.		27 ft.	108 ft.	135 ft.

Static Water Level

20 ft. land surface Measure 00/00/1944

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

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 00/00/1944

Manufacturer's name

Model Number HP Volt

Length of drop pipe 108 ft Capacity 325 g.p. Typ Turbine

Abandoned

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

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat gravel (+larger) Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:12,000) (>15 meters)

System UTM - NAD83, Zone 15, Meters X 504781 Y 5247995

Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

SEE REMARKS

Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

233061

County St. Louis
Quad Hibbing
Quad ID 294B

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 02/22/1988
Update Date 07/20/2015
Received Date

Well Name	**Township**	**Range**	**Dir Section**	**Subsection**
HIBBING 11C	57	20	W 31	BBBACB

Elevation 1429 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1832 6TH AV E HIBBING MN 55746

Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	26	RED/GRY	
SAND, FINE TO	26	75		
CLAY	75	105		
SAND & GRAVEL	105	145		
CLAY & SAND,	145	155		

Remarks

Well Depth	**Depth Completed**	**Date Well Completed**
155 ft.	142 ft.	00/00/1973

Drill Method **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
12 in. To 112 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** **Make**

Diameter	Slot/Gauze	Length	Set	
12 in.	50	40 ft.	112 ft.	142 ft.

Static Water Level
20 ft. land surface Measure 00/00/1973

Pumping Level (below land surface)
63 ft. 24 hrs. Pumping at 400 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

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
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
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

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat clay+sand Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 504599 Y 5247984
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Thein Well Co. Clara City	12013	

Minnesota Unique Well Number

778015

County St. Louis
Quad Riley
Quad ID 294C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 11/16/2010
Update Date 04/14/2017
Received Date 10/21/2011

Well Name	Township	Range	Dir Section	Subsection
HIBBING 17	57	20	W 31	DCCDBA

Elevation 1393 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1902 6TH AV E HIBBING MN 55746
Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & GRAVEL	0	10	VARIED	MED-HRD
TILL GRAVELLY CLAY	10	41	BROWN	MED-HRD
COBBLES GRAVELLY	41	58		MED-HRD
SAND	58	74	BROWN	SOFT
CLAY	74	76	BROWN	SOFT
SAND	76	83	BROWN	SOFT
SAND (FINER)	83	96	BROWN	SOFT
SAND	96	108	BROWN	SOFT
SAND (MED)	108	118	BROWN	SOFT
SAND (COARSE)	118	130	VARIED	MEDIUM
SAND & GRAVEL	130	139	VARIED	SOFT
CLAY TILL	139	140	GRAY	SOFT

Remarks

THIS WELL RECORD REPLACES PREVIOUSLY SUBMITTED RECORD FOR WELL THAT WAS
DETERMINED TO BE UNSUCCESSFUL.
BOTTOM 10' 15 SLOT, 20' 60 SLOT, TOP 14' 40 SLOT.
MIDDLE 20' 60 SLOT, BOTTON 10' 15 SLOT.
DRILLERS: BRIAN TRAUT AND TONY NOVAK.
THIS IS THE SECOND WELL DRILLED UNDER THIS UNIQUE NUMBER.
THE FIRST WELL AS UNIQUE NUMBER 278005.

Well Depth	Depth Completed	Date Well Completed
140 ft.	139.5 ft.	05/20/2011

Drill Method Dual Rotary **Drill Fluid** Water

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below**

Casing Diameter **Weight** **Hole Diameter**
12 in. To 95.5 ft. 0 lbs./ft. 17 in. To 140 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
12 in.		44 ft.	95.5 ft.	139.5 ft.

Static Water Level
13.5 ft. land surface Measure 05/20/2011

Pumping Level (below land surface)
85.5 ft. 24 hrs. Pumping at 250 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
150 feet West Direction Body of water Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
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

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat till-white Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 505441 Y 5246537
Unique Number Verification Info/GPS from data Input Date 10/04/2011

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Mark J Traut Wells, Inc.	1404	SEE REMARKS

Minnesota Unique Well Number

791017

County St. Louis
Quad Buhl
Quad ID 294A

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date
Update Date 03/20/2017
Received Date 05/23/2013

Well Name	Township	Range	Dir	Section	Subsection
CAREY VALLEY	57	20	W	24	DBABAB

Elevation 1351 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1902 6TH AV E HIBBING MN 55746

Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVELY FINE SAND	0	28	BROWN	SOFT
FINE SAND	28	38	BROWN	SOFT
FINE SAND	38	40	GRAY	SOFT
MED SAND	40	60	BROWN	SOFT
GRAVELY SAND	60	68	BROWN	SOFT
GRAVELY SAND	68	71	GRAY	SOFT
GRAVELY SAND	71	96	GRAY	SOFT
VERY FINE SAND	96	101	GRAY	SOFT

Remarks

GROUT - DRIVEN CASING SEAL 0-101' 1 BAG.
DRILLERS: BRIAN TRAUT & JASON JOHNSON.
12"-030 SLOT, 2'-.050 SLOT, 16'-.080 SLOT, 2'-.505 SLOT, 8'-.404 SLOT

Well Depth	Depth Completed	Date Well Completed
101 ft.	96.5 ft.	03/26/2013

Drill Method Dual Rotary **Drill Fluid** Water

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☒ From To

Casing Type Single casing **Joint** Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below**

Casing Diameter 12 in. To 59 ft. **Weight** 49.5 lbs./ft. **Hole Diameter** 12 in. To 101 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
12 in.	30	1 ft.	56.5 ft.	57.5 ft.
12 in.	50	2 ft.	57.5 ft.	59.5 ft.
12 in.	80	16 ft.	59.5 ft.	75.5 ft.
12 in.	50	2 ft.	75.5 ft.	77.5 ft.
12 in.	40	8 ft.	77.5 ft.	85.5 ft.

Static Water Level
23 ft. land surface Measure 03/26/2013

Pumping Level (below land surface)
41 ft. 88 hrs. Pumping at 650 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
driven casing seal	1	Sacks	ft.	101 ft.

Nearest Known Source of Contamination
250 feet East Direction Body of water Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
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

Miscellaneous
First Bedrock Aquifer Quat. Water
Last Strat sand-gray Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 513939 Y 5249742
Unique Number Verification Information from Input Date 07/20/2015

Angled Drill Hole

Well Contractor

Mark J Traut Wells, Inc.	1404	SEE REMARKS
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

716190

County St. Louis
Quad Buhl
Quad ID 294A

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date
Update Date 10/04/2019
Received Date 04/11/2005

Well Name	Township	Range	Dir	Section	Subsection
HIBBING	57	20	W	26	DABCBA

Elevation 1342 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 1902 6TH AV E HIBBING MN 55746
Well 3837 HUGHES RD S HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY & SAND	0	2	BLACK	SOFT
CLAY	2	30	BROWN	MEDIUM
CLAY	30	43	GRAY	MEDIUM
FINE SAND, CLAY &	43	78	GRAY	HARD
FINE SILTY CLAY SAND	78	87	GRAY	M.SOFT
FINE SILTY CLAY SAND	87	89	GRAY	M.SOFT
SLATE	89	120	BLACK	M.SOFT
SLATE	120	130	GREEN	SOFT
SLATE	130	255	BLACK	MEDIUM

Remarks
PUMP WILL BE INSTALLED AT A LATER DATE.
GAMMA, CALIPER, & MULTI TOOL LOGGED 5-2-2005. LOGGED FOR MDH.

Well Depth 255 ft. **Depth Completed** 255 ft. **Date Well Completed** 03/05/2005

Drill Method Multiple methods used **Drill Fluid** Water

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☒ **From** **To**

Casing Type Single casing **Joint** Other
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter **Weight** **Hole Diameter**
6 in. To 89 ft. 19.4 lbs./ft. 6 in. To 89 ft.
6 in. To 255 ft.

Open Hole From 89 ft. To 255 ft.
Screen? ☐ **Type** **Make**

Static Water Level
7.8 ft. land surface Measure 03/03/2005

Pumping Level (below land surface)
77.3 ft. 24 hrs. Pumping at 87 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
bentonite	5	Sacks	ft.	89 ft.

Nearest Known Source of Contamination
50 feet Northwes Direction Sewer Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
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

Miscellaneous
First Bedrock Virginia/Thomson Aquifer Virginia/Thomson
Last Strat Virginia/Thomson Depth to Bedrock 87 ft
Located by Minnesota Department of Health
Locate Method GPS SA Off (averaged) (15 meters)
System UTM - NAD83, Zone 15, Meters X 512666 Y 5248108
Unique Number Verification Input Date 05/05/2005

Angled Drill Hole

Well Contractor

Petersen Well Co.	69183	PETERSON, D.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

147463

County St. Louis
Quad Hibbing
Quad ID 294B

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 02/22/1988
Update Date 10/27/2014
Received Date

Well Name	Township	Range	Dir Section	Subsection
HIBBING	57	21	W 12	ADBBDA

Elevation 1493 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1832 6TH AV E HIBBING MN 55746
Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
ROCK CLAY,	0	18	GRAY	
COARSE SAND,	18	72		
CLAY	72	84	GRAY	
CLAY GRAVEL ROCK	84	97		
ROCK	97	110		
CLAY, TACONITE	110	115	BLUE	
TACONITE- BROKEN	115	175		
TACONITE	175	199		HARD
TACONITE	199	234	RED	SFT-HRD
TACONITE	234	266	DK. RED	HARD
TACONITE HARD	266	343		
ORE	343	470	BLACK	V.HARD
ROCK BROKEN	470	491	GRAY	
ROCK GRAVEL LOOSE	491	535	BROWN	

Remarks
GAMMA LOGGED 4-9-1987. GWQ NO. 0412.

Well Depth	Depth Completed	Date Well Completed
535 ft.	535 ft.	12/00/1984

Drill Method Non-specified Rotary **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ From To

Casing Type Step down **Joint** Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 2 ft.

Casing Diameter **Weight**
24 in. To 304 ft. lbs./ft.
18 in. To 460 ft. lbs./ft.

Open Hole From 460 ft. To 535 ft.
Screen? ☐ **Type** **Make**

Static Water Level
251 ft. land surface Measure 12/00/1984

Pumping Level (below land surface)
360 ft. 8 hrs. Pumping at 1000 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement	35 Cubic yards	0 ft.	460 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☒ No

Pump ☐ Not Installed Date Installed 12/00/1984
Manufacturer's name LAYNE-BOWLER
Model Number HP 200 Volt 480
Length of drop pipe 380 ft Capacity 1000 g.p. Typ Turbine

Abandoned
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

Miscellaneous
First Bedrock Biwabik Iron-Formation Aquifer Biwabik Iron-
Last Strat Biwabik Iron-Formation Depth to Bedrock 115 ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 504055 Y 5253912
Unique Number Verification Information from Input Date 03/29/1999

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Layne Well Co.	27010	MCLAUGHIN, B.

Appendix B

Part 1 Wellhead Protection Plan Amendment

Hibbing Public Utilities Wellhead Protection Plan Amendment

Part I:

Delineation of the Wellhead Protection Area (WHPA), Drinking Water Supply Management Area (DWSMA), and Assessments of Well and DWSMA Vulnerability

Prepared for

Hibbing Public Utilities

March 2021

3128 14th Avenue E
Hibbing, MN 55746
218.262.8600
www.barr.com

Hibbing Public Utilities Wellhead Protection Plan Amendment

March 2021

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Certifications

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

March 24, 2021

John C. Greer
PG #: 30347

Date

Public Water Supply Profile

The following persons are the contacts for the Hibbing Public Utilities Wellhead Protection Plan:

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General Information

UNIQUE WELL NUMBER(S) 147463, 716190, 233054, 792077, 233056, 271992, 233058, 233061, 778015, 791017

SIZE OF POPULATION SERVED 16,361 (2010 Census)

COUNTY St. Louis

Abbreviations

DWSMA	Drinking Water Supply Management Area
ERA	Emergency Response Area
HPUC	Hibbing Public Utilities Commission
IMZ	Inner Management Zone
MDH	Minnesota Department of Health
MGS	Minnesota Geological Survey
WHPA	Wellhead Protection Area
WHPP	Wellhead Protection Plan

1 Introduction

In compliance with the Minnesota Wellhead Protection Rules (MN Rules 4720.5100 through 4720.5590), wellhead protection areas (WHPAs) and Drinking Water Supply Management Areas (DWSMAs) were delineated for Hibbing Public Utilities (HPU) in 2004 (Hydrogeological and Modeling Services, Inc., 2004). Minnesota Rule 4720.5570 states that wellhead protection plans must be reviewed and amended at least every ten years. In 2016, the Minnesota Department of Health (MDH) and HPU agreed to delay the completion of the next wellhead protection plan by a few years to allow HPU to develop a strategy for meeting water demand if future mining activities limit the pumping capacity of the Scranton Well.

As required by Minnesota Rule 4720.5570, new WHPAs and new DWSMAs have been delineated for HPU. This report summarizes work completed to update the delineation of the Hibbing WHPAs and DWSMAs in compliance with the Minnesota Wellhead Protection Rules and to meet the current MDH requirements. Data elements used in preparation of the report are presented in Table 1.

HPU currently has 10 municipal water supply wells. Wells 1C, 2B, 3A, 4A, 8A, 11C, 17, and 18 (unique numbers 233054, 792077, 233056, 271992, 233058, 233061, 778015, and 791017, respectively) are completed in the glaciofluvial outwash aquifer. The Scranton well (unique number 147463) is completed in the Biwabik Iron Formation. The Airport Well (unique number 716190) is completed in the Virginia Formation. All the wells are classified as primary water supply wells, except for Well 18. MDH does not require delineation of WHPAs and DWSMAs for emergency wells, so delineation was not completed for Well 18. Well locations are shown on Figure 1. Table 2 summarizes construction, use, and vulnerability information for the Hibbing water supply wells. Well logs for the City’s wells are presented in Appendix A.

2 Criteria for Wellhead Protection Area Delineation

The following criteria were used to ensure accurate delineation of the WHPAs.

2.1 Time of Travel

A minimum 10-year groundwater time of travel criterion must be used to delineate a WHPA (MN Rule 4720.5510) so there is sufficient reaction time to remediate potential health impacts in the event of contamination of the aquifer. A groundwater time of travel of ten years was considered in this study. As required by the Wellhead Protection Rules, the one-year groundwater time of travel was also determined for each well addressed in this study.

2.2 Aquifer Transmissivity

An aquifer test was conducted by Hydrogeological and Modeling Systems, Inc. (HMS) at Well 8A in September 2003 (HMS, 2003). Based on the results of this aquifer test, the transmissivity of the glaciofluvial outwash aquifer near Wells 8A and 11C was estimated as 8,940 ft^2/day. Specific capacity tests were performed by HPU at Wells 1C, 2A, and 3A during well installation and development. The transmissivity estimates based on these specific capacity tests are 4,007 ft^2/day, 3,711 ft^2/day, and 3,979 ft^2/day, at Wells 1C, 2A, and 3A, respectively. Summaries of the aquifer tests are included in Appendix B. See Section 2.5 below for details regarding how these transmissivity values were included in the groundwater flow model.

Wellhead protection areas for the Biwabik Iron Formation and Virginia Formation were derived from fracture flow evaluations, without the use of a groundwater flow model. Therefore, the transmissivities of the bedrock aquifers are provided for informational purposes only. The transmissivity of the bedrock aquifers were estimated with aquifer tests. The Virginia Formation transmissivity near the Airport Well was estimated as 407 ft^2/day, which was the geometric mean of the results of a 2005 aquifer test. Aquifer test analysis for the Scranton Well indicated a wide range for Biwabik Iron Formation transmissivity due to the predominance of fracture flow, but 1,570 ft^2/day was selected as a representative maximum transmissivity at the Scranton Well.

2.3 Daily Volume of Water Pumped

Pumping data for Hibbing Public Utilities for the period 2014 through 2018 are summarized in Table 3. The largest annual withdrawal for that period was 789,299,000 gallons in 2014. The projected 2025 demand of 715,000,000 gallons was calculated with the assumption that the population and 2015 water use will remain about the same through 2025. The projected 2025 demand was modeled with the pumping rates distributed between the Hibbing wells in three different ways, assuming that the Scranton Well is pumped below its current capacity, is not pumped at all, or is pumped at its full capacity. For the three projected pumping scenarios, each well was simulated with a pumping rate greater than or similar to its 5-year maximum pumping rate, except the Airport Well. Airport Well pumping rates were assigned to meet the total projected demand after setting the pumping rates for HPUC's other wells. Table 3 summarizes the pumping rates used in the model for delineation of the WHPAs.

2.4 Conceptual Hydrogeologic Model

The hydrogeologic conceptual model was presented in the previous Wellhead Protection Plan (HMS, 2004). Additional geological information is included below, along with discussion of groundwater flow boundaries and flow directions in the Hibbing area.

2.4.1 Surficial Geology

Wisconsinan-age glacial drift is present over much of the Hibbing area (Winter, 1973). The drift consists of three major till units interspersed with glaciofluvial outwash. From lowest to highest, the till units are the basal till, bouldery till, and surficial till. The basal and surficial tills are sandy, silty, and calcareous, while the bouldery till is non-calcareous, sandy, and silty with many cobbles and boulders (Winter, 1973). Glaciofluvial outwash occurs between the surficial and bouldery tills and between the bouldery and basal tills in the Hibbing area. The glaciofluvial outwash is primarily confined to a north-south trending buried valley in which the Hibbing glaciofluvial wells are installed (Lindholm, 1968).

Surficial geology and the locations of geologic cross sections are shown on Figure 2. Geologic cross sections through the Hibbing glaciofluvial wells are shown on Figure 3 through Figure 8.

2.4.2 Bedrock Geology

The Archean-age Giants Range batholith forms the topographic highlands northeast of Hibbing. The overlying Animikie Group of Precambrian metasediments includes, from oldest to youngest, the Pokegama Quartzite, Biwabik Iron Formation, and Virginia Formation. These three formations strike northeast at about 50 degrees and dip southeast 10 to 12 degrees. The Biwabik Iron Formation and Virginia Formation are described in more detail below.

Biwabik Iron Formation

The Biwabik Iron Formation is about 600 feet thick near Hibbing (Pfleider et al., 1968) and directly underlies the basal till or underlying glaciofluvial deposits in much of the area. The Biwabik Iron Formation contains chert and iron minerals and has been divided into four members based on texture (from bottom to top): the lower cherty, lower slaty, upper cherty, and upper slaty (White, 1954). The Scranton well is open to the lower cherty member. While the Biwabik Iron Formation has low primary porosity, fractures and solution-weathering near the surface make it more permeable than the surrounding bedrock layers. Bedding plane fractures follow the strike and dip of the formation, described above in Section 2.4.2. High-angle faults predominantly trend northwest, at about 283 and 321 degrees (Morey and Meints, 2000).

Virginia Formation

The Virginia Formation, where present, overlies the Biwabik Iron Formation. The Virginia Formation consists of argillite, siltstone, and graywacke (Morey, 1972) and is less permeable than the Biwabik Iron Formation.

2.4.3 Flow Boundaries

Groundwater flow in the glaciofluvial outwash aquifer is primarily from the northwest to the southeast. The primary flow boundaries for the glaciofluvial outwash aquifer are two unnamed tributaries to East Swan River. The glaciofluvial outwash aquifer comprises part of the glacial material burying a north-south trending bedrock valley. Thus, the glaciofluvial outwash aquifer thins to the west and east of the Hibbing outwash wells. Appendix C Figure C-6 shows the mapped extent (Lindholm, 1968) of the glaciofluvial outwash aquifer within the buried valley for reference.

Bedrock aquifer flow boundaries were incorporated in the WHPA delineations using the physical boundaries of the aquifer and the dominant orientations of stratigraphic dip and faulting within the aquifer. In the case of the Biwabik Iron Formation, watershed boundaries of the mine pits that intersect the aquifer and are likely direct or indirect sources of recharge to the Scranton Well were also included.

2.5 Model Description

To accurately delineate the WHPAs, it is necessary to assess how nearby wells, rivers, lakes, and variations in geologic conditions affect groundwater flow directions and velocities in the aquifer. A groundwater model constructed with the finite difference code MODFLOW-96 (Harbaugh and McDonald, 1996) was used to delineate the previous wellhead protection areas (HMS, 2004). The existing model was used for this study, with the modifications described below, to simulate groundwater flow in the glaciofluvial outwash aquifer. MODFLOW is public domain software that is available at no cost from the U.S. Geological Survey. The pre- and post-processor Groundwater Vistas (version 8) (Environmental Simulations, Inc., 2020) was used to create the model data files and evaluate the model results.

2.5.1 Base Model

The groundwater flow model has four layers representing: the upper surficial till in layer 1, the upper glaciofluvial outwash aquifer in layer 2, the bouldery till in layer 3, and the middle glaciofluvial outwash aquifer in layer 4. The basal till is assumed to be an impermeable barrier to flow, so the top of the basal till is represented by the no-flow boundary at the bottom of layer 4. The model cells range from 5 m near the Hibbing wells to 50 m near the edges of the model.

2.5.2 Model Modifications and Updates

The groundwater flow model was updated to use the MODFLOW-NWT solver (Niswonger et al., 2011), which is more robust when model cells go dry than earlier solvers published by the U.S. Geological Survey.

Since the previous Hibbing Wellhead Protection Plan was prepared, the city of Hibbing has installed Wells 4A and 17, and also replaced Well 2A with Well 2B. Only Well 2B needed to be added to the groundwater flow model, as Wells 4A and 17 were already included. As discussed in the 2016 pre-delineation meeting, the model grid was refined to a minimum cell spacing of 10 m at Well 2B.

MDH held Scoping Meeting No. 1 with HPU staff on September 12, 2019 and summarized the discussion in MDH’s Scoping Decision Notice No. 1 on the same day. At the 2019 scoping meeting, two high capacity wells within two miles of the Hibbing wells were identified (696993, 780503). These wells were added to the model with their 5-year maximum pumping rates, using data from 2014 through 2018.

During 2016 model updates, the glaciofluvial outwash aquifer thickness in Lindholm (1968) was compared to the 2004 groundwater flow model and well data in the Minnesota Well Index. At a few locations within the model domain, the glaciofluvial outwash aquifer was found to be thicker in Lindholm (1968) than the 2004 groundwater flow model. In two of these areas the bottom of model layer 4 was lowered so that the aquifer thickness is represented more accurately in the model (Figure C-6 in Appendix C).

During 2016 model updates, a topographic highland west of Well 11C was found to dry out in all model layers, due to the relative thinness and elevation of the model there. The bottoms of model layers 2 through 4 were lowered to reach more consistent elevations with surrounding model cells in each layer (area shown on Figure C-6 in Appendix C). The altered cells in layers 2 through 4 were assigned to a new hydraulic conductivity zone. Bedrock topography (Jirsa et al., 2011) indicates that the modeled interval is likely to be glacial till, so the hydraulic conductivity value assigned to the zone was consistent with glacial till.

Specified flux boundaries were evaluated for the northern and eastern edges of the model domain where the glaciofluvial outwash aquifer in layer 2 extends beyond the model boundary. The hydraulic gradients along the northern model edge were primarily from west to east, parallel to the model boundary. Therefore, specified flux boundaries were not applied to the northern edge of the model. The hydraulic gradients along the eastern model edge indicate that groundwater flows out of the model domain. Specified flux boundary cells were added to layer 2 where the glaciofluvial outwash aquifer intersects the model boundary (Figure C-2 of Appendix C). The fluxes were estimated from Darcy's law calculations using the modeled transmissivity and cross-sectional areas of the boundary cells. An average gradient was estimated from static water level measurements from well logs in the Minnesota Well Index (MWI) at wells west and east of the model domain boundary.

As discussed at the 2016 predelineation meeting, no additional recalibration of the model was deemed necessary. A calibration summary plot for the updated model is included in Appendix C (Figure C4). MODFLOW files for the updated model are included in Appendix G.

2.6 Groundwater Flow Field

The groundwater flow field used for delineation of the WHPAs was determined by the groundwater flow model. Modeled contours for the glaciofluvial outwash aquifer are shown on Figure 9.

Figure 9 shows groundwater flow in the glaciofluvial outwash aquifer varies within the model domain from primarily eastward to primarily southward flow. Modeled groundwater flow is to the southeast near Hibbing Wells 8A and 11C, with a more eastern component to flow (ESE trend) near Wells 3A, 4A, and 17. Farther south along the buried valley, modeled groundwater flow is primarily to the east at Wells 1C and 2B. The modeled groundwater flow directions are consistent with previous work (Lindholm, 1968; HMS, 2004).

3 Delineation of the Wellhead Protection Areas

Delineation of the WHPAs for the Hibbing wells involved the evaluation of both porous media flow and fracture flow. Porous media capture zones were delineated for the wells in the glaciofluvial outwash aquifer and fracture flow capture zones were delineated for the Airport and Scranton Wells.

3.1 Porous Media Flow Evaluation

The groundwater flow model discussed above in Section 2.5 was used to simulate the groundwater flow field in the vicinity of Hibbing. The porous media capture zones for the Hibbing wells were delineated using the software program MODPATH (Version 7; Pollock, 2016) with the modeled groundwater flow field. A minimum of 250 particles were tracked from each well. The particles were released from five vertical points in each layer along the open interval of each well. These particles were tracked backwards in time for both one and ten years. Particle tracking was completed for all three pumping scenarios. In plan view, the areas encompassed by the particle traces were then outlined as the one- and ten-year porous media time of travel capture zones for each well. A porosity of 0.25 was used for the glaciofluvial outwash aquifer in the porous media flow evaluation.

3.1.1 Sensitivity Analysis

A sensitivity analysis was performed to test the sensitivity of the model results to varying hydraulic conductivities near the Hibbing wells. Only the maximum pumping configuration for the glaciofluvial outwash wells (Scenario 2 as noted in Table 3) was used for sensitivity analysis. Transmissivities were adjusted by ±50% unless a smaller adjustment could be supported by transmissivity estimates from the well 8A pumping test or specific capacity calculations (Appendix B). Table C-1 in Appendix C summarizes the horizontal hydraulic conductivity bounds used for each hydraulic conductivity zone in the sensitivity analysis. The distribution of hydraulic conductivity values during sensitivity analysis are shown on Figures C-12 through C-14 in Appendix C. The same ratios of horizontal to vertical hydraulic conductivity used in the base model were also used for the sensitivity runs. Particle traces from all simulations were used to delineate the 1-year and 10-year porous media capture zones for each well. The porous media capture zones are shown on Figure 10. Particle traces from all simulations are shown in Appendix C (Figure C-16)

3.2 Fracture Flow Evaluation

As noted in Section 1.0, two of Hibbing's wells are completed in fractured bedrock aquifers: the Scranton Well is completed in the Biwabik Iron Formation and the Airport Well is completed in the Virginia Formation. Fracture flow delineations were completed by MDH, using Delineation Technique Number 1 for the Airport Well and Delineation Technique Number 2 for the Scranton Well (MDH, 2011b).

3.2.1 Airport Well

Parameters used by MDH in the calculation of the fixed radius capture area for the Airport Well are included in Table 4. A summary of the calculations is presented in Appendix D. Airport Well fixed radius capture zones were calculated for 1 year and 10 years (Figure 11).

3.2.2 Scranton Well

Parameters used by MDH in the calculation of the fixed radius capture area for the Scranton Well are included in Table 4. The log in the Minnesota Well Index for the Scranton Well shows the top of Biwabik Iron Formation at a depth of 115 feet below ground surface and a 1984 static depth to water measurement of 251 feet below ground surface, indicating unconfined conditions at that time. According to the MDH fracture flow guidelines (MDH, 2011b), Delineation Technique Number 2 – Calculated Fixed Radius With An Upgradient Extension should be used for unconfined conditions. A summary of the calculations is presented in Appendix D. Scranton Well fixed radius capture zones were calculated for 6 months and 5 years and then extended in the upgradient direction an additional 6 months and 5 years to account for the 1-year and 10-year protection areas.

The Geologic Map of Minnesota (Jirsa et al., 2005) shows the fault orientations in the Biwabik Iron Formation in the vicinity of the Scranton Well at 77 degrees west of north and 39 degrees west of north. Upgradient extensions with 6-month and 5-year time of travel distances were aligned with these two fault orientations. The upgradient extension northwest of the capture zone was truncated at surface water features within the Hibbtac mine pit complex based on MDH conjunctive delineation guidelines (draft 2019). The groundwater contribution area (GWCA) for the Scranton Well is shown on Figure 12 and the composite 1-year and 10-year time of travel zones for the Scranton Well are shown on Figure D1 in Appendix D.

3.2.3 Overlap from Nearby Wells

A search of the Minnesota Department of Natural Resources' (MnDNR) Permitting and Reporting System (MPARS) was conducted to find any nearby high-capacity wells completed in the Biwabik Iron Formation that may have fixed-radius capture zones that overlap the Hibbing fixed radius fracture flow capture zones. No such wells were identified.

3.3 WHPA Delineations

In the absence of a conjunctive delineation, the combined 10-year fracture flow capture zones and composite 10-year porous media capture zones define the WHPAs. The Emergency Response Area (ERA) is delineated for each well by the combined 1-year fracture flow capture zones and composite 1-year porous media capture zones. The WHPAs and ERAs are shown on Figure 10, Figure 11, and Figure 12.

3.4 Conjunctive Delineation

A conjunctive delineation (aka, surface water contribution area) adds the potential contribution area of surface water to the groundwater contribution area, with surface water contribution in the form of runoff and/or a surface water feature and its catchment area. The need for conjunctive delineation was evaluated at the Hibbing wells using draft guidance from MDH (2019). The flowchart developed by MDH to visually define the process is included in Appendix D as Figure D2.

The conjunctive delineations described below in this section were added to the combined 10-year fracture flow zones and 10-year porous media capture zones to define the final WHPAs carried forward for DWSMA delineation described in Section 4.

3.4.1 Quaternary Aquifer

Hibbing's Quaternary wells are installed in the glaciofluvial outwash aquifer near the headwaters of two unnamed tributaries to the East Swan River; therefore, the evaluation of conjunctive delineations for the Quaternary wells started at Step 2 in the draft guidance (see Figure D2). The Emergency Response Area (ERA; 1-year time of travel) for each well was compared to the DWSMA aquifer vulnerability areas (see Section 6 below for a discussion of aquifer vulnerability). The ERA for Well 17falls within a portion of the DWSMA in which aquifer vulnerability is classified as moderate, so no surface water contribution area is needed. The ERAs for Wells 1C, 2B, 3A, 4A, 8A, and 11C fall within portions of the DWSMAs in which aquifer vulnerability is classified as high, so the evaluation continued to step 3 in the guidance document.

The combined ERA for Wells 8A and 11C intersects an unnamed tributary to East Swan River; however, particle traces from MODPATH indicated only a few particles (3% of the total number of particles) reach model layer 1 within one year. The boundary condition cells representing the unnamed tributary and intersected by these particles were simulated to lose approximately 14 gpm to the aquifer while simulated pumping from Wells 8A and 11C was approximately 385 gpm (the simulated stream loss to the aquifer is ~4% of the combined discharge for Wells 8A and 11C). Runoff toward the combined ERA for Wells 8A and 11C is more likely to reach the unnamed tributary than to infiltrate to groundwater; therefore, a surface water contribution area was not delineated for Wells 8A and 11C (Figure 13a).

The need for conjunctive delineation at Wells 1C, 2B, and 3A proceeded to step 4 in the guidance document, because the ERAs do not intersect surface water. The ERAs for Wells 1C and 2B intersect a limited area with runoff-promoting soils and topography is flat (Figure 13c); therefore, a surface water runoff area was not delineated. Topography around the Well 3A ERA is relatively flat and does not indicate substantial runoff from outside the ERA would reach Well 3A (Figure 13b); therefore, a surface water runoff area was not delineated for Well 3A.

The groundwater model indicated that the ERAs for Hibbing wells 8B, 11C, and 17 may capture some surface water flow from an unnamed tributary to the East Swan River.

One year time of travel particle traces from MODPATH extend from Hibbing well 4A beyond the unnamed tributary to East Swan River and do not reach model layer 1. Mass balance information from MODFLOW indicates that the creek is gaining (i.e., all simulated flow is from the aquifer to the stream) in the reach crossed by the ERA for Well 4A. On this basis, the need for conjunctive delineation at Well 4A proceeded to step 4 in the guidance. The Well 4A ERA could receive runoff from a low mound to the north. However, this area is small and only 10 feet higher than the ERA (Figure 13c). Therefore, a surface water runoff area was not delineated for Well 4A.

3.4.2 Bedrock Aquifers

A conjunctive delineation was completed for the Scranton Well. The Hibbing Taconite Pit has several ponded areas, as identified in 2019 aerial imagery, that are adjacent to the Scranton Well groundwater contribution area. Subwatershed divides were defined for each surface water feature using 2011 St. Louis County LiDAR data. The surface water contribution area (SWCA) for the Scranton Well is shown on Figure 12.

4 Delineation of the Drinking Water Supply Management Areas

The Hibbing DWSMAs encompass the WHPAs with boundaries that correspond to geographically identifiable features (e.g., roads, parcel boundaries, quarter-quarter section lines). St. Louis County 2021 parcel data were primarily used to delineate the DWSMAs, but roads were used where St. Louis County parcel data showed gaps along the rights-of-way. DWSMA boundaries were adjusted using quarter-quarter section lines to be closer to WHPA boundaries where WHPAs intersected large parcels. The Hibbing DWSMAs are shown on Figure 14, Figure 15, and Figure 16. Comparison of the current and previous Hibbing DWSMAs is included on figures at 1:24,000 scale in Appendix G. The full extent of the previous DWSMA for the Scranton Well is shown at a larger scale on Figure G-4 in Appendix G.

5 Well Vulnerability Assessment

MDH evaluated the vulnerability of the Hibbing municipal wells to contamination from contaminants released at the surface. The evaluation parameters include geology, well construction, pumping rate, and water quality. All of Hibbing’s wells are classified as “vulnerable.” Copies of the MDH well vulnerability scoring sheets for the Hibbing wells are presented in Appendix E.

6 Drinking Water Supply Management Area Vulnerability Assessment

The vulnerability of the glaciofluvial outwash, Biwabik Iron Formation, and Virginia Formation aquifers within the DWSMAs associated with the Hibbing wells was evaluated in a manner consistent with MDH guidance for assessing aquifer vulnerability (MDH, 1997). The evaluation used geologic sensitivities based on L scores computed from boring log data and water quality data for the Hibbing wells.

The first step in the assessment is to determine the geologic sensitivity rating of the aquifer. The Minnesota Department of Natural Resources (MnDNR) defines geologic sensitivity based on the travel time of water moving vertically from the surface to the aquifer of interest as follows (see MnDNR, 1991):

- Sensitivity = Very High: vertical travel time is hours to months
- Sensitivity = High: vertical travel time is weeks to years
- Sensitivity = Moderate: vertical travel time is years to decades
- Sensitivity = Low: vertical travel time is several decades to a century
- Sensitivity = Very Low: vertical travel time is more than a century

Geologic logs listed in the CWI for wells in the vicinity of the DWSMAs were reviewed and “L scores” based on the thickness of low permeability units at each well location were assigned to each well. (See MnDNR (1991) for a discussion of how to determine L scores). Well logs lacking detail in the Quaternary stratigraphy and shallow boreholes (≤30 feet deep) were excluded from the L score calculations. Maps of WHPA geologic sensitivity and the L scores used to develop them are included in Appendix F.

The second step in the assessment is to refine the geologic sensitivity using water quality data from the water supply wells. In their source water assessment program, MDH uses a classification scheme that rates the vulnerability of groundwater to surface contamination based on sampling data for a list of parameters that indicate man-made impacts or similarity to rainwater (MDH, 2011a) and gives some indication of relative groundwater residence time in the subsurface. There are five main categories lettered A to E in descending order of vulnerability, ranging from Category A which indicates that groundwater has been recharged rapidly from precipitation to Category E which indicates old, saline groundwater with a very long residence time in the subsurface. Water quality samples were collected from the Hibbing wells in 2012, 2013, and 2015. All of the wells have been analyzed for bromide, chloride, nitrate, sulfate, and tritium. Half of the wells have also been sampled for arsenic. Table 5 summarizes the water quality data and the categories assigned. The water from Wells 4A and 8A was classified as Category B2 (“Mineral Fertilizer Impacted”), water from Well 11C was classified as Category B3 (“Road Salt/Water Softener Impacted”), water from Well 17 was classified as Category B4 (“Post-1953 Impacted Non-Pathogen”), and water from Wells 1C, 2B, 3A, Airport, and Scranton was classified as Category C (“Post-1953 Un-impacted”).

Tritium (^{3}H), a radioactive isotope of hydrogen, has been used extensively to date groundwater. Tritium activities peaked during atmospheric hydrogen bomb testing of the 1950s and 1960s, and values of ^{3}H in precipitation reached a maximum of approximately 10,000 T.U. (tritium units) in 1963 (Mazor, 2004).

Natural production of ^3H in the upper atmosphere introduces approximately 5 T.U. to precipitation each year (Mazor, 2004). Because ^3H has a relatively short half-life of 12.43 years, radioactive decay since the bomb peak has reduced tritium activities to near background levels and ^3H is used mostly for relative age dating today. As shown in Table 5, tritium has been detected at all of the Hibbing wells, resulting in "modern" and "mixed" assessments, and thus confirming the vulnerable nature of the wells (Lindsey et al., 2019).

The geologic sensitivity classification of the outwash aquifer ranges from very high to low at Wells 3A and 4A. The glaciofluvial outwash aquifer near Wells 1C, 2B, 8A, and 11C has moderate to low geologic sensitivity. Well 17 and the Airport and Scranton Wells have low geologic sensitivity. In keeping with MDH policy, the vulnerability of the Scranton Well SWCA is classified as High.

Tritium concentrations at 1C, 2B, and 11C increase the vulnerability of the glaciofluvial outwash aquifer relative to the geologic sensitivity classification to high or moderate vulnerability. Due to tritium concentrations at Wells 8A, 17, Airport, and Scranton, the DWSMAs were assigned moderate vulnerability. Geologic sensitivity and tritium concentrations were consistent at Wells 3A and 4A; the DWSMAs are mapped as high to low vulnerability. Per current MDH policy, the vulnerability zone boundaries were delineated using geographically identifiable features (e.g., parcels, quarter-quarter section lines). Figure 17, Figure 18, and Figure 19 show the final aquifer vulnerability maps for the uppermost aquifer supplying water to municipal wells in each of the Hibbing DWSMAs.

7 Recommendations

It is recommended that the City work with the MDH to conduct tritium sampling of the municipal wells at least every ten years in order to have current data available when updating the aquifer vulnerability assessment as part of the required decennial wellhead protection plan amendments. Tritium data were most recently collected at Hibbing municipal wells in 2015.

Additional data collection is recommended to investigate possible surface water interactions with wells along unnamed tributaries to the East Swan River (Hibbing wells 3A, 4A, 8A, 11C, and 17), as described in Section 3.4.1. The purpose of the data collection would be to support high vs. moderate vulnerability ratings in the DWSMAs for these glacial outwash wells using a groundwater age dating method. The feasibility of existing groundwater age-dating methods would need to be investigated in coordination with MDH.

8 Supporting Data Files

The groundwater model files and GIS files are included in Appendix H. (Appendix H can be found in the "Part1" folder on the CD.)

The groundwater model can be reviewed using MODFLOW-NWT (Niswonger et al., 2011). MODPATH files can be reviewed using MODPATH Version 7.

All coordinates in the modeling files are based on UTM NAD 83 Zone 15 N datum. Elevations are in meters above mean sea level (m MSL). Time units are days. Length units are meters.

The GIS files have been named according to the MDH conventions. Shapefiles are in UTM NAD83 Zone 15 N coordinate system.

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Tables

Table 1

Assessment of Data Elements
Hibbing Part 1 WHPP Amendment

Data Element	Present and Future Implications				Data Source
	Use of the Wells	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Precipitation	M	L	M	M	Minnesota Climatology Working Group
Geology					
Maps and geologic descriptions	M	H	H	H	MGS, MWI
Subsurface data	M	H	H	H	MGS, MDH, MWI
Borehole geophysics	M	M	M	M	MGS, MWI
Surface geophysics	L	L	L	L	Not available
Maps and soil descriptions	L	M	M	M	MGS, NRCS
Eroding lands					
Water Resources					
Watershed units	L	H	H	L	DNR
List of public waters	L	H	H	L	DNR
Shoreland classifications					
Wetlands map	L	L	L	L	NWI
Floodplain map					
Land Use					
Parcel boundaries map	L	H	L	L	St. Louis County
Political boundaries map	L	L	L	L	MNGEO
PLS map	L	L	L	L	DNR
Land use map and inventory					
Comprehensive land use map					
Zoning map					
Public Utility Services					
Transportation routes and corridors	L	H	L	L	MNDOT
Storm/sanitary sewers and PWS system map	L	L	L	L	City of Hibbing?

Definitions Used for Assessing Data Elements:

High (H) - the data element has a direct impact
Moderate (M) - the data element has an indirect or marginal impact
Low (L) - the data element has little if any impact
Shaded - the data element was not required by MDH for preparing the WHP plan
NU - not used

CWI – Minnesota County Well Index
DNR – Minnesota Department of Natural Resources
MNGEO - Minnesota Geospatial Information Office
MDH – Minnesota Department of Health
MNDOT – Minnesota Department of Transportation
MPCA – Minnesota Pollution Control Agency
NRCS – Natural Resources Conservation Service
NWI – National Wetlands Inventory
SSURGO – Soil Survey Geographic Database
USGS – United States Geological Survey

Table 1

Assessment of Data Elements (Continued)
Hibbing Part 1 WHPP Amendment

Data Element	Present and Future Implications: Use of the Wells	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	Data Source
Oil and gas pipelines map					
Public drainage systems map/ list	L	L	L	L	Not available
Records of well construction, maintenance, and use	H	H	L	L	City of Hibbing, MWI, MDH files
Surface Water Quantity					
Stream flow data	L	L	L	L	USGS, DNR?
Ordinary high water mark data	L	L	L	L	DNR or not available
Permitted withdrawals					
Protected levels/flows	L	L	L	L	DNR or not available
Water use conflicts	L	L	L	L	DNR
Groundwater Quantity					
Permitted withdrawals	H	H	H	H	DNR
Groundwater use conflicts	L	L	L	L	DNR
Water levels	H	H	H	H	MWI, MDH
Surface Water Quality					
Stream and lake water quality management classification					
Monitoring data summary	L	L	L	L	MDH, MPCA
Groundwater Quality					
Monitoring data	H	H	H	H	MDH
Isotopic data	H	H	H	H	MDH
Tracer studies	L	L	L	L	Not Available
Contamination site data	L	L	L	L	MPCA, MDH
Property audit data from contamination sites					
MPCA and MDA spills/release reports	L	L	L	L	MDH, MPCA

Definitions Used for Assessing Data Elements:

High (H) - the data element has a direct impact
Moderate (M) - the data element has an indirect or marginal impact
Low (L) - the data element has little if any impact
Shaded - the data element was not required by MDH for preparing the WHP plan

DNR – Minnesota Department of Natural Resources
MDH – Minnesota Department of Health
MNDOT – Minnesota Department of Transportation
MNGEO - Minnesota Geospatial Information Office
MPCA – Minnesota Pollution Control Agency
MWI – Minnesota County Well Index
NRCS – Natural Resources Conservation Service
SSURGO – Soil Survey Geographic Database
USGS – United States Geological Survey

Table 2

Well Summary
Hibbing Part 1 WHPP Amendment

Local Well Name	Unique Number	Use/ Status[1]	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed/ Reconstructed	Aquifer[2]	Well Vulnerability
1C	233054	P	12	70	100	1973	QWTA	Vulnerable
2B	792077	P	16	70	103	5/10/2013	QBAA	Vulnerable
3A	233056	P	24x18	105	145	1934	QBAA	Vulnerable
4A	271992	P	36x24x16	53.5	79	1944	QBAA	Vulnerable
8A	233058	P	24x16	108	135	1944	QBAA	Vulnerable
11C	233061	P	12	112	142	1973	QBAA	Vulnerable
17	778015	P	12	95.5	139.5	5/20/2011	QBAA	Vulnerable
18	791017	E	12	59	96.5	3/26/2013	QWTA	Vulnerable
Airport	716190	P	6	89	255	3/5/2005	PEVR	Vulnerable
Scranton	147463	P	24x18	460	535	12/1984	PEBI	Vulnerable

Notes:

1. Primary (P), Emergency (E)
2. QBAA = Quaternary Buried Artesian Aquifer, QWTA = Quaternary Water Table Aquifer, PEBI = Biwabik Iron Formation, PEVR = Virginia Formation

Table 3

Annual and Projected Pumping Rates for Hibbing Wells
Hibbing Part 1 WHPP Amendment

Unique Number	Local Well Name	Total Annual Withdrawal (Million Gallons)					Total Projected Withdrawal (Million Gallons)		
		2014	2015	2016	2017	2018	Scenario 1	Scenario 2	Scenario 3
233054	1C	18.771	22.628	54.497	44.853	53.984	62.5	65.9	48.5
792077	2B	191.058	144.419	116.632	119.735	140.364	160.5	191	140
233056	3A	65.452	25.419	83.819	70.451	84.773	97.4	97.4	72.5
271992	4A	50.353	41.553	28.793	34.525	43.138	50.2	50.2	37
233058	8A	50.235	67.163	45.48	55.091	34.483	40.4	67.2	45
233061	11C	63.354	92.510	88.436	90.371	115.151	131.9	135.3	100
778015	17	79.659	77.760	67.800	58.417	70.414	81.1	84.6	60
791017	18	47.455	0.164	0	0	0	0	0	0
716190	Airport	46.199	45.210	28.436	23.614	16.553	20	23.4	15
147463	Scranton	176.763	197.771	139.214	145.333	71.473	71	0	197
	Total	789.299	715.174	653.107	642.390	630.333	715	715	715

Table 4

Fracture Flow Parameters
Hibbing Part 1 WHPP Amendment

Bedrock Well	Parameter	Value	Source
Airport Well	Porosity	0.01	Walsh (2011)
	Aquifer thickness (ft)	166	Well log (Appendix A)
	Pumping rate (gpm)	38 44.5 28.5	Table 3
Scranton Well	Porosity	0.1	HMS (2004)
	Aquifer thickness (ft)	75	Well log (Appendix A)
	Pumping Rate (gpm)	135 375	Table 3
	Fracture Bearings (degrees from North)	283 321	MGS (2000)

Table 5

Water Quality
Hibbing Part 1 WHPP Amendment

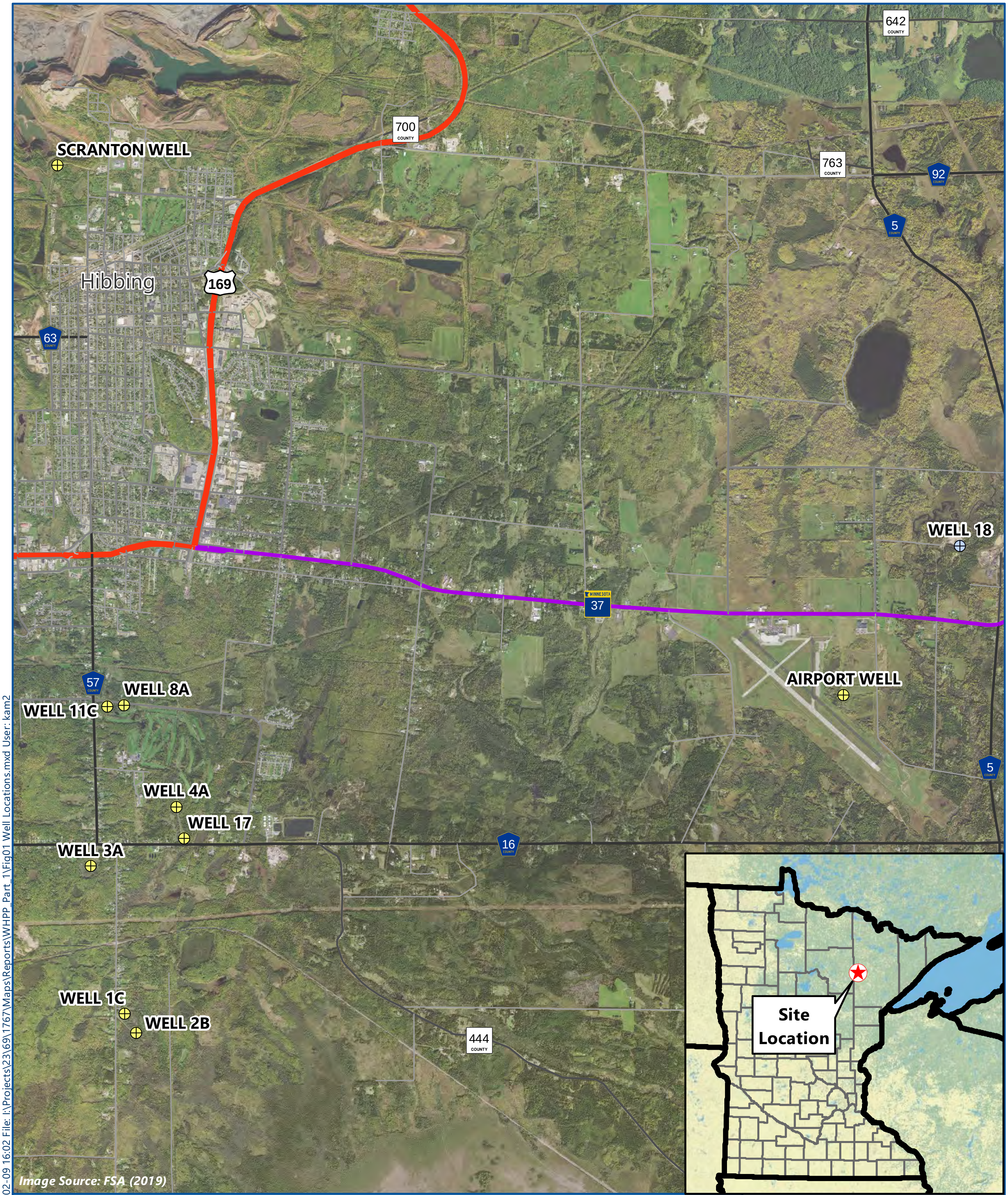
Unique Number	Local Well Name	Tritium	Groundwater Relative Age*	Nitrate (mg/L)	Chloride (mg/L)	Bromide (mg/L)	Cl/Br	Sulfate (mg/L)	Arsenic (ug/L)	Monitoring Date Notes	Vulnerability Category
233054	1C	8.9	Modern	<0.05	2.98	0.011	271	15	1.08	1	C
792077	2B	9.3	Modern	<0.05	2.55	0.0116	220	23.5	<1	2	C
233056	3A	3.7	Mixed	<0.05	3.31	0.0159	208	8.8	--	1	C
271992	4A	6.8	Modern	0.22	7.9	0.0175	451	27.1	--	2	B2
233058	8A	6.9	Modern	0.14	22.8	0.0357	639	34	--	3	B2
233061	11C	7.4	Modern	<0.05	46.6	0.0194	2402	35	2.44	4	B3
778015	17	4.2	Mixed	<0.05	11.5	0.0161	714	12.3	--	2	B4
791017	18	8.1	--	<0.05	6.27	0.0128	490	7.5	3.72	2	B4
716190	Airport	1.5	Mixed	<0.05	9.11	0.0329	277	3.44	1.23	2	C
147463	Scranton	2.7	Mixed	<0.05	9.17	0.0278	330	28.4	<1	2	C

Notes:

* Relative groundwater age calculated by MDH using methods and terminology in Lindsey et al. (2019). 'Modern' refers to groundwater with tritium-based evidence of recharge in 1953 or later. 'Mixed' refers to groundwater with tritium-based evidence of some recharge prior to 1953 and some recharge was in 1953 or later.

1. All analytes except arsenic monitored at Wells 1C and 3A on April 3, 2013. Arsenic monitored July 27, 2012 at Well 1C.
2. All analytes monitored at Wells 2B, 4A, 17, 18, Airport, and Scranton on July 16, 2015.
3. All analytes except tritium monitored at Well 8A on July 16, 2015. Tritium monitored April 3, 2013 at Well 8A.
4. All analytes expect arsenic monitored at Well 11C on July 16, 2015. Arsenic monitored July 27, 2012 at Well 11C.

Figures



Hibbing Municipal Well

Hibbing Emergency Well

N

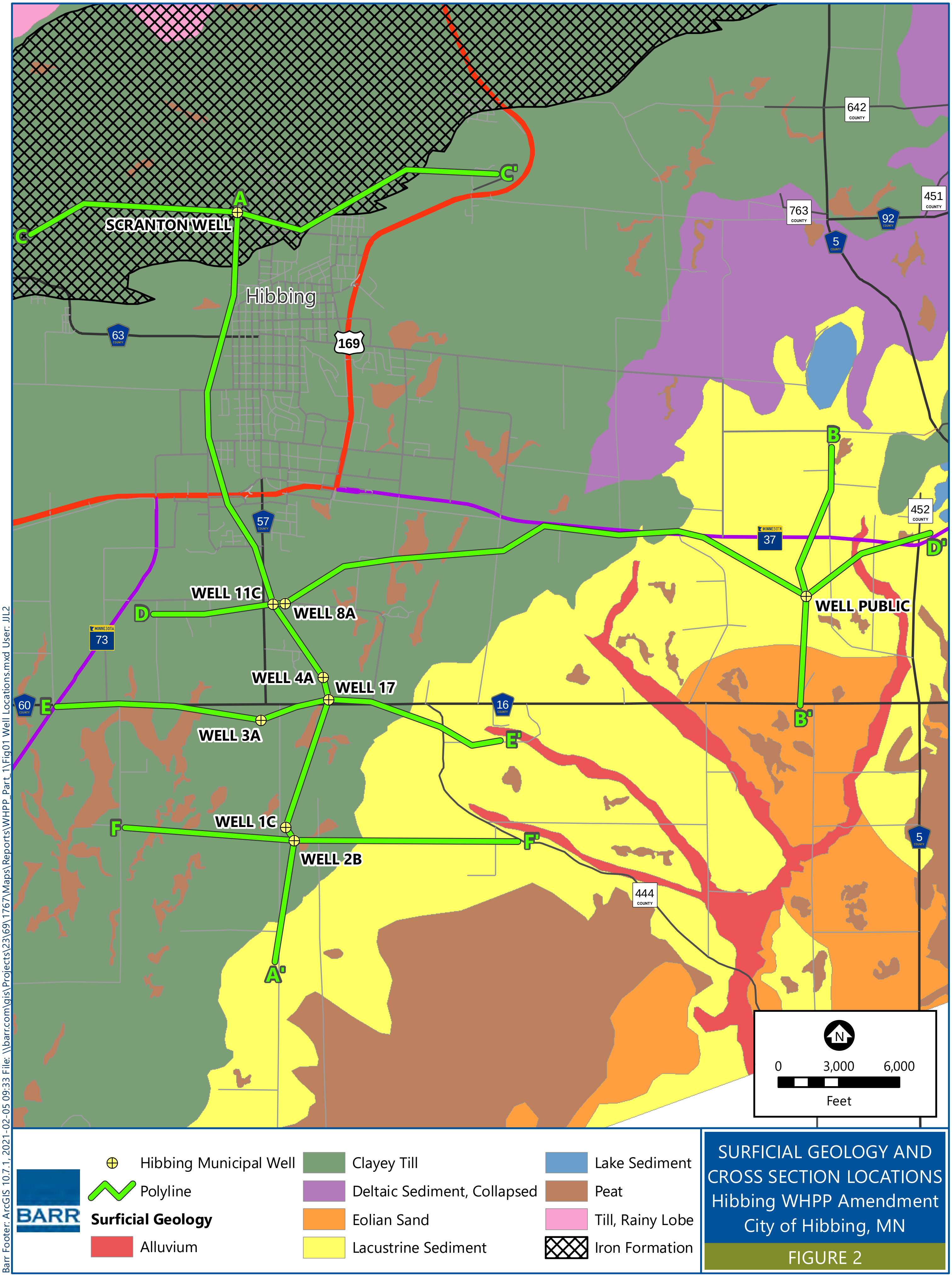
0 2,000 4,000

Feet

BARR

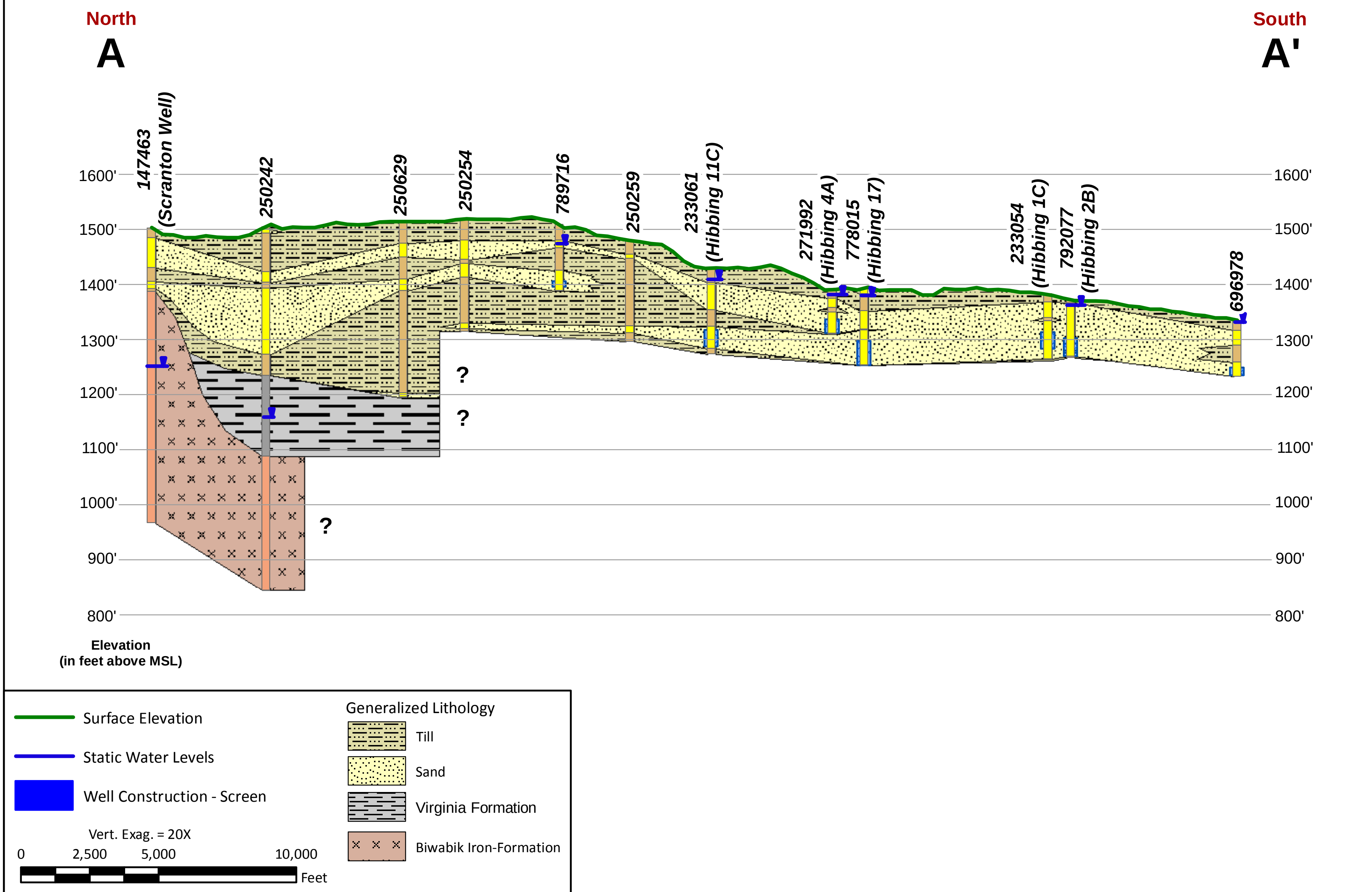
WELL LOCATIONS
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 1



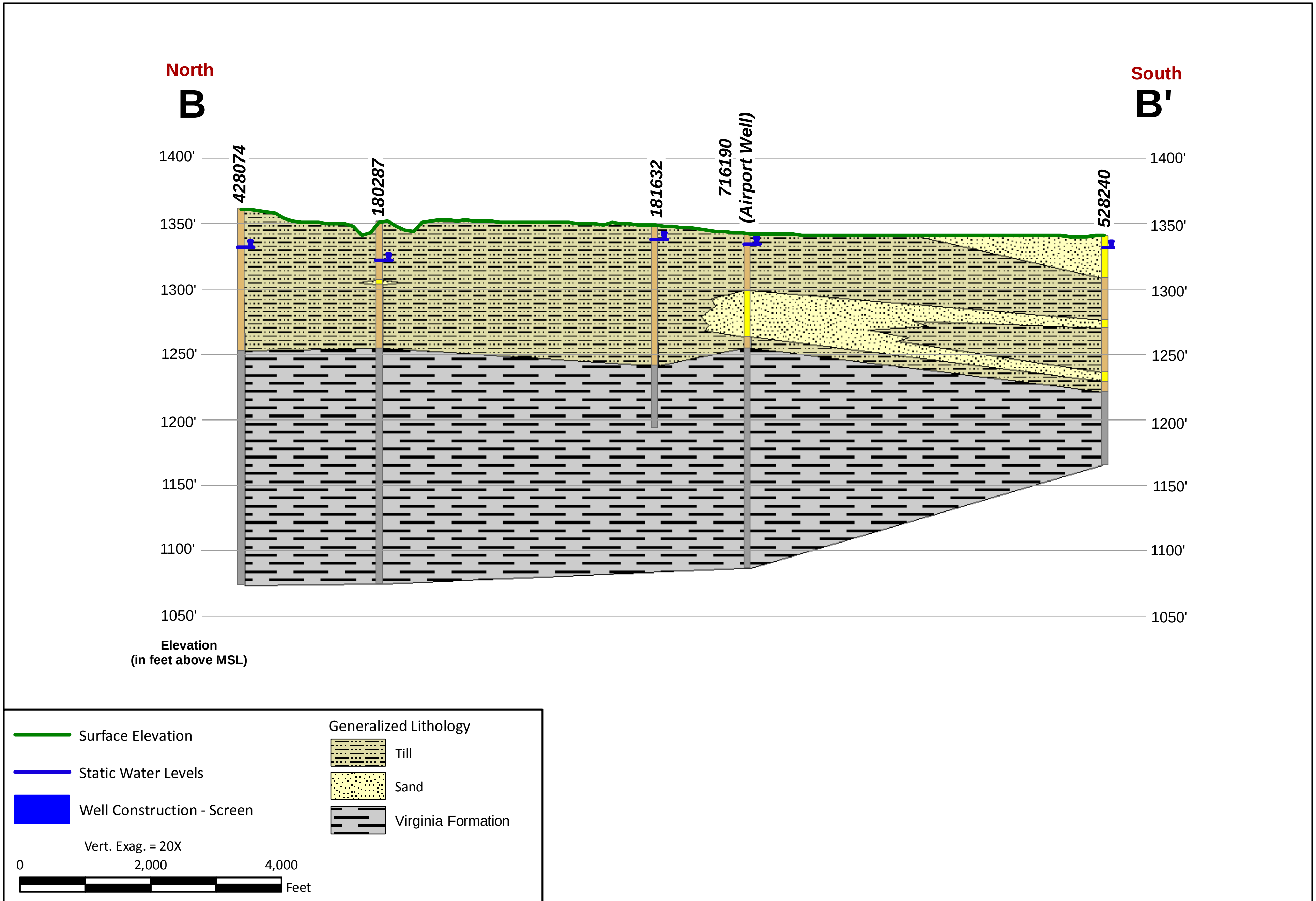
SURFICIAL GEOLOGY AND CROSS SECTION LOCATIONS
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 2



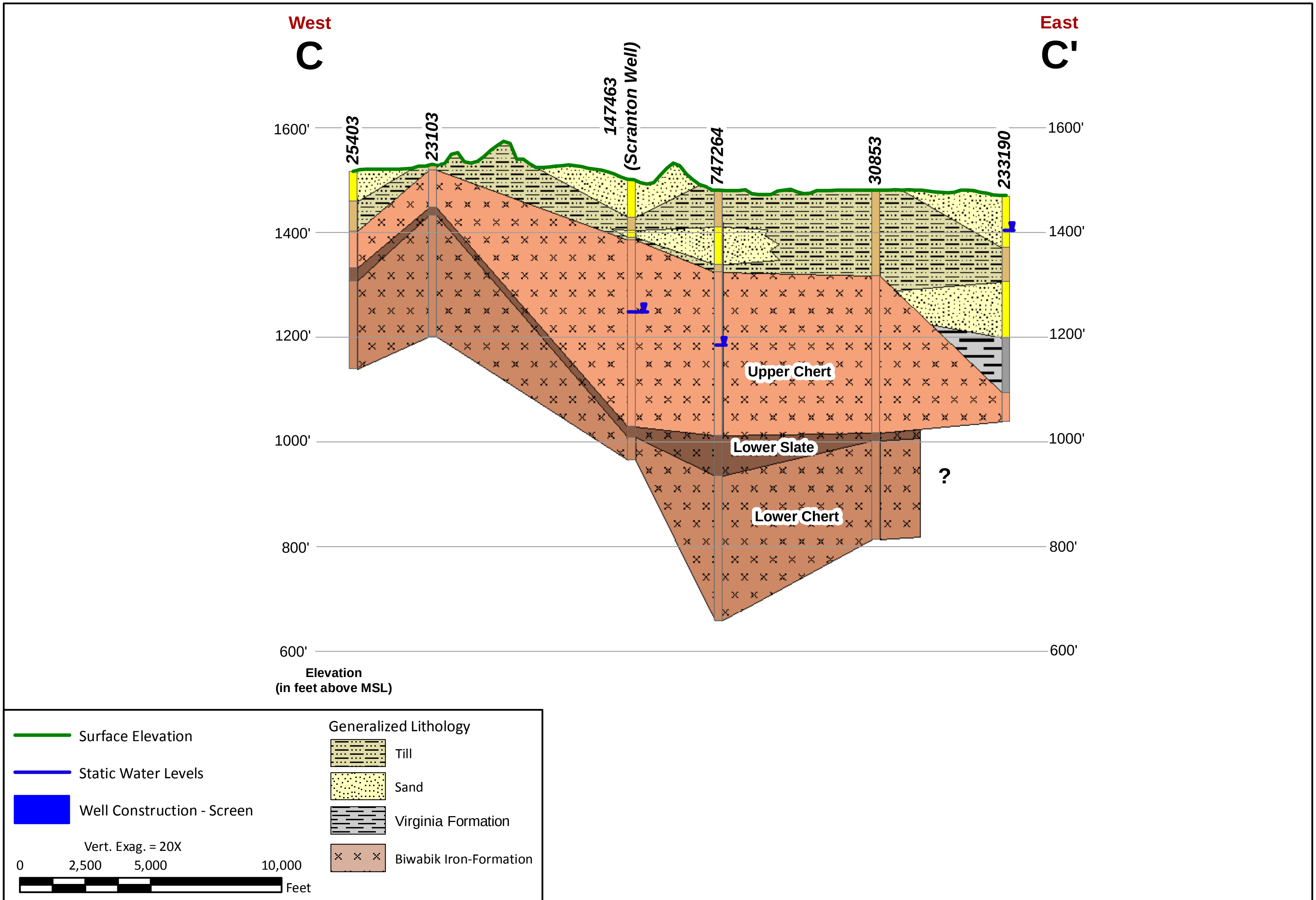
DEPARTMENT OF HEALTH

Figure 3
Geologic Cross-Section A-A'
City of Hibbing



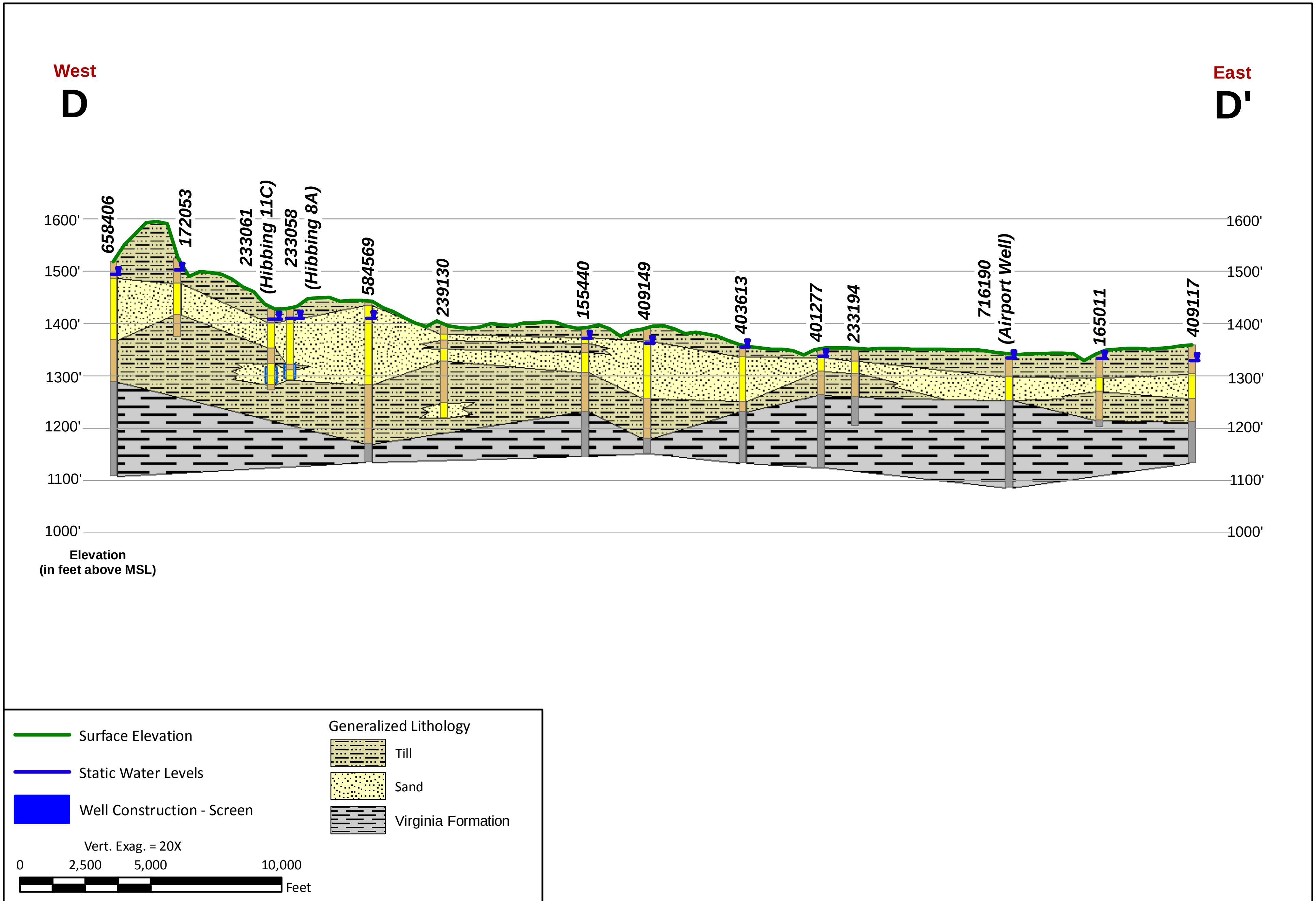
DEPARTMENT OF HEALTH

Figure 4
Geologic Cross-Section B-B'
City of Hibbing



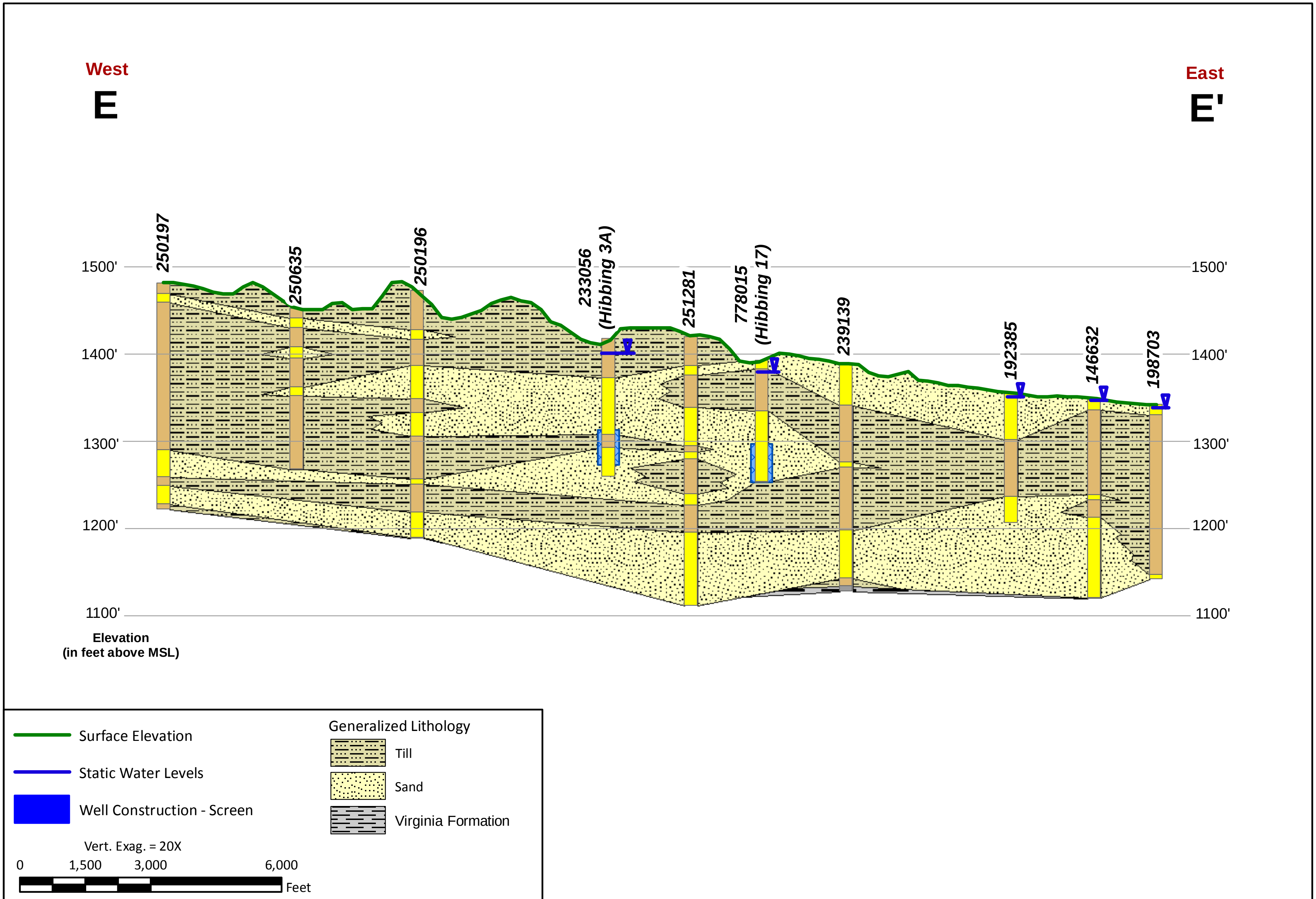
DEPARTMENT OF HEALTH

Figure 5
Geologic Cross-Section C-C'
City of Hibbing



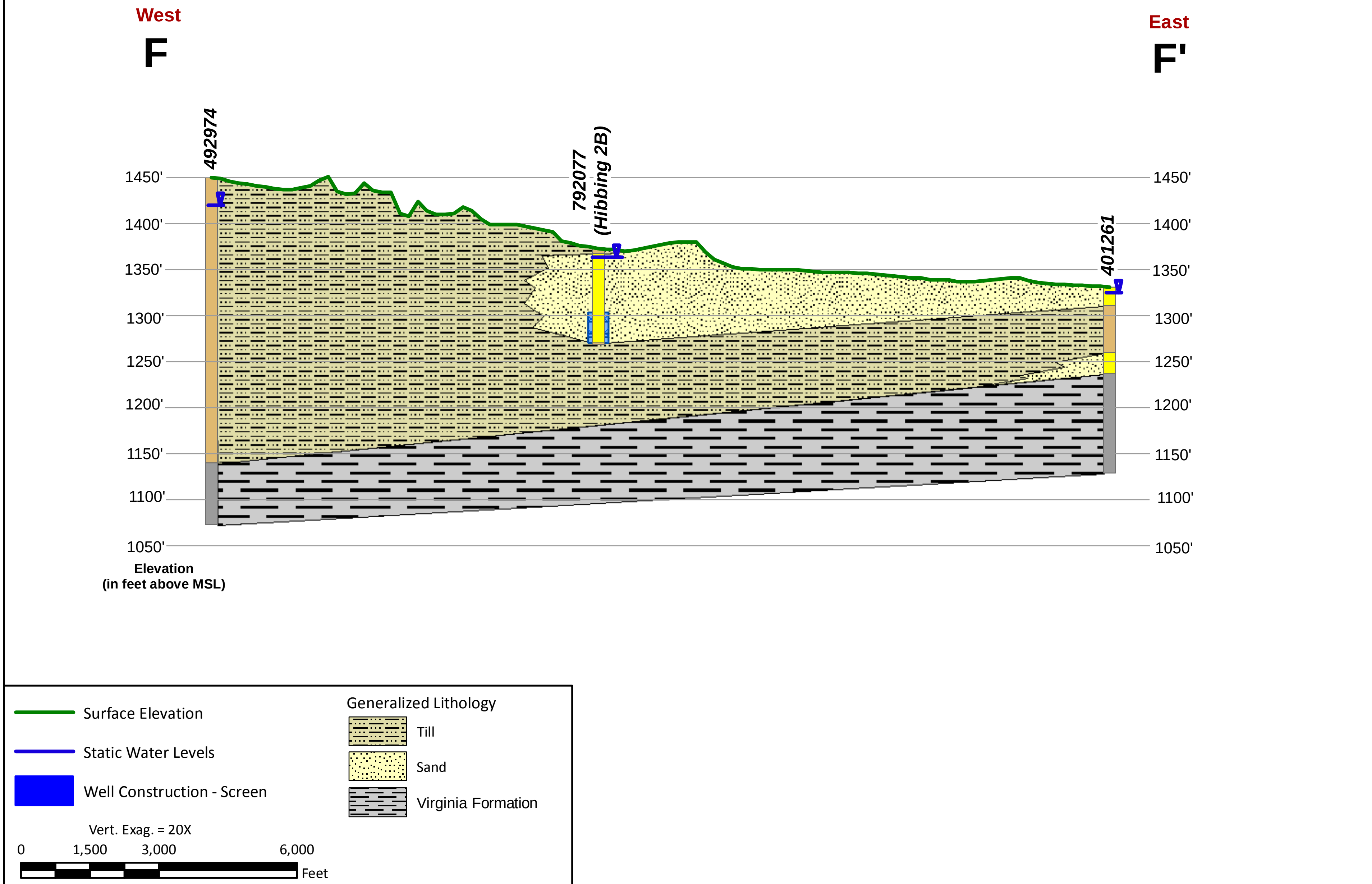
DEPARTMENT OF HEALTH

Figure 6
Geologic Cross-Section D-D'
City of Hibbing



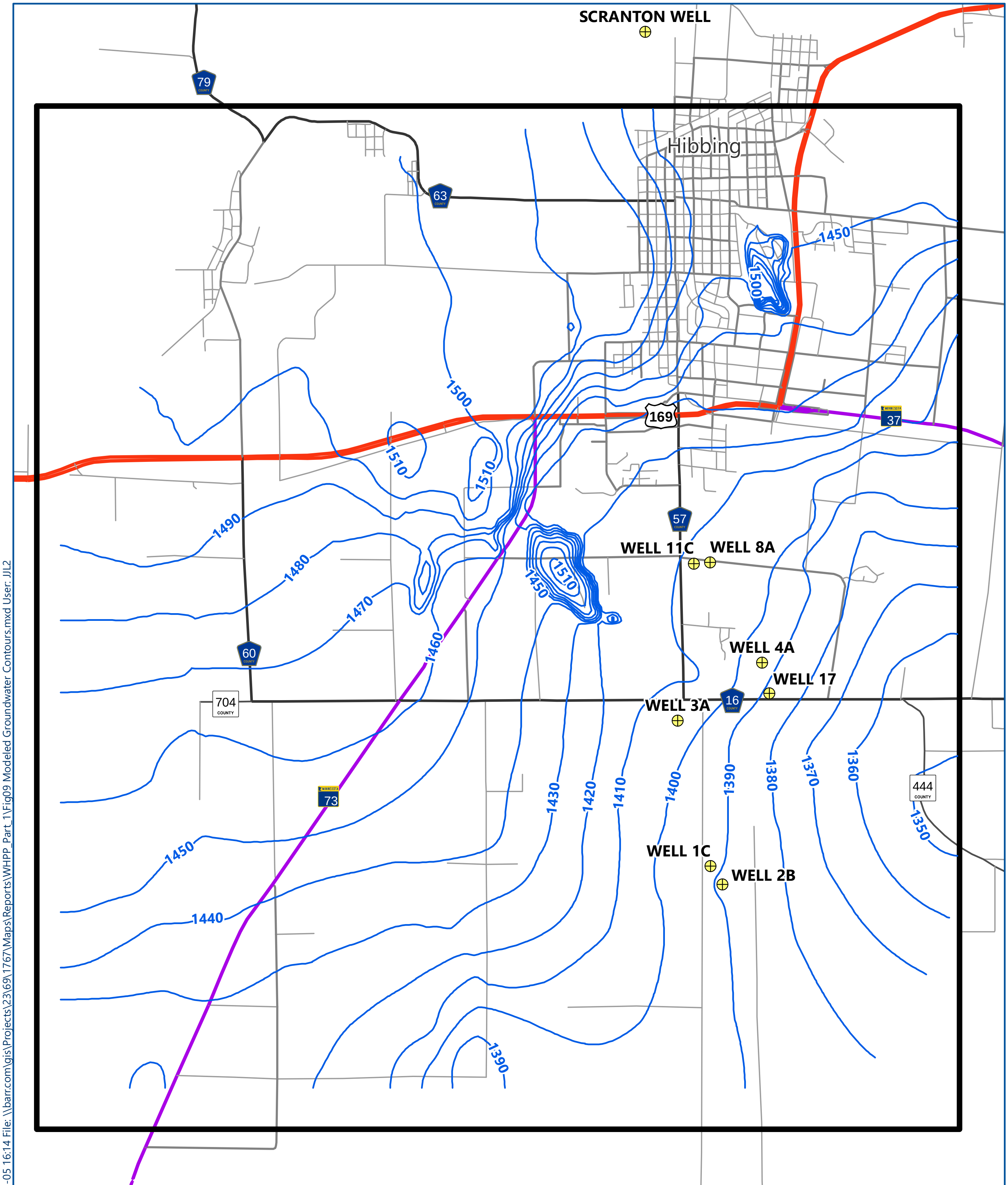
DEPARTMENT OF HEALTH

Figure 7
Geologic Cross-Section E-E'
City of Hibbing



DEPARTMENT OF HEALTH

Figure 8
Geologic Cross-Section F-F'
City of Hibbing



Hibbing Municipal Well

Model Layer 4 Groundwater Contour

Model Boundary

N

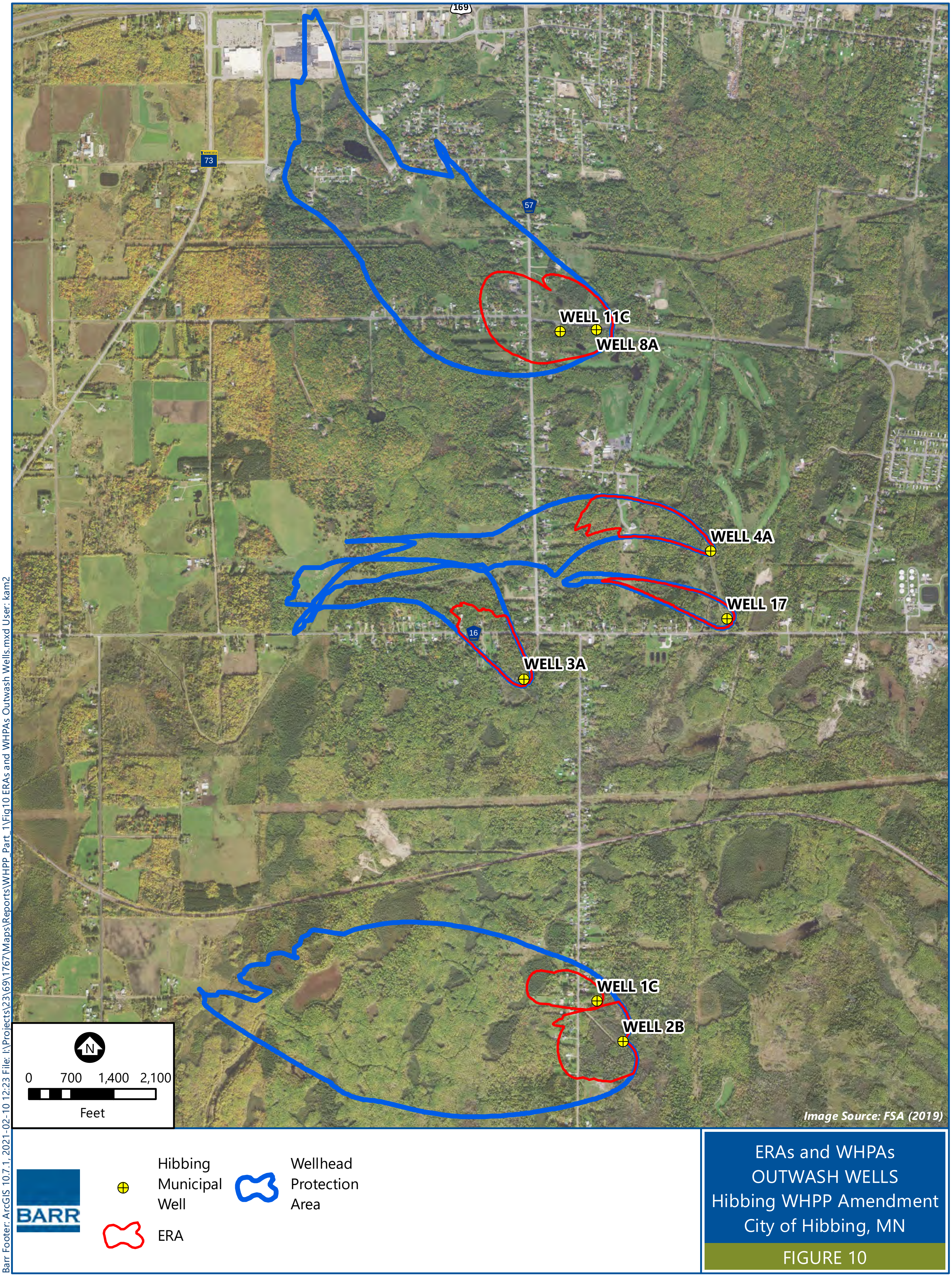
0 2,000 4,000

Feet

BARR

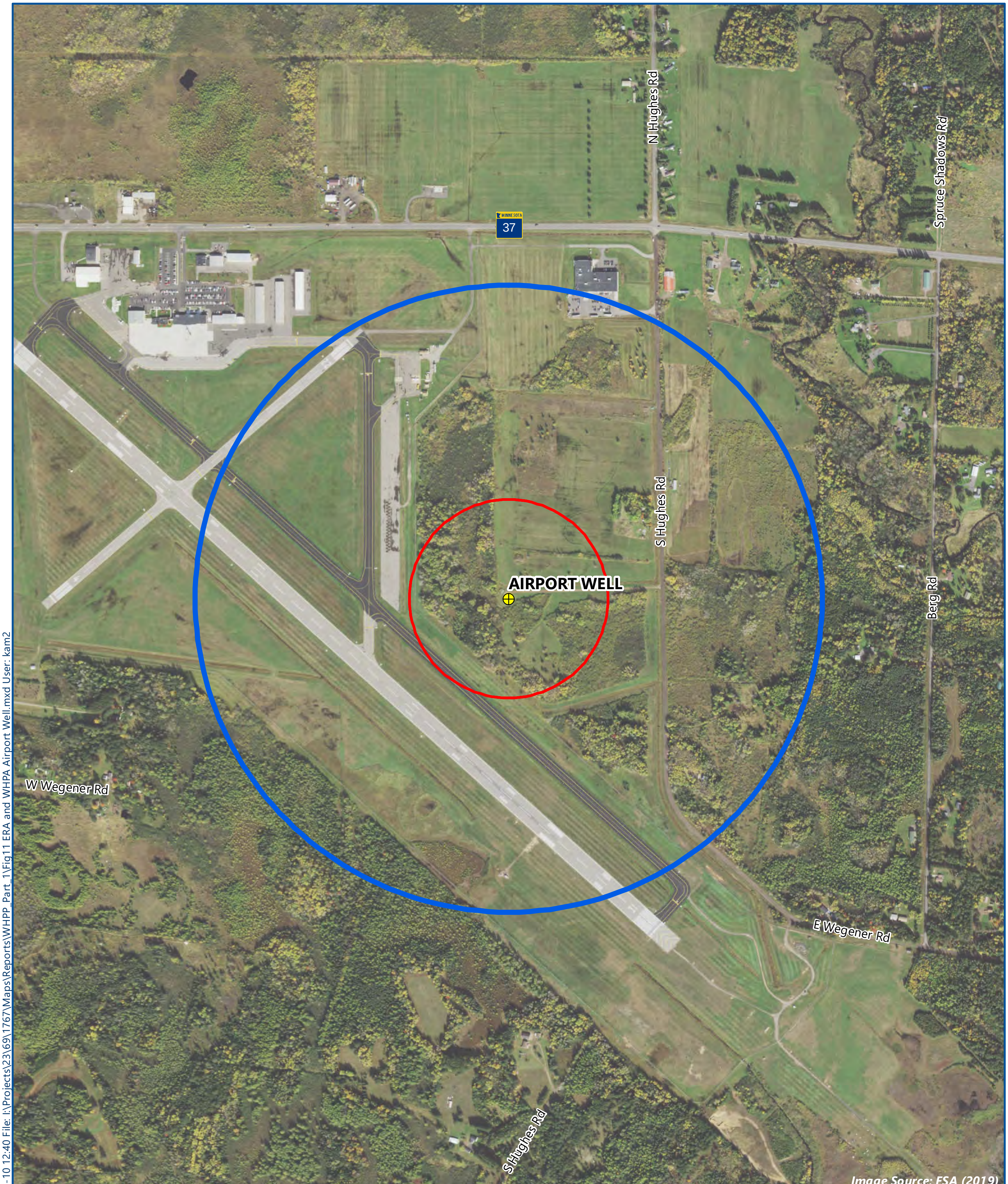
MODELED GROUNDWATER CONTOURS
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 9



ERAs and WHPAs
OUTWASH WELLS
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 10



Barr Footer: ArcGIS 10.7.1, 2021-02-10 12:40 File: I:\Projects\23\69\1767\Maps\Reports\WHPP_Part_1\Fig11 ERA and WHPA Airport Well.mxd User: kam2

BARR

Hibbing Municipal Well

ERA

Wellhead Protection Area

0 500 1,000

Feet

ERA AND WHPA
AIRPORT WELL
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 11

Hibbing Municipal Well

ERA

Groundwater Capture Area

Surface Water Conribution Area

Note: The GWCA is also the 10-year time of travel zone truncated at surface water features.

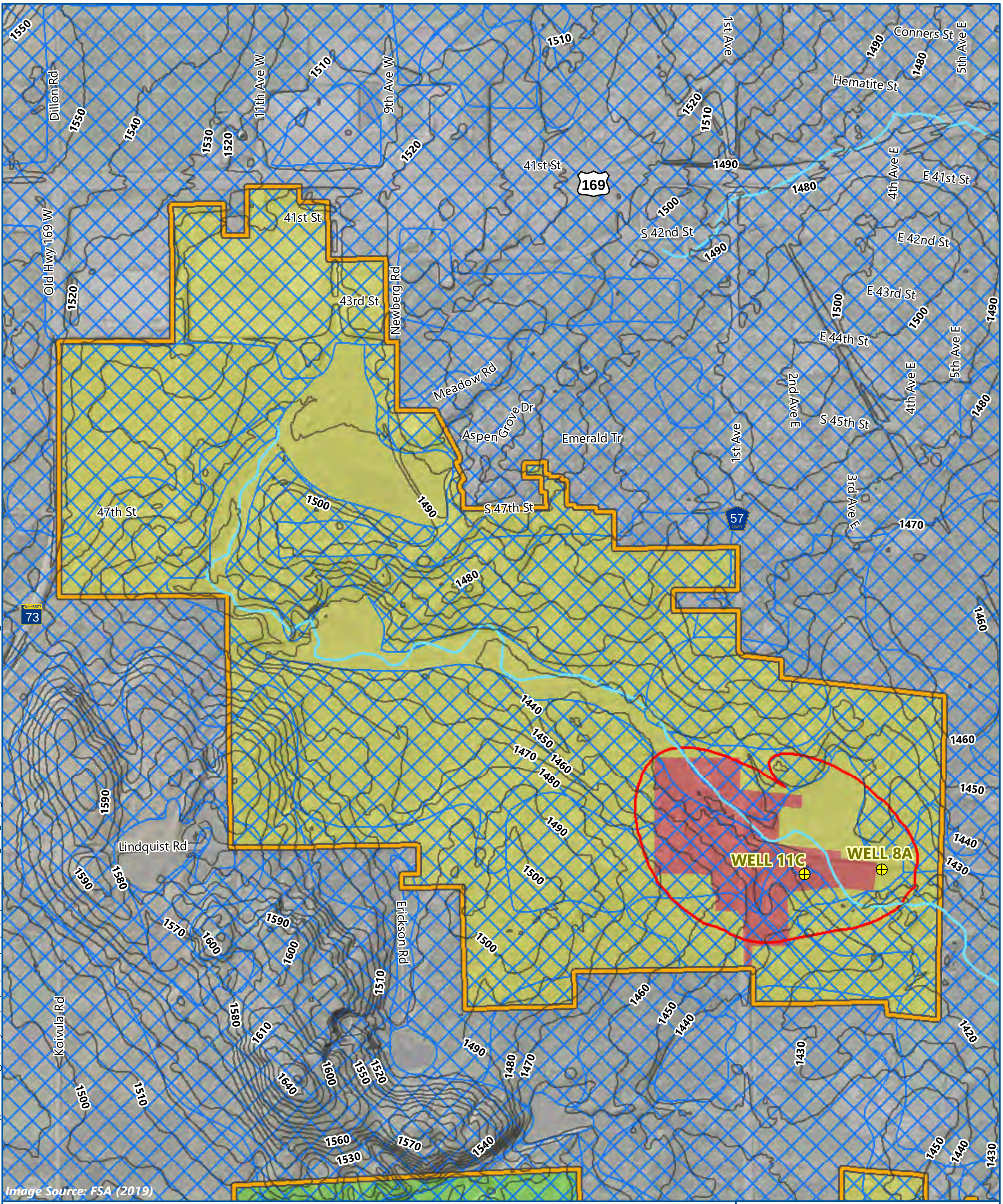
0 1,000 2,000 3,000

Feet

BARR

ERA, GWCA, AND SWCA
SCRANTON WELL
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 12



Hibbing Municipal Well

Elevation Contour (10')

Stream

ERA

DWSMA

Runoff Promoting Soils

Aquifer Vulnerability

Low

Moderate

High

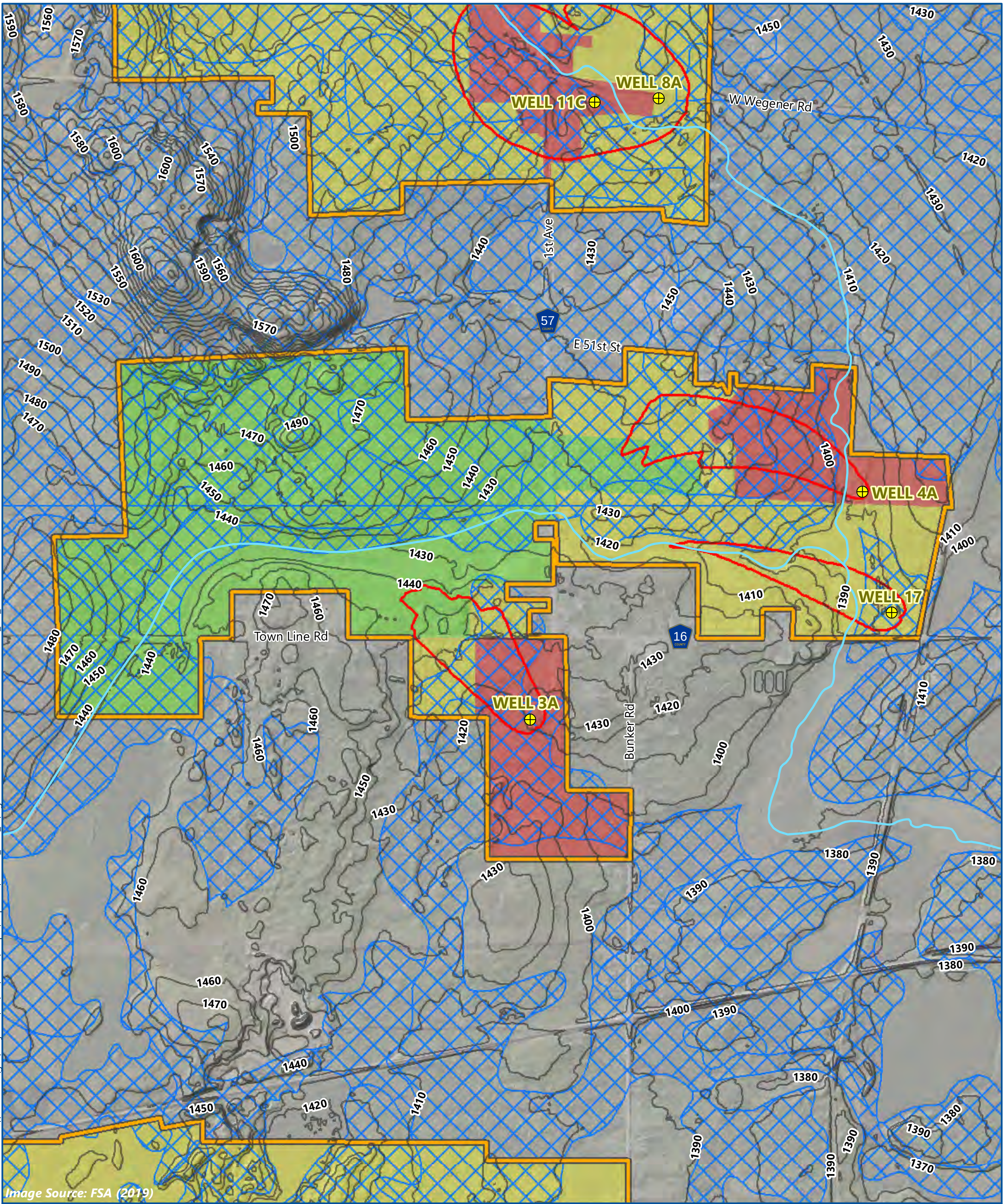
0 500 1,000

Feet

BARR

RUNOFF POTENTIAL SOILS
WELLS 8A AND 11C
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 13a



Hibbing Municipal Well
Elevation Contour (10')
Stream
ERA
DWSMA
Runoff Promoting Soils

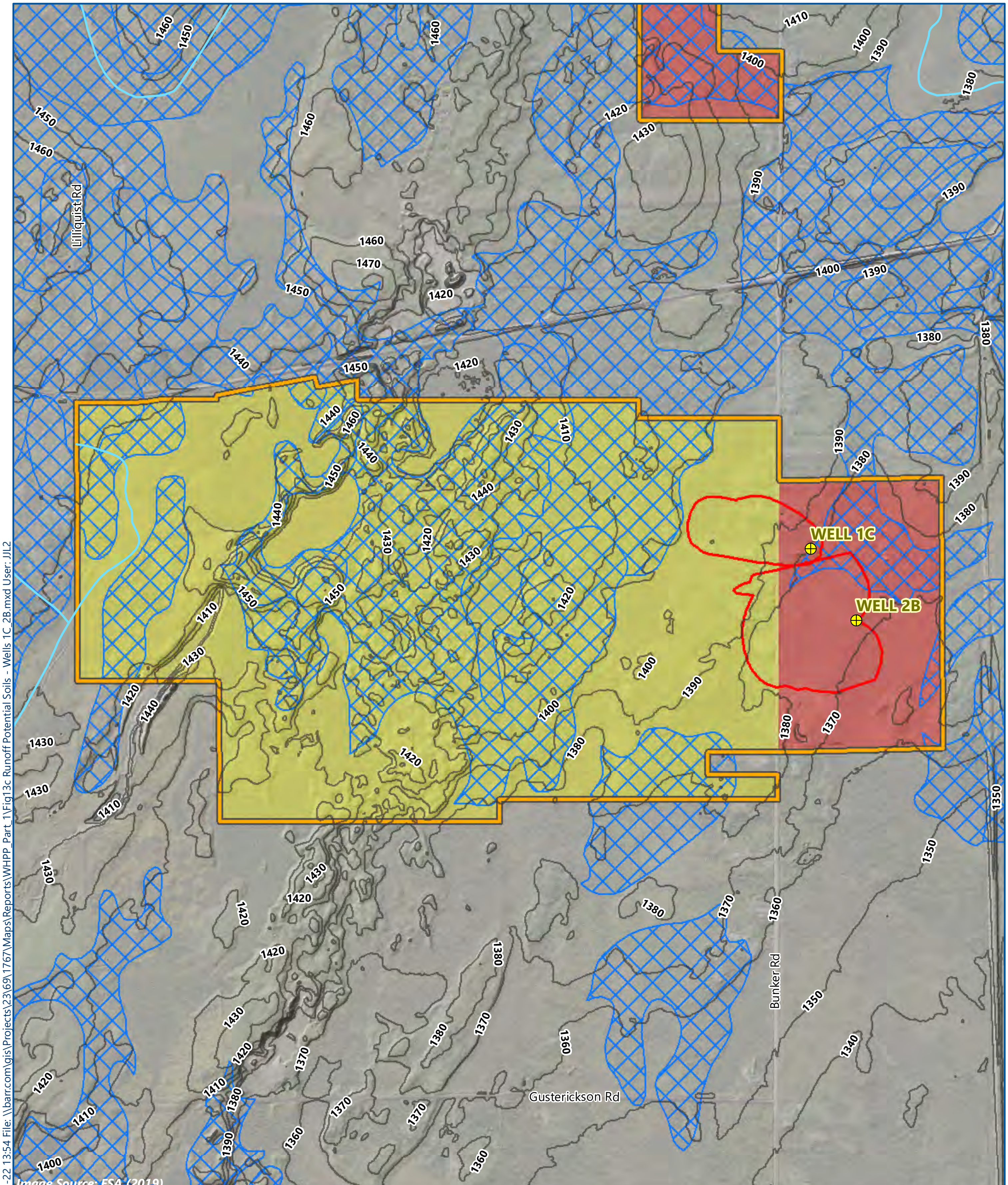
Aquifer Vulnerability
Low
Moderate
High

0 600 1,200
Feet

BARR

RUNOFF POTENTIAL SOILS
WELLS 3A, 4A, AND 17
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 13b



Hibbing Municipal Well

Elevation Contour (10')

Stream

ERA

DWSMA

Runoff Promoting Soils

Aquifer Vulnerability

Moderate

High

0 600 1,200

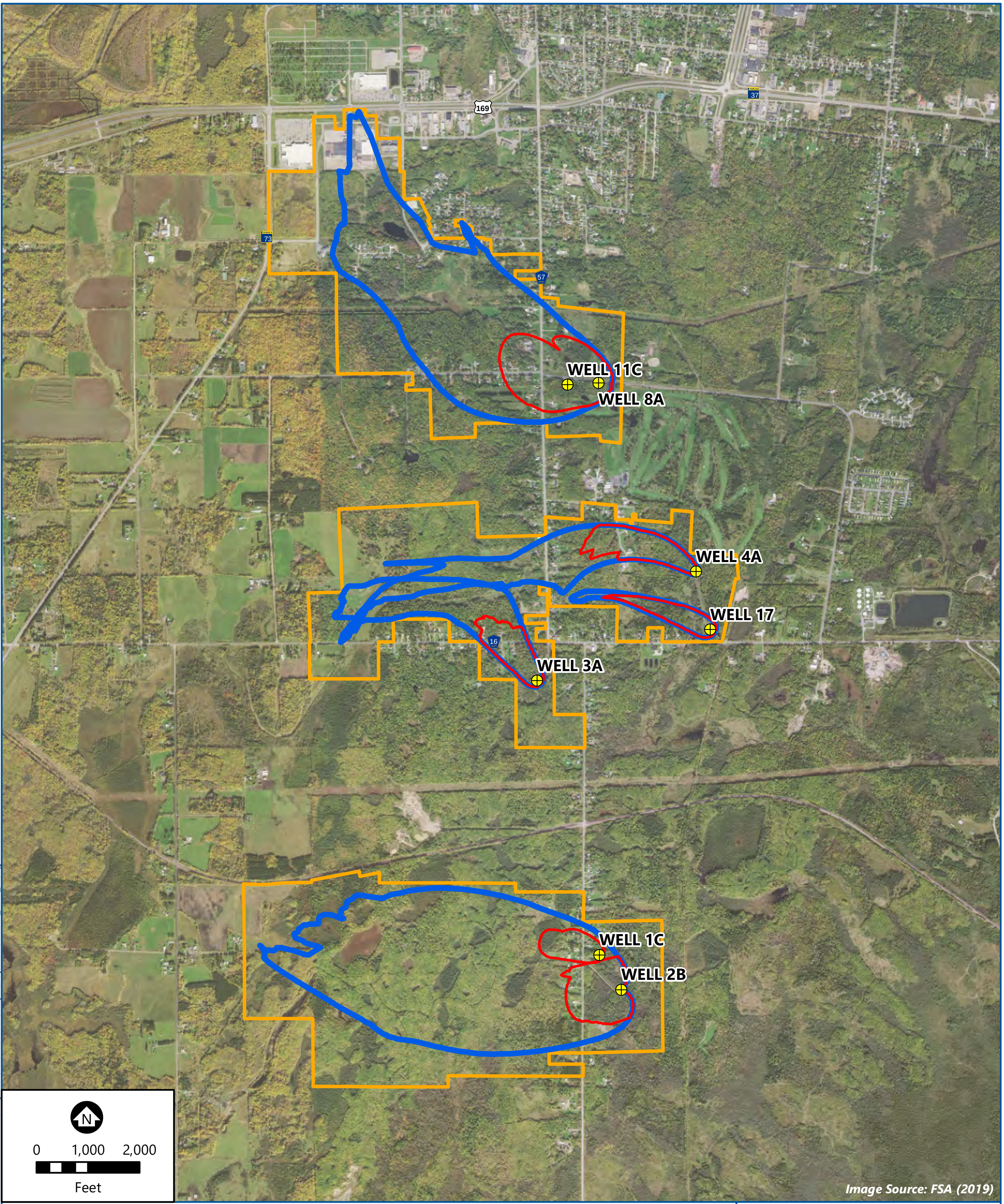
Feet

BARR

RUNOFF POTENTIAL SOILS
WELLS 1C and 2B
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 13c

Barr Footer: ArcGIS 10.7.1, 2021-03-22 13:54 File: \\barr.com\gis\Projects\23\69\1767\Maps\Reports\WHPP_Part_1\Fig13c Runoff Potential Soils - Wells 1C_2B.mxd User: JJL2



BARR

Hibbing Municipal Well

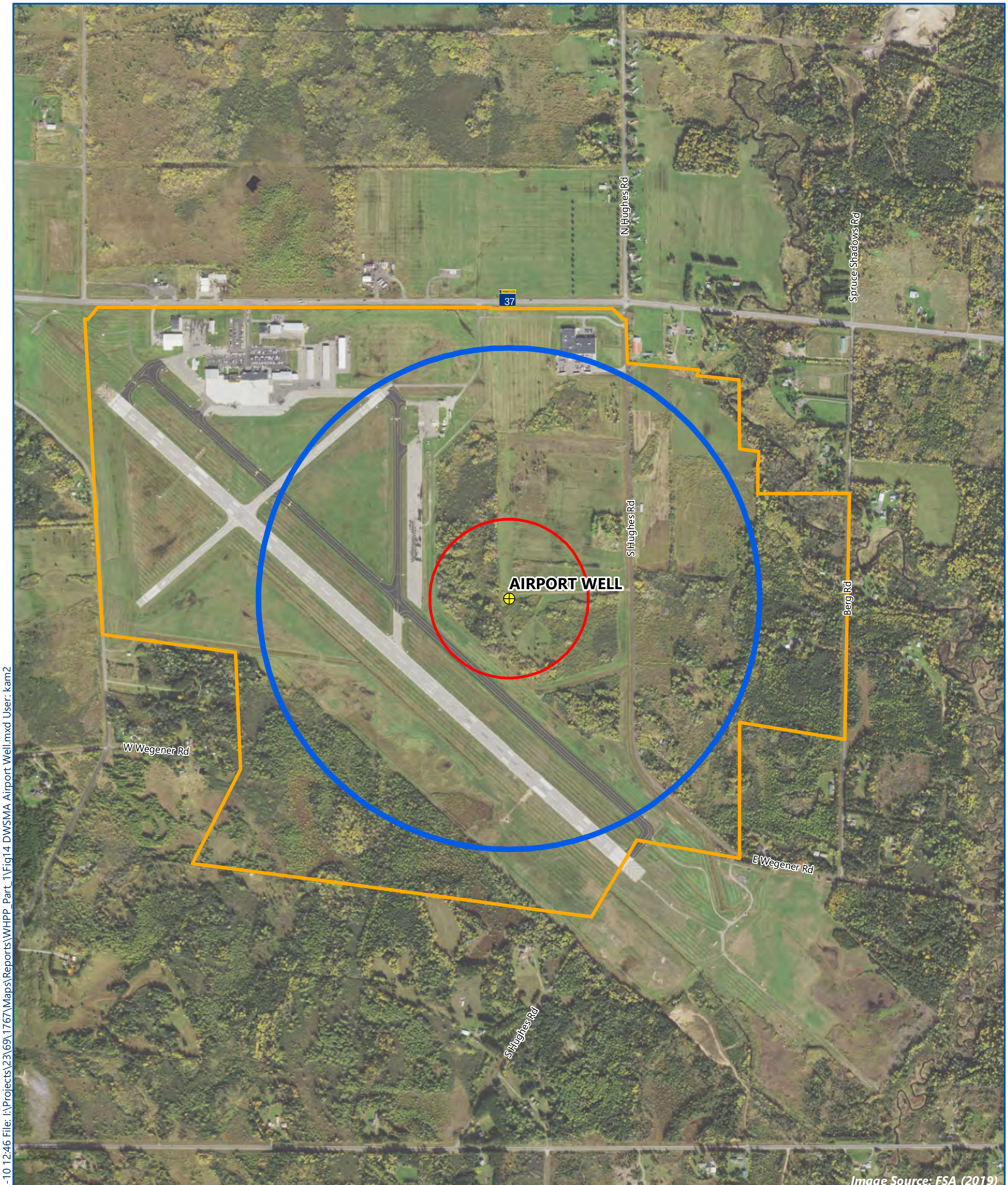
ERA

Wellhead Protection Area

DWSMA

DWSMAS
OUTWASH WELLS
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 14



BARR

Hibbing Municipal Well

Wellhead Protection Area

ERA

DWSMA

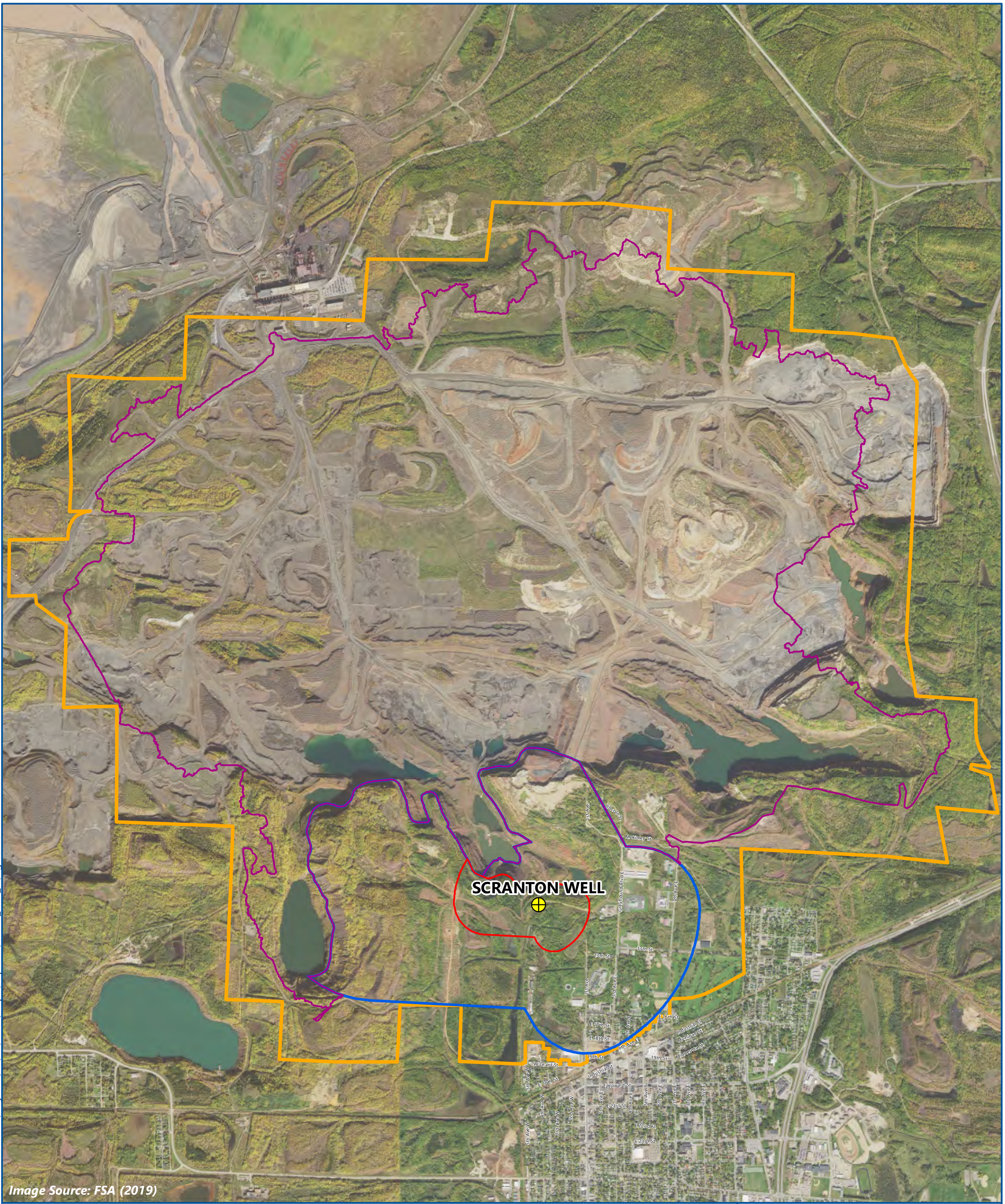
N

0 500 1,000 1,500

Feet

DWSMA
AIRPORT WELL
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 15



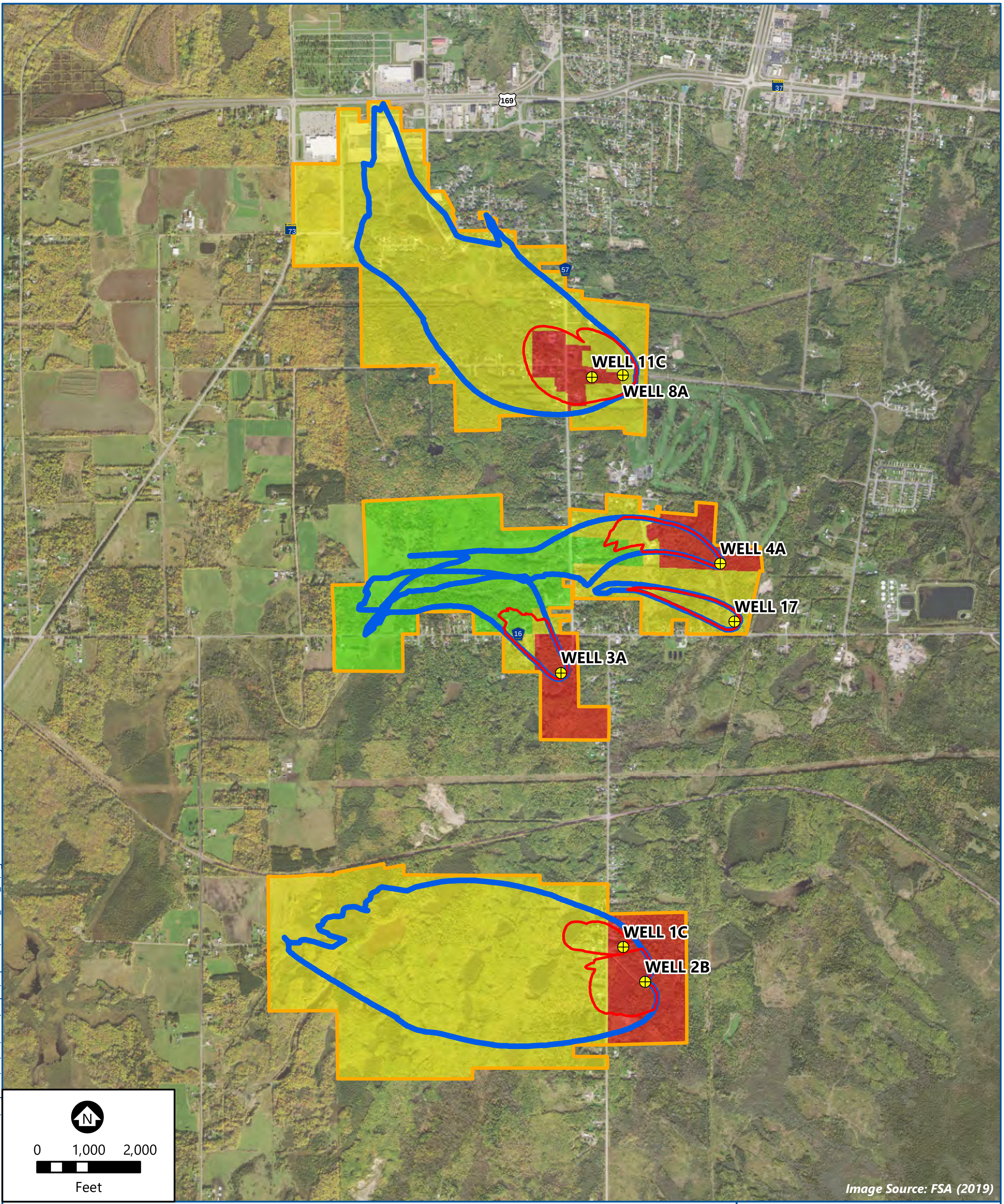
Hibbing Municipal Well
ERA
Groundwater Capture Area
Surface Water Conribution Area
DWSMA

0 1,000 2,000 3,000
Feet

BARR

DWSMA
SCRANTON WELL
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 16



Hibbing Municipal Well

ERA

Wellhead Protection Area

DWSMA

Aquifer Vulnerability

Low

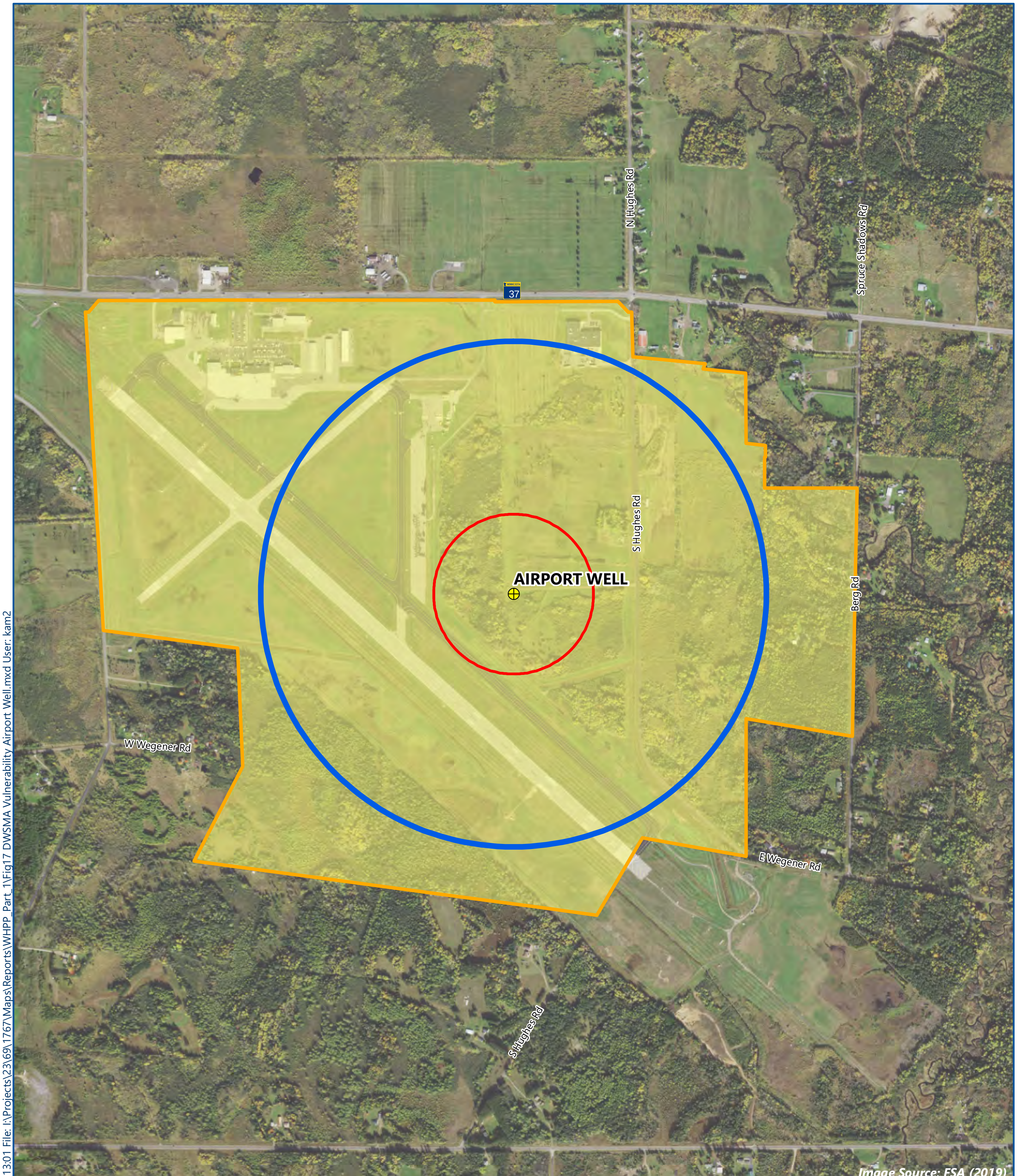
Moderate

High

BARR

DWSMA VULNERABILITY
OUTWASH WELLS
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 17



Hibbing Municipal Well

ERA

Wellhead Protection Area

DWSMA

Moderate Vulnerability

N

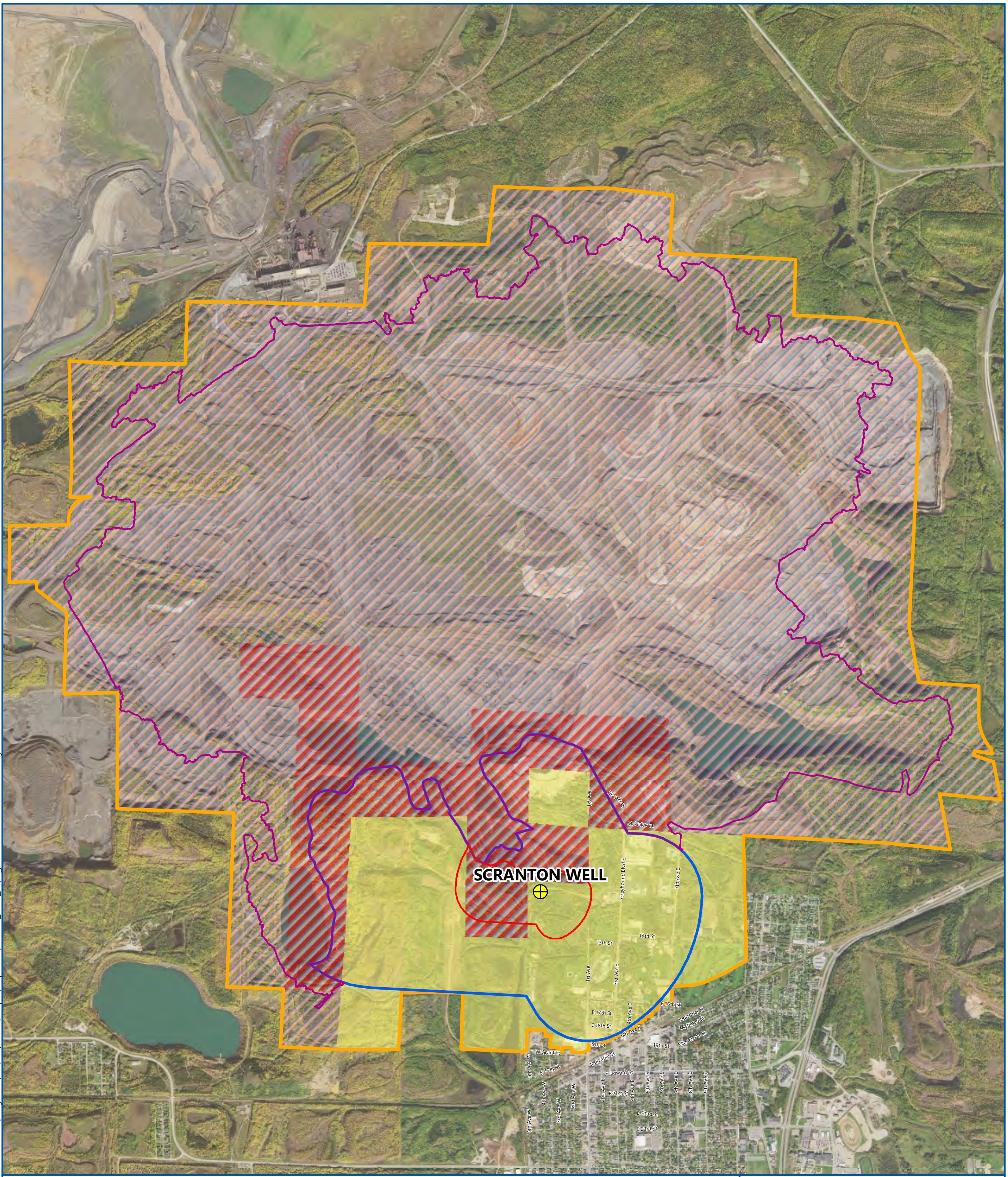
0 500 1,000 1,500

Feet

BARR

DWSMA VULNERABILITY
AIRPORT WELL
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 18



Hibbing Municipal Well

ERA

Groundwater Capture Area

Surface Water Conribution Area

DWSMA

SWCA High Vulnerability

Aquifer High Vulnerability

Aquifer Moderate Vulnerability

0 1,000 2,000 3,000

Feet

DWSMA VULNERABILITY
SCRANTON WELL
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE 19

Appendix A

Well Construction Records

Minnesota Unique Well Number

233054

County St. Louis
Quad Riley
Quad ID 294C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/22/1988
Update Date 10/27/2014
Received Date

Well Name	Township	Range	Dir Section	Subsection
HIBBING 1C	56	20	W 7	BBBBAC

Elevation 1383 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 1832 6TH AV E HIBBING MN 55746
Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
FILL	0	4		
CLAY	4	15	YELLOW	
SAND	15	24		
SAND & COBBLES	24	27		
SAND, COARSE	27	43		
CLAY	43	49	BLUE	
GRAVEL W/BOULDERS	49	104		
SAND, CLAYEY	104	118		

Remarks
DRILLED BY THEIN WELL CO. CLARA CITY, MN.
GWQ NO. 0408.

Well Depth	Depth Completed	Date Well Completed
118 ft.	100 ft.	00/00/1973

Drill Method **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
12 in. To 70 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** **Make**

Diameter	Slot/Gauze	Length	Set	
10 in.	60	30 ft.	70 ft.	100 ft.

Static Water Level

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

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
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ Turbine

Abandoned
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

Miscellaneous
First Bedrock Aquifer Quat. Water
Last Strat clay+sand Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:12,000) (>15 meters)
System UTM - NAD83, Zone 15, Meters X 504785 Y 5244612
Unique Number Verification Information from Input Date 03/29/1999

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Minnesota Dept. of Natural	MNDNR	

Minnesota Unique Well Number

792077

County St. Louis
Quad Riley
Quad ID 294C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 09/27/2013
Update Date 03/20/2017
Received Date 08/23/2013

Well Name	**Township**	**Range**	**Dir Section**	**Subsection**
HIBBING 2-B	56	20	W 7	BBDBCB

Elevation 1375 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1902 6TH AV E HIBBING MN 55746
Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	6	BROWN	SOFT
SAND GRAVEL,	6	21		MEDIUM
GRAVEL/CLAY	21	63		MEDIUM
SAND/GRAVEL/SILT	63	65		SOFT
GRAVEL/CLAY	65	67		MEDIUM
FINE-MED SAND	67	94		SOFT
ROCK/FINE-MED SAND	94	97		MEDIUM
FINE SAND	97	103		SOFT
CLAY	103	105		MEDIUM

Remarks
DRILLERS: BRIAN TRAUT & JASON JOHNSON.

Well Depth	**Depth Completed**	**Date Well Completed**
105 ft.	103 ft.	05/10/2013

Drill Method Dual Rotary **Drill Fluid** Water

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☒ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter **Weight**
16 in. To 70 ft. 62.5 lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
16 in.	55	10 ft.	70 ft.	80 ft.
16 in.	40	13 ft.	80 ft.	93 ft.
16 in.	60	4 ft.	93 ft.	97 ft.
16 in.	20	6 ft.	97 ft.	103 ft.

Static Water Level
10 ft. land surface Measure 04/04/2013

Pumping Level (below land surface)
45 ft. 72 hrs. Pumping at 600 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
driven casing seal	3	Sacks	ft.	105 ft.

Nearest Known Source of Contamination
1000 feet West Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 05/17/2013
Manufacturer's name A.Y. MCDONALD
Model Number 650-3-A HP 50 Volt 460
Length of drop pipe 84 ft Capacity 750 g.p. Typ Submersible

Abandoned
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

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat clay Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 504915 Y 5244407
Unique Number Verification Information from Input Date 07/20/2015

Angled Drill Hole

Well Contractor

Mark J Traut Wells, Inc.	1404	SEE REMARKS
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

233056

County St. Louis
Quad Riley
Quad ID 294C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/22/1988
Update Date 12/11/2019
Received Date

Well Name	Township	Range	Dir Section	Subsection
HIBBING 3A	56	21	W 1	AACABB

Elevation 1418 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1832 6TH AV E HIBBING MN 55746

Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GLACIAL TILL, ROCKS,	0	40		
SAND, GRAVEL & CLAY	40	45		
SAND & GRAVEL	45	55		
SAND	55	60		
QUICKSAND	60	75		
SAND	75	95		
SAND & GRAVEL	95	100		
SAND	100	110		
SAND & GRAVEL,	110	115		
SAND, LITTLE CLAY	115	125		
QUICKSAND	125	135		
SAND	135	140		
GRAVEL	140	158		

Remarks

REHABED BY BERGERSON-CASWELL ON 9-1-1994.

Well Depth	Depth Completed	Date Well Completed
158 ft.	145 ft.	00/00/1934

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Step down **Joint** Welded

Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter **Weight**

24 in. To 81 ft. 94.6 lbs./ft.

18 in. To 105 ft. 70.5 lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
16 in.	80	42 ft.	105 ft.	145 ft.

Static Water Level

17 ft. land surface Measure 09/01/1994

Pumping Level (below land surface)

90 ft. 24 hrs. Pumping at 650 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
neat cement	7	Cubic yards	0 ft.	100 ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☒ Not Installed Date Installed

Manufacturer's name

Model Number HP Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

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

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat gravel (+larger) Depth to Bedrock ft

Located by Minnesota Department of Health

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 504416 Y 5246234

Unique Number Verification Information from Input Date 03/29/1999

Angled Drill Hole

Well Contractor

Minnesota Geological Survey	MGS	EISINGER, D.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

271992

County St. Louis
Quad Hibbing
Quad ID 294B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 05/18/2011
Update Date 01/27/2017
Received Date

Well Name	Township	Range	Dir Section	Subsection
HIBBING 4A	57	20	W 31	DBCCCA

Elevation 1394 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1902 6TH AV E HIBBING MN 55746
Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
ROAD FILL	0	3		
SAND, GRAVEL	3	5		
CLAY TILL	5	15		
MED-COARSE SAND &	15	19		
CLAY SAND	19	20		
SAND COARSING	20	32		
SANDY SILTY TILL	32	40		
MEDIUM SAND	40	50		
FINE SILTY SAND	50	59		
MEDIUM SAND	59	63		
MEDIUM TO COARSE	63	64		
FINE SAND	64	79		
CLAY TILL	79	80		
NO RECORD	80	183		

Remarks

WELL RECONSTRUCTED BY MARK J. TRAUT WELLS, INC.
GEOLOGIC LOG GENERATED FROM NEARY ROTOSONIC HOLES.
DRILLERS: ED REIA & BUTCH GAUSTAD.

Well Depth	Depth Completed	Date Well Completed
183 ft.	79 ft.	00/00/1944

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Step down **Joint** Threaded
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**

36 in. To ft. 123. lbs./ft.
16 in. To 53.5 ft. 62.5 lbs./ft.
24 in. To ft. 94.6 lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** **Make** S

Diameter Slot/Gauze Length Set
in. ft. 53.5 ft. 79 ft.

Static Water Level

9 ft. land surface Measure 02/01/2011

Pumping Level (below land surface)

47.5 ft. 72 hrs. Pumping at 181 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
		ft.	ft.
neat cement	5.5 Cubic yards	ft.	43 ft.

Nearest Known Source of Contamination

1700 feet East Direction Body of water Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned

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

Miscellaneous

First Bedrock no record Aquifer
Last Strat indeterminate Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 505358 Y 5246880
Unique Number Verification Information from Input Date 07/20/2015

Angled Drill Hole

Well Contractor

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

233058

County St. Louis
Quad Hibbing
Quad ID 294B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/22/1988
Update Date 04/04/2017
Received Date

Well Name	**Township**	**Range**	**Dir Section**	**Subsection**
HIBBING 8A	57	20	W 31	BBAABC

Elevation 1425 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 1832 6TH AV E HIBBING MN 55746
Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SANDY TOP SOIL	0	3		
CLAY	3	23	RED	
SAND & GRAVEL	23	108		
SANDY CLAY	108	119		
COARSE GRAVEL &	119	138		

Remarks
DRILLED BY LAYNE WELL CO.

Well Depth	**Depth Completed**	**Date Well Completed**
138 ft.	135 ft.	00/00/1944

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter		**Weight**
24 in. To	80 ft.	lbs./ft.
16 in. To	108 ft.	lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** **Make**

Diameter	Slot/Gauze	Length	Set	
in.		27 ft.	108 ft.	135 ft.

Static Water Level
20 ft. land surface Measure 00/00/1944

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

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 00/00/1944
Manufacturer's name
Model Number HP Volt
Length of drop pipe 108 ft Capacity 325 g.p. Typ Turbine

Abandoned
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

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat gravel (+larger) Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:12,000) (>15 meters)
System UTM - NAD83, Zone 15, Meters X 504781 Y 5247995
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

SEE REMARKS
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

233061

County St. Louis
Quad Hibbing
Quad ID 294B

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 02/22/1988
Update Date 07/20/2015
Received Date

Well Name	Township	Range	Dir Section	Subsection
HIBBING 11C	57	20	W 31	BBBACB

Elevation 1429 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1832 6TH AV E HIBBING MN 55746
Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	26	RED/GRY	
SAND, FINE TO	26	75		
CLAY	75	105		
SAND & GRAVEL	105	145		
CLAY & SAND,	145	155		

Remarks

Well Depth	Depth Completed	Date Well Completed
155 ft.	142 ft.	00/00/1973

Drill Method **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ From To

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter **Weight**
12 in. To 112 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? X **Type** **Make**

Diameter	Slot/Gauze	Length	Set	
12 in.	50	40 ft.	112 ft.	142 ft.

Static Water Level
20 ft. land surface Measure 00/00/1973

Pumping Level (below land surface)
63 ft. 24 hrs. Pumping at 400 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

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
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
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

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat clay+sand Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 504599 Y 5247984
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Thein Well Co. Clara City 12013
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

778015

County St. Louis
Quad Riley
Quad ID 294C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/16/2010
Update Date 04/14/2017
Received Date 10/21/2011

Well Name	Township	Range	Dir Section	Subsection
HIBBING 17	57	20	W 31	DCCDBA

Elevation 1393 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1902 6TH AV E HIBBING MN 55746
Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND & GRAVEL	0	10	VARIED	MED-HRD
TILL GRAVELLY CLAY	10	41	BROWN	MED-HRD
COBBLES GRAVELLY	41	58		MED-HRD
SAND	58	74	BROWN	SOFT
CLAY	74	76	BROWN	SOFT
SAND	76	83	BROWN	SOFT
SAND (FINER)	83	96	BROWN	SOFT
SAND	96	108	BROWN	SOFT
SAND (MED)	108	118	BROWN	SOFT
SAND (COARSE)	118	130	VARIED	MEDIUM
SAND & GRAVEL	130	139	VARIED	SOFT
CLAY TILL	139	140	GRAY	SOFT

Remarks

THIS WELL RECORD REPLACES PREVIOUSLY SUBMITTED RECORD FOR WELL THAT WAS
DETERMINED TO BE UNSUCCESSFUL.
BOTTOM 10' 15 SLOT, 20' 60 SLOT, TOP 14' 40 SLOT.
MIDDLE 20' 60 SLOT, BOTTON 10' 15 SLOT.
DRILLERS: BRIAN TRAUT AND TONY NOVAK.
THIS IS THE SECOND WELL DRILLED UNDER THIS UNIQUE NUMBER.
THE FIRST WELL AS UNIQUE NUMBER 278005.

Well Depth	Depth Completed	Date Well Completed
140 ft.	139.5 ft.	05/20/2011

Drill Method Dual Rotary **Drill Fluid** Water

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below**

Casing Diameter **Weight** **Hole Diameter**
12 in. To 95.5 ft. 0 lbs./ft. 17 in. To 140 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
12 in.		44 ft.	95.5 ft.	139.5 ft.

Static Water Level
13.5 ft. land surface Measure 05/20/2011

Pumping Level (below land surface)
85.5 ft. 24 hrs. Pumping at 250 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
150 feet West Direction Body of water Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
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

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat till-white Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 505441 Y 5246537
Unique Number Verification Info/GPS from data Input Date 10/04/2011

Angled Drill Hole

Well Contractor

Mark J Traut Wells, Inc.	1404	SEE REMARKS
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

791017

County St. Louis
Quad Buhl
Quad ID 294A

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date
Update Date 03/20/2017
Received Date 05/23/2013

Well Name	Township	Range	Dir	Section	Subsection
CAREY VALLEY	57	20	W	24	DBABAB

Elevation 1351 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1902 6TH AV E HIBBING MN 55746

Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVELY FINE SAND	0	28	BROWN	SOFT
FINE SAND	28	38	BROWN	SOFT
FINE SAND	38	40	GRAY	SOFT
MED SAND	40	60	BROWN	SOFT
GRAVELY SAND	60	68	BROWN	SOFT
GRAVELY SAND	68	71	GRAY	SOFT
GRAVELY SAND	71	96	GRAY	SOFT
VERY FINE SAND	96	101	GRAY	SOFT

Well Depth 101 ft. **Depth Completed** 96.5 ft. **Date Well Completed** 03/26/2013

Drill Method Dual Rotary **Drill Fluid** Water

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☒ From To

Casing Type Single casing **Joint** Welded

Drive Shoe? Yes ☒ No ☐ **Above/Below**

Casing Diameter 12 in. To 59 ft. **Weight** 49.5 lbs./ft. **Hole Diameter** 12 in. To 101 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
12 in.	30	1 ft.	56.5 ft.	57.5 ft.
12 in.	50	2 ft.	57.5 ft.	59.5 ft.
12 in.	80	16 ft.	59.5 ft.	75.5 ft.
12 in.	50	2 ft.	75.5 ft.	77.5 ft.
12 in.	40	8 ft.	77.5 ft.	85.5 ft.

Static Water Level
23 ft. land surface Measure 03/26/2013

Pumping Level (below land surface)
41 ft. 88 hrs. Pumping at 650 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
driven casing seal	1	Sacks	ft.	101 ft.

Nearest Known Source of Contamination
250 feet East Direction Body of water Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
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

Miscellaneous
First Bedrock Aquifer Quat. Water
Last Strat sand-gray Depth to Bedrock ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 513939 Y 5249742
Unique Number Verification Information from Input Date 07/20/2015

Remarks
GROUT - DRIVEN CASING SEAL 0-101' 1 BAG.
DRILLERS: BRIAN TRAUT & JASON JOHNSON.
12"-030 SLOT, 2'-.050 SLOT, 16'-.080 SLOT, 2'-.505 SLOT, 8'-.404 SLOT

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Mark J Traut Wells, Inc.	1404	SEE REMARKS

Minnesota Unique Well Number

716190

County St. Louis
Quad Buhl
Quad ID 294A

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date
Update Date 10/04/2019
Received Date 04/11/2005

Well Name	Township	Range	Dir Section	Subsection
HIBBING	57	20	W 26	DABCBA

Elevation 1342 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Contact 1902 6TH AV E HIBBING MN 55746
Well 3837 HUGHES RD S HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY & SAND	0	2	BLACK	SOFT
CLAY	2	30	BROWN	MEDIUM
CLAY	30	43	GRAY	MEDIUM
FINE SAND, CLAY &	43	78	GRAY	HARD
FINE SILTY CLAY SAND	78	87	GRAY	M.SOFT
FINE SILTY CLAY SAND	87	89	GRAY	M.SOFT
SLATE	89	120	BLACK	M.SOFT
SLATE	120	130	GREEN	SOFT
SLATE	130	255	BLACK	MEDIUM

Remarks

PUMP WILL BE INSTALLED AT A LATER DATE.
GAMMA, CALIPER, & MULTI TOOL LOGGED 5-2-2005. LOGGED FOR MDH.

Well Depth	Depth Completed	Date Well Completed
255 ft.	255 ft.	03/05/2005

Drill Method Multiple methods used **Drill Fluid** Water

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☒ **From** **To**

Casing Type Single casing **Joint** Other
Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below**

Casing Diameter **Weight** **Hole Diameter**

6 in. To 89 ft. 19.4 lbs./ft. 6 in. To 89 ft.
6 in. To 255 ft.

Open Hole From 89 ft. To 255 ft.
Screen? ☐ **Type** **Make**

Static Water Level

7.8 ft. land surface Measure 03/03/2005

Pumping Level (below land surface)

77.3 ft. 24 hrs. Pumping at 87 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
bentonite	5	Sacks	ft.	89 ft.

Nearest Known Source of Contamination

50 feet Northwes Direction Sewer Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned

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

Miscellaneous

First Bedrock Virginia/Thomson Aquifer Virginia/Thomson
Last Strat Virginia/Thomson Depth to Bedrock 87 ft
Located by Minnesota Department of Health
Locate Method GPS SA Off (averaged) (15 meters)
System UTM - NAD83, Zone 15, Meters X 512666 Y 5248108
Unique Number Verification Input Date 05/05/2005

Angled Drill Hole

Well Contractor

Petersen Well Co.	69183	PETERSON, D.
Licensee Business	Lic. or Reg. No.	Name of Driller

Minnesota Unique Well Number

147463

County St. Louis
Quad Hibbing
Quad ID 294B

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/22/1988
Update Date 10/27/2014
Received Date

Well Name	Township	Range	Dir Section	Subsection
HIBBING	57	21	W 12	ADBBDA

Elevation 1493 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 1832 6TH AV E HIBBING MN 55746

Well HIBBING MN 55746

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
ROCK CLAY,	0	18	GRAY	
COARSE SAND,	18	72		
CLAY	72	84	GRAY	
CLAY GRAVEL ROCK	84	97		
ROCK	97	110		
CLAY, TACONITE	110	115	BLUE	
TACONITE- BROKEN	115	175		
TACONITE	175	199		HARD
TACONITE	199	234	RED	SFT-HRD
TACONITE	234	266	DK. RED	HARD
TACONITE HARD	266	343		
ORE	343	470	BLACK	V.HARD
ROCK BROKEN	470	491	GRAY	
ROCK GRAVEL LOOSE	491	535	BROWN	

Remarks

GAMMA LOGGED 4-9-1987. GWQ NO. 0412.

Well Depth	Depth Completed	Date Well Completed
535 ft.	535 ft.	12/00/1984

Drill Method Non-specified Rotary **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Step down **Joint** Welded

Drive Shoe? **Yes** ☒ **No** ☐ **Above/Below** 2 ft.

Casing Diameter **Weight**

24 in. To 304 ft. lbs./ft.

18 in. To 460 ft. lbs./ft.

Open Hole From 460 ft. To 535 ft.

Screen? ☐ **Type** **Make**

Static Water Level

251 ft. land surface Measure 12/00/1984

Pumping Level (below land surface)

360 ft. 8 hrs. Pumping at 1000 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
neat cement	35	Cubic yards	0 ft.	460 ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☒ No

Pump ☐ Not Installed Date Installed 12/00/1984

Manufacturer's name LAYNE-BOWLER

Model Number HP 200 Volt 480

Length of drop pipe 380 ft Capacity 1000 g.p. Typ Turbine

Abandoned

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

Miscellaneous

First Bedrock Biwabik Iron-Formation Aquifer Biwabik Iron-

Last Strat Biwabik Iron-Formation Depth to Bedrock 115 ft

Located by Minnesota Department of Health

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 504055 Y 5253912

Unique Number Verification Information from Input Date 03/29/1999

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Layne Well Co.	27010	MCLAUGHIN, B.

Appendix B

Aquifer Test Data and Analysis

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

Determination of Aquifer Properties and Aquifer Test Plan (DAP-ATP) Form

Public Water Supply ID:	1690022	PWS Name:	Hibbing

Contact Information for Person Completing this Form

Name:	Peter Kero
Address:	Barr Engineering Company
	3128 14th Ave East
City, State, Zip:	Hibbing, MN 55746
Phone, Fax, e-mail:	p:(218) 262-8611, f:(218) 262-3460, pkero@barr.com

Aquifer Properties Determination Methods

For Methods 1 - 5, check all that apply - attach Summary of Aquifer Properties Based on Existing Data

- [x] **1.** An existing pumping test that meets the requirements of wellhead protection rule part 4720.5520 and that was previously conducted on a well connected to the public water supply system.
- [ ] **2.** An existing pumping test that meets the requirements of wellhead protection rule part 4720.5520 and that was previously conducted on another well in a hydrogeologic setting determined by the department to be equivalent.
- [ ] **3.** An existing pumping test that does not meet the requirements of wellhead protection rule part 4720.5520 and that was previously conducted on: 1) a public water supply well or 2) another well in a hydrogeologic setting determined by the department to be equivalent.
- [x] **4.** Existing specific capacity test(s) conducted on the public water supply well(s) or specific capacity tests conducted on other wells in a hydrogeologic setting determined by the department to be equivalent.
- [ ] **5.** An existing published transmissivity value.

For Method 6 or 7 - attach detailed Aquifer Test Plan for Proposed Test

- [ ] **6.** A proposed new test to be conducted on a new or existing well connected to the public water supply system and that meets the requirements for larger-sized water systems (wellhead protection rule part 4720.5520). The test plan must be approved before conducting the test.
- [ ] **7.** A proposed new test to be conducted on a new or existing public well connected to the public water supply system and that meets the requirements for smaller-sized water systems (wellhead protection rule part 4720.5530). The test plan must be approved before conducting the test.

List the unique number of each public water supply well to which this DAP-ATP Form applies

233061 (11C)	233056 (3A)				
778015 (17)	271992 (4A)				
233054 (1C)	233058 (8A)				
792077 (2B)					

Submitted by: PK	Prof. License: 26808	Date: 9/16/19
Reviewed by: TF	Approved: (●) Yes ( ) No	Approval Date: 9/16/19

Summary of Aquifer Properties Based on Existing Data

Aquifer Name:	**Aquifer Code:**

Hydraulic Confinement ☑ **Confined** ☐ **Unconfined** ☐ **Fractured Rock**

Aquifer Test Number of test(s) on file used to compile the information tabulated below:

Aquifer Properties Summary Table

Representative Values		Unit	Range Minimum	Range Maximum	+/- %
Top Stratigraphic Elev.		**feet (MSL)**			
Bottom Stratigraphic Elev.		**feet (MSL)**			
Transmissivity (T)	8940	**ft^2/day**	2653	8940	
Aquifer Thickness (b)		**feet**			
Saturated Thickness* (b)	40	**feet**			
Hydraulic Conductivity (k)	223.5	**ft/day**			
Primary Porosity (e_p)		**0.00 %**			
Secondary Porosity (e_s)**		**0.00 %**			
Storativity (S)	0.0004	**dimensionless**			
Characteristic Leakage (L)		**feet**			
Hydraulic Resistance (c)		**days**			

Notes: Shaded fields are required - * hydraulically unconfined aquifer - ** dual porosity aquifer because of fractures or solution weathering

Describe rationale for selected method(s). Attach documentation and analysis.

As reported by Hydrogeological & Modeling Services, Inc. in Appendix B of the Hibbing PUC's 2004 Wellhead Protection Plan Part I, an aquifer test and specific capacity tests were conducted in the glaciofluvial outwash aquifer. The aquifer test and specific capacity results are as follows:

1. Municipal Well 8A test (conducted by Hydrogological & Modeling Services, Inc. in September 2003)
   Pumping well: Municipal Well 8A (unique no. 233058)
   Observation wells: Municipal Well 11C (unique no. 233061) and Mesaba Country Club Well (unique no. 237622)
   Geometric mean transmissivity: 8,940 ft2/day

2. Municipal Well 2B (conducted by Trout Wells in May 2013)
   Transmissivity: 2,653 ft2/day

3. Specific capacity tests
   Pumping well: Municipal Well 1C (unique no. 233054) Transmissivity: 4,077.0 ft2/day
   Pumping well: Municipal Well 2A (unique no. 233055) Transmissivity: 3,711.4 ft2/day
   Pumping well: Municipal Well 3A (unique no. 233056) Transmissivity: 3,978.8 ft2/day
   Pumping well: Municipal Well 8A (unique no. 233058) Transmissivity: 2,089.6 ft2/day
   Pumping well: Municipal Well 11C (unique no. 233061) Transmissivity: 2,430.7 ft2/day
   Geometric mean transmissivity: 3,130 ft2/day

Overall transmissivity range: 2,653 ft2/day to 8,940 ft2/day

These data will be used as inputs to the existing three-dimensional MODFLOW groundwater model for the glaciofluvial outwash aquifer. At the request of the MDH, the hydrogeologic boundaries and domain of the existing groundwater model will be re-evaluated. The geometric mean transmissivity from the Well 8A pumping test is proposed for use in the model as the representative transmissivity for the glaciofluvial outwash aquifer. The range of specific capacity tests and aquifer test at 2B results is proposed for the model sensitivity analysis.

Hydrogeological & Modeling Services, Inc.

1443 Goodrich Ave., St. Paul, MN 55105 651.330.2928 651.690.5050 FAX

TECHNICAL MEMORANDUM

To: Corey Lubovich, Hibbing Public Utilities Commission

From: Amal M. Djerrari, PhD, P.E., CGWP

Dare: September 22, 2003

Re: Aquifer Pumping Test
HMS No. 09/02-01-001

This Technical Memorandum summarizes the aquifer pumping test conducted for the Hibbing Public Utilities Commission (HPUC). The test was performed in accordance with the Minnesota Department of Health (MDH) Wellhead Protection Rules (MN Rules Chapter 4720.5320 and 4720.5520), and the September 10, 2003 Aquifer Test Plan submitted to and approved by MDH staff.

Test Description

The test was performed on September 16, 17, 18, and 19, 2003 and consisted of a 24-hour background phase, a 24-hour pumping phase, and a 24-hour recovery phase. Municipal Well 8A (MN Unique Well Number 233058) was used as the pumping well, and Municipal Well 11C (MN Unique Well Number 233061) and the Mesaba Country Club Well (MN Unique Number 237622) were used as the observation wells to record groundwater drawdown. Municipal Well 8A, the pumping well, was also used to record groundwater drawdown. A transducer could not be introduced in the Mesaba Country Club well; therefore, it was monitored manually with a water level indicator. Well records for the wells are attached to this technical memorandum.

All wells are open to the buried sand and gravel aquifer. The approximate distances from Municipal Well 8A to Municipal Well 11C and the Mesaba Country Club Well are 625 and 1067 feet, respectively.

Electronic pressure transducers and data loggers were utilized to monitor and record the groundwater levels and drawdown in municipal wells 8A and 11C. Water levels were measured manually in the Mesaba Country Club Well using a water level indicator. Groundwater level readings were recorded logarithmically in Municipal Wells 8A and 11C, and every minute for the first 35 minutes at the Mesaba Country Club Well. At the beginning of the test, the approximate depths of static groundwater in Wells

8A, 11 and the Mesaba Country Club Well were 18.85, 21.01, and 11.17 feet below the access port of the casings respectively.

Prior to the pumping phase of the test, all wells were not pumped for at least 24 hours. The groundwater level recording equipment was installed in Municipal Wells 8A and 11 on September 16, 2003. The 24-hour pumping phase of the test was started at 10:00 a.m. on September 17, 2003 and ended at 10:00 a.m. on September 18, 2003. During this phase, only Municipal Well 8A was pumped in the vicinity of the test. The other city wells that were pumping during that period did not affect the test data. The closest well (Well 3A) is located more than 6,000 ft from Well 8A.

The pumping rate of Municipal Well 8A was relatively stable at approximately 560 gallons per minute (gpm) based on data from the well's totalizer. The average pumping rate over the entire pumping phase of the test was 562 gpm. The pumping rates of the well during the test as recorded from totalizer are provided in Table 1. After the pump of Municipal Well 8A was shut off, the recovery phase of the test lasted 24 hours from 10:00 a.m. on September 18 to 10:00 a.m. September 19, 2003. None of the wells were pumped during this phase of the test.

Groundwater level data collected during the test has been provided on a disk with this Technical Memorandum. The maximum groundwater drawdown observed in the observation wells were 71.72 feet in Municipal Well 8A, 4.80 feet in Municipal Well 11C and 1.09 feet in the Mesaba Country Club well.

Data Analysis

The groundwater level data were analyzed using AQTESOLV® software. The analysis consisted of matching the groundwater level data to an appropriate type-curve, resulting in a calculated estimate of the transmissivity and storativity of the aquifer. Time-drawdown graphs for the data collected from the municipal wells are attached.

Results

The aquifer is confined at Well 8A and 11 C location based on information from the well records. This is also confirmed by the drawdown data analysis. The hydraulic solutions for confined aquifers (i.e., Theis, Cooper Jacob, and Theis Recovery) match the data accurately. The computed storativity of 0.0004 is that of a confined aquifer. No effect of boundaries was detected in the analysis of the pumped well (Well 8A) drawdown data. The transmissivity computed from Wells 8A and 11C ranges from 5,950 to 8,940 ft^2/day

(Table 2). The transmissivity computed at the Mesaba Country Club well was higher. But due to the quality and quantity of data collected, this estimate is less reliable

Conclusions

The aquifer system in the vicinity of Municipal Well 8A is confined. No effect of aquifer boundaries were detected in the data. The representative transmissivity and storativity for the aquifer in this area are estimated to be 8,940 ft^2/day and 0.0004, respectively.

Attachments - Well Records
Time-Drawdown Graphs

Enclosure - Groundwater level data

Table 1

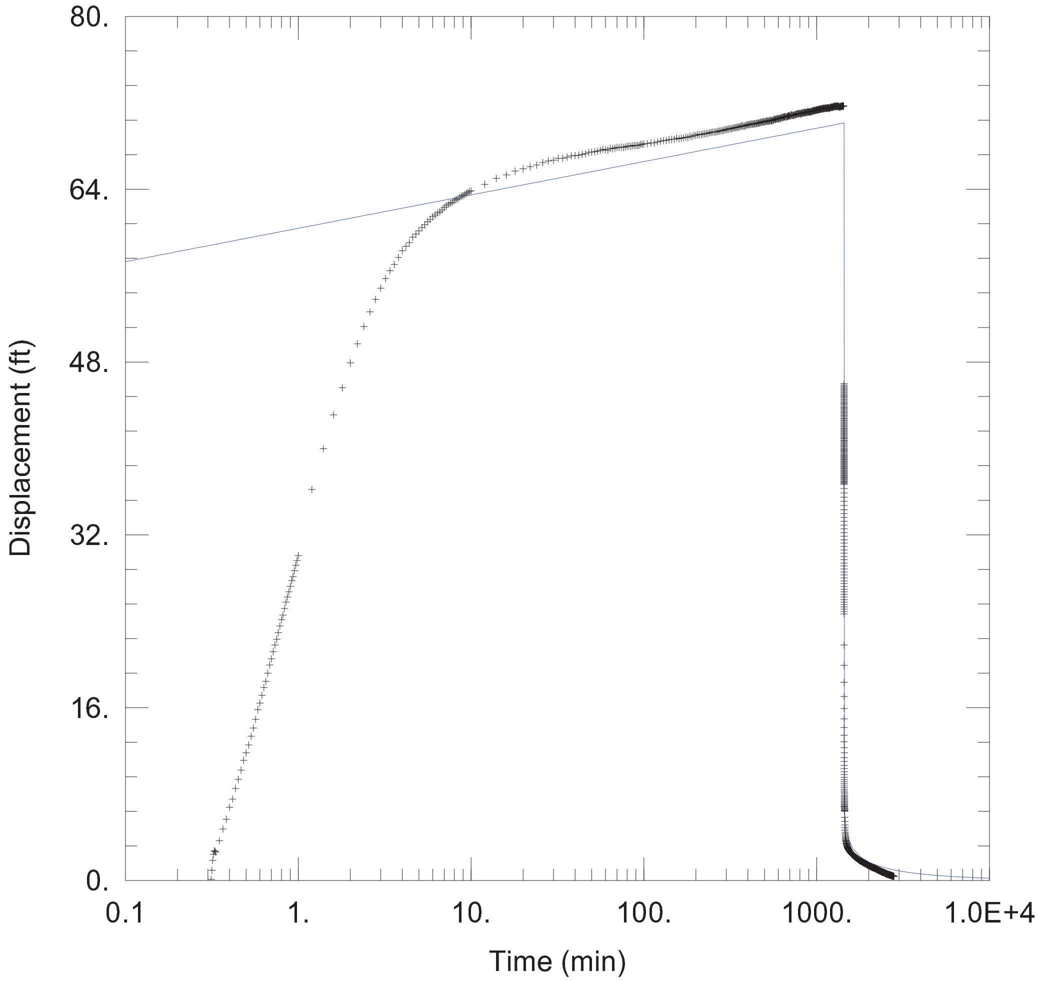
Pumping Rate Summary
City of Hibbing

Time	Minutes Since Pumping	Volume Pumped (in 1000 gallons)	Calculated Discharge Rate (gpm)	Analog Discharge Reading (gpm)	Totalizer Reading (in 1000 gallons)
09/17/2003 10:00:00	0	0		0	208127
09/17/2003 10:05:00	5	3000	600.0	560 - 600	208130
09/17/2003 10:10:00	10	7000	800.0	560 - 600	208134
09/17/2003 10:15:00	15	9000	400.0	560 - 600	208136
09/17/2003 10:20:00	20	12000	600.0	540 - 600	208139
09/17/2003 10:25:00	25	15000	600.0	560 - 600	208142
09/17/2003 10:30:00	30	18000	600.0	560 - 600	208145
09/17/2003 10:35:00	35				
09/17/2003 10:45:00	45	26000	550.0	540 - 600	208153
09/17/2003 10:50:00	50	29000	600.0	540 - 600	208156
09/17/2003 10:55:00	55	32000	600.0	540 - 600	208159
09/17/2003 11:00:00	60	35000	600.0	560 - 610	208162
09/17/2003 11:15:00	75				
09/17/2003 11:40:00	100	57000	550.0	540 - 600	208184
09/17/2003 11:43:00	103				
09/17/2003 12:00:00	120	68000	550.0	560 - 600	208195
09/17/2003 12:05:00	125				
09/17/2003 13:00:00	180	102000	566.7	560 - 600	208229
09/17/2003 13:08:00	188				
09/17/2003 16:00:00	360	203000	561.1	560 - 600	208330
09/17/2003 16:03:30	363				
09/18/2003 8:15:00	1335	750000	561.0	560 - 600	208877
09/18/2003 8:24:00	1329				
09/18/2003 9:15:00	1405				
09/18/2003 9:55:00	1435	806000	560.0	560 - 600	208933
09/18/2003 10:00:00	1440	806003	560.0	0	208936
		Average Discharge (gpm)	**561.67**		

Table 2

Pumping Test Analysis Summary Results
City of Hibbing

	Transmissivity (ft^2/day)				Storativity (dimensionless)			
Well ID	**Theis**	**Theis Recovery**	**Cooper-Jacob**	**Step Drawdown**	**Theis**	**Theis Recovery**	**Cooper-Jacob**	**Step Drawdown**
Well 8A	6,415	8,096	8,981	5,763	NC	NC	NC	4.00E-04
Well 11C	8,938	8,925	8,938	NA	3.70E-04	NA	3.70E-04	NA
Mesaba Country Club Well	12,800	Not enough Data	Not enough Data		5.87E-03	Not enough Data	Not enough Data	NA



PUMPING TEST AT HIBBING WELL 8A

Data Set: L:\...\Hibbing Well 8A - Pump Test at Well 8A 9-17 - 9-19-2003.aqt
Date: 12/26/13 Time: 15:53:23

PROJECT INFORMATION

Company: HMS. Inc.
Client: Hibbing PUC
Project: 09\02\01\001
Location: Hibbing, MN
Test Well: Well 8A
Test Date: 9/17-19/2003

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well 8A	6105.64	17831.36

Observation Wells

Well Name	X (ft)	Y (ft)
+ Well 8A	6105.64	17831.36

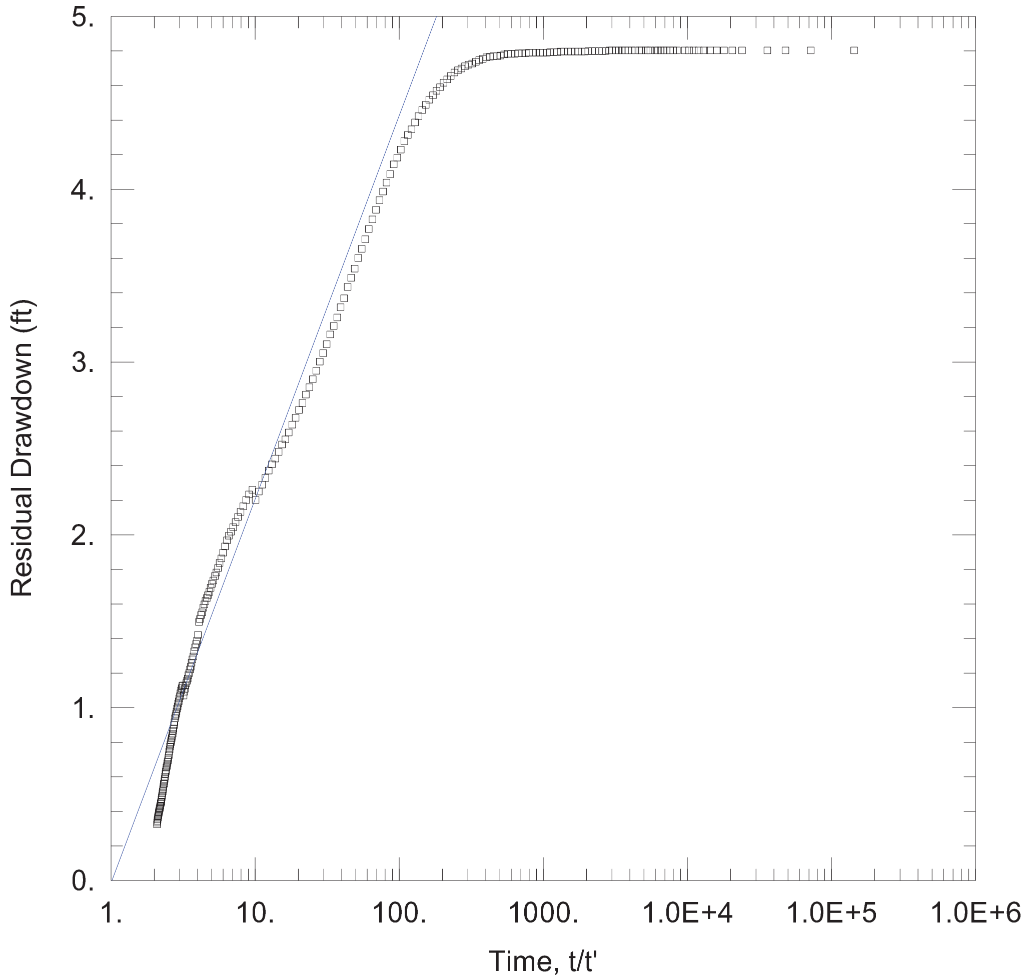
SOLUTION

Aquifer Model: Confined

Solution Method: Theis

T = 6414.5 ft^2/day
Kz/Kr = 1.

S = 2.157E-19
b = 26. ft



PUMPING TEST AT HIBBING WELL 8A

Data Set: L:\...\Hibbing Well 11C - Pump Test at Well 8A 9-17 - 9-19-2003.aqt
Date: 12/26/13 Time: 15:53:42

PROJECT INFORMATION

Company: HMS. Inc.
Client: Hibbing PUC
Project: 09\02\01\001
Location: Hibbing, MN
Test Well: Well 8A
Test Date: 9/17-19/2003

AQUIFER DATA

Saturated Thickness: 40. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well 8A	6105.64	17831.36

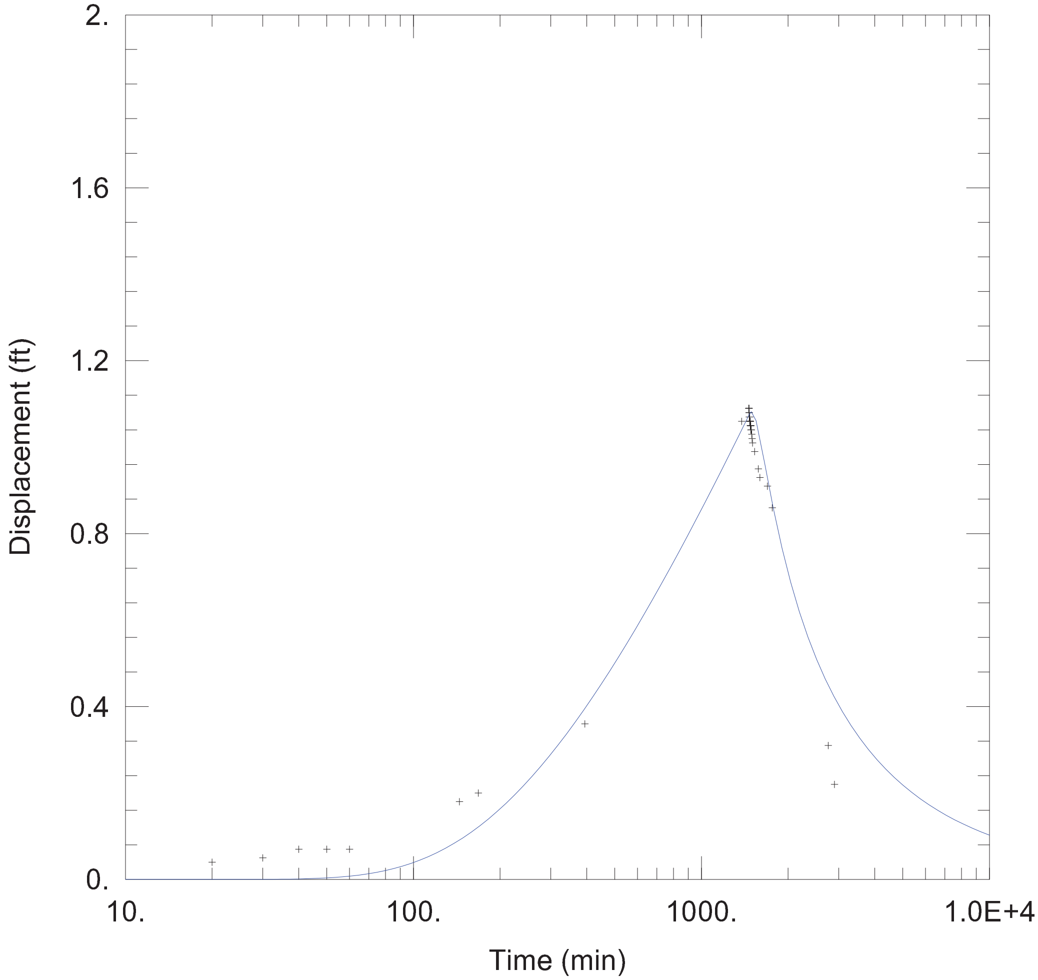
Observation Wells

Well Name	X (ft)	Y (ft)
□ Well 11C	5485.6	17913.42

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 8925. ft^2/day S/S' = 1.016



PUMPING TEST AT HIBBING WELL 8A

Data Set: L:\...\Hibbing Mesaba CC Well- Pump Test at Well 8A.aqt
Date: 12/26/13 Time: 15:53:09

PROJECT INFORMATION

Company: HMS. Inc.
Client: Hibbing PUC
Project: 09\02\01\001
Location: Hibbing, MN
Test Well: Well 8A
Test Date: 9/17-19/2003

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
Well 8A	6105.64	17831.36

Observation Wells

Well Name	X (ft)	Y (ft)
+ Mesaba CC	6696.19	16942.26

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 1.28E+4 ft^2/day
Kz/Kr = 1.
S = 0.005866
b = 40. ft

72 HR TEST

PROJECT: HIBBING PUBLIC UTILITIES   Well # 2-B   Uniq # 792077

Test By: BRIAN TRAUT & JASON JOHNSON   Job # 3010024

Meter Reading Beginning: 64883900

Meter Reading Ending: 67584800

Well Information: Transducer set at: 62' ft. (From Grade)

Stick Up 1 ft

Length of Casing: 71'

Length of Screen: 34'   Hp of Pump: 40

Total Well Depth: 103.5'   Model of Pump:

Static Water Level: 6.15

Well Capacity: 622 GPM @ 45 PWL   16.01 **G.P.F.D.D.**

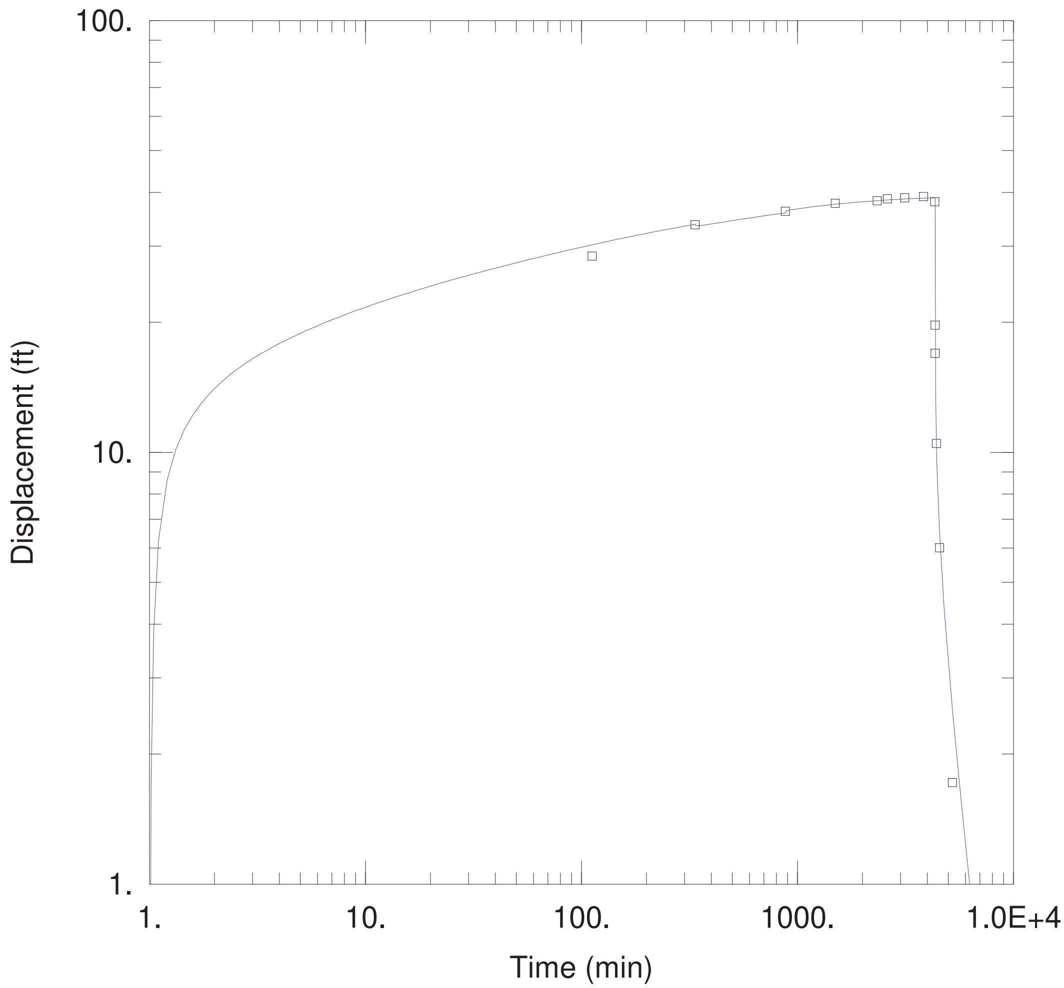
Page 1 of 1

Date	Time	AM	PM	GPM	PWL	Sand/Gal	Comments
1/2/2001	12:34	X	X	123	12'3"	4" c/g	This is a sample
5/6/2013	5:32		X	600	START TEST PUMP		
	5:46		X	600	28.4	few grains/trace clear	
	7:23		X	600	34.63		
	11:07		X	590	39.82		
5/7/2013	8:11	X		590	42.32		
	8:15	X		600	N/A		
	6:30		X	600	43.87	None	
5/8/2013	8:34	X		600	44.37		
	1:00		X	600	44.80		
	9:50		X	600	45.02	None	
5/9/2013	9:36	X		600	45.28		
	5:46		X	600	44.21		
	5:49		X	SHUT DOWN			
	5:53		X		25.85		
	6:00		X		23.10		
	7:00		X		16.63		
	9:23		X		12.16		
5/10/2013	8:33	X			7.87		

data stated above is representative of the time spent pumping at the capacities stated. Deviation from either time spent pumping or both could change outcome if these results.

NOTE: On RECOVERY need: 5-1 minute checks   2-30 minute checks
5-5 minute checks   1-per hour as needed

Notes:



WELL TEST ANALYSIS

Data Set: O:\...\2B_all.aqt
Date: 09/06/19 Time: 15:19:06

PROJECT INFORMATION

Client: Hibbing
Test Well: 792077
Test Date: 5/6/2013

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
2B	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
□ 2B	0	0

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush-Jacob

T = 2652.9 ft^2/day
r/B = 0.004341
b = 46. ft

S = 0.05
Kz/Kr = 1.

MINNESOTA MDH DEPARTMENT OF HEALTH

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

Determination of Aquifer Properties and Aquifer Test Plan (DAP-ATP) Form

Public Water Supply ID:	1690022	**PWS Name:**	Hibbing

Contact Information for Person Completing this Form

Name:	Peter Kero
Address:	Barr Engineering Company 3128 14th Ave East
City, State, Zip:	Hibbing, MN 55746
Phone, Fax, e-mail:	p:(218) 262-8611, f:(218) 262-3460, pkero@barr.com

Aquifer Properties Determination Methods

For Methods 1 - 5, check all that apply - attach Summary of Aquifer Properties Based on Existing Data

- [x] **1.** An existing pumping test that meets the requirements of wellhead protection rule part 4720.5520 and that was previously conducted on a well connected to the public water supply system.
- [ ] **2.** An existing pumping test that meets the requirements of wellhead protection rule part 4720.5520 and that was previously conducted on another well in a hydrogeologic setting determined by the department to be equivalent.
- [ ] **3.** An existing pumping test that does not meet the requirements of wellhead protection rule part 4720.5520 and that was previously conducted on: 1) a public water supply well or 2) another well in a hydrogeologic setting determined by the department to be equivalent.
- [ ] **4.** Existing specific capacity test(s) conducted on the public water supply well(s) or specific capacity tests conducted on other wells in a hydrogeologic setting determined by the department to be equivalent.
- [ ] **5.** An existing published transmissivity value.

For Method 6 or 7 - attach detailed Aquifer Test Plan for Proposed Test

- [ ] **6.** A proposed new test to be conducted on a new or existing well connected to the public water supply system and that meets the requirements for larger-sized water systems (wellhead protection rule part 4720.5520). The test plan must be approved before conducting the test.
- [ ] **7.** A proposed new test to be conducted on a new or existing public well connected to the public water supply system and that meets the requirements for smaller-sized water systems (wellhead protection rule part 4720.5530). The test plan must be approved before conducting the test.

List the unique number of each public water supply well to which this DAP-ATP Form applies

716190					

Submitted by: PK	**Prof. License:** 26808	**Date:** 9/16/19
Reviewed by:	**Approved:** (●) Yes ( ) No	**Approval Date:**

Summary of Aquifer Properties Based on Existing Data

Aquifer Name: Virginia Formation	**Aquifer Code:** PEVR

Hydraulic Confinement ☐ **Confined** ☐ **Unconfined** ☑ **Fractured Rock**

Aquifer Test Number of test(s) on file used to compile the information tabulated below:

Aquifer Properties Summary Table

Representative Values		Unit	Range		+/- %
			Minimum	Maximum	
Top Stratigraphic Elev.		feet (MSL)			
Bottom Stratigraphic Elev.		feet (MSL)			
Transmissivity (T)	407	ft^2/day			
Aquifer Thickness (b)		feet			
Saturated Thickness* (b)		feet			
Hydraulic Conductivity (k)		ft/day			
Primary Porosity (e_p)		0.00 %			
Secondary Porosity** (e_s)		0.00 %			
Storativity (S)		dimensionless			
Characteristic Leakage (L)		feet			
Hydraulic Resistance (c)		days			

Notes: Shaded fields are required - * hydraulically unconfined aquifer - ** dual porosity aquifer because of fractures or solution weathering

Describe rationale for selected method(s). Attach documentation and analysis.

Two pump tests have been conducted on the Hibbing Public Utilities Commission's Airport Well completed in the Virginia Formation - one by Peterson Drilling in March 2005 and another by Mark's Well and Pump in April 2009. The geometric mean transmissivity from the 2005 aquifer test is proposed as the representative transmissivity for the Virginia Formation aquifer and the range of results from both tests is proposed for the sensitivity analysis. The aquifer test results are as follows:

1. Airport Well (conducted by Petersen Drilling in March 2005)
   Pumping well: Airport Well (unique no. 716190)
   Geometric mean transmissivity: 407.1 ft2/day

2. Airport Well (conducted by Mark's Well and Pump in April 2009)
   Pumping well: Airport Well (unique no. 716190)
   Transmissivity from drawdown period (recovery data not available): 229.9 ft2/day

Representative transmissivity: 407.1 ft2/day
Overall transmissivity range: 229.9 ft2/day to 425.3 ft2/day

The Virginia Formation is comprised of argillite, known locally as the "Virginia Slate." The rock itself is non-porous, does not outcrop and yields low volumes of water through fractures. The Airport Well and the nearby Iron Junction wells are known, local community water supplies supplied by the formation. Because it is a fracture-flow dominated system, a non-model based approach (such as the calculated fixed radius method with upgradient extension) is recommended for upcoming WHPA and DWSMA delineation. The calculations will rely on 1-year and 10-year pumping quantities and information on the water producing horizons of the well and characteristics of the formation. Therefore, the transmissivity values will be used for informational purposes only and will not influence the delineation results.

MINNESOTA MDH DEPARTMENT OF HEALTH

Source Water Protection Unit
Drinking Water Protection Section
121 East 7th Place, Suite 220
P.O. Box 64975
St. Paul, Minnesota 55164-0975

Test No.

Aquifer Test Information

Page 1 of 1

Test Location 3837 S. Hughes Hibbing, Mn 55746	Well Owner Hibbing Public Utility	Test Conducted By Petersen Drilling
Date/Time Test Start (03/03/05) (08:24:00)	Flow Rate (Units) gallons per minute	Pump Type 5hp 85 gpm subm.
Date/Time Recovery Start (03/04/05) (08:24:00)	Flow Rate Measuring Device 80 g.p.m. Dole Control	Pump Intake Depth 80 feet
Date/Time Test Finish (03/05/05) (08:24:00)	Totalizer: End none	Pumped Well Inner Casing Diameter 6 inch
Notes checked flow rate with 32 gallon barrel and stop watch to measure time	Totalizer: Start	Confined/Unconfined confined
	Total Pumped (Units)	Quad Sheet Name/Number Buhl, MN A294

Unique Well Numbers	Location T, R, S, Quarters	Location N, E	Radial Distance	Open Depth	Transducer Setting	Measuring Point Location	Elevation, Datum
Pumped Well 716190	T57N R20W S26	N47°23'10.9" E92°49'55.7		89 ft to 255ft		casing top 2 ft above ground level	
Observation Wells		N E					
		N E					
		N E					
		N E					
		N E					

Sketch Map of Well Locations

Test Pumping

Airport Well n

Aquifer Test Data Form

Test: Hibbing Public Utilities				By: Bill Matschiner + Todd Petersen					Test Date: 03/03/05		Page 1 of 3
LOCATION (Unique Well Number)	DATE Month	Day	Year	TIME Hour	Minute	Sec.	Elapsed Time (Minutes)	Depth to Water	Drawdown/ Recovery	Discharge	Remarks S.W.L. 7.80
716190	03	03	05	08	24	05	sec 05	17.0	9.2	87 g.p.m.	slight yellow color
				08	24	10	10	20.0	12.2		
						15	15	22.6	14.8		
						20	20	27.1	19.3		
						25	25	29.6	21.8		
						30	30	33.0	25.2		
						40	40	35.0	27.2		
						50	50	38.0	30.2		
				08	25	00	60	41.0	33.2		close to clear
					25	12	72	43.9	36.1		
					25	24	84	46.0	38.2		
					25	42	sec 102	48.8	41.0		
				08	26	00	min 2	50.7	42.9		
					26	30	2.5	52.8	45.0		
					27	00	3	54.45	46.65		clear
					27	30	3.5	55.60	47.8		
					28	00	4	56.35	48.55		
				08	29	00	5	57.60	49.8	87 g.p.m.	discharge reading
					30	00	6	58.60	50.8		
	03	03	05		31	30	7.5	59.45	51.65		
				08	33	00	9	60.10	52.3		clear

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

NOTES:

Test Pumping

Aquifer Test Data Form

Test: Hibbing Public Utilities				By: Bill Matschiner + Todd Petersen						Test Date:	Page 2 of 3
LOCATION (Unique Well Number)	DATE Month	Day	Year	TIME Hour	Minute	Sec.	Elapsed Time (Minutes)	Depth to Water	Drawdown/ Recovery	Discharge	Remarks
716190	03	03	05	08	34	00	10	60.5	52.7	87 g.p.m.	discharge reading
				08	35	00	11	61.1	53.3		
					38	00	14	61.9	54.1		
					39	00	15	62.2	54.4	87 g.p.m.	discharge reading
					41	00	17	62.4	54.6		
					44	00	20	63.0	55.2	87 g.pm	discharge reading
					49	00	25	63.5	55.7	87 gpm	" "
					54	00	30	64.2	56.4	87 gpm	" "
					59	00	35	64.75	56.95	87 gpm	" "
				09	04	00	40	65.0	57.2	87 gpm	" "
				09	09	00	45	65.4	57.6	87 gpm	" "
					14	00	50	65.8	58.0	87 gpm	" "
					19	00	55	66.2	58.4	87 gpm	" "
					24	00	60	66.4	58.6	87 gpm	" "
					39	00	75	66.8	59.0		
					54	00	90	67.7	59.9		
				10	14	00	110	68.75	60.95		
				10	24	00	120	68.75	60.95	87 gpm	discharge reading
					44	00	140	68.90	61.10		
	03	03	05	11	24	00	180	69.60	61.8	87 gpm	discharge reading
				11	54	00	210	70.05	62.25		

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NOTES:

Test Pumping

Aquifer Test Data Form

Test: Hibbing Public Utilities				By: Bill Metschiner & Todd Petersen				Test Date:		Page 3 of 3
LOCATION (Unique Well Number)	DATE Month	Day	Year	TIME Hour	Minute	Sec.	Elapsed Time (Minutes)	Depth to Water	Drawdown/ Recovery	Discharge	Remarks
716190	03	03	05	12	24	00	240	70.55	62.86		clear
	03	03	05	12	54	00	270	70.95	63.15		
				13	24	00	300	71.40	63.60		
				14	24	00	360	71.85	64.05	87gpm	discharge reading
				15	24	00	420	72.35	64.55		
	03	03	05	16	24	00	480	72.70	64.90		
				17	24	00	540	73.40	65.60		
				18	24	00	600	73.80	66.00		
				20	24	00	720	74.65	66.85	87gpm	discharge reading
				22	24	00	840	75.20	67.40		
	03	04	05	00	24	00	960	75.75	67.95		
				02	24	00	1080	76.20	68.40		clear
				04	24	00	1200	76.90	69.10		
				06	24	00	1324	77.15	69.35		
	03	04	05	08	24	00	1440	77.30	69.50	87gpm	discharge reading

MINNESOTA MDH DEPARTMENT OF HEALTH
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St. Paul, Minnesota 55164-0975

NOTES:

discharge reading

Recovery

Airport Well

Aquifer Test Data Form

Test: Hibbing Public Utilities	By: Bill Matschiner + Todd Petersen	Test Date: 03/04-05/05	Page 1 of 3

LOCATION (Unique Well Number)	DATE Month	Day	Year	TIME Hour	Minute	Sec.	Elapsed Time (Minutes)	Depth to Water	Drawdown/ Recovery	Discharge	Remarks P.W.L. 77.3
716190	03	04	05	08	24	05	sec 5	75	2.3	0	begin recovery
	03	04	05	08	24	10	10	67.8	9.5		
					24	15	15	62.0	15.3		
					24	20	20	58.8	18.5		
					24	25	25	56.8	20.5		
					24	30	30	52.8	24.5		
					24	40	40	48.5	28.8		
					24	50	50	46.2	31.1		
	03	04	05	08	25	00	60	42.2	35.1		
					25	12	72	39.4	37.9		
					25	24	84	37.2	40.1		
					25	42	sec 102	35.6	41.7		
				08	26	00	min. 2	33.8	43.5		recovery
					26	30	2.5	32.2	45.1		
					27	00	3.0	31.3	46.0		
					27	30	3.5	30.6	46.7		
					28	00	4.0	30.1	47.2		
					29	00	5.0	29.2	48.1		
	03	04	05	08	30	00	6.0	28.5	48.8		
	03	04	05	08	31	30	7.5	27.75	49.55		
				08	33	00	9.0	27.1	50.2		recovery

MINNESOTA MDH DEPARTMENT of HEALTH
Minnesota Department of Health
Source Water Protection Unit
Drinking Water Protection Section
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St. Paul, Minnesota 55164-0975

NOTES:

Recovery

Aquifer Test Data Form

Test: Hibbing Public Utilities				By: Bill Matschiner, Todd Petersen + Norville Petersen				Test Date: 03/04-05/05		Page 2 of 3
LOCATION (Unique Well Number)	DATE Month	Day	Year	TIME Hour	Minute	Sec.	Elapsed Time (Minutes)	Depth to Water	Drawdown/ Recovery	Discharge	Remarks P.W.L 77.3
716190	03	04	05	08	35	00	11	26.4	50.9	0	recovery
	03	04	05	08	38	00	14	25.5	51.8		
				08	39	00	15	25.25	52.05		
				08	41	00	17	24.8	52.5		
				08	44	00	20	24.2	53.1		
				08	49	00	25	23.4	53.9		
				08	54	00	30	22.8	54.5		
				08	59	00	35	22.3	55.0		
				09	04	00	40	21.8	55.5		
				09	09	00	45	21.4	55.9	0	recovery
				09	14	00	50	21.1	56.2		
				09	19	00	55	20.8	56.5		
				09	24	00	60	20.5	56.8		
				09	39	00	75	19.8	57.5		
				09	54	00	90	19.2	58.1		
				10	14	00	110	18.6	58.7		
				10	24	00	120	18.35	58.95		
				10	44	00	140	17.95	59.35		
	03	04	05	11	24	00	180	17.22	60.08		
	03	04	05	11	54	00	210	16.83	60.47	0	recovery

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

NOTES:

Recovery

Aquifer Test Data Form

Test: Hibbing Public Utilities	By: Norville Petersen	Test Date: 3/04-05/05	Page 3 of 3

LOCATION (Unique Well Number)	DATE Month	Day	Year	TIME Hour	Minute	Sec.	Elapsed Time (Minutes)	Depth to Water	Drawdown/ Recovery	Discharge	Remarks P.W. C. 77.3
716190	03	04	05	12	24	00	240	16.45	60.85	0	Recovery
	03	04	05	12	54	00	270	16.15	61.15		
				13	24	00	300	15.84	61.46		
				14	24	00	360	15.34	61.96		
				15	24	00	420	14.92	62.38		
				16	24	00	480	14.49	62.81		
				17	24	00	540	14.20	63.10		
				18	24	00	600	13.91	63.39	0	Recovery
				20	24	00	720	13.35	63.95		
				22	24	00	840	13.03	64.27		
	03	05	05	00	24	00	960	12.50	64.80		
	03	05	05	02	24	00	1080	12.18	65.12		
	03	05	05	04	24	00	1200	11.85	65.45		
	03	05	05	06	24	00	1320	11.57	65.73		
	03	05	05	08	24	00	1440	11.33	65.97	0	Recovery 24hr.

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Drinking Water Protection Section
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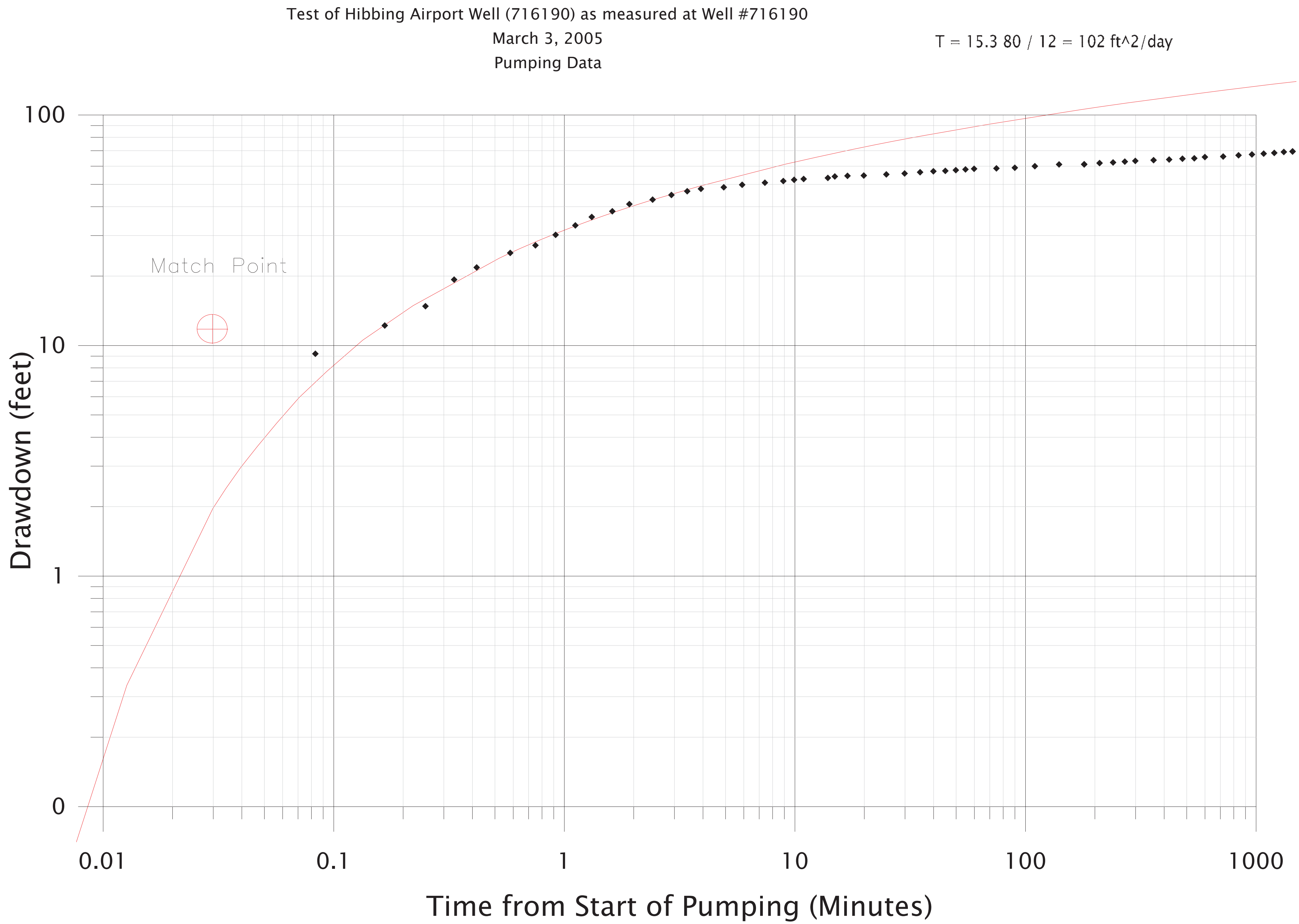
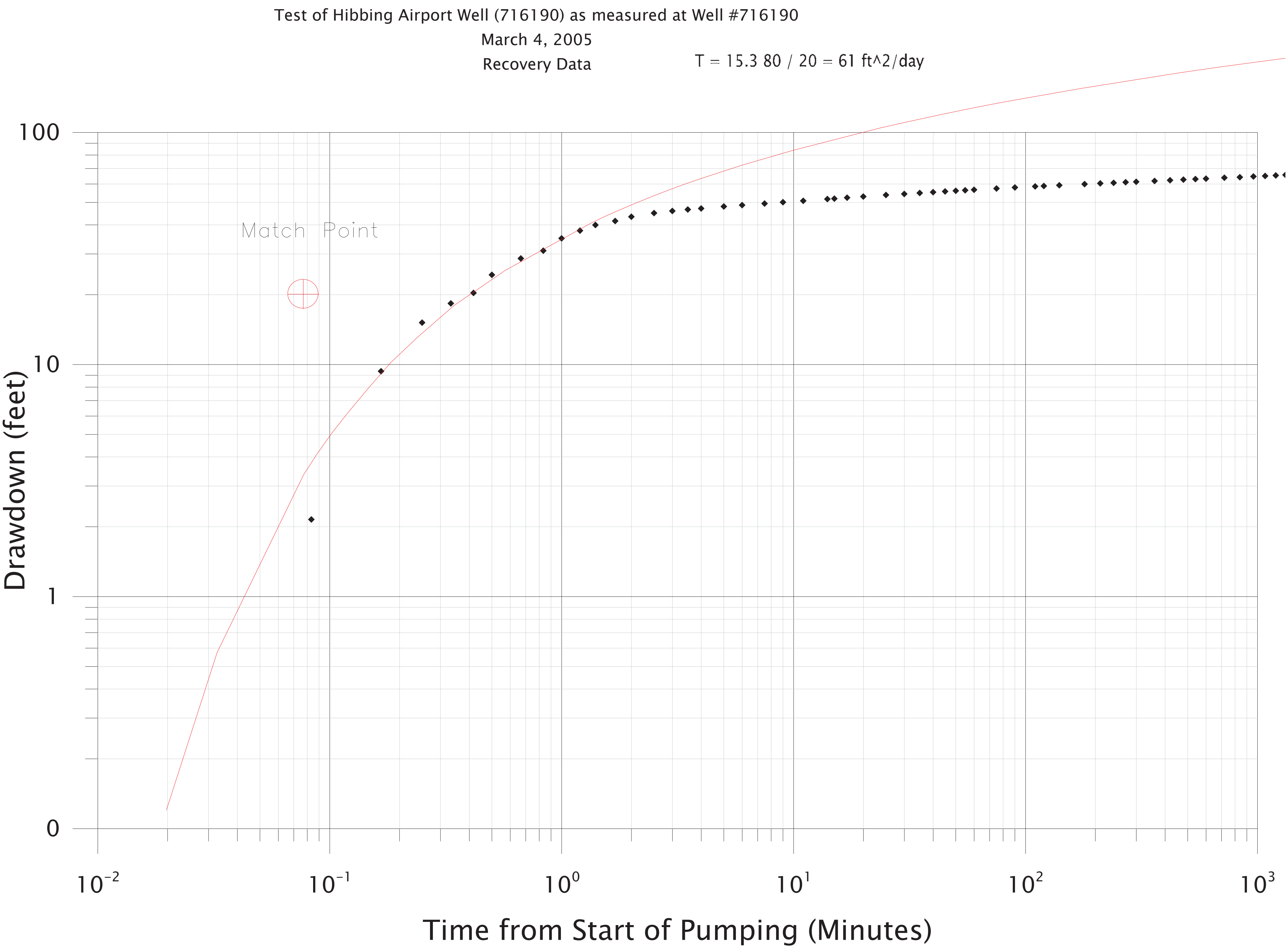
St. Paul, Minnesota 55164-0975

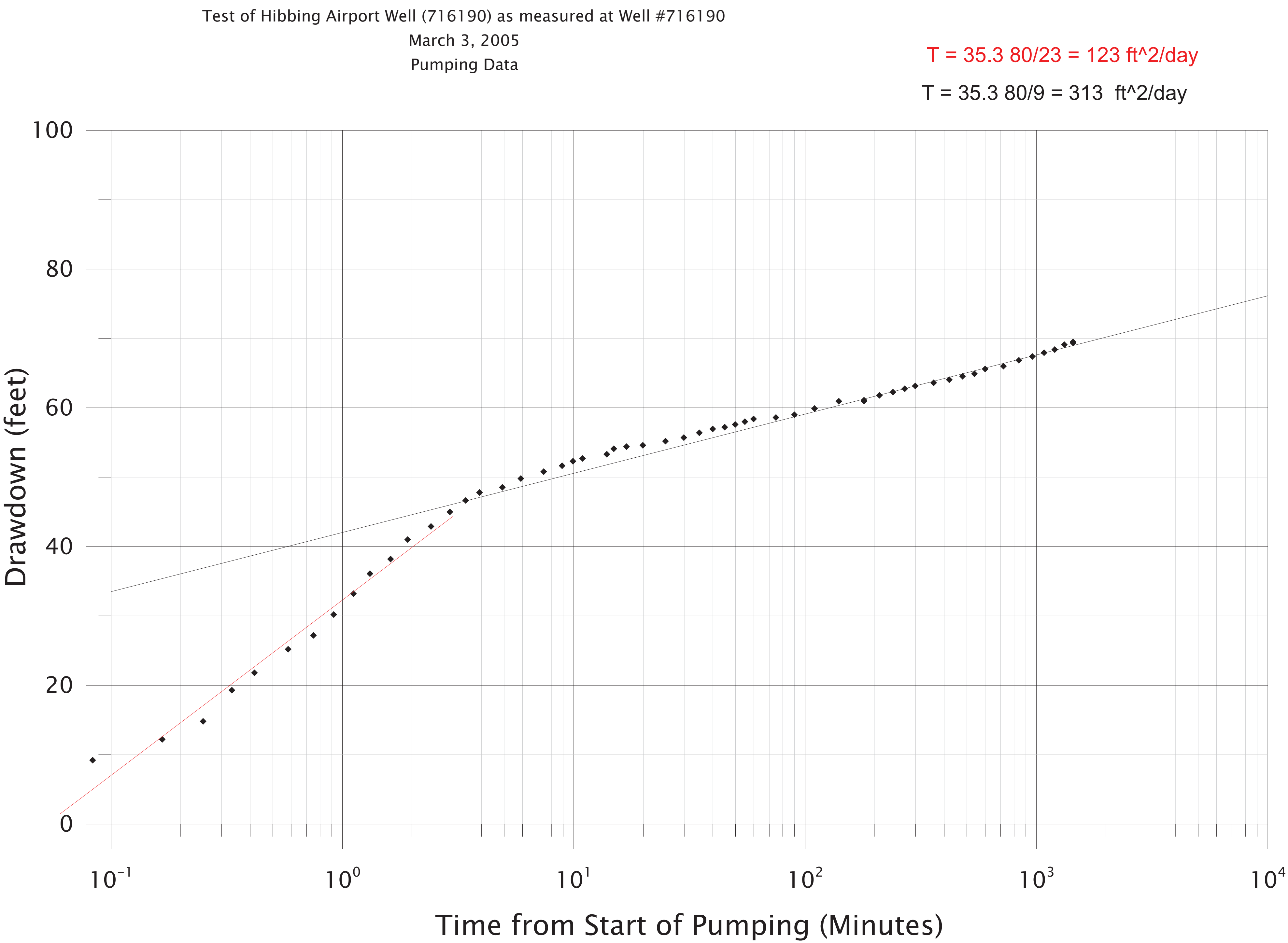
NOTES:



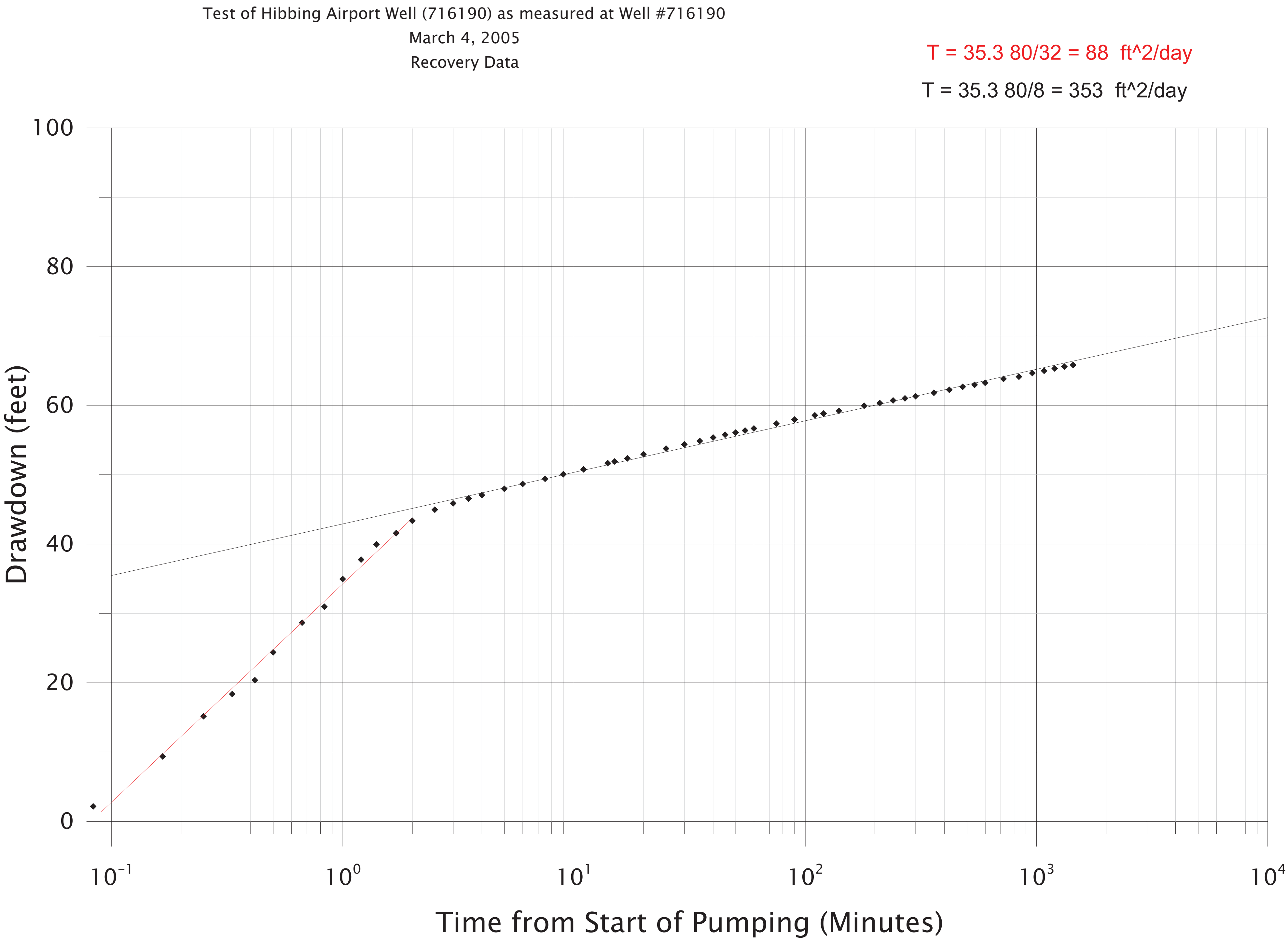
Test of Hibbing Airport Well (716190) as measured at Well #716190
March 3, 2005
Pumping Data
T = 15.3 80 / 12 = 102 ft^2/day
Match Point
Drawdown (feet)
100
10
1
0
0.01
0.1
1
10
100
1000
Time from Start of Pumping (Minutes)



Test of Hibbing Airport Well (716190) as measured at Well #716190
March 4, 2005
Recovery Data
T = 15.3 80 / 20 = 61 ft^2/day
Match Point
Drawdown (feet)
100
10
1
0
10^{-2}
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
Time from Start of Pumping (Minutes)



Test of Hibbing Airport Well (716190) as measured at Well #716190
March 3, 2005
Pumping Data
T = 35.3 80/23 = 123 ft^2/day
T = 35.3 80/9 = 313 ft^2/day
Drawdown (feet)
Time from Start of Pumping (Minutes)



Test of Hibbing Airport Well (716190) as measured at Well #716190
March 4, 2005
Recovery Data
T = 35.3 80/32 = 88 ft^2/day
T = 35.3 80/8 = 353 ft^2/day
100
80
60
40
20
0
Drawdown (feet)
10-1
100
101
102
103
104
Time from Start of Pumping (Minutes)

1. AIRPORT WELL
PUMP TEST APR 2009

Aquifer Test Data Form

Test: H.P.V, Airport well	By: MARKS Well & Pump MARK Swader	Test Date: 4-27-09	Page 1 of 3

LOCATION (Unique Well Number)	DATE Month	Day	Year	TIME Hour	Minute	Sec.	Elapsed Time (Minutes)	Depth to Water	Drawdown/ Recovery	Discharge	Remarks Top of Casing Static 7.00
716190	4	27	09	10	00	20	Sec. .20	19.50	12.50	50 GPM	cloudy
						40	40	21.10	14.10	"	
				10	01	60	60	25.50	18.50		
				10	02	00	MIN. 2	28.60	21 60		
				10	03	00	3	30.30	23.30		
				10	04	00	4	31.60	24.60		
				10	05	00	5	32.10	25.10		
				10	06	00	6	32.30	25.30		
				10	07	00	7	32.50	25.50		
				10	08	00	8	32.90	25.90		
				10	09	00	9	33.15	26.15		
				10	10	00	10	33.55	26.55		
				10	15	00	15	34.90	27.90		
				10	20	00	20	35.90	28.80		
				10	25	00	25	37.10	30.10		
				10	30	00	30	37.85	30.85		
				10	45	00	45	38.60	31.60		
				11	00	00	60	40.40	33.40		Clear
				11	30	00	90	41.10	34.10		
				12	00	00	120	42.05	35.05		
	4	27	09	12	30	00	150	42.75	35.75		

NOTES: TEST Pumping

AIRPORT WELL
TEST PUMPING
APR 2009

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Source Water Protection Unit
Drinking Water Protection Section
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Aquifer Test Data Form

Test: H.D.U Airport Well				By: Marks Well & Pump Mark Snyder					Test Date: 4-27-09		Page 2 of 3
LOCATION (Unique Well Number)	DATE Month	Day	Year	TIME Hour	Minute	Sec.	Elapsed Time (Minutes)	Depth to Water	Drawdown/ Recovery	Discharge	Remarks STATIC 7.00
716190	4	27	09	13	00	00	180	43.35	36.35	50 GPM	clear
				13	30	00	210	43.70	36.70		
				14	00	00	240	43.90	36.90		
				14	30	00	270	44.15	37.15		
				15	00	00	300	44.35	37 35		
				16	00	00	360	45.35	38.35		
				17	00	00	420	45.70	38.70		
				18	00	00	480	46.10	39.10		
				19	00	00	540	46.10	39.55		
				20	00	00	600	46.75	39.75		
				21	00	00	660	47.15	40.15		clear
				22	00	00	720	47.40	40.40		
				23	00	00	780	47.65	40.65		
	4	28	09	24	00	00	840	47.85	40.85		
				01	00	00	900	48.15	41.15		
				02	00	00	960	48.35	41.35		
				03	00	00	1020	48.55	41.55		
				04			1080	48.90	41.90		
				05	00	00	1140	48.95	41.95		
				06	00	00	1200	49.15	42.15		
				07	00	00	1260	49.30	42.30		

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NOTES:
1.17 GALLONS Per foot

IC #140-0923 (5/00)

Aquifer Test Data Form

Test: H. P. V. Airport Well				By: Marks Well & Pump Mark Swader					Test Date: 4-28-09		Page 3 of 3
LOCATION (Unique Well Number)	DATE Month	Day	Year	TIME Hour	Minute	Sec.	Elapsed Time (Minutes)	Depth to Water	Drawdown/ Recovery	Discharge	Remarks STATIC 7.00
716190	4	28	09	08	00	00	1320	49.52	42.52		
				09	00	00	1380	49.70	42.70		
				10	00	00	1440	49.82	42.82		

NOTES:

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IC #140-0523 (3/00)

MINNESOTA MDH DEPARTMENT OF HEALTH

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

Determination of Aquifer Properties and Aquifer Test Plan (DAP-ATP) Form

Public Water Supply ID:	1690022	PWS Name:	Hibbing

Contact Information for Person Completing this Form

Name:	Peter Kero
Address:	Barr Engineering Company
	3128 14th Ave East
City, State, Zip:	Hibbing, MN 55746
Phone, Fax, e-mail:	p:(218) 262-8611, f:(218) 262-3460, pkero@barr.com

Aquifer Properties Determination Methods

For Methods 1 - 5, check all that apply - attach Summary of Aquifer Properties Based on Existing Data

- [x] **1.** An existing pumping test that meets the requirements of wellhead protection rule part 4720.5520 and that was previously conducted on a well connected to the public water supply system.
- [ ] **2.** An existing pumping test that meets the requirements of wellhead protection rule part 4720.5520 and that was previously conducted on another well in a hydrogeologic setting determined by the department to be equivalent.
- [ ] **3.** An existing pumping test that does not meet the requirements of wellhead protection rule part 4720.5520 and that was previously conducted on: 1) a public water supply well or 2) another well in a hydrogeologic setting determined by the department to be equivalent.
- [ ] **4.** Existing specific capacity test(s) conducted on the public water supply well(s) or specific capacity tests conducted on other wells in a hydrogeologic setting determined by the department to be equivalent.
- [ ] **5.** An existing published transmissivity value.

For Method 6 or 7 - attach detailed Aquifer Test Plan for Proposed Test

- [ ] **6.** A proposed new test to be conducted on a new or existing well connected to the public water supply system and that meets the requirements for larger-sized water systems (wellhead protection rule part 4720.5520). The test plan must be approved before conducting the test.
- [ ] **7.** A proposed new test to be conducted on a new or existing public well connected to the public water supply system and that meets the requirements for smaller-sized water systems (wellhead protection rule part 4720.5530). The test plan must be approved before conducting the test.

List the unique number of each public water supply well to which this DAP-ATP Form applies

147463					

Submitted by: PK	Prof. License: 26808	Date: 9/13/19
Reviewed by: TF	Approved: (●) Yes ( ) No	Approval Date: 9/13/19

Summary of Aquifer Properties Based on Existing Data

Aquifer Name: Biwabik Iron Formation	**Aquifer Code:** PEBI

Hydraulic Confinement ☐ **Confined** ☐ **Unconfined** ☑ **Fractured Rock**

Aquifer Test Number of test(s) on file used to compile the information tabulated below:

Aquifer Properties Summary Table

Representative Values		Unit	Range		+/- %
			Minimum	Maximum	
Top Stratigraphic Elev.		feet (MSL)			
Bottom Stratigraphic Elev.		feet (MSL)			
Transmissivity (T)	1570	ft^2/day			
Aquifer Thickness (b)		feet			
Saturated Thickness* (b)		feet			
Hydraulic Conductivity (k)		ft/day			
Primary Porosity (e_p)		0.00 %			
Secondary Porosity** (e_s)		0.00 %			
Storativity (S)	9.01e-3	dimensionless			
Characteristic Leakage (L)		feet			
Hydraulic Resistance (c)		days			

Notes: Shaded fields are required - * hydraulically unconfined aquifer - ** dual porosity aquifer because of fractures or solution weathering

Describe rationale for selected method(s). Attach documentation and analysis.

As reported by Braun Intertec and HDR in the Scranton Well - Test Well Pumping Test Report dated April 14, 2009, a two-well aquifer test was conducted in the Biwabik Iron Formation aquifer. The test resulted in a broad range of results for transmissivity and storage coefficient values at each well and between wells caused, in part, by the predominance of fracture-dominated flow. A representative transmissivity value that assumes porous media flow conditions is considered inappropriate in the vicinity of these wells. The results of the aquifer test are as follows:

1. Scranton Well test (conducted by Braun Intertec in March 2008)
   - Pumping well: Scranton Well (unique no. 147463)
     - Transmissivity range: 567 ft2/day to 1,570 ft2/day
   - Observation well: Test Well (unique no. 747264)
     - Transmissivity range: 889 ft2/day to 22,080 ft2/day

As documented in Appendix E the February 2004 Hibbing Public Utilities Commission Wellhead Protection Plan Part 1, the Wellhead Protection Area (WHPA) and the Drinking Water Supply Management Area (DWSMA) for the Scranton Well in the Biwabik Iron Formation were delineated without the use of groundwater model. The past approach calculated a WHPA and DWSMA based on the pumped volume from the well over 1- and 10-year periods, the thickness of the water-producing horizons in the well, the dip and strike of the Biwabik Iron Formation and the watershed boundaries for the nearby mine pits that were presumed to be hydraulically-connected to well capture zone.

Because it is a fracture-flow dominated system near an open pit mine, a similar approach is recommended for upcoming WHPA and DWSMA delineation for the Scranton Well. The calculations will be updated with current pumping quantities and new information on the water producing horizons of the well and characteristics of the formation. Therefore, the transmissivity values will be used for informational purposes only and will not influence the delineation results.

Scranton Well - Test Well
Pumping Test Report
Hibbing, Minnesota

Prepared for

HDR Engineering
Hibbing Public Utilities Commission

Project BL-08-00925

April 14, 2009

BRAUN INTERTEC

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SCRANTON WELL—TEST WELL PUMPING TEST REPORT
HIBBING, MINNESOTA

Introduction

As part of the development of the scope of work and tasks related to the replacement of of the Scranton well for the Hibbing Public Utilities Commission (PUC), the HDR-Braun Intertec team identified an early need for a two-well pumping test involving the Scranton well and the nearby test well that had been recently installed. Because of the continuing drop in water levels in the Scranton well, a pumping test needed to be conducted quickly to avoid operational problems and to cost-effectively conduct the test. Accordingly, a test was carried out in late March, 2008 to determine the aquifer characteristics and assess the boundary conditions and extent of the permeable portion of the Biwabik Formation accessed by the Scranton Well and the Test Well, the uppermost unit of the Lower Cherty Member of the Biwabik.
Two pumping tests were conducted for this project. The first test, conducted from March 6 to 9, 2008, had several problems that necessitated a second test which was conducted from March 25 to 29, 2008. This report describes the methods, results, and conclusions of the second pumping test.

Methods

Monitoring Locations

Two existing wells were used for the pumping test, the municipal well located on the northern periphery of the City of Hibbing near the edge of the Scranton Pit ("Scranton Well") and a test well ("Test Well") located approximately 3,226 feet southeast of the Scranton Well. The locations of these wells are shown in Figure 1. The well logs for these monitoring wells are in Appendix 7. In addition to the wells the water level fluctuations of the Scranton Pit were also monitored.

These dataloggers were Model 3001 Levelogger® Gold ("Levelogger"), manufactured by Solinst Canada Ltd. The Leveloggers are self-contained, non-vented, programmable dataloggers that measure absolute pressure and temperature and have an operating pressure range of ±13.1 feet with an accuracy of ±0.010 feet. These Leveloggers were supplemented by a Model 3001 Barologger® Gold ("Barologger"), also manufactured by Solinst Canada Ltd. The Barologger is a vented, programmable datalogger that measures barometric pressure with an accuracy of ±0.003 feet.

The Leveloggers and Barologger were programmed to take readings at thirty second intervals. Each Levelogger was placed in its respective monitoring location with the Levelogger submerged within the operational range of the device. The Barologger was placed within the Hibbing office of Braun Intertec. The procedure by which the Levelogger readings were converted to static water level (SWL) elevations for the wells is described in Appendix 8.

Access to the Scranton Well was blocked by an airline with analog gage readout which was attached to the pump assembly, precluding the use of a Levelogger. During the first pumping test attempt instrument a rotating drum recorder was attached to another port on the air line and used for a continuous record of water levels within the Scranton well casing. However, that proved to have an accuracy of ± 5 feet, deemed to be too insensitive for quantitative analysis. Consequently, the second pumping test attempt used a digital recorder attached to the air line port. The datalogger was an Extech Differential Pressure Manometer, Model 407910 with an operating range of ± 29 psi with an accuracy of ± 1% of full scale.

Pumping Rate

The pumping rate was monitored every 10 seconds for the first 30 minutes at the digital readout in a well house several hundred yards east of the Scranton Well. Thereafter the pumping rate was monitored a rotating drum analog recorder. The pump in the Scranton Well took approximately a minute to reach its operating speed, and once running, it was not possible to adjust the pumping rate. Consequently, the pumping test was conducted with the usual operating performance of the Scranton Well pump.

Results

Pumping Rate

The pumping test was started on March 25, 2008 at 13:37 (1:37 p.m.). The manual readings of the digital readout of the pumping rate ("manual data") taken for the first 30 minutes of pumping are in Appendix 1A. Thereafter, the analog recorder was started monitored the pumping rate thereafter. These analog recorder data are in Appendix 1B.

There was one manual measurement taken during the period monitored by the analog recorder. This measurement was approximately 27 gpm lower than the analog recorder reading at the same time. Consequently, the analog recorder readings were calibrated to the digital readout (assumed to be more accurate) by decreasing the readings by 27 gpm. The manual data and the calibrated analog recorder data are summarized on Figure 2.

The average pumping rate after the first minute was 429 gallons per minute (gpm). This was determined from the readings, weighted by their respective time intervals that they represent. The pumping rate was 10 to 15 percent higher than the average (*i.e.* 482 gpm) for the first ten minutes, continued to approach the average over the next 20 minutes of pumping, and was within 2 percent of the average for the remainder of the pumping test.

Climatological data

The barometric datalogger data are in Appendix 2. The barometric pressure was recorded in units of feet of water. This allows the atmospheric pressure to be directly subtracted from the total pressure readings collected by the Leveloggers in the Test Well and the Scranton Pit. The barometric pressure data are summarized on Figure 11. As can be seen, the diurnal temperature fluctuations are within 1.3°C.

In addition, data for several other weather parameters are in Appendix 6, including air temperature and precipitation. These data were obtained from Weather Underground (www.wunderground.com) for the weather station at the Hibbing Airport. These data indicate that there were only two dates where there was measureable precipitation. On the morning of March 25, a few hours before the start of the pumping test, there was 0.01 inches of precipitation, and on the morning of March 30, a few hours before the end of the recovery test, there was 0.02 inches. On both occasions the precipitation fell as snow onto existing snow cover with air temperatures slightly above freezing. Neither event appeared to contribute significant recharge to the area.

Water level readings

Scranton Well

The water level information collected from the Scranton Well by manual readings of the analog gage on the air line is in Appendix 3A, and the water level information from the digital recorder on the air line is in Appendix 3B. A comparison of the two sets of data is shown in Figure 3. This relationship indicates that the data are closely relatable; because of this and because of the more extensive record, the data in Appendix 3B will be used for further analysis of the Scranton Well. Appendix 3B also includes the corresponding calculated drawdown, residual drawdown and recovery, as appropriate, for the readings.

The short period of pre-pumping water level monitoring indicated a static water level in the Scranton Well; accordingly, no conversion of the data during the drawdown test or the recovery test was carried out. From the pumping portion of the test the drawdown with respect to time is summarized in Figure 4. From the recovery portion of the test the residual drawdown and recovery with respect to time are summarized in Figures 5 and 6, respectively. All of these plots are semi-logarithmic. These results will be discussed further in the Discussion section.

Test Well

The water level information collected from the Test Well by datalogger is in Appendix 4. The appendix also contains the corresponding barometric pressure data from the barologger, the adjusted water levels taking barometric pressure into account, and the corresponding calculated drawdown, residual drawdown, and recovery, as appropriate, for the readings.

From the pumping portion of the test the drawdown with respect to time is summarized in Figure 7. From the recovery portion of the test the residual drawdown and recovery with respect to time are summarized in Figures 8 and 9, respectively. All of these plots are semi-logarithmic as well. These results will be discussed further in the Discussion section.

Scranton Pit

The water level information collected from the Scranton Pit by datalogger is in Appendix 5. The appendix also contains the corresponding barometric pressure data from the barologger and the adjusted water levels taking barometric pressure into account. These adjusted water level data are summarized in Figure 10 along with the air temperatures for the period. These are included because the air temperature fluctuated from below to above freezing (*i.e.* 32° F) during the test. Consequently, snow melting was occuring at intervals through the drawdown and recovery test periods. During the drawdown test the melting occurred during the first half-day of the test. During the recovery test the melting occurred three times during the test: during the first afternoon at the start of the recovery test, during the second half-day, and during the mid-day at the end of the test. After each period of temperatures above freezing there was a period of rising pit levels. These were superimposed on a trend of generally lowering pit water levels during the drawdown and recovery tests, likely due to the ongoing dewatering of the pit.

The water level records of both the Scranton Well and the Test Well were examined to determine if there was a correlation, direct or delayed, of any fluctuations in the Scranton Pit with those wells' water level fluctuations, especially later parts of the drawdown and recovery tests. Analyses of both the simultaneous readings and lagged peak-and-valley offsets all failed to yield any indication that the minor fluctuations in the pit water levels were reflected in the wells' water level fluctuations. An example is shown in Figure 12, along with an inset showing the side-by-side comparison of the water levels. Accordingly, the Scranton Pit water level fluctuations were not used to filter their effects out of the wells' water level records during the tests.

Discussion

The pumping test was conducted primarily to ascertain the hydrogeologic nature of the features by which the Scranton Well obtained its water supply. This is the primary goal of the discussion of the test results in this section. These test have also been analyzed to assess the hydraulic characteristics of the wells' geologic formations. These analyses can also yield insights on their hydrogeologic nature.

If the wells were primarily supplied with water from the Lower Cherty aquifer, and the LCA was laterally extensive – *i.e.* continuously permeable for more than a few miles beyond the test area – the drawdown and recovery tests would respond in the fashion of a confined aquifer, either with or without vertical leakage. The analysis of the drawdown or recovery with respect to logarithmic time as shown in Figures 4 through 9 would be amenable to either a Jacobs or Hantush analysis and yield comparable results.

These plots were analyzed in accordance with Lohman (1972) and Krusemann and de Ridder (1976). The portions of the data used are indicated in Figures 13 through 18. It was found that the single-well analyses for the test results yield consistent results for each well.

For the Scranton Well, the Jacobs analysis of the drawdown, residual drawdown, and recovery curves, summarized in Figures 13 through 15, give consistent values for transmissivities and storage coefficients. For these the transmissivities range from 1,446 to 1,570 square feet per day (sfd), and the storage coefficients range from 0.012 (1.2E-2) to 0.00901 (9.01E-3). These are summarized in Table 1.

For the Test Well, the Jacobs analysis of the drawdown, residual drawdown, and recovery curves, summarized in Figures 16 through 18, also give consistent values for transmissivities and storage coefficients. For these the transmissivities range from 15,560 to 22,080 sfd, and the storage coefficients range from 2.14E-4 to 2.78E-4. These are also summarized in Table 1.

As can be seen, the transmissivity values for the Test Well are an order of magnitude greater than those for the Scranton Well. This typically indicates that there is another water supply source beyond radial flow toward the pumping well. This could be due to vertical leakage from overlying and/or underlying permeable units or from vertical permeable features such as faults or both.

Hantush leaky aquifer analyses of the Scranton Well drawdown and recovery curves yield transmissivity values of 596 and 567 sfd, respectively, and storage coefficient values of 1.72E-3 and 2.17E-3, respectively (see Table 1). These transmissivities are one-third of those from the Jacobs analysis, which is expected when leakage into the aquifer is taken into account. However, the storage coefficients are still too large for the thinness of the Lower Cherty aquifer that purportedly is the main aquifer for the Scranton Well.

Hantush leaky aquifer analyses of the Test Well drawdown and recovery curves yield transmissivity values of 3,060 and 2,880 sfd, respectively, and storage coefficient values of 9.02E-5 and 8.99E-5, respectively (see Table 1). These transmissivities are less than one-fifth of those from the Jacobs analysis, again which is expected when leakage into the aquifer is taken into account. However, even though the storage coefficients are at least an order-of-magnitude smaller, they are somewhat larger than would be expected for the sandy ore zone of the Lower Cherty which is approximately 18 feet thick in this area. The basis for this conclusion is that for confined aquifers the storage coefficient is generally 1E-6 for each foot of saturated thickness (Lohman, 1972).

The drawdown test data for the Scranton and Test Wells were further analyzed by Mr. Justin Blum of the Minnesota Department of Health. Mr. Blum used the pumping test software AQTESOLVE to analyze the data also using Hantush leaky aquifer analyses ("second Hantush analyses"). The analytical plots are contained in Appendix 7. These analyses of the Scranton Well and Test Well resulted in transmissivity values of 857.9 and 10,260 ft^2/day, respectively, and storage coefficient values of 1.20E-3 and 8.59, respectively. These values are also summarized on Table 1.

These transmissivity values are within a half order-of-magnitude of the values from the first Hantush analyses and also fall between the Jacob- and Hantush-derived values for each well. Similarly the Scranton well storage coefficient is very similar to the values from the first Hantush analysis (*cf.* 1.20E-3 *vs.* 1.72E-3). However, the storage coefficient for the Test Well (8.59) is a physical impossibility.

Inspection of the vertical hydraulic conductivity (K') values from the first Hantush analyses summarized in Table 1 show that the K' values for the Scranton Well are 3,210 and 7,870 feet per day (ft/day), much greater than the aquifer's transmissivity values. The K' values for the Test Well are 2.03E-3 and 1.95E-3, both six orders of magnitude lower than the well's transmissivity values. Both the disparity in all of these values and consistent differences between the two wells' values indicate that other hydrogeologic factors are involved.

The vertical hydraulic conductivity values from the second Hantush analyses are generally the inverse of those from the first Hantush analyses. The K' value for the Scranton Well is 5.08E-2 ft/day (*cf.* 3,210 and 7,870), and the K' value for the Test Well is 4,350 (*cf.* 2.03E-3 and 1.95E-3). Again, both the disparity in all of these values and consistent differences between the two wells' values indicate that other hydrogeologic factors are involved.

Examination of all of the semi-logarithmic curves for the Scranton Well in Figures 13 through 15 show generally two slopes to the curve: a steep, early-period slope and a nearly flat, late-period slope. During the first minute of pumping the pump in the Scranton Well was getting up to full operating speed and the initial volume of water in the well casing was being removed. Because of these initial processes the very-early-time data are not useable for analysis. After that initial period the former slope becomes established and persists for nearly an hour, indicating that the permeable features in the first several hundred feet of the vicinity of the Scranton Well extend in a consistent manner away from the well, conveying water in a proportional manner from these hydrogeologic features.

The latter slope is taken to be the result of the expanding cone of depression from the onset of pumping intersecting the water body in the Scranton Pit, *i.e.* a recharge boundary. That the drawdown curve in Figure 13 is essentially horizontal from 200 minutes until the end of pumping indicates that a permeable feature nearby – for example , a water body or rock aperature network with an very high hydraulic conductivity – is the predominant water supply for the well. The very slight upward trend to the latter slope is likely due to finite constraints on this feature

Several faults and their associated oxidized, weathering zones have been mapped in the vicinity of the two wells. Figures 19 and 20 show two versions of the interpreted locations of the major faults within the Biwabik Formation in the Hibbing vicinity with the locations of the Scranton Well and Test Well shown (denoted “SW” and “TW,” respectively). As can be seen, both wells are in the immediate vicinity or in the extrapolated vicinity of the mapped location of a fault extending to the southeast from the Scranton Pit (denoted “SP”). All of the faults shown in Figure 20 have associated oxidized zones in their immediate vicinity. These zones are generally more permeable as well, and the Scranton Well was originally located within a localized extension of the oxidized zone not shown on these figures. These features and the degree to which they are indirectly connected to these features are likely influencing the apparent hydraulic characteristics of the two wells.

Analysis to assess the hydraulic characteristics of these fractures is problematic. While analytical methods exist to carry out this assessment (*e.g.* Raghavan, 1977; Witherspoon, 1986), these methods require either highly idealized fracture configurations or extensive knowledge of the locations, aperature widths, and interconnections of the fractures, neither of which are relevant or applicable. Accordingly, the conclusions made below concerning the nature of the fracture connections should be regarded as qualitative and speculative.

Taking these faults and associated fractures into account along with the plots and analysis results of the wells’ data, the Scranton Well appears to be situated within an oxidized zone with an extensive network of fractures that are readily providing the well with water but are diffusely connected to fracture network within the Biwabik Formation and the Scranton Pit. Conversely, the Test Well appears to be connected to a fracture or a small number of fractures which are indirectly connected to the nearby Scranton Well. Because no recharge boundary effect was observed at the Test Well during the drawdown and recovery tests, the pathways connecting the Test Well to the Scranton Well is apparently relatively long. This provides some assurance for expecting limited pumping interference between the Scranton Well and a new municipal well in the vicinity of the Test Well.

As an independent check on these analyses, the data from a pumping test of the Test Well conducted by Traut Wells on September 3, 2007 were analyzed by the Jacob and Hantush methods. The results are included on Table 1. The Jacob analysis of the early portion of the drawdown test yielded a transmissivity of 500 ft^2/day and a storage coefficient of 1.92; the latter is a physical impossibility and indicates that a major source for the pumping well is leakage or fracture flow. The Hantush analysis of the later portion of the drawdown test yielded a transmissivity of 889 ft^2/day, a storage coefficient of 0.083, and a vertical hydraulic conductivity of 79,320 ft/day; these results are similar to the Hantush results from the Scranton well. The relatively high storage coefficient and the extremely high vertical hydraulic conductivity indicate that conduit flow is an important component of the overall flow to the well.

This implies that the hydrogeology of the vicinities of the two wells are similar, with the larger-scale permeabilities the result of a combination of conduit networks, structurally related oxidized zones, and other heterogeneities that cannot be assessed by the layout and scope of this pumping test. These conduits may be horizontal partings within the units of the Biwabik, vertical joints, faults and fractures, or a combination of both. At the locations of both wells, but especially at the location of the Test Well, the conduit flow from fractures appears to be an important component for the yield of the well. These findings should be combined with other related information on the stratigraphy, structural geology, isotopic composition of waters in the vicinity, and the general geochemistry to arrive at a fuller picture of the hydrogeologic setting of the Scranton Well and Test Well.

References

Kruseman, G. P., and N. A. de Ridder (1976) Analysis and Evaluation of Pumping Test Data: Bulletin 11; International Institute for Land Reclamation and Improvement; Wageningen, The Netherlands; 200 p.

Lohman, S. W. (1972) Ground-Water Hydraulics: U.S. Geological Survey Professional Paper 708; United States Government Printing Office; Washington; 70 p.

Raghavan, R. (1977) Pressure Behavior of Wells Intercepting Fractures: Proceedings of Invitational Well-Testing Symposium, Berkeley; p. 117-160.

Traut, Joe (2007) Final Submittals for Scranton Test Well: report to Hibbing Public Utilities; Mark J. Traut Wells, Inc.

Witherspoon, P. A. (1986) Flow of groundwater in fractured rocks: Bulletin of Engineering Geology and the Environment; vol. 34, no. 1, p. 103-115.

Table 1. Summary of hydraulic characteristic values

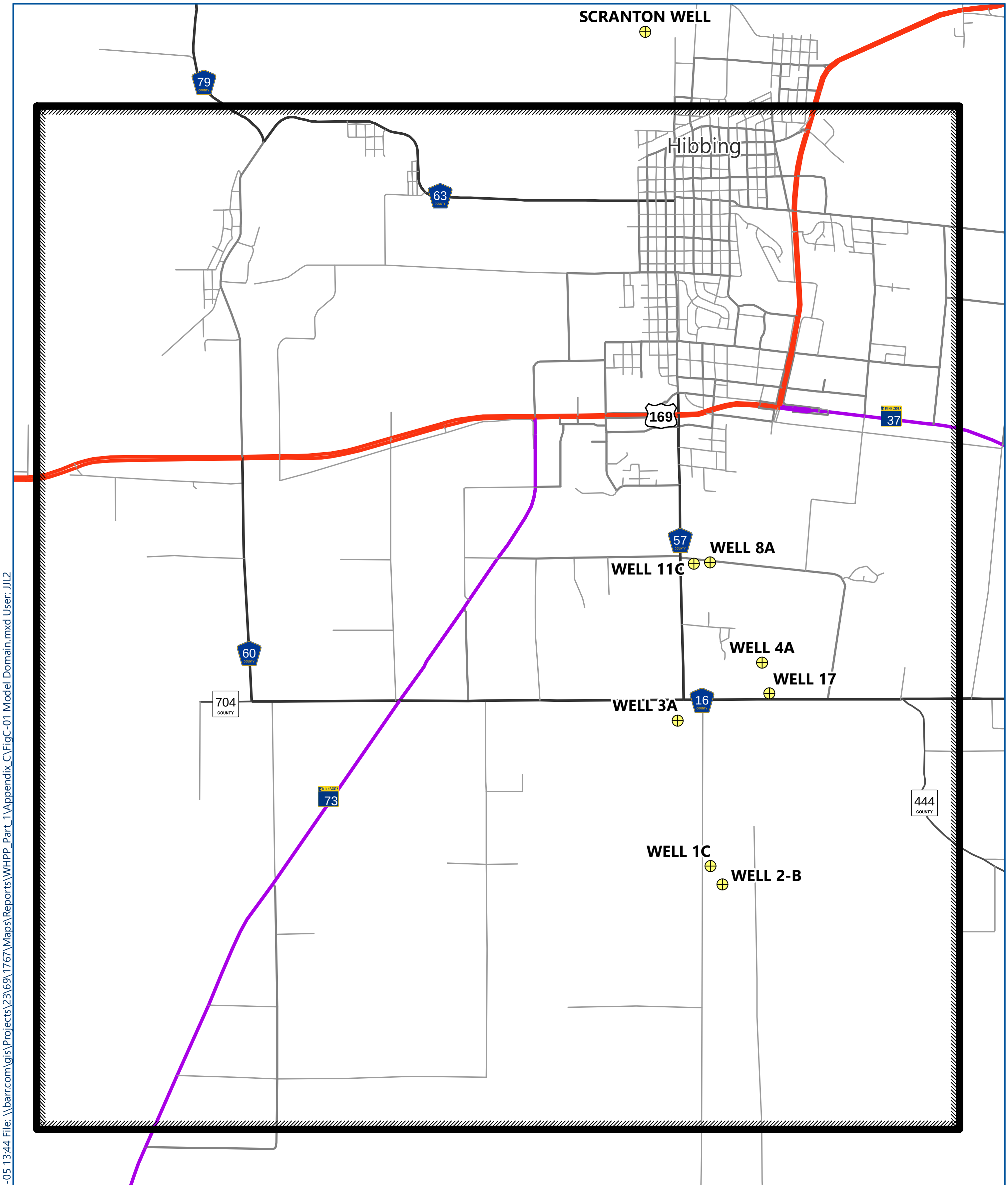
Well/Test phase	JACOB		HANTUSH[1]			HANTUSH[2]		
	Transmissivity T (ft2/day)	Storage coefficient S (-)	Transmissivity T (ft2/day)	Storage coefficient S (-)	Vertical Hydraulic Conductivity K' (ft/day)	Transmissivity T (ft2/day)	Storage coefficient S (-)	Vertical Hydraulic Conductivity K' (ft/day)
SCRANTON WELL								
Drawdown	1,570	9.01E-03	596	1.72E-03	3,210	857.9	1.20E-03	5.08E-02
Residual drawdown	1,495							
Recovery	1,446	1.20E-02	567	2.17E-03	7,870			
TEST WELL								
Drawdown	15,560	2.12E-04	3,057	9.02E-05	2.03E-03	10,260	8.59E+00	4.35E+03
Residual drawdown	20,300							
Recovery	22,080	2.78E-04	2,880	8.99E-05	1.95E-03			
TEST WELL (Traut, 2007)								
Drawdown	500	1.92E+00	889	8.30E-02	79,320			

[1]Type curve matching using Lohman (1972)

[2]Type curve matching using AQTESOLVE by J. Blum, Minnesota Dept. of Health

Appendix C

Groundwater Flow Model Details



Hibbing Municipal Well

Model Boundary

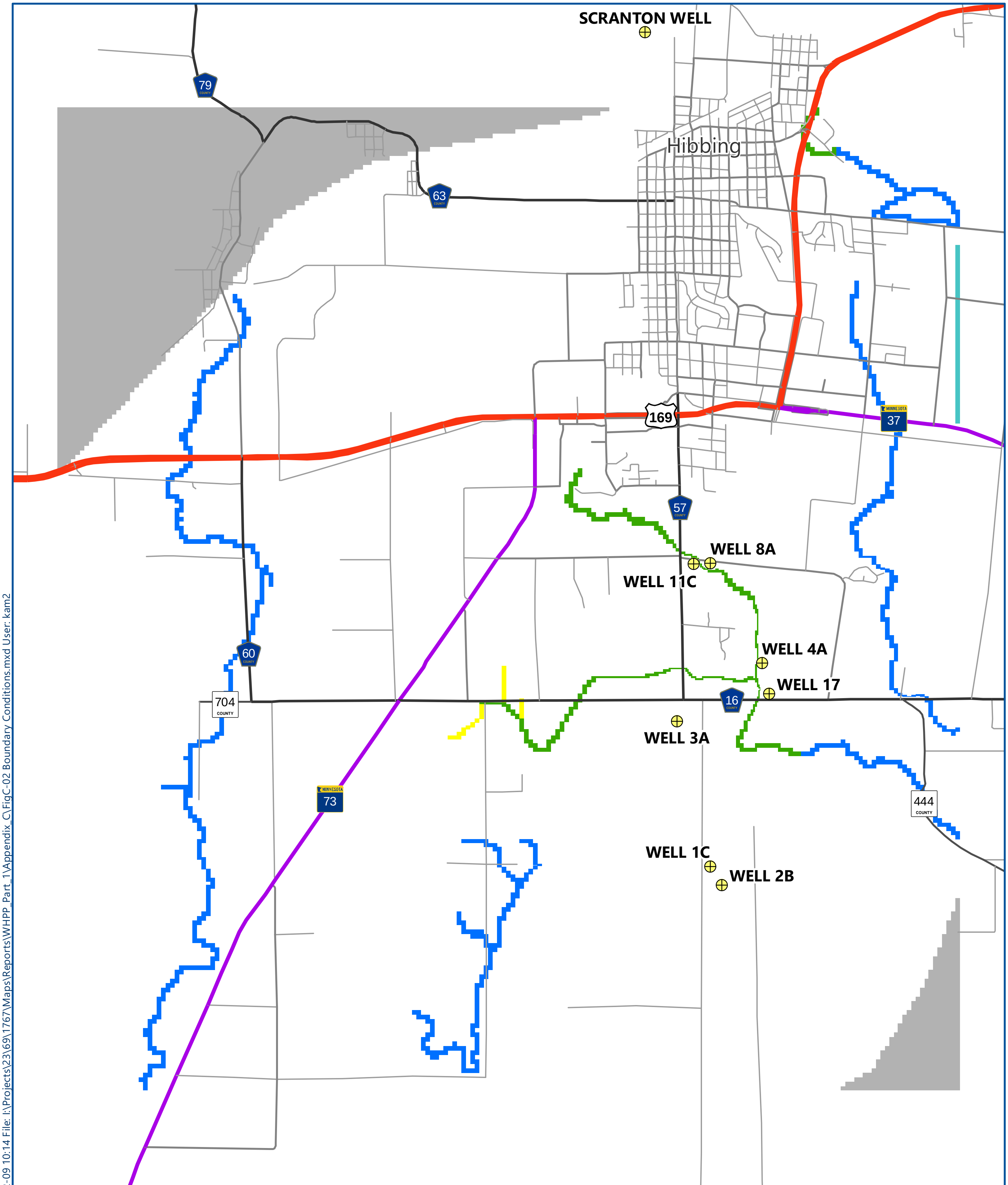
N

0 2,000 4,000

Feet

MODEL DOMAIN
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE C-1



Hibbing Municipal Well

Boundary Conditions

Specified Head Cells

Drain Cells

No Flow Cells

River Cells

Specified Flux Cells

N

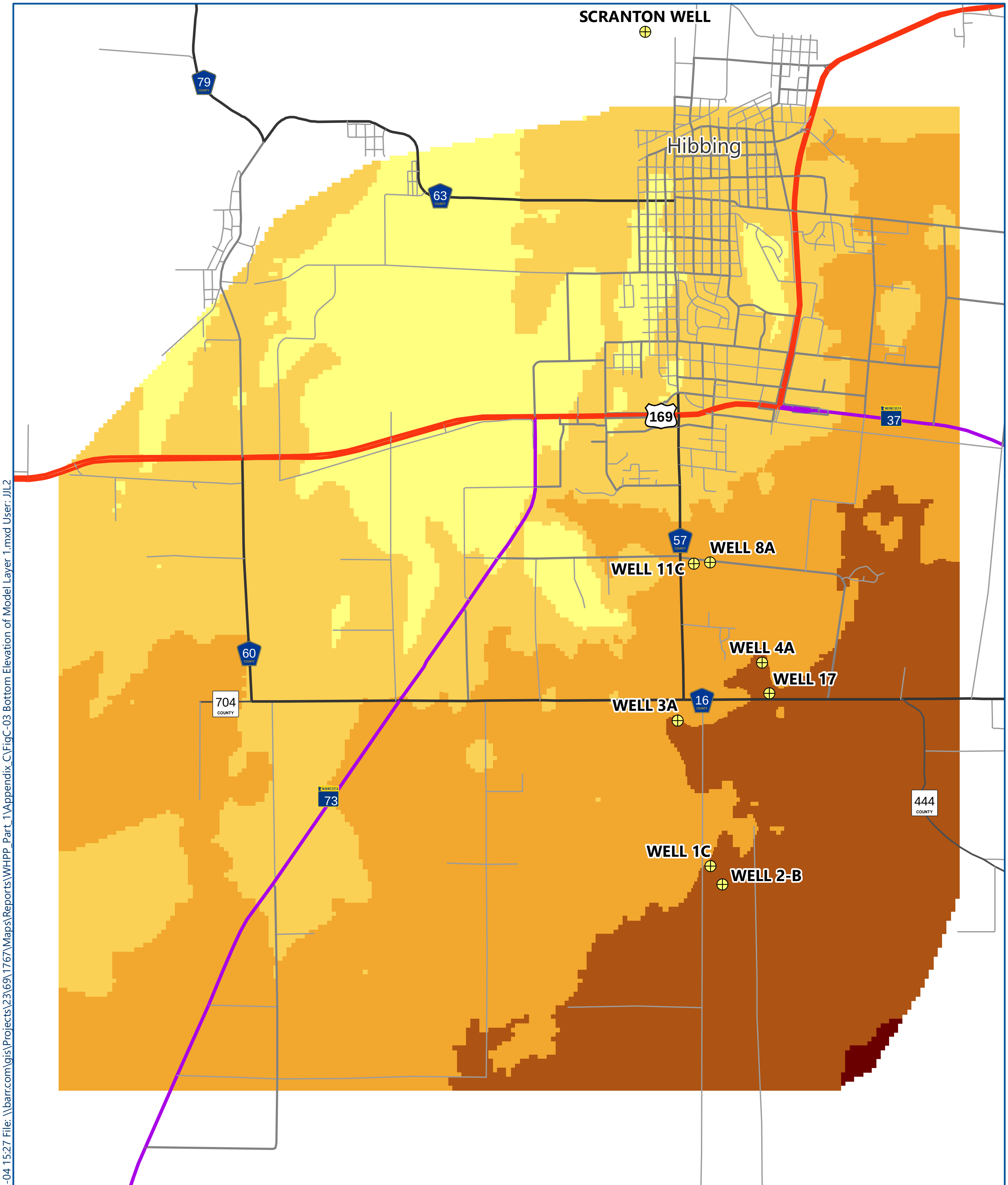
0 2,000 4,000

Feet

BARR

BOUNDARY CONDITIONS
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE C-2



Hibbing Municipal Well

Elevation (m)

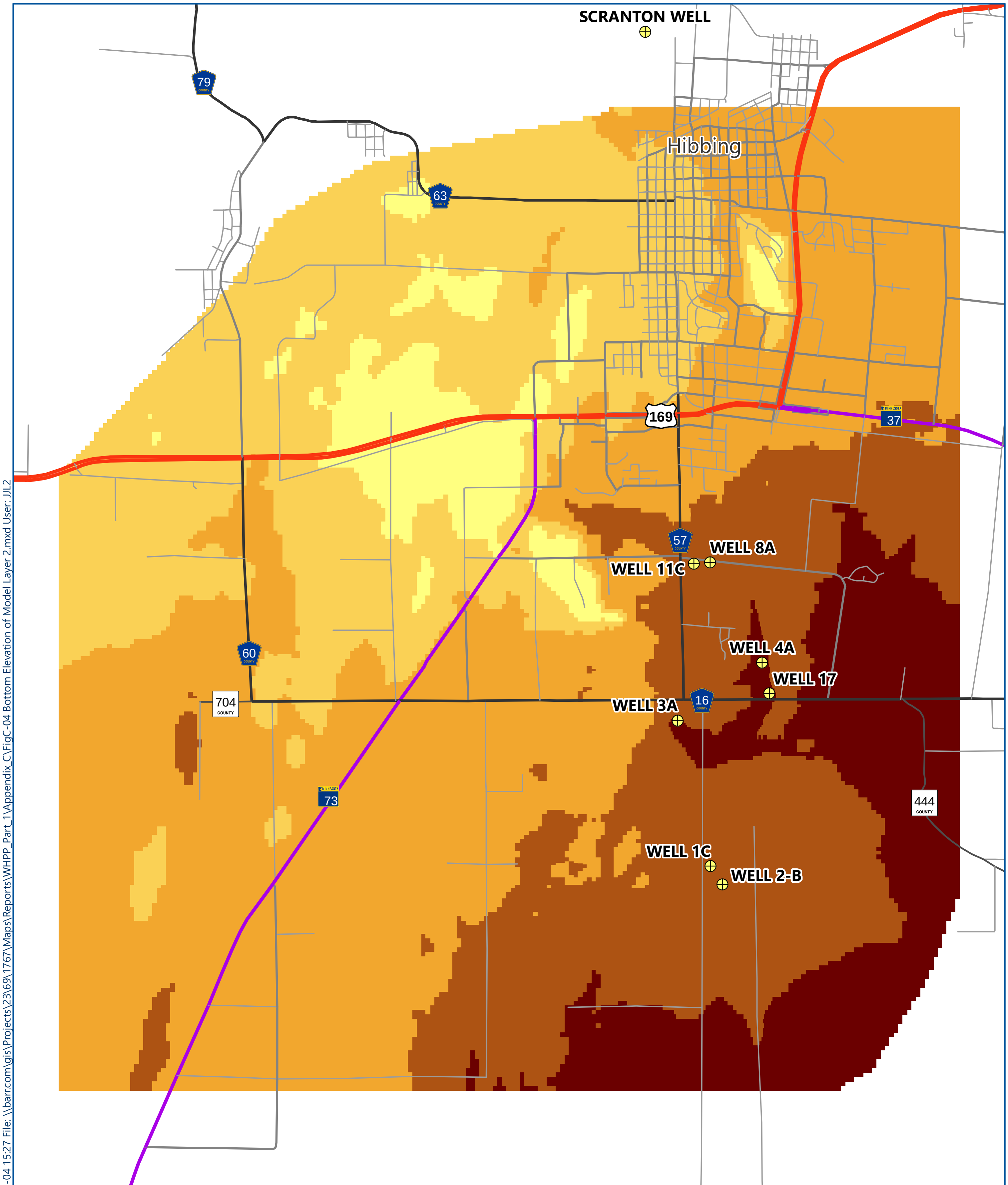
< 400	
400 - 420	
420 - 440	
440 - 460	
460 - 480	

0 2,000 4,000
Feet

BARR

BOTTOM ELEVATION OF MODEL LAYER 1
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE C-3



Hibbing Municipal Well

Elevation (m)

386 - 400

400 - 420

420 - 440

440 - 460

460 - 480

N

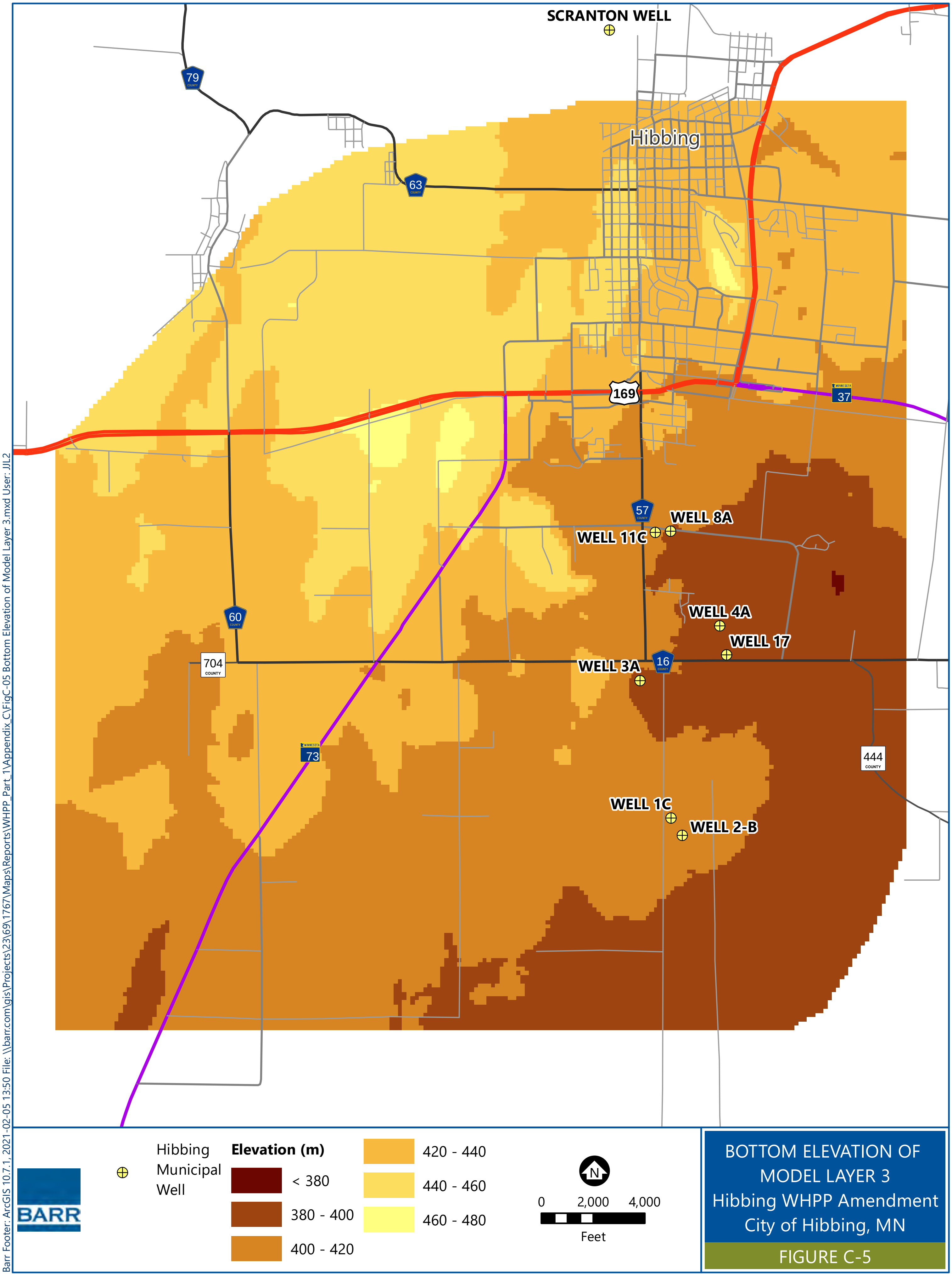
0 2,000 4,000

Feet

BARR

BOTTOM ELEVATION OF MODEL LAYER 2
Hibbing WHPP Amendment
City of Hibbing, MN

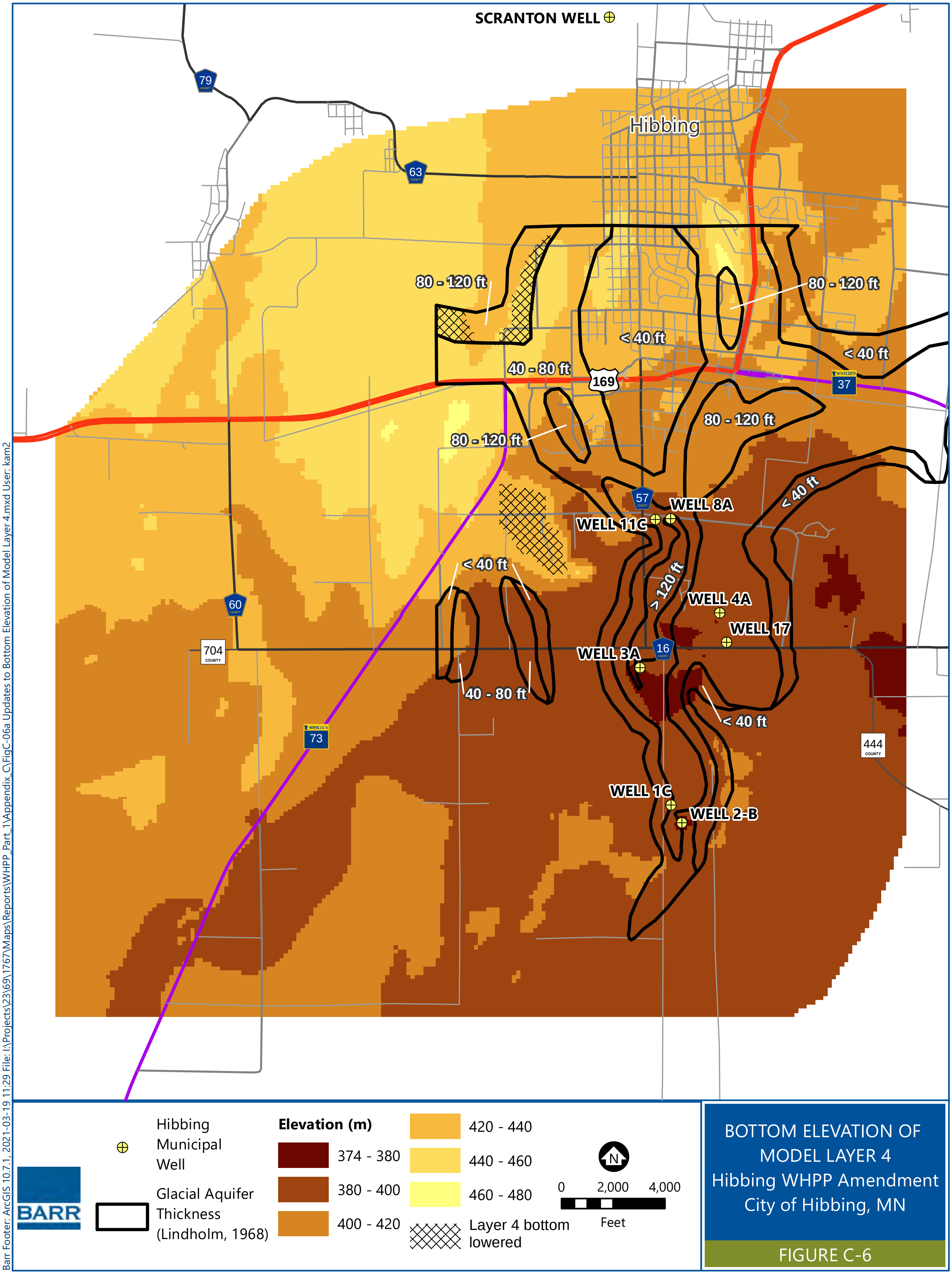
FIGURE C-4

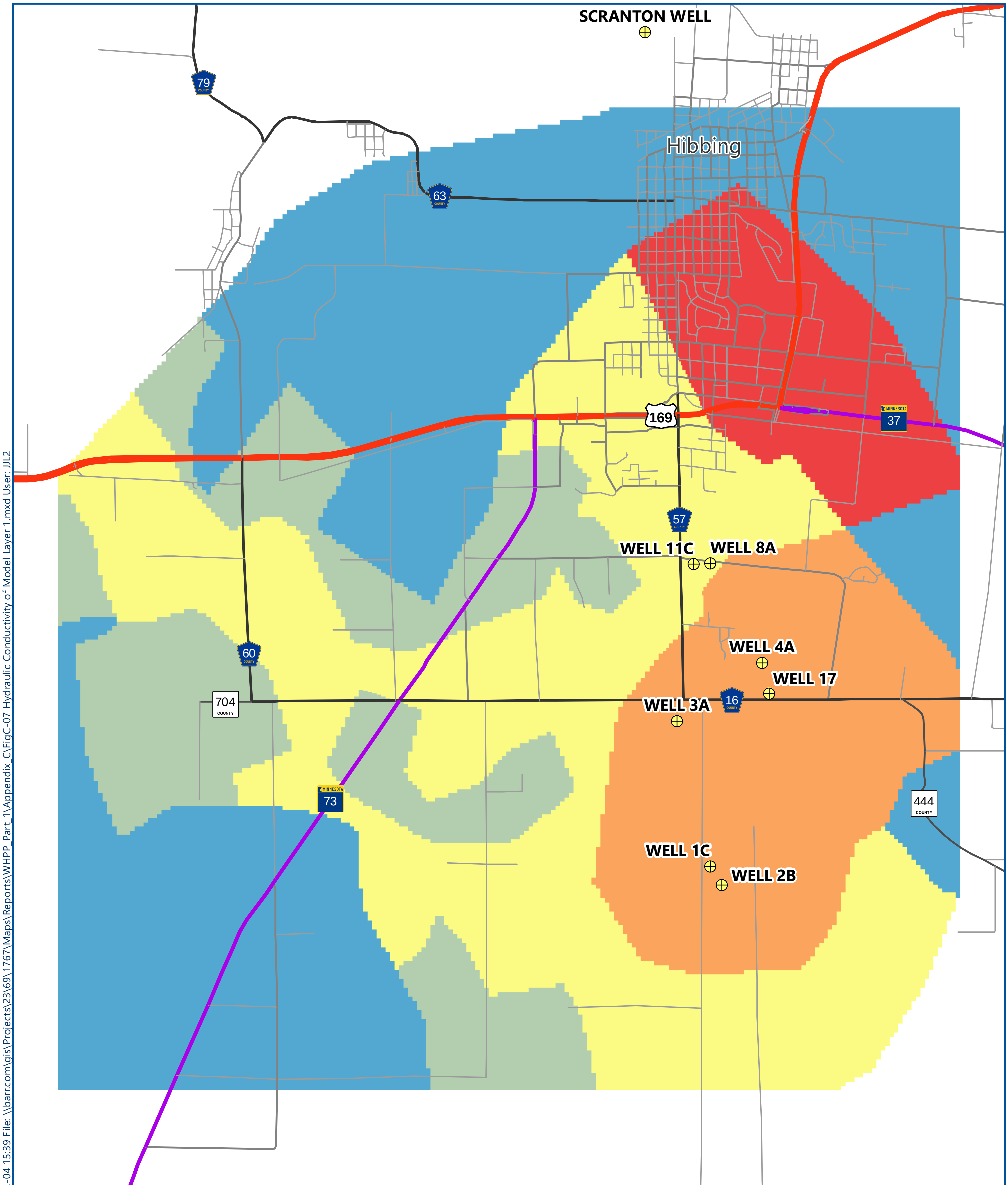


BOTTOM ELEVATION OF MODEL LAYER 3
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE C-5

Barr Footer: ArcGIS 10.7.1, 2021-02-05 13:50 File: \\barr.com\gis\Projects\23\69\1767\Maps\Reports\WHPP_Part_1\Appendix_C\FigC-05 Bottom Elevation of Model Layer 3.mxd User: JJL2


SCRANTON WELL
Hibbing
79
63
169
37
57
60
704 COUNTY
16
73
444 COUNTY
80 - 120 ft
80 - 120 ft
< 40 ft
< 40 ft
40 - 80 ft
80 - 120 ft
80 - 120 ft
< 40 ft
WELL 8A
WELL 11C
< 40 ft
> 120 ft
WELL 4A
WELL 17
WELL 3A
40 - 80 ft
< 40 ft
WELL 1C
WELL 2-B
Hibbing Municipal Well
Glacial Aquifer Thickness (Lindholm, 1968)
Elevation (m)
374 - 380
380 - 400
400 - 420
420 - 440
440 - 460
460 - 480
Layer 4 bottom lowered
N
0
2,000
4,000
Feet
BARR
BOTTOM ELEVATION OF MODEL LAYER 4
Hibbing WHPP Amendment
City of Hibbing, MN
FIGURE C-6



Hibbing Municipal Well

Kx (m/day)

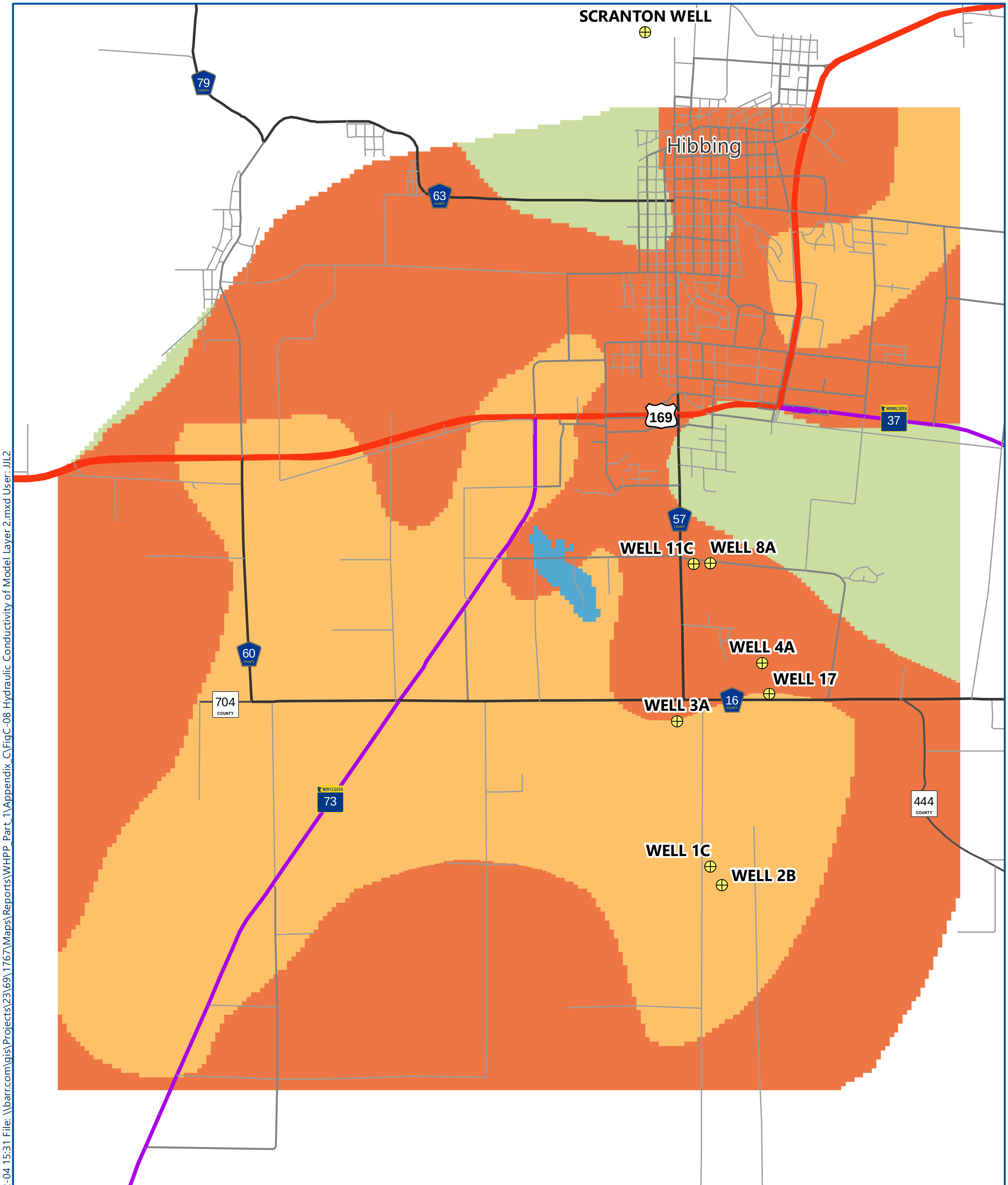
2.00	
5.00	
13.94	
70.83	
83.26	

0 2,000 4,000
Feet

BARR

HYDRAULIC CONDUCTIVITY OF MODEL LAYER 1
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE C-7



Hibbing Municipal Well

Kx (m/day)

	1.00
	25.00
	70.83
	0.01524

0 2,000 4,000

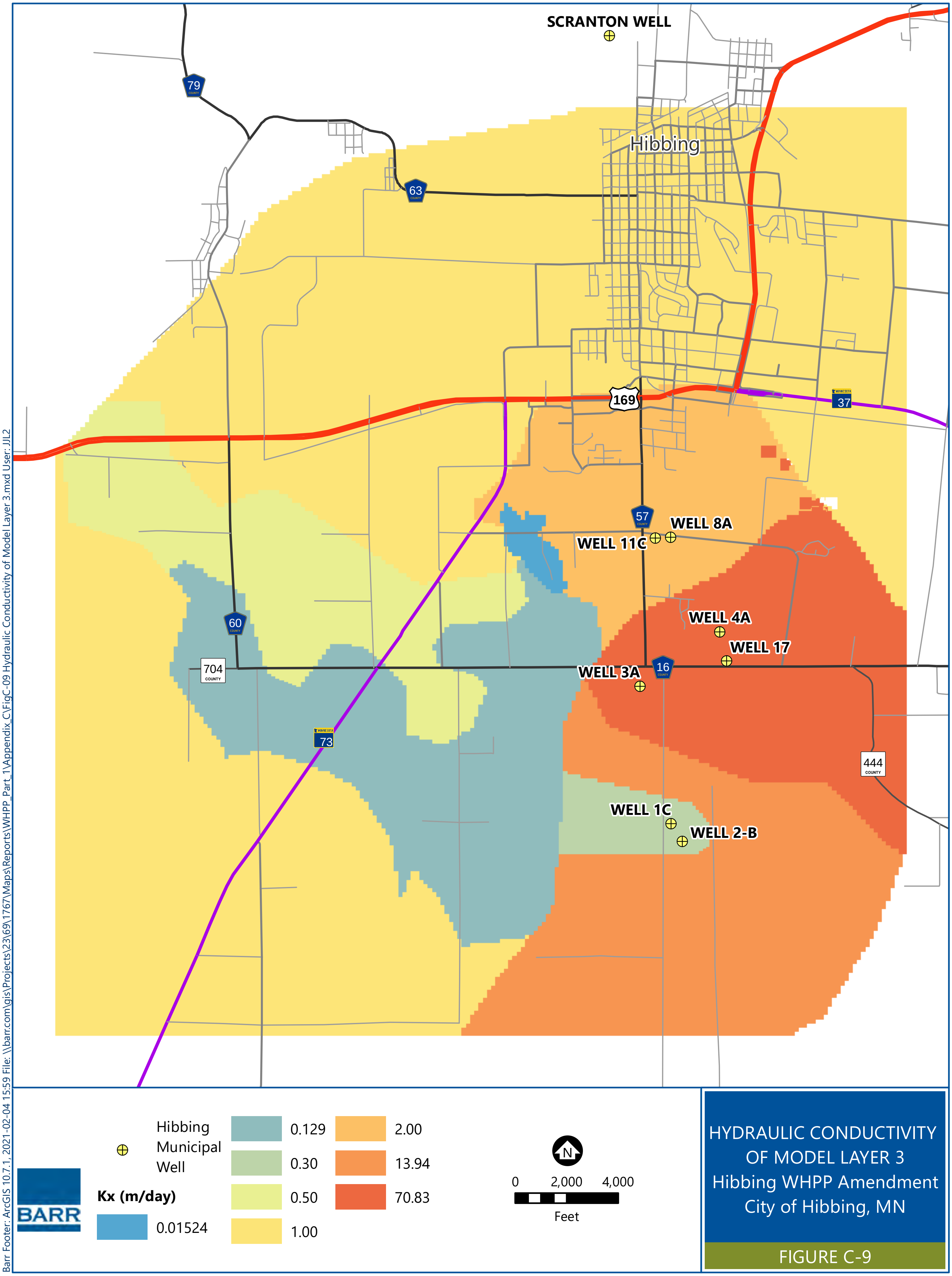
Feet

HYDRAULIC CONDUCTIVITY OF MODEL LAYER 2

Hibbing WHPP Amendment

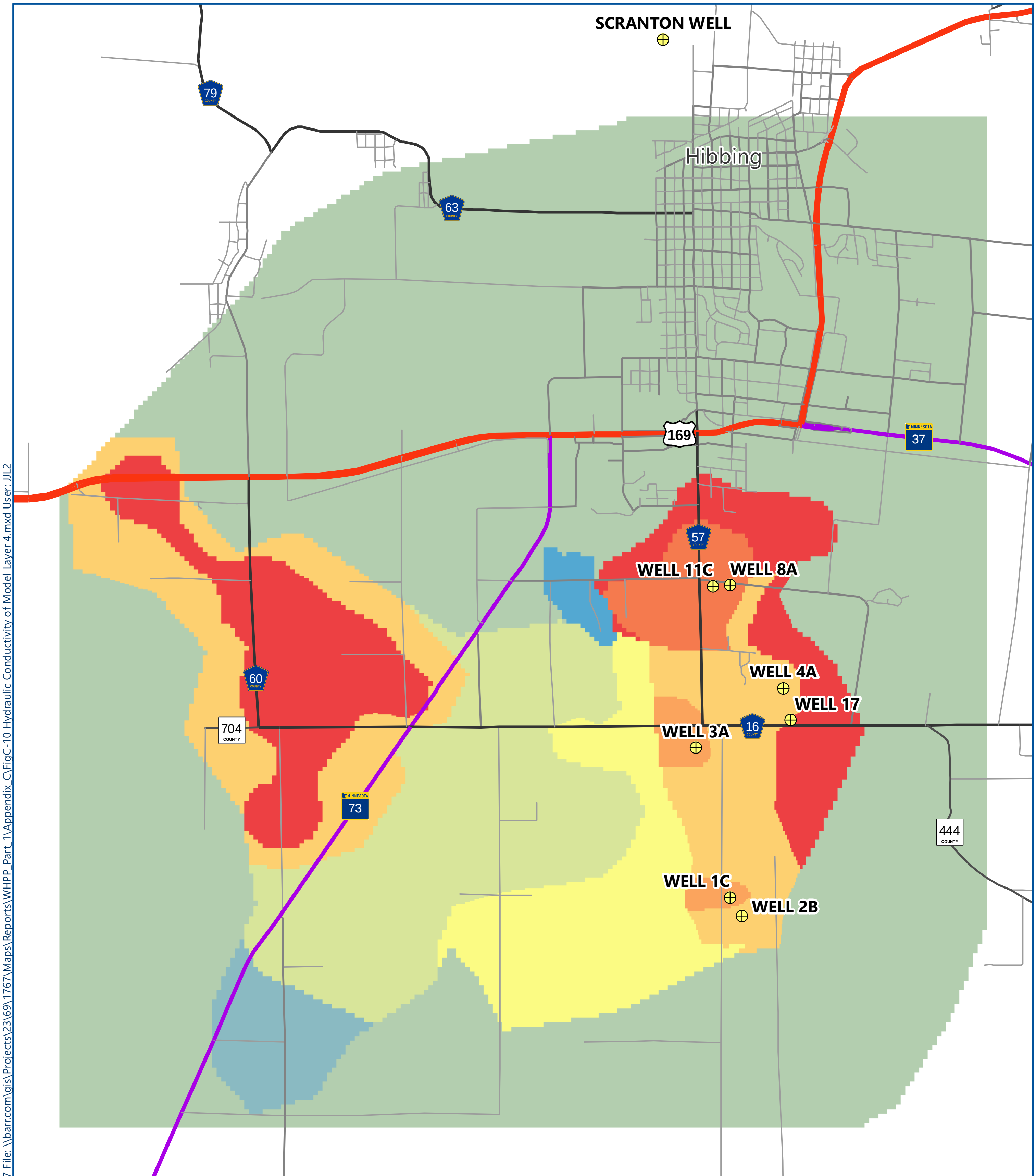
City of Hibbing, MN

FIGURE C-8



HYDRAULIC CONDUCTIVITY OF MODEL LAYER 3
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE C-9



⊕ Hibbing Municipal Well

Kx (m/day)

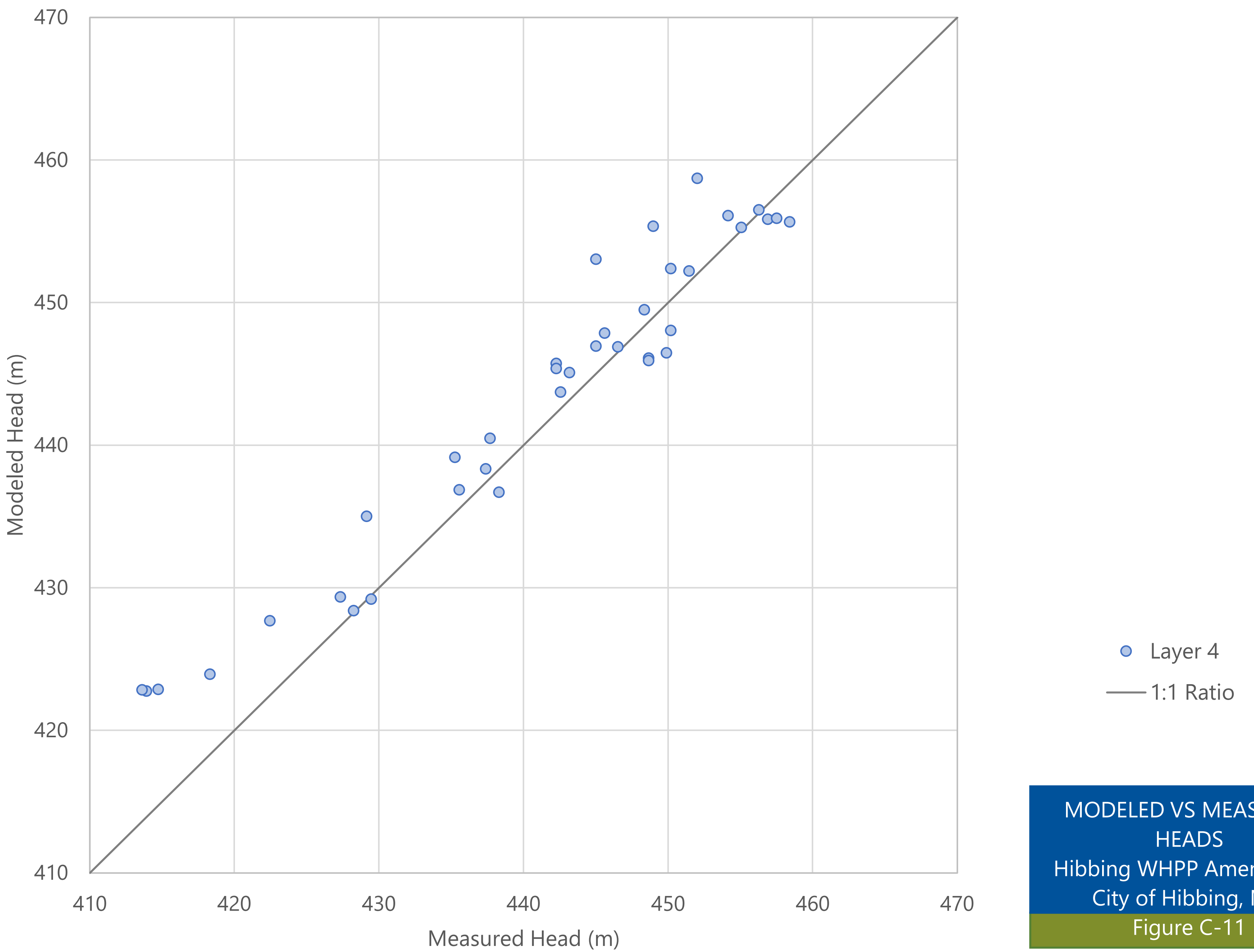
0.01524	1.00	13.94	60.00
0.50	5.00	33.31	79.248
			83.26

0 2,000 4,000
Feet

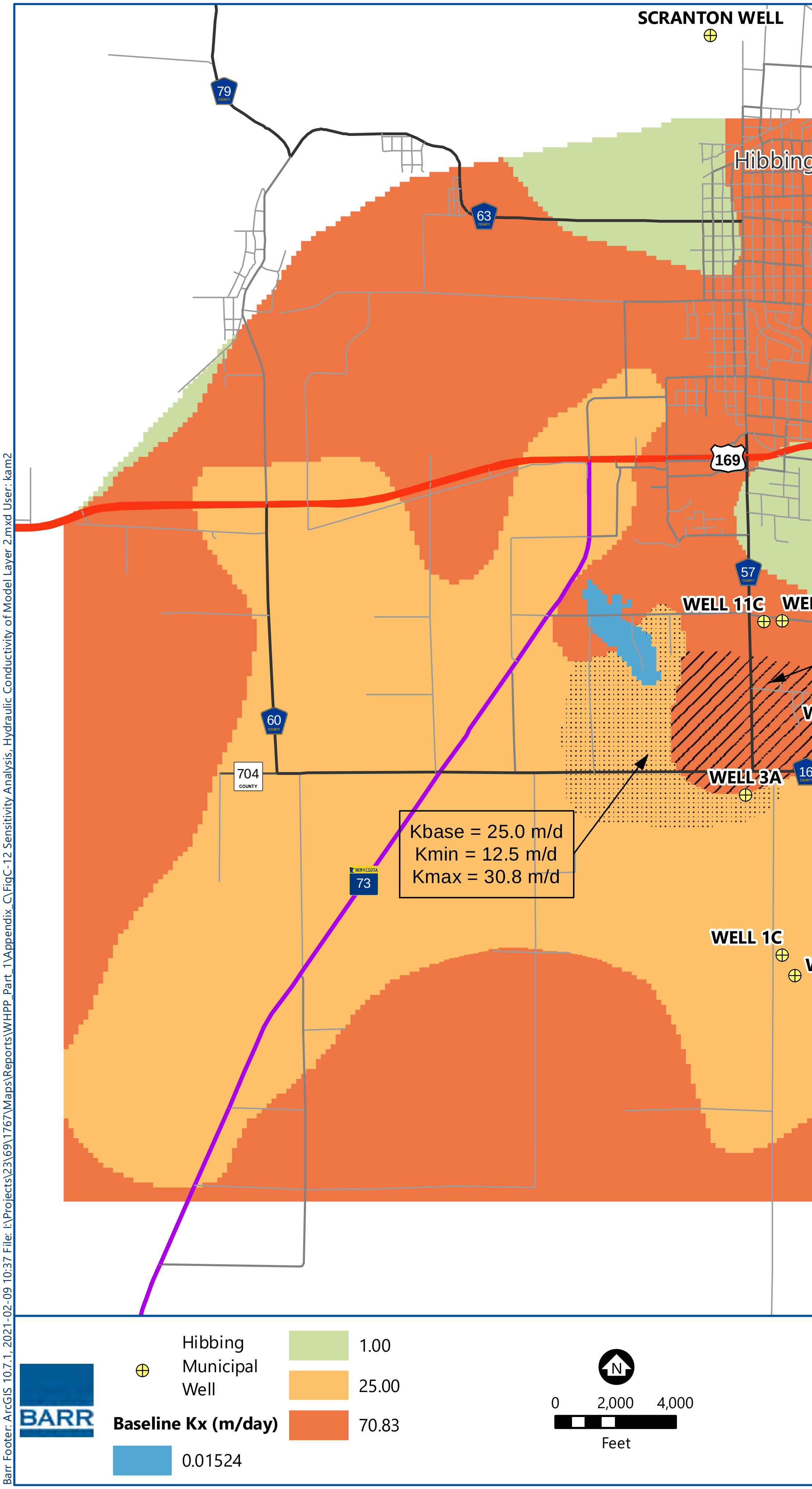
BARR

HYDRAULIC CONDUCTIVITY OF MODEL LAYER 4
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE C-10

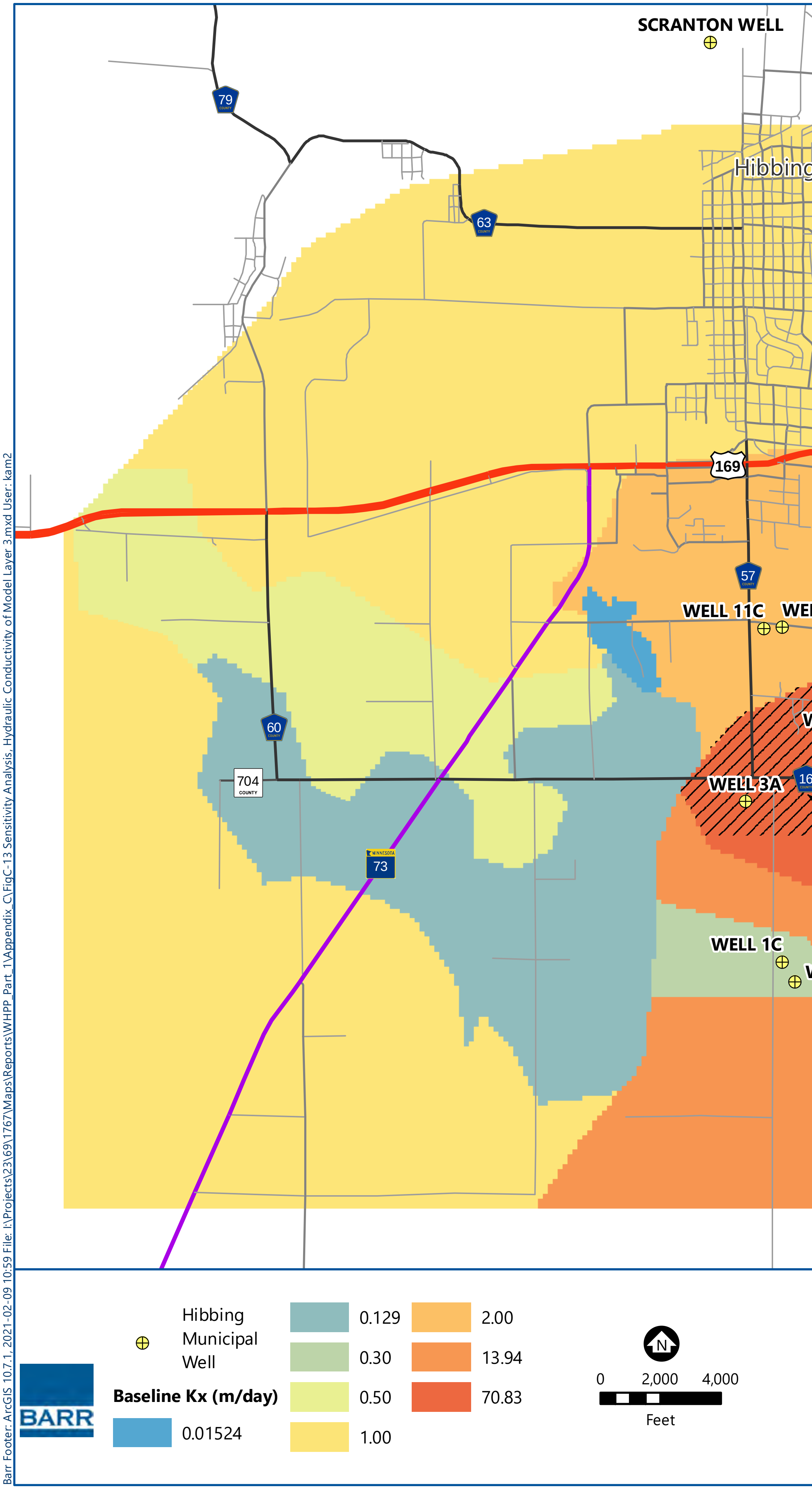


MODELED VS MEASURED HEADS
Hibbing WHPP Amendment
City of Hibbing, MN
Figure C-11



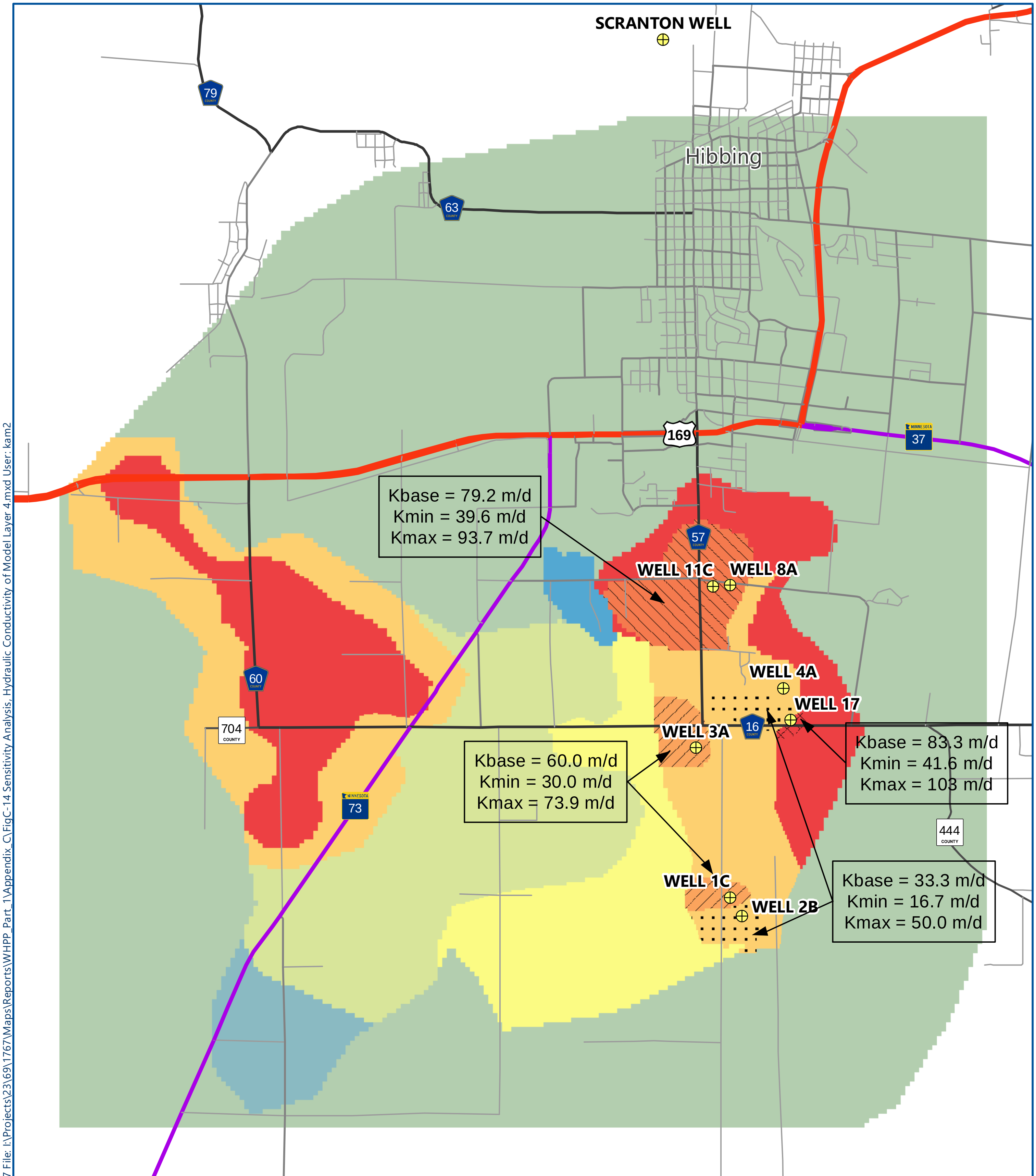
SENSITIVITY ANALYSIS
HYDRAULIC CONDUCTIVITY
OF MODEL LAYER 2
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE C-12



SENSITIVITY ANALYSIS
HYDRAULIC CONDUCTIVITY
OF MODEL LAYER 3
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE C-13



Hibbing Municipal Well

Baseline Kx (m/day)

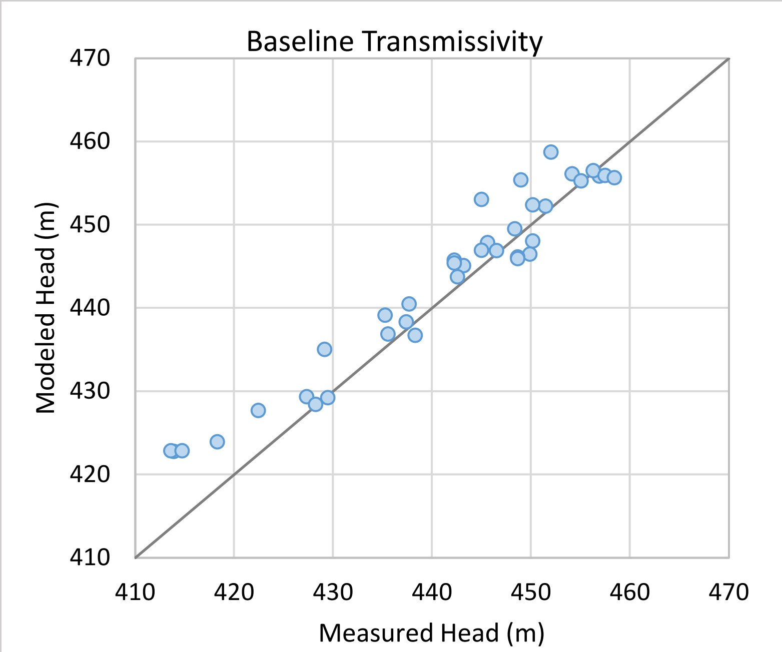
0.01524
0.50
1.00
5.00
13.94
33.31
60.00
79.248
83.26

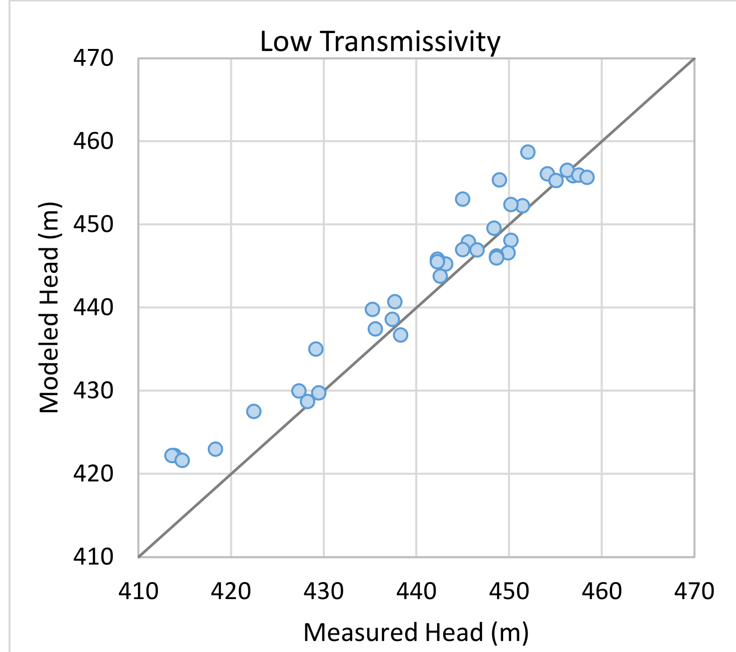
0 2,000 4,000
Feet

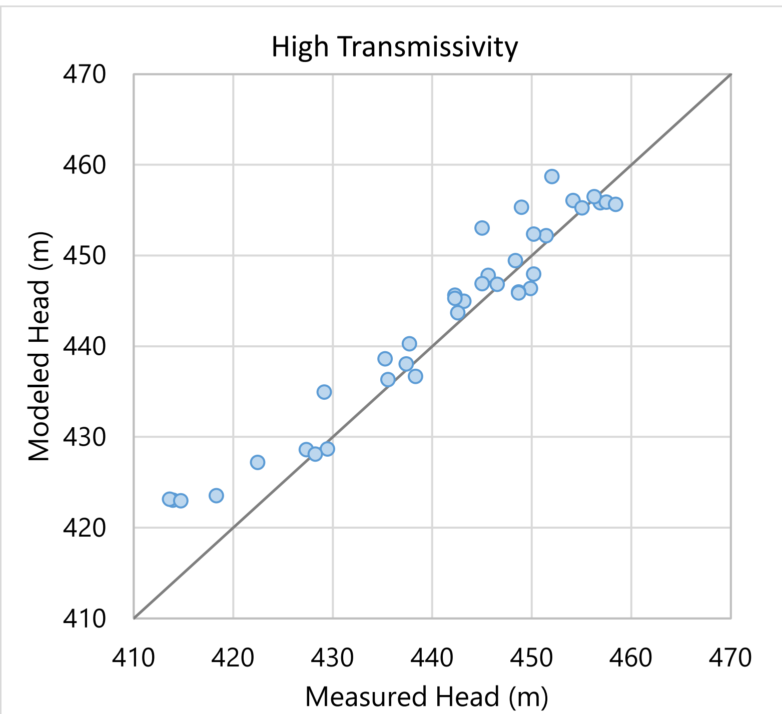
BARR

SENSITIVITY ANALYSIS
HYDRAULIC CONDUCTIVITY
OF MODEL LAYER 4
Hibbing WHPP Amendment
City of Hibbing, MN

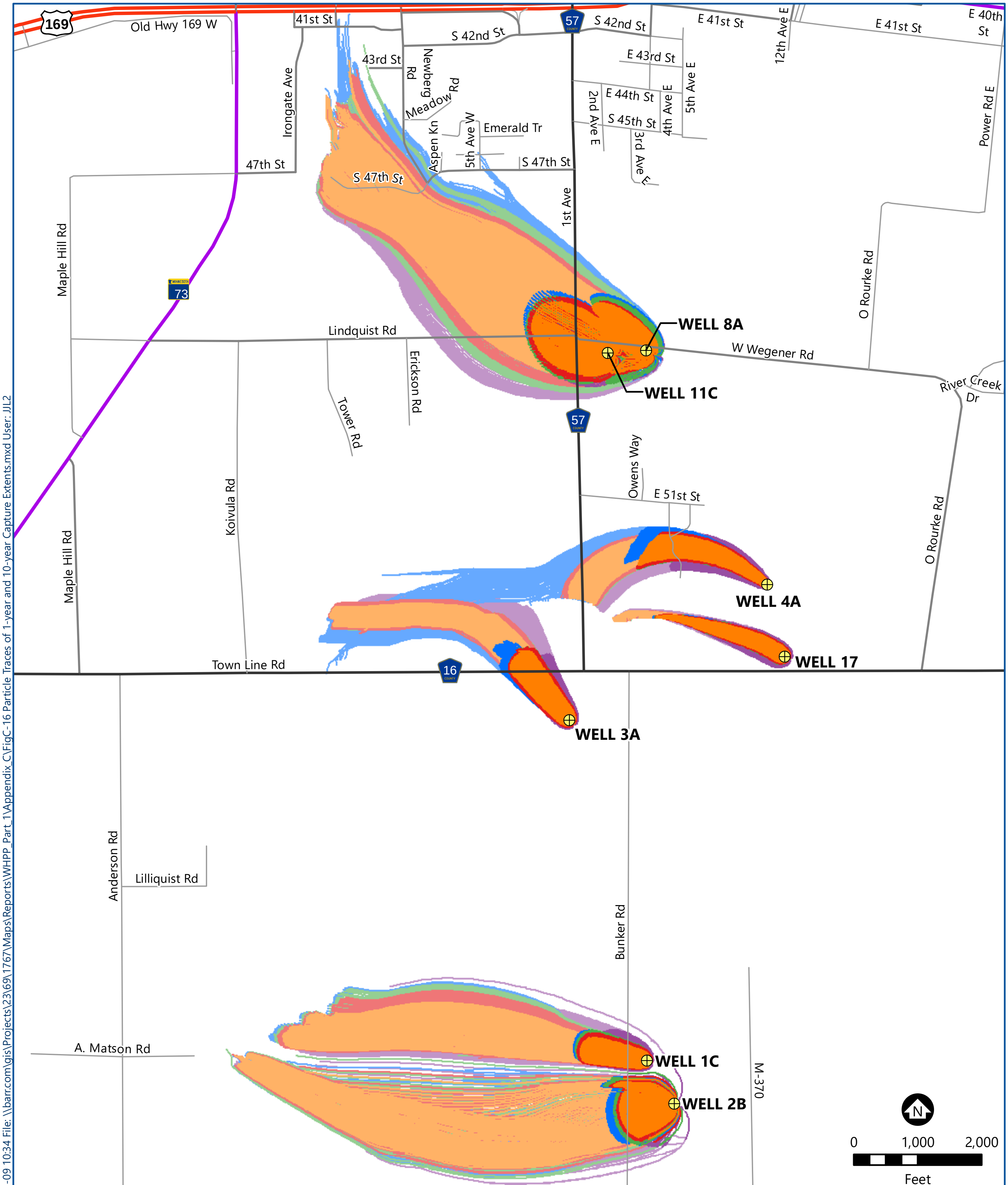
FIGURE C-14







CALIBRATION COMPARISON
Hibbing WHPP Amendment
City of Hibbing, MN
Figure C-15



Hibbing Municipal Well

Pumping Scenarios (1 Year)

Particle Scenario 1

Particle Scenario 2

Particle Scenario 2 Minimum Hydraulic Conductivity

Particle Scenario 2 Maximum Hydraulic Conductivity

Particle Scenario 3

Pumping Scenarios (10 Year)

Particle Scenario 1

Particle Scenario 2

Particle Scenario 2 Minimum Hydraulic Conductivity

Particle Scenario 2 Maximum Hydraulic Conductivity

Particle Scenario 3

BARR

PARTICLE TRACES OF 1-YEAR AND 10-YEAR CAPTURE EXTENTS
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE C-16

Table C-1

Sensitivity Values
Hibbing Part 1 WHPP Amendment

Well	Calibrated Transmissivity (ft^2/d)	Low Transmissivity (ft^2/d)	High Transmissivity (ft^2/d)	Modeled Thickness (ft)	Baseline Hydraulic Conductivity (ft/d)	Low Hydraulic Conductivity (ft/d)	High Hydraulic Conductivity (ft/d)
1C	14,155	7,077	17,443	71.9	196.9	98.4	242.6
2B	9,509	4,755	14,264	87.0	109.3	54.6	163.9
3A	18,584	9,292	22,901	64.2, 15.1, 49.9	82.0, 232.4, 196.9	41.0, 116.2, 98.4	101.1, 286.4, 242.6
4A	15,630	7,815	23,445	67.3	232.4	116.2	348.6
8A	7,560	3,780	8,940	29.1	260.0	130.0	307.4
11C	10,217	5,108	12,081	39.3	260.0	130.0	307.4
17	13,114	6,557	16,160	21.4, 29.8	232.4, 273.2	116.2, 136.6	286.4, 336.6

Appendix D

Fracture Flow Calculations

Hibbing Municipal Well

Scenario 1 1-year time of travel

Scenario 3 1-year time of travel

Scenario 1 10-year time of travel

Scenario 3 10-year time of travel

0 500 1,000

Feet

N

BARR

TIME OF TRAVEL ZONES
SCRANTON WELL
Hibbing WHPP Amendment
City of Hibbing, MN

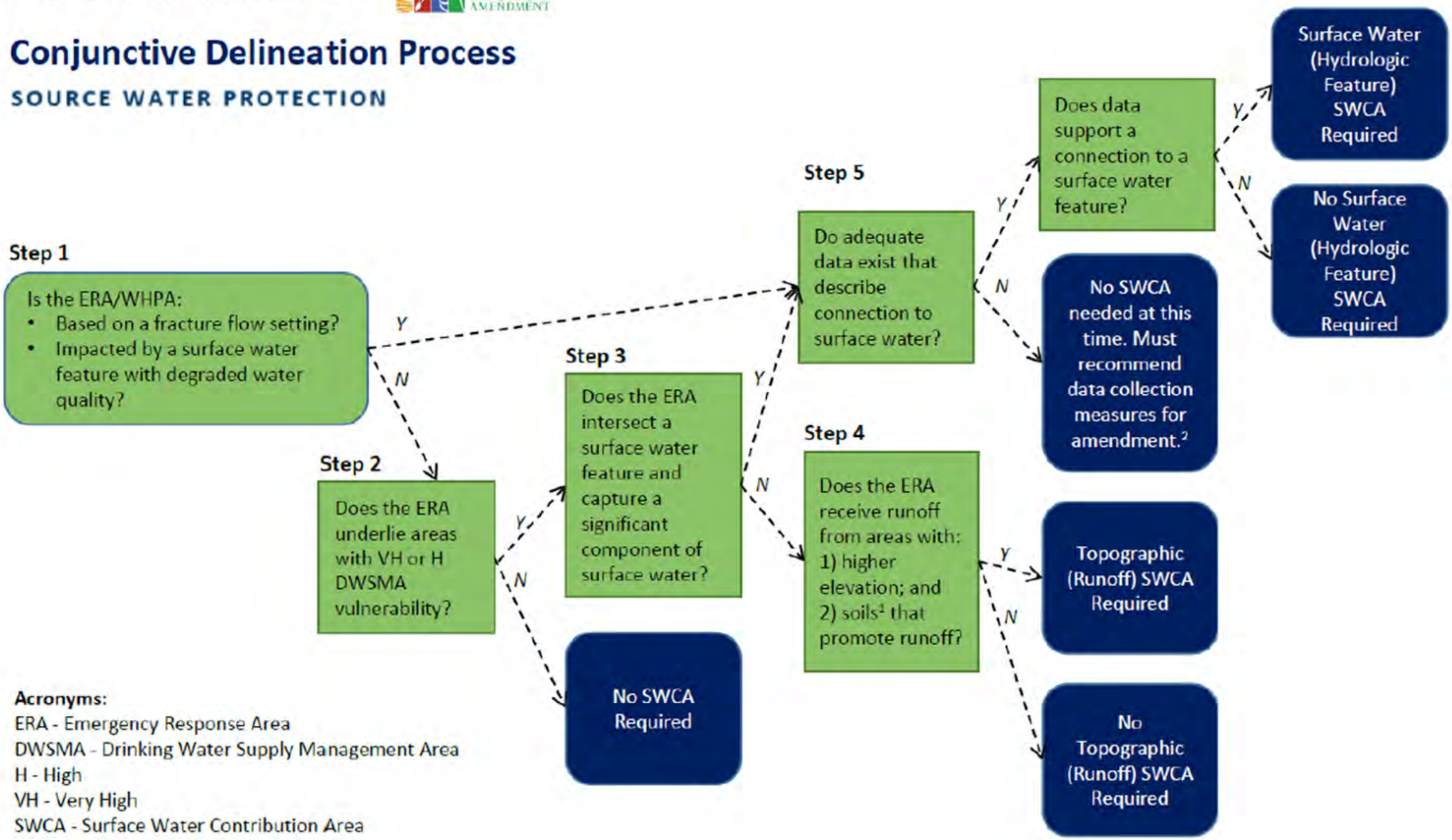
FIGURE D1

DEPARTMENT OF HEALTH

CLEAN WATER LAND & LEGACY AMENDMENT

Conjunctive Delineation Process

SOURCE WATER PROTECTION



Acronyms:

ERA - Emergency Response Area
DWSMA - Drinking Water Supply Management Area
H - High
VH - Very High
SWCA - Surface Water Contribution Area
WHPA - Wellhead Protection Area

[1]*Hydrologic Groups C and D*

[2]*Amendments: If previously existing SWCA was based on inadequate data, refrain from removing SWCA while additional data is gathered.*

11/4/19 Modified from Figure 1 in Draft Conjunctive Delineation Guidance (MDH, 2019).

P:\Hibbing\23 MN\69\23691767 Wellhead Protection Plan\WorkFiles\2021 Amendment\report\appendices\D-Fracture Flow\Figure D2.docx

CONJUNCTIVE DELINEATION PROCESS
Hibbing WHPP Amendment
City of Hibbing, MN
Figure D2

Table D1
Fracture Flow Calculations Summary
Hibbing WHPP Amendment

		Airport Well		Scranton Well	
	Aquifer Thickness (m)	50.6		22.9	
	Effective Porosity	0.01		0.1	
Pumping Scenario 1	Pumping Rate (m^3/d)	207.4		736.3	
	Pumping Duration (d)	365	3650	182	1825
	Fixed Capture Radius (m)	218.2	690.1	136.5	432.2
Pumping Scenario 2	Pumping Rate (m^3/d)	242.7		0	
	Pumping Duration (d)	365	3650	--	--
	Fixed Capture Radius (m)	236.1	746.5	--	--
Pumping Scenario 3	Pumping Rate (m^3/d)	155.6		2,043.1	
	Pumping Duration (d)	365	3650	182	1825
	Fixed Capture Radius (m)	189	597.7	227.3	719.9

Appendix E

MDH Well Vulnerability Assessments

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:	1690022	TIER:	1
SYSTEM NAME:	Hibbing	WHP RANK:	
WELL NAME:	Airport Well	UNIQUE WELL #:	00716190

COUNTY: St. Louis | TOWNSHIP NUMBER: | RANGE: | SECTION: | QUARTERS:

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Virginia Formation	
DNR Geologic Sensitivity Rating	:	Low	20
L Score	:	3	
Geologic Data From	:	Well Record	
Year Constructed	:	2005	
Construction Method	:	Rotary/Drilled	0
Casing Depth	:	89	10
Well Depth	:	255	
Casing grouted into borehole?		Yes	0
Cement grout between casings?		Not applicable	0
All casings extend to land surface?		Yes	0
Gravel - packed casings?		Not applicable	0
Wood or masonry casing?		No	0
Holes or cracks in casing?		No	0
Isolation distance violations?			0
Pumping Rate	:	100	5
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	<.05 01/29/2013	0
Maximum tritium detected	:	1.54 07/16/2015	VULNERABLE
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		35
Wellhead Protection Vulnerability Rating	:		VULNERABLE
Vulnerability Overridden	:		

COMMENTS

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

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

PWSID: 1690022 | TIER: 1
SYSTEM NAME: Hibbing | WHP RANK:
WELL NAME: Scranton Well | UNIQUE WELL #: 00147463

COUNTY: St. Louis | TOWNSHIP NUMBER: 57 | RANGE: 21 W | SECTION: 12 | QUARTERS: ADBC

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Biwabik Iron-Formation	
DNR Geologic Sensitivity Rating	:	Low	20
L Score	:	2	
Geologic Data From	:	Well Record	
Year Constructed	:	1984	
Construction Method	:	Rotary/Drilled	0
Casing Depth	:	460	0
Well Depth	:	535	
Casing grouted into borehole?		Yes	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	:	515	10
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	.75 08/06/1998	0
Maximum tritium detected	:	2.72 07/16/2015	VULNERABLE
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	M	0
Wellhead Protection Score	:		30
Wellhead Protection Vulnerability Rating	:		VULNERABLE
Vulnerability Overridden	:		

COMMENTS

Previous tritium result of 33.5 TU on 6/13/1988.

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: 1690022
SYSTEM NAME: Hibbing
WELL NAME: Well #11C

TIER: 1
WHP RANK:
UNIQUE WELL #: 00233061

COUNTY: St. Louis | TOWNSHIP NUMBER: 57 | RANGE: 20 W | SECTION: 31 | QUARTERS: BBBA

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Quaternary Buried Artesian Aquifer	
DNR Geologic Sensitivity Rating	:	Very low	15
L Score	:	5	
Geologic Data From	:	Well Record	
Year Constructed	:	1973	
Construction Method	:	Rotary/Drilled	0
Casing Depth	:	112	10
Well Depth	:	142	
Casing grouted into borehole?		Yes	0
Cement grout between casings?		Not applicable	0
All casings extend to land surface?		Yes	0
Gravel - packed casings?		Unknown	5
Wood or masonry casing?		No	0
Holes or cracks in casing?		No	0
Isolation distance violations?			0
Pumping Rate	:	450	5
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	<.05 04/16/2014	0
Maximum tritium detected	:	7.44 07/16/2015	VULNERABLE
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		35
Wellhead Protection Vulnerability Rating	:		VULNERABLE
Vulnerability Overridden	:		

COMMENTS

Construction information updated 7/23/03 based on information provided by Corey Lubovich at the City of Hibbing.

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

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

PWSID: 1690022 — TIER: 1
SYSTEM NAME: Hibbing — WHP RANK:
WELL NAME: Well #17 — UNIQUE WELL #: 00778015

COUNTY: St. Louis TOWNSHIP NUMBER: RANGE: SECTION: QUARTERS:

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Quaternary Buried Artesian Aquifer	
DNR Geologic Sensitivity Rating	:	Medium	25
L Score	:		
Geologic Data From	:	Well Record	
Year Constructed	:	2011	
Construction Method	:	Rotary/Drilled	0
Casing Depth	:	96	10
Well Depth	:	140	
Casing grouted into borehole?		Unknown	5
Cement grout between casings?		Not applicable	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	:	200	5
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	<.05 04/16/2014	0
Maximum tritium detected	:	4.24 07/16/2015	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

625 Robert St. N. St. Paul MN 55155
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MINNESOTA DEPARTMENT OF HEALTH
SECTION OF DRINKING WATER PROTECTION
SWP Vulnerability Rating

PWSID: 1690022
SYSTEM NAME: Hibbing
WELL NAME: Well #18

TIER: 1
WHP RANK:
UNIQUE WELL #: 00791017

COUNTY: St. Louis TOWNSHIP NUMBER: RANGE: SECTION: QUARTERS:

CRITERIA		DESCRIPTION		POINTS
Aquifer Name(s)	:	Quaternary Water Table Aquifer		
DNR Geologic Sensitivity Rating	:	High		0
L Score	:	0		
Geologic Data From	:	Well Record		
Year Constructed	:	2013		
Construction Method	:	Cable Tool/Bored		0
Casing Depth	:	59		10
Well Depth	:	97		
Casing grouted into borehole?		Not applicable		0
Cement grout between casings?		Not applicable		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?		No		0
Isolation distance violations?				0
Pumping Rate	:			0
Pathogen Detected?				0
Surface Water Characteristics?				0
Maximum nitrate detected	:	<.05	08/18/2015	0
Maximum tritium detected	:	8.05	07/16/2015	VULNERABLE
Non-THMS VOCs detected?				0
Pesticides detected?				0
Carbon 14 age	:	Unknown		0
Wellhead Protection Score	:			10
Wellhead Protection Vulnerability Rating	:			VULNERABLE
Vulnerability Overridden	:			

COMMENTS

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

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PWSID: 1690022
SYSTEM NAME: Hibbing
WELL NAME: Well #1C

TIER: 1
WHP RANK:
UNIQUE WELL #: 00233054

COUNTY: St. Louis TOWNSHIP NUMBER: 56 RANGE: 20 W SECTION: 7 QUARTERS: BBBB

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Quaternary Water Table Aquifer	
DNR Geologic Sensitivity Rating	:	High	0
L Score	:	0	
Geologic Data From	:	Well Record	
Year Constructed	:	1973	
Construction Method	:	Rotary/Drilled	0
Casing Depth	:	70	10
Well Depth	:	100	
Casing grouted into borehole?		Yes	0
Cement grout between casings?		Not applicable	0
All casings extend to land surface?		Yes	0
Gravel - packed casings?		Unknown	5
Wood or masonry casing?		No	0
Holes or cracks in casing?		Unknown	0
Isolation distance violations?			0
Pumping Rate	:	500	5
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	<.4 12/21/1989	0
Maximum tritium detected	:	8.9 04/03/2013	VULNERABLE
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		20
Wellhead Protection Vulnerability Rating	:		VULNERABLE
Vulnerability Overridden	:		

COMMENTS
Construction information updated 7/23/03 based on information provided by Corey Lubovich at the City of Hibbing.

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

PWSID: 1690022	TIER: 1
SYSTEM NAME: Hibbing	WHP RANK:
WELL NAME: Well #2B	UNIQUE WELL #: 00792077

COUNTY: St. Louis   TOWNSHIP NUMBER: RANGE: SECTION: QUARTERS:

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Quaternary Buried Artesian Aquifer	
DNR Geologic Sensitivity Rating	:	High	0
L Score	:	0	
Geologic Data From	:	Well Record	
Year Constructed	:	2013	
Construction Method	:	Cable Tool/Bored	0
Casing Depth	:	70	10
Well Depth	:	103	
Casing grouted into borehole?		Not applicable	0
Cement grout between casings?		Not applicable	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?		No	0
Isolation distance violations?			0
Pumping Rate	:		0
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	Unknown	0
Maximum tritium detected	:	9.33 07/16/2015	VULNERABLE
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		10
Wellhead Protection Vulnerability Rating	:		VULNERABLE
Vulnerability Overridden	:		

COMMENTS

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

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PWSID: 1690022 TIER: 1
SYSTEM NAME: Hibbing WHP RANK:
WELL NAME: Well #3A UNIQUE WELL #: 00233056

COUNTY: St. Louis TOWNSHIP NUMBER: 56 RANGE: 21 W SECTION: 1 QUARTERS: AACA

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Quaternary Buried Artesian Aquifer	
DNR Geologic Sensitivity Rating	:	Low	20
L Score	:	3	
Geologic Data From	:	Well Record	
Year Constructed	:	1934	
Construction Method	:	Rotary/Drilled	0
Casing Depth	:	105	10
Well Depth	:	145	
Casing grouted into borehole?		Yes	0
Cement grout between casings?		No	10
All casings extend to land surface?		Yes	0
Gravel - packed casings?		Yes	20
Wood or masonry casing?		No	0
Holes or cracks in casing?		No	0
Isolation distance violations?			0
Pumping Rate	:	550	10
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	<.05 04/16/2014	0
Maximum tritium detected	:	3.7 04/03/2013	VULNERABLE
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	M	0
Wellhead Protection Score	:		70
Wellhead Protection Vulnerability Rating	:		VULNERABLE
Vulnerability Overridden	:		

COMMENTS

Construction information updated 7/23/03 based on information provided by Corey Lubovich at the City of Hibbing. This well was reconstructed in 1960 and again in 1994. 1994 log was the source of the shallower casing depth.

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

PWSID: 1690022 | TIER: 1
SYSTEM NAME: Hibbing | WHP RANK:
WELL NAME: Well #4A | UNIQUE WELL #: 00271992

COUNTY: St. Louis | TOWNSHIP NUMBER: | RANGE: | SECTION: | QUARTERS:

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Quaternary Buried Artesian Aquifer	
DNR Geologic Sensitivity Rating	:	High	0
L Score	:		
Geologic Data From	:	Well Record	
Year Constructed	:	1944 (Year Reconstructed 2012)	
Construction Method	:	Cable Tool/Bored	0
Casing Depth	:	53	10
Well Depth	:	79	
Casing grouted into borehole?		Yes	0
Cement grout between casings?		Unknown	5
All casings extend to land surface?		Yes	0
Gravel - packed casings?		Unknown	0
Wood or masonry casing?		No	0
Holes or cracks in casing?		Unknown	0
Isolation distance violations?			0
Pumping Rate	:	180	5
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	.2 04/16/2014	0
Maximum tritium detected	:	6.81 07/16/2015	VULNERABLE
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		20
Wellhead Protection Vulnerability Rating	:		VULNERABLE
Vulnerability Overridden	:		

COMMENTS

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

PWSID: 1690022 — TIER: 1
SYSTEM NAME: Hibbing — WHP RANK:
WELL NAME: Well #8A — UNIQUE WELL #: 00233058

COUNTY: St. Louis — TOWNSHIP NUMBER: 57 — RANGE: 20 W — SECTION: 31 — QUARTERS: BBAA

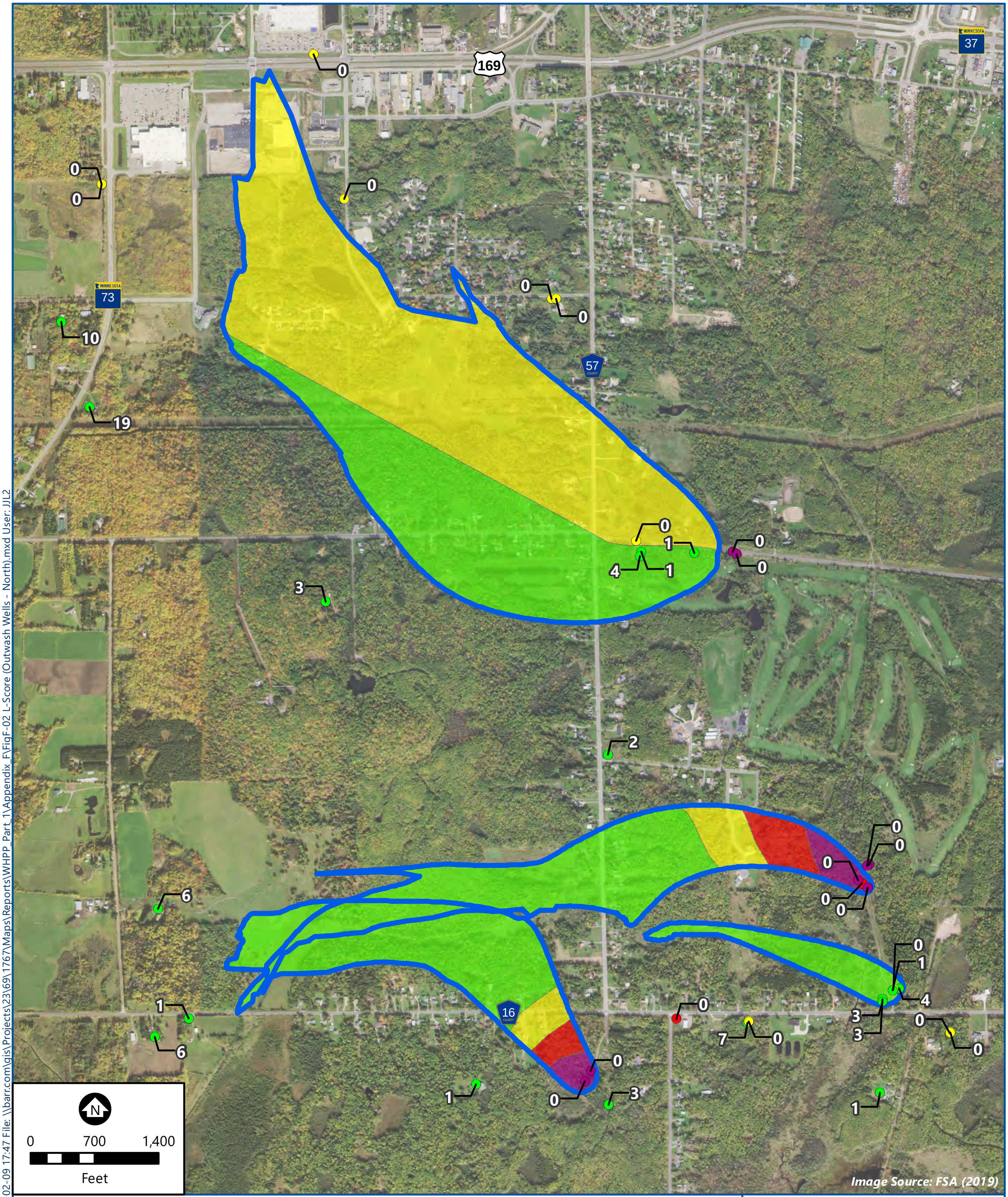
CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Quaternary Buried Artesian Aquifer	
DNR Geologic Sensitivity Rating	:	Low	20
L Score	:	1	
Geologic Data From	:	Well Record	
Year Constructed	:	1944	
Construction Method	:	Rotary/Drilled	0
Casing Depth	:	108	10
Well Depth	:	135	
Casing grouted into borehole?		Yes	0
Cement grout between casings?		No	10
All casings extend to land surface?		Yes	0
Gravel - packed casings?		Yes	20
Wood or masonry casing?		No	0
Holes or cracks in casing?		No	0
Isolation distance violations?			0
Pumping Rate	:	500	5
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	<1 10/01/1970	0
Maximum tritium detected	:	6.9 04/03/2013	VULNERABLE
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		65
Wellhead Protection Vulnerability Rating	:		VULNERABLE
Vulnerability Overridden	:		

COMMENTS

Construction information updated 7/23/03 based on information provided by Corey Lubovich at the City of Hibbing.

Appendix F

L-Score and Geologic Sensitivity Maps



L-Score Geologic Sensitivity

- Low
- Moderate
- High
- Very High

Wellhead Protection Area

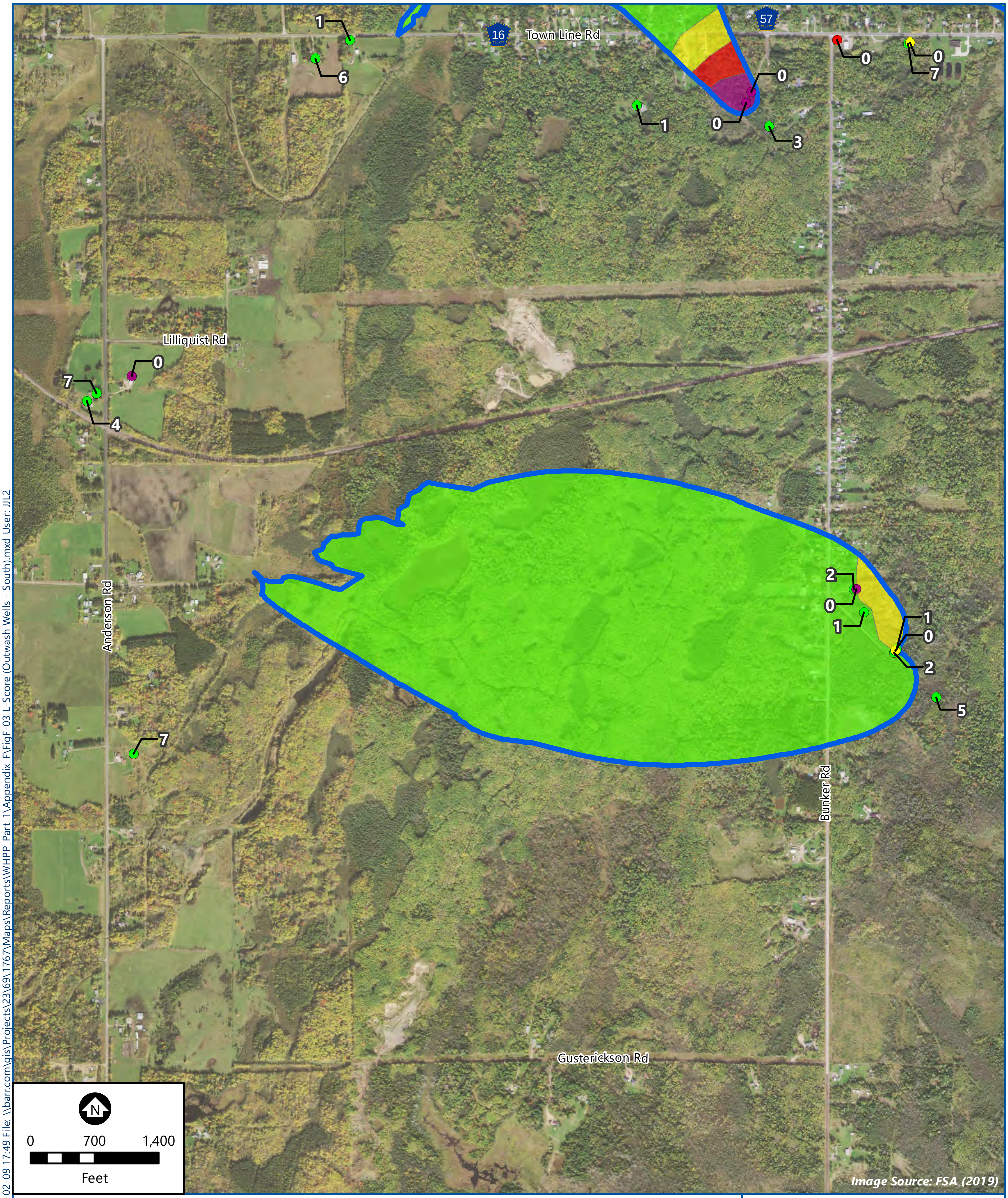
Geologic Sensitivity

- Low
- Moderate
- High
- Very High

BARR

L-SCORES
OUTWASH WELLS
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE F-1



L-Score Geologic Sensitivity

Low

Moderate

High

Very High

Wellhead Protection Area

Geologic Sensitivity

Low

Moderate

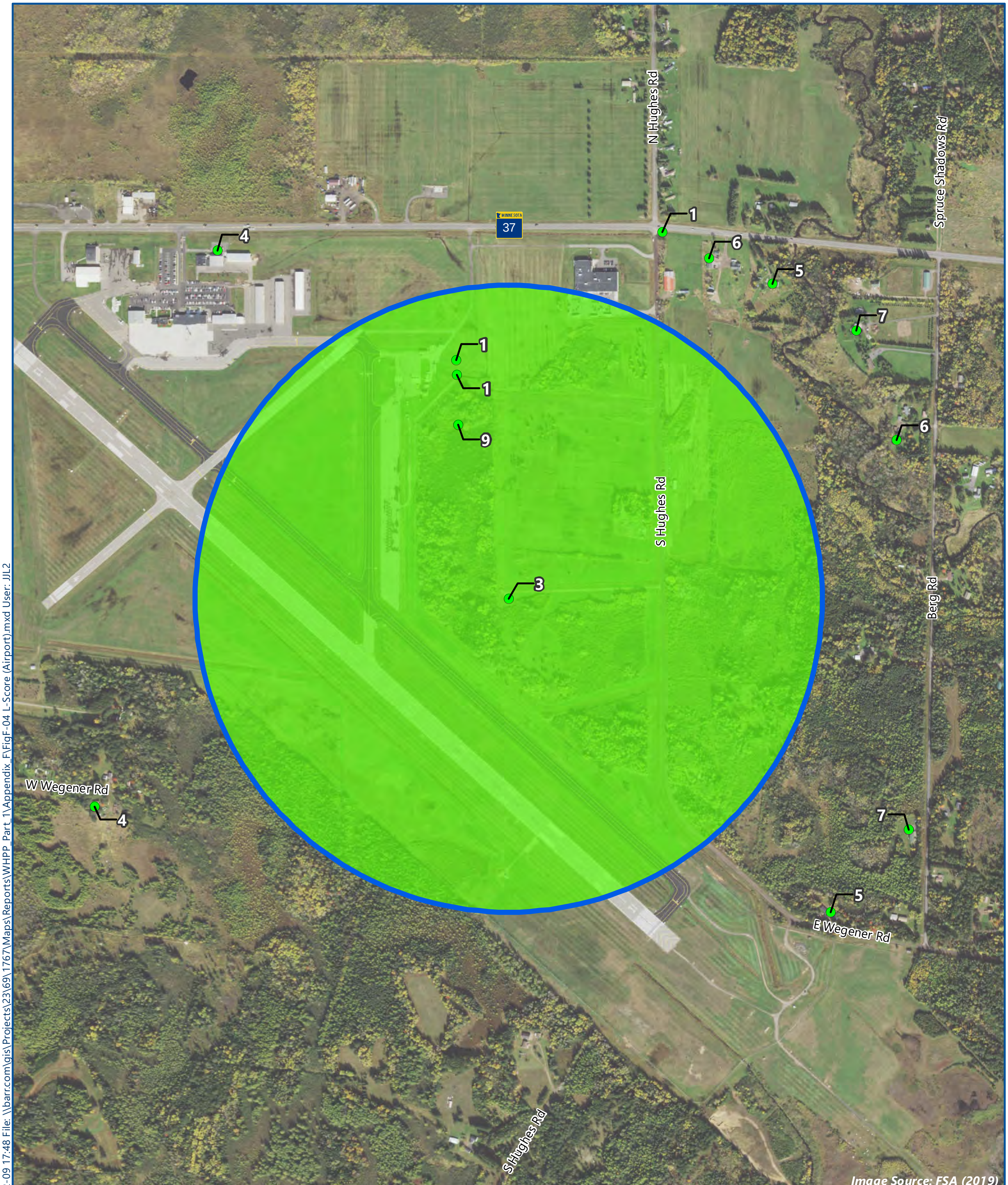
High

Very High

BARR

L-SCORES
OUTWASH WELLS
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE F-2



Barr Footer: ArcGIS 10.7.1, 2021-02-09 17:48 File: \\barr.com\gis\Projects\23\69\1767\Maps\Reports\WHPP_Part_1\Appendix_F\FigF-04 L-Score (Airport).mxd User: JJL2

BARR

L-Score Geologic Sensitivity

Low

Wellhead Protection Area

Geologic Sensitivity

Low

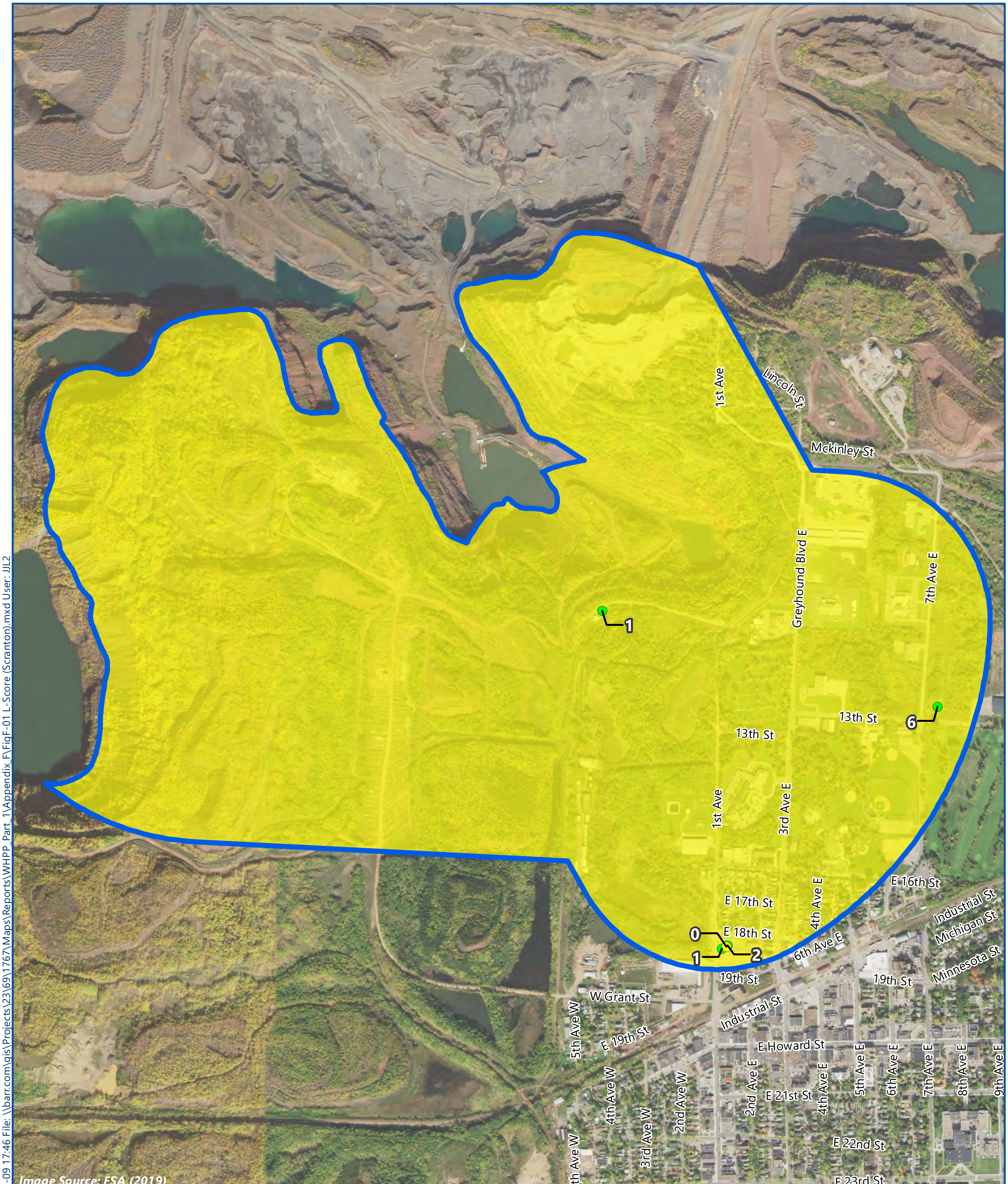
N

0 500 1,000

Feet

L-SCORES
AIRPORT WELL
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE F-3



L-Score Geologic Sensitivity

Low

Moderate

Groundwater Capture Area

Geologic Sensitivity

Moderate

N

0 600 1,200

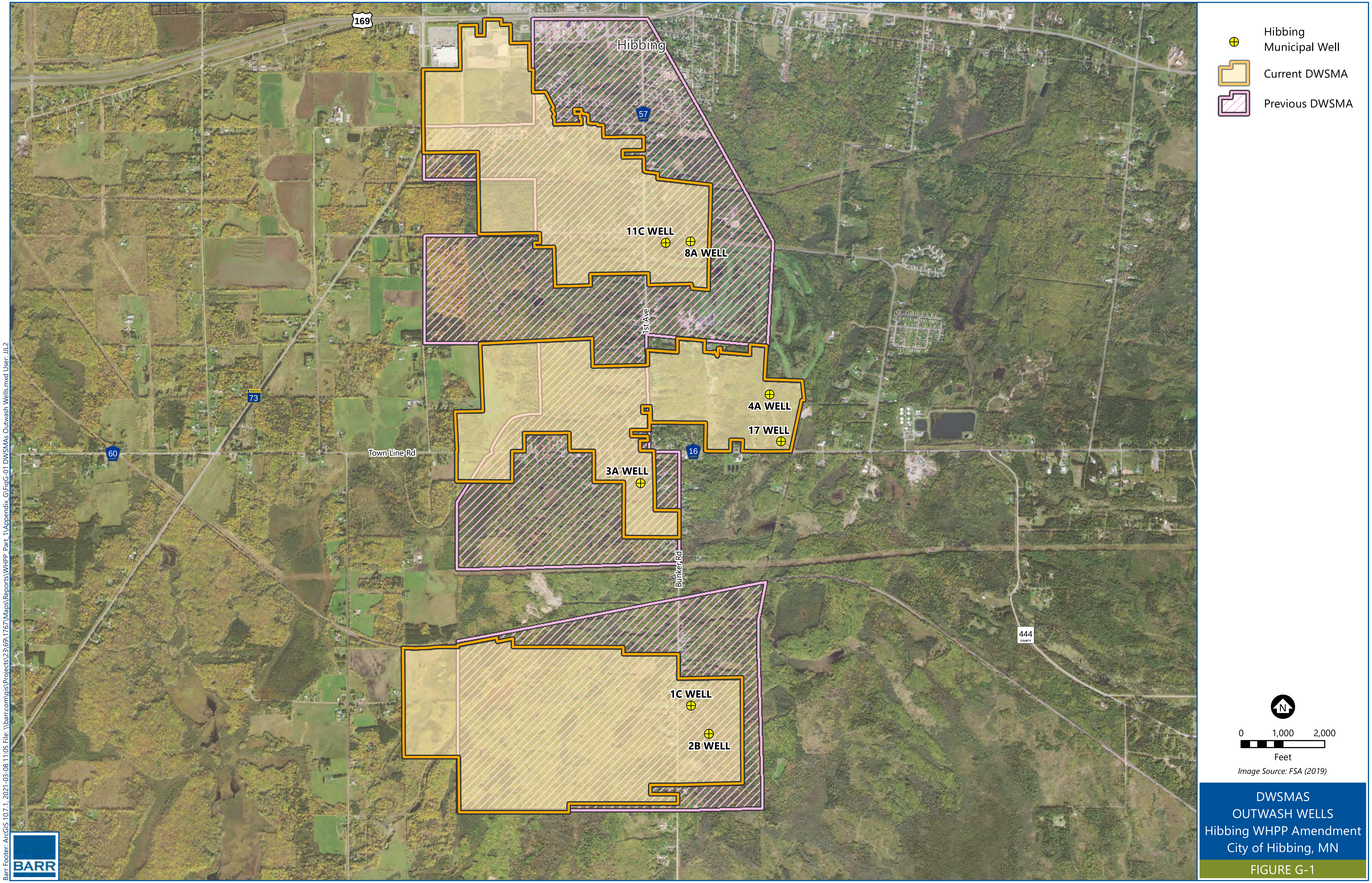
Feet

L-SCORES
SCRANTON WELL
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE F-4

Appendix G

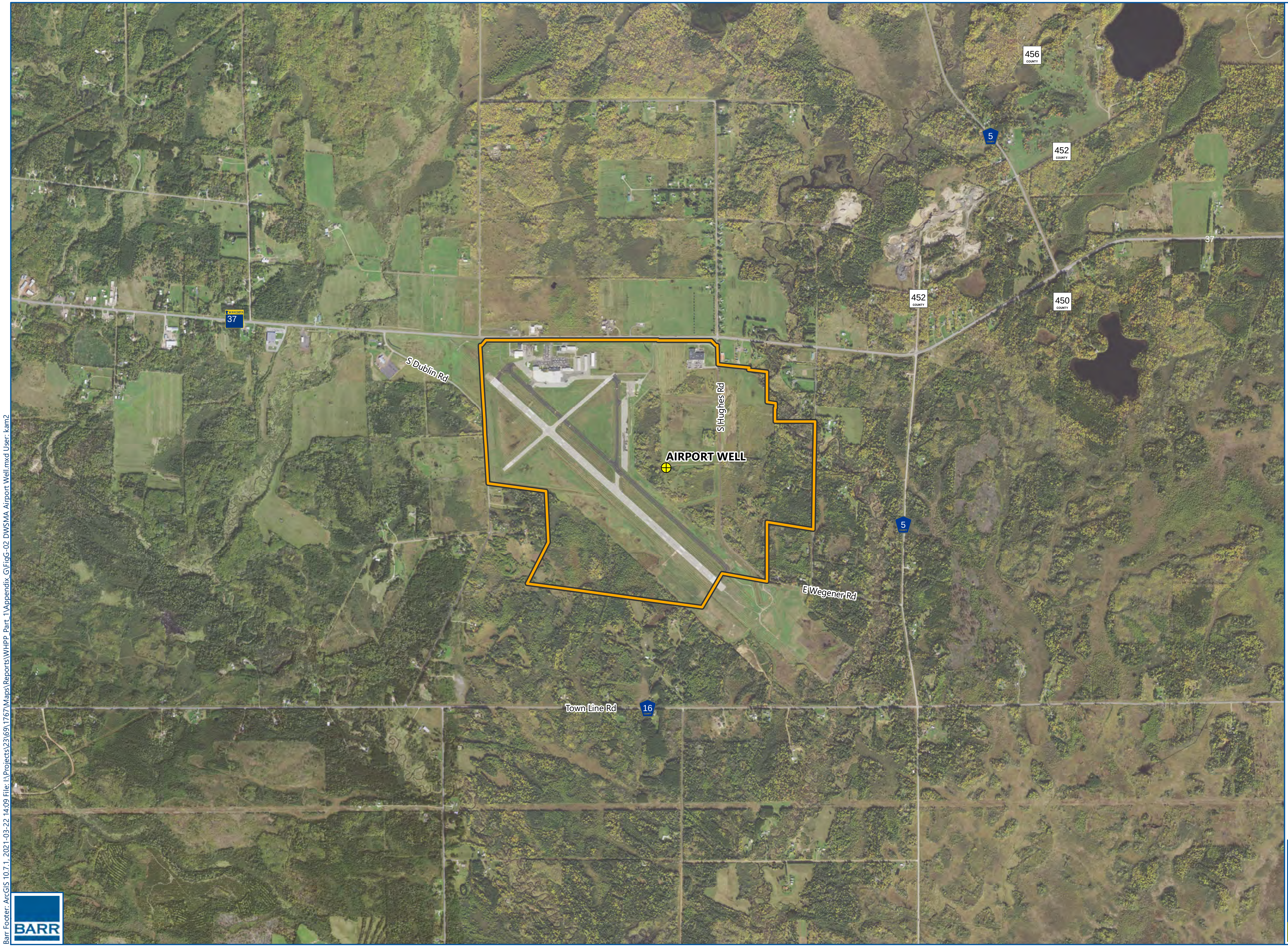
DWSMAs at 1:24,000 and Comparison of Previous and Current DWSMAs



DWSMAS
OUTWASH WELLS
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE G-1

Barr Footer: ArcGIS 10.7.1, 2021-03-08 11:05 File: \\barr.com\gis\Projects\23\69\1767\Maps\Reports\WHPP_Part_1\Appendix_G\FigG-01 DWSMAs Outwash Wells.mxd User: JIL2



Hibbing Municipal Well

Current DWSMA

Note: The previous WHPP did not include a DWSMA for the Airport Well.

0 1,000 2,000

Feet

Image Source: FSA (2019)

DWSMA
AIRPORT WELL
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE G-2

Image Source: FSA (2019)

DWSMA
SCRANTON WELL
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE G-3

BARR

DWSMA COMPARISON
SCRANTON WELL
Hibbing WHPP Amendment
City of Hibbing, MN

FIGURE G-4

Appendix H

Groundwater Model Files and GIS Shapefiles

Provided under seperate cover

Appendix C

Data Elements Assessment

Appendix C

Data Elements Assessment

Contents

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C1.0 Data Elements Assessment

The data elements and their assessments required to be included in the Wellhead and Source Water Protection Plan (WHPP) amendment for the Hibbing Public Utilities (HPU) (Public Water Supply 1690022) are discussed in this appendix. Data elements related to the physical environment, land use, water quantity, and water quality required for this WHPP for the Hibbing Public Utilities were specified in the April 29, 2022 Scoping 2 Decision Notice from the Minnesota Department of Health (MDH, 2022).

Five Drinking Water Supply Management Areas (DWSMAs) have been delineated for HPU that encompass the Wellhead Protection Areas (WHPAs) for the HPU municipal water supply wells (Barr, 2021). The Scranton DWSMA extends beyond Hibbing city limits into Balkan Township. The South wellfield and Airport DWSMAs are entirely within Hibbing city limits. Locations of the HPU DWSMAs are shown on Figure C-1.

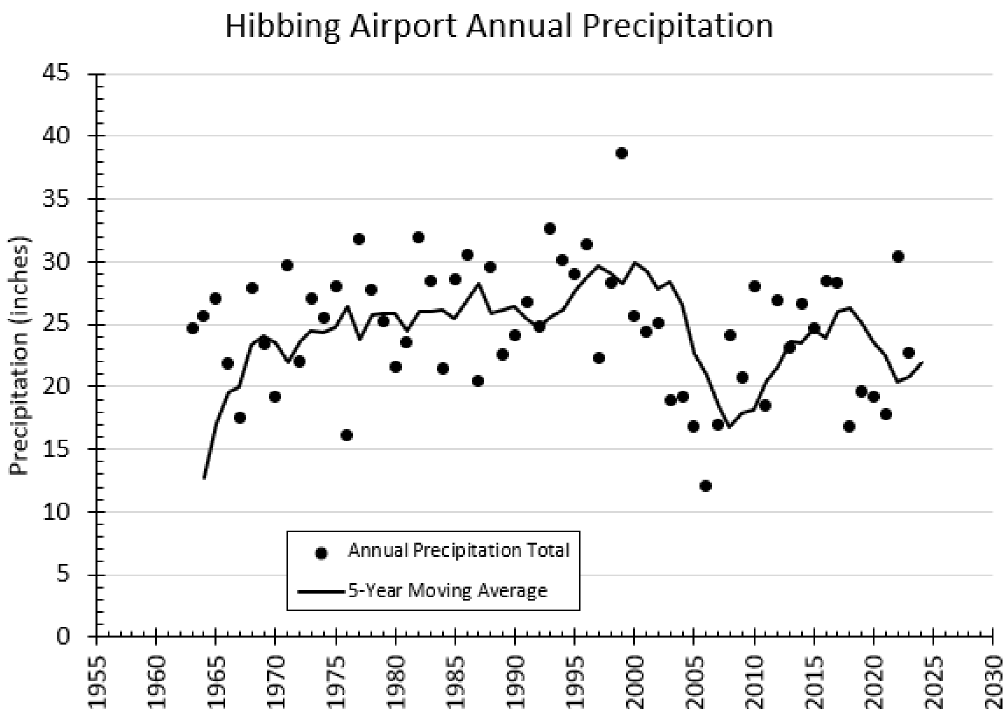
C1.1 Physical Environment Data Elements

Physical environment data elements including precipitation, geology and hydrogeology, soils, water resources, and land use data elements were considered during development of the Plan.

C1.1.1 Precipitation

As shown in Attachment C-1, there are a number of precipitation gaging stations in St. Louis County, including at the Hibbing Airport, which reported measurements to the State Climatology Office during the period 1962-2023. Locations of precipitation gaging stations throughout the county are identified by township, range, and section in the Minnesota Climatology Working Group tables in Attachment C-1. These tables show the monthly and annual precipitation measured at St. Louis County stations for the period 2019 through 2023.

Annual precipitation at the Hibbing Airport, Hibbing, Minnesota from 1963 to 2023 is shown on the following graph:



Source: Minnesota Dept. of Natural Resources website

The amount of precipitation affects recharge to the groundwater system and the potential for contaminant loading to the groundwater system. This is particularly important in areas of high aquifer vulnerability where the aquifer is not protected from infiltration of precipitation by significant confining units between the ground surface and the uppermost source water aquifer. Recharge to the groundwater system affects the size of a WHPA. Recharge (both from the surface and between aquifers) was included in the groundwater flow model used to identify the porous media flow portion of the WHPA (Barr, 2021). The amount of precipitation also affects the amount of surface runoff. As shown in Barr (2021), the aquifer vulnerability is classified as Low to High in the Outwash well and Airport Well DWSMAs and High within the Scranton well DWSMA.

C1.1.2 Geology and Hydrogeology

Existing information on the geology and hydrogeology in the vicinity of Hibbing was used to define the extent of the source water aquifers used by HPU, delineate the WHPAs, and in the assessment of the vulnerability of the public water supply wells and the aquifers in the DWSMAs.

The regional conceptual hydrogeologic model is described by Barr (2021). Information pertinent to the Hibbing area is summarized below.

Wisconsinan-age glacial drift is present over much of the Hibbing area (Winter, 1973). The drift consists of three major till units interspersed with glaciofluvial outwash. The glaciofluvial outwash is primarily confined to a north-south trending buried valley in which the Hibbing outwash wells are installed (Lindholm, 1968).

The Archean-age Giants Range batholith forms the topographic highlands northeast of Hibbing. The overlying Animikie Group of Precambrian metasediments includes, from oldest to youngest, the Pokegama Quartzite, Biwabik Iron Formation, and Virginia Formation (Figure C-2). As shown on Table C-1), Hibbing's bedrock municipal wells are completed in the Biwabik Iron Formation and Virginia Formation.

The Biwabik Iron Formation is about 600 feet thick near Hibbing (Pleider et al., 1968) and has been divided into four members based on texture (from bottom to top): the lower cherty, lower slaty, upper cherty, and upper slaty (White, 1954). The Scranton well is open to the lower cherty member. While the Biwabik Iron Formation has low primary porosity, fractures and solution-weathering near the surface make it more permeable than the surrounding bedrock layers.

The Virginia Formation, where present, overlies the Biwabik Iron Formation. The Virginia Formation consists of argillite, siltstone, and graywacke (Morey, 1972) and is less permeable than the Biwabik Iron Formation. A geophysical survey was completed in the Airport Well, open to the Virginia Formation. HPU is not aware of any other geophysical surveys completed near the DWSMAs.

As shown in Table C-1, the HPU municipal water supply wells are completed in the glaciofluvial outwash aquifer, Biwabik Iron Formation, and the Virginia Formation. These aquifers are also referred to in this Plan amendment as the source water aquifers.

Information regarding the geology and hydrogeology of the area, as well as water chemistry data, was used to assess the vulnerability to contamination of the source water aquifers within the DWSMAs. The information is consistent with the classification of the susceptibility to contamination of the source water aquifers within the DWSMAs varying from Low to High depending upon location.

C1.1.3 Soils

Review of available information from the U.S. Department of Agriculture – Natural Resources Conservation Service SSURGO database (USDA-NRCS, 2012) indicates that there are a variety of surficial soil types within the DWSMAs. Surficial soil types within the DWSMAs are shown on Figure C-3. Approximately 2.4% of the soil cover in the DWSMAs is rated for severe erosion potential, 8.5% is rated for moderate erosion potential, 12.6% is rated for slight erosion potential, and the remaining 76.4% has not been rated. Unrated areas are primarily in the Scranton SWCA and Airport DWSMA, though small areas also occur within the South Wellfield DWSMAs. Severe erosion potential is associated with the Hibbing-Buhl (1-18% slopes), Hibbing loam (8-18% slopes or 18-30% slopes), and Hibbing-Udorthents soil complexes, all of which occur in uplands west of the South Wellfield wells or adjacent to Dempsey Creek east of the Airport Well. St. Louis County 2023 aerial imagery indicates the areas with soil rated for severe erosion potential are vegetated and undeveloped; as such, these areas are not expected to produce on-going, substantial sediment loads to nearby water bodies hydraulically connected to the water supply aquifers. HPU is not aware of areas of eroding lands causing sedimentation problems within the DWSMAs.

The soil permeability classifications are shown on Figure C-4. As indicated on Figure C-4, nearly all of the Scranton Well DWSMA and a small fraction of the area within the South Wellfield DWSMAs have a soil permeability classification identified as "not rated or not available".

Based on the aquifer vulnerability assessment results, issues related to surficial soil characteristics or the surficial soil types may potentially have an effect on the management strategies developed for the DWSMAs. Unconsolidated geologic materials in the Hibbing area include clay, silt, sand, gravel, and porous soils. HPU is well aware that land development and land use activity may have an impact on the source water aquifers, particularly in areas of high aquifer vulnerability within the DWSMAs. Therefore, HPU plans to maintain communications with the City of Hibbing and St. Louis County planning staff regarding future land use planning.

C1.1.4 Water Resources

Per the April 29, 2022 Scoping 2 Decision Notice from the MDH, submission of data elements related to water resources is required for this WHPP amendment.

The Airport Well DWSMA and the eastern half of the Scranton Well DWSMA are in FEMA flood zone X, which covers areas of minimal flood hazard (Figure C-1). These DWSMA areas are outside a 500-year flood. The South Wellfield DWSMAs and western half of the Scranton Well DWSMA are in FEMA flood zone D, where flood hazard is possible but undetermined because flood hazard analysis has not been completed (Figure C-1).

Hibbing is in the headwaters for the East Swan River, a tributary that enters the St. Louis River approximately 12 miles to the southeast of Hibbing's south wellfield (see Figure 4 in Part 2 report). Hibbing is in the West Swan River-East Swan River portion of the North St Louis River Planning Region of the St. Louis River One Watershed, One Plan. Minor watersheds that overlap the DWSMAs include Auroric (Little Swan) Creek, Barber Creek, Dempsey Creek, West Swan River, and an unnamed DNR minor watershed in the St. Louis River watershed. The northwestern edge of the Scranton SWCA crosses the major watershed divide between the St. Louis River, Little Fork River, and Mississippi River. Minor watersheds outside the St. Louis River watershed include Shannon River and an unnamed DNR watershed (Little Fork River) as well as Deer Creek (Mississippi River). Flow directions in and boundaries of the watersheds in the area do not indicate any reasons for concern.

There are surface water bodies and wetlands within or crossing the Hibbing DWSMAs, but no public ditches (see Figure 4 in Part 2 report). These water bodies include Dempsey Creek and unnamed perennial tributaries to the East Swan River. The MPCA has identified the unnamed tributary to the East Swan River that flows through the DWSMAs for Wells 3B, 4A, and 17 as a category 4A impaired water. The unnamed creek is impaired for aquatic recreation due to elevated *E. coli*. Streamflow data are not available for Dempsey Creek or the unnamed tributaries near Hibbing DWSMAs. There are no permitted withdrawals from these streams. Additional watershed health information is available from Explore Watershed Health: Minnesota Department of Natural Resources (state.mn.us) and wetlands information is available from Wetlands Mapper | U.S. Fish & Wildlife Service (fws.gov).

There appears to be a direct hydraulic connection between surface waters and the Scranton Well installed in the Biwabik Iron Formation. Therefore, changes to the conditions of surface waters within the pit complex adjacent to the Scranton Well may have an impact on the quality and/or quantity of this emergency well. A direct hydraulic connection between surface waters and the South Wellfield wells was not established during the Part 1. However, the groundwater flow model indicated that the ERAs for Wells 8A, 11C, and 17 may capture some surface water flow from an unnamed tributary to the East Swan River.

HPU is not aware of any plans to alter the course or location of any surface water bodies currently present within the DWSMA in the next ten years.

Geologic conditions in HPU's DWSMAs result in the aquifer vulnerability in approximately 68 percent of the area encompassed by the DWSMAs being classified as High. Aquifer vulnerability in approximately 30 percent of the area in the DWSMAs is classified as Moderate. Approximately 2 percent of the area in the DWSMAs has an aquifer vulnerability classification of Low. In areas of high aquifer vulnerability, surface water resource issues could have some effect on the water quality in the source water aquifers. The quality of the source water is dependent on the quality of its recharge. Recharge sources/mechanisms are noted above. Since HPU does not have any responsibilities for surface water management it will rely on existing City of Hibbing, St. Louis County, and State of Minnesota programs for management of surface water quality within the DWSMAs. The existing surface water management programs address water quality and, therefore, reduce the potential negative effects that infiltrating surface waters may have on the source water aquifers. HPU believes that existing City, County, and State surface water management programs are adequate to address surface water quality in the DWSMAs and to ensure that aquifer recharge and water availability do not become an issue for HPU.

C1.2 Land Use Data Elements

The Scoping 2 Decision Notice required land use data elements to be considered during development of this Plan amendment. Land use and public utility services within the DWSMAs are discussed in this section. In Part 1 of this Plan amendment, quarter-quarter section lines, property parcel boundaries, and roadways were used in the delineation of the DWSMA (Barr, 2021). The majority of the DWSMA boundaries are defined by parcels. Parcels are shown on Figure 3 of the Part 2 report.

C1.2.1 Current Land Use

Figure C-5 shows the current land use map within the DWSMAs. Numerous land uses are found within the DWSMAs including residential, commercial, industrial, institutional, agricultural, and recreational land uses. Figure C-6 shows the current zoning within the DWSMAs.

C.1.2.1.1 Potential Contaminant Source Inventory

A potential contaminant source inventory (PCSI) was conducted within the DWSMAs. The types of potential contaminant sources that must be inventoried vary by vulnerability classification. Since the majority of the area in the DWSMAs has an aquifer vulnerability classification of High, HPU opted to inventory all potential contaminant source types for high vulnerability DWSMAs throughout the DWSMAs. Data from public databases were used to conduct a PCSI (see Table C-2). For future updates of this Plan, HPU will access available data sources and strive to maintain an up to date a potential contaminant source database in its wellhead protection file.

A potential contaminant source inventory in the Inner Wellhead Management Zone (IWMZ) around each of the municipal supply wells was completed in January 2024. Copies of the IWMZ inventory reports are presented in Attachment C-2.

Results of PCSI indicate the presence of potential contaminant source properties within the DWSMAs. Locations of potential contaminant sources are shown on Figure C-7 through Figure C-15, while information on these properties is presented in Table C-3 through Table C-11 as follows:

- Wells – Figure C-7a, b and Table C-3
- Potential Class V wells – Figure C-8 and Table C-4
- Storage tanks and LUST sites – Figure C-9 and Table C-5
- Chemical storage sites – Figure C-10 and Table C-6
- Hazardous waste generators – Figure C-11 and Table C-7
- Spill locations – Figure C-12 and Table C-8
- Potential contaminant source sites – Figure C-13 and Table C-9
- Wastewater treatment and disposal sites – Figure C-14 and Table C-10
- Subsurface sewage treatment system (SSTS) locations – Figure C-15 and Table C-11

These potential contaminant sources have been considered in the development of the management strategies for the DWSMAs.

Potential contaminant source locations were verified, to the extent possible, during preparation of this Plan amendment. The status of location verification for each potential contaminant source location is shown in Table C-3 through Table C-11. New information developed on potential contaminant source locations in the future will be verified as they are discovered as part of the WHPP implementation.

C1.2.2 Historical Land Use

Hibbing was founded in 1893 and incorporated as a city in 1979. Summaries of Hibbing's history can be found at https://www.hibbingmn.gov/283/Facts-History and https://en.wikipedia.org/wiki/Hibbing,_Minnesota.

The population of Hibbing grew from less than 3,000 residents in 1900 to more than 15,000 residents in 1920. Hibbing's population grew to a maximum of 21,193 in census year 1980, before declining to 18,046 in 1990 and 17,071 in 2000. The 2020 census counted 16,214 people in Hibbing. The U.S. Census Bureau estimated the 2022 population of Hibbing to be 16,052.

The town moved two miles south starting in 1919 with approximately 200 buildings relocated from over iron ore deposits. Based on descriptions of Hibbing's history, past land uses included undeveloped land, mining, residential, industrial, and commercial land uses. Past land use mapping is not available. Based on available information, historical land uses no longer present within the DWSMAs and that might significantly affect the management strategies for the DWSMAs were not identified.

While it is possible that buried features such as wells that were not properly sealed or unused underground storage tanks not listed in any available database could be present within the DWSMAs, available information does not suggest the presence of such features. Thus, there is no basis for a concerted search for such buried features within the DWSMAs. If any such, currently unknown, features are to be located in the future it would most likely occur only if they are encountered during development or redevelopment of a property.

C1.3 Public Utilities

HPU's precursor Hibbing Light and Water Company began operating the Hibbing water supply system in 1894. The Public Utilities Commission was so named in 1949.

All HPU water supply wells within the Quaternary outwash aquifer have screens and the Airport and Scranton wells (which are open to bedrock aquifers) have open-borehole completions. The aquifers in which these wells are open are shown in Table C-1. Well construction information for the HPU water supply wells is summarized in Table C-1. Copies of the MDH Well Records for these wells are presented in Appendix A.

HPU has sealed at least 14 old municipal and test wells; however, MDH does not have records of the sealing of older municipal wells 1A, 1B, 2, Th2, 8A-Test, 11B, 12A, and one unnamed well (unique numbers 233052, 226635, 229149, 239970, 784455, 233060, 233063, and 229148, respectively),

C1.3.1 Pipelines

A natural gas pipeline crosses west to east through the DWSMA for South Wellfield wells 8A and 11C approximately 1,000 feet north of the wells (Figure C-17). Gas distribution main lines intersect all five DWSMAs. There are no petroleum pipelines that cross the HPU DWSMAs. Spills and releases from pipelines are a concern where they are present. HPU will rely on State/Federal oversight and the management programs of the pipeline owners for proper operation and maintenance of the pipelines and response to releases from the pipelines. HPU will inform the pipeline owners of the proximity of their pipelines to the HPU DWSMAs. To the extent possible, the HPU will support any response activities by these other entities in the event of a release from any of the pipelines within or near the DWSMAs.

C1.3.2 Sewers

C1.3.2.1 Sanitary Sewers

The trunk sanitary sewer system in HPU is shown on Figure C-18.

An improperly designed or maintained sanitary sewer system may increase the chance for the release of untreated sewage into environmentally sensitive areas such as protected wetlands, lakes, or rivers or allow infiltration of contaminants that could potentially reach the uppermost source water aquifer. The City of Hibbing Engineering Department operates and maintains the city sanitary sewer system. HPU will rely on the Engineering Department for proper maintenance of the sanitary sewer system in Hibbing. Additional measures in this Plan to address the sanitary sewer system in Hibbing are considered to be unnecessary.

C1.3.2.2 Storm Sewers

Storm water management in Hibbing is responsibility of the City of Hibbing Engineering Department. Hibbing's storm sewer system is shown on Figure C-19. Chapter 17 of the City of Hibbing Ordinances addresses storm water pollution prevention. No map or list of public drainage systems other than the Hibbing storm sewer map that includes areas within the HPU DWSMAs could be identified during the preparation of this Plan.

A municipal storm sewer and surface water drainage system plays a significant role in the management of storm water and can be an important part of management strategies developed for a wellhead protection plan. An improperly designed or maintained storm sewer and surface water drainage system may increase the chance for the spread of a contaminant into environmentally sensitive areas such as protected wetlands, lakes, or rivers or allow infiltration of contaminants that could potentially reach the uppermost source water aquifer. A surface water management program is in place in Hibbing. HPU will rely on the City's existing surface water management program to address issues related to surface water. Therefore, additional measures to address surface water in this Plan are considered unnecessary.

C1.3.3 Transportation Corridors

Highway and railroad corridors can pose a contamination risk to the DWSMAs when used to move hazardous materials and a spill occurs. Transportation corridors are shown on Figure C-19. The DWSMA for Wells 11C and 8A is adjacent to US Highway 169 and State Highway 73, and crossed by County Highway 57. The DWSMA for Wells 3A, 4A, and 17 is crossed by County Highways 16 and 57. The DWSMA for Wells 1C and 2B is adjacent to a railroad corridor operated by BNSF. The Airport Well DWSMA is adjacent to State Highway 37. HPU will educate emergency responders on the locations of the DWSMAs and potential risks associated with spills in these areas. HPU will rely on operators and emergency responders to apply best management practices in spill containment.

C1.4 Water Quantity Data Elements

Groundwater and surface water quantity are discussed in this section.

C1.4.1 Surface Water Quantity

As discussed above, surface water features within the DWSMAs include Dempsey Creek, the unnamed tributaries of the East Swan River, and wetlands. HPU will rely on the Hibbing Engineering Department for surface water management with the Hibbing city limits. There are no known permitted uses of surface water in the DWSMAs. In addition, HPU is not aware of any current water-use conflicts that impact surface water quantity in the vicinity of the DWSMAs. Streamflow data are not available for any of the streams crossing Hibbing DWSMAs. No lakes occur within the DWSMAs. There are no lakes or streams for which state protected levels or flows have been established. Measures in this Plan to address current surface water quantity issues are considered to be unnecessary.

C1.4.2 Groundwater Quantity

The HPU municipal water supply system currently includes 8 primary wells and 2 emergency wells (Table C-1). Under MDNR Appropriation Permit No. 1975-2222, HPU currently has a permitted annual groundwater appropriation of 1 billion gallons per year (1 BGY). HPU's primary municipal water supply wells have a maximum operating capacity of 2.69 MGD (1,870 gpm). Including the two emergency wells, HPU's water supply has a maximum operating capacity of 3.92 MGD (2,725 gpm).

The daily average water demand for the time period 2014-2021 was 1.73 MGD (approximately 1,200 gpm). Maximum daily demand varied from 3.08 MGD in the regular season to 3.49 MGD in "watermain break season". "Watermain break season" is defined as the period from February through June when the ground has shifted due to freezing conditions, causing the underground watermains to experience breaks. The U.S. Census Bureau estimated the 2022 population of Hibbing to be 16,052, similar to the population since 2010. Water demand for the period 1988 through 2021 is presented in HPU's Water System Analysis (Bolton & Menk, 2022). Total annual volume pumped by the HPU municipal wells during the period 2014 through 2018 is presented in the Part 1 WHPP amendment (Barr, 2021). Between 2014 and 2018 HPU's water demand varied from year to year despite minimal change in population, primarily due to watermain breaks. The projected water use (i.e., pumpage) used to delineate the HPU WHPAs and DWSMAs was 715,000,000 gallons per year (715 MGY) (Barr, 2021).

The PCSI identified 1 high-capacity water well, in addition to the HPU municipal wells, within one mile of the DWSMAs that are listed in the MDNR's MPARS database as having annual appropriations of more than 1 million gallons. Information on these wells is presented in Table C-12. HPU is currently unaware of any adverse groundwater conflicts or interferences related to the existing HPU municipal wells.

Construction of other high-capacity wells in or near the DWSMAs or increases in pumping of existing high-capacity wells may influence groundwater flow in the source water aquifers and the groundwater quantity available to the municipal water supply system. Such changes could potentially affect the boundaries of the DWSMAs, which would require HPU to update the Wellhead Protection Plan. In addition, pumping of such wells could potentially reduce the static levels in the source water aquifers. Issues regarding changes in appropriations resulting from additions or deletions to the current list of water appropriations in or near the DWSMAs will be addressed in the management portion of this Plan.

Persistent drought conditions may also prove to be a threat to the quantity of groundwater available to the municipal system. HPU's water conservation program includes providing conservation information to customers via its website, and water use reduction through water supply system improvements (see for the Water Supply Plan). Per HPU's Water Supply Plan (see Appendix F), if HPU determines there is a water supply shortage it will notify customers and take all necessary actions to alleviate the shortage.

HPU's current water supply meets the demand of its consumers, but HPU is proactively investigating additional locations for future municipal wells to ensure that the municipal water supply system will be able to sustainably meet future water demand in Hibbing.

C1.5 Water Quality Data Elements

Surface water and groundwater quality are discussed in this section. Submission of data related to water quality in this WHPP amendment is not required by the April 29, 2022 Scoping 2 Decision Notice.

C1.5. Surface Water Quality

Surface water bodies and wetlands within the Hibbing DWSMAs include Dempsey Creek and unnamed tributaries to the East Swan River. The MPCA has identified the unnamed tributary to the East Swan River that flows through the DWSMAs for Wells 3B, 4A, and 17 as a category 4A impaired waters in the DWSMAs. The unnamed creek is impaired for aquatic recreation due to elevated *E. coli*. No other impaired waters are present within the DWSMAs. HPU will reply on the City of Hibbing Engineering Department for surface water management within the Hibbing city limits.

C1.5.2 Groundwater Quality

The MDH has an ongoing program to monitor the quality of municipal water supplies to ensure they comply with applicable regulatory standards. HPU municipal water supply wells are sampled annually as part of this program. Parameters that are part of this program include metals, other inorganic compounds, organic compounds (including perfluorochemicals), and bacteria. Samples collected from HPU's water supply wells are not analyzed for all parameters every year. To date, reported concentrations of all monitoring parameters meet the regulatory levels specified by the U.S. EPA as part of the Safe Drinking Water Act and health-based guidelines provided by the State of Minnesota. These results are presented in HPU's annual Consumer Confidence Reports (aka, Water Quality Reports). The 2022 Consumer Confidence Report is presented in Appendix D. A link to the current Consumer Confidence Report can be found on HPU's website at https://hpuc.com/wp-content/uploads/2023/04/2022-MDH-Consumer-Confidence-Report.pdf.

Information identified during the PCSI shows that there are known contaminant releases in Hibbing. HPU's historical water quality monitoring results indicate that detections of any contaminants in water samples from the HPU wells have been very low and have not exceeded applicable drinking water quality standards. In addition, no contaminants have been reported in recent water samples from HPU's wells at concentrations that exceed applicable Federal health-related drinking water standards and no trends toward increasing concentrations have been identified to date. Groundwater pumped from the source water aquifers by HPU wells is also currently free of pathogens and disease-causing organisms.

Water pumped from the South wellfield wells is treated at the South Water Treatment Plant by adding chlorine (disinfection and iron treatment) and sodium permanganate (manganese treatment) simultaneously, followed by adding fluoride before water enters the distribution system. HPU treats water pumped from the Airport Well by adding chlorine (disinfection) and fluoride.

The vulnerability classification of the uppermost source water aquifer within the Hibbing DWSMAs ranges from Low to High. In areas where the aquifer vulnerability is classified as High there may be a better hydraulic connection between the surface and the uppermost source water aquifer. It is important to consider groundwater quality when determining management strategies for the land uses within the

DWSMAs. Since HPU currently enjoys good water quality, management strategies developed for this WHPP amendment are aimed at maintaining the groundwater quality in the source water aquifers.

C1.6 Assessment of Data Elements

C1.6.1 Use of the Municipal Wells

HPU currently has 10 municipal water supply wells in the municipal water supply and distribution system for Public Water Supply 1690022. Locations of the wells are shown on Figure C-1 and construction details for the HPU municipal wells are summarized in Table C-1. Copies of the MDH well records for these wells are presented in Appendix A.

In the 2020 census Hibbing had a population of 16,214. The U.S. Census Bureau estimated the 2022 population of Hibbing to be 16,052. Per HPU's Water Systems Analysis (Bolton & Menk, 2022), Hibbing's population (and the population served by HPU) is projected to remain approximately stable.

Current daily water demand (based on the period 2014-2021) in Hibbing averages approximately 1.73 MGD (631 MGY). HPU's permitted annual appropriation volume is 1 BGY. Assuming moderate to high growth, the projected daily water demand is approximately 2.19 MGD (approximately 1,520 gpm) to approximately 2.66 MGD (approximately 1,850 gpm) (Bolton & Menk, 2022). HPU expects to construct additional wells to meet higher future water demand, as needed.

HPU currently has 3 water storage facilities consisting of 2 elevated storage facilities and 1 ground storage facility. These facilities have a combined storage capacity of 3 million gallons. HPU does not anticipate additional water storage facilities will be constructed within the next 10 years.

C1.6.2 Wellhead Protection Area Criteria

Delineation of the WHPAs for the HPU wells involved the evaluation of both porous-media and fractured media flow (Barr, 2021). Information/criteria used to perform the groundwater flow modeling for the HPU WHPA/DWSMA delineations are discussed in the Part 1 WHPP amendment (Barr, 2021) and summarized below.

C1.6.2.1 Time of Travel

A 10-year groundwater time of travel was used for the WHPA delineation for each of the HPU municipal wells. A map in the Part 1 amendment report shows the composite 10-year groundwater time of travel WHPAs for the HPU wells.

C1.6.2.2 Aquifer Transmissivity

Source water aquifer transmissivities in the groundwater models used to delineate the WHPAs for the HPU wells are based on a combination of pumping tests and literature values (Barr, 2021).

C1.6.2.3 Daily Volume of Water Pumped

Daily volume of water pumped from each of HPU's municipal wells used in the groundwater flow model was determined by using the highest recorded or projected pumping annual volume for each well.

Determination of the daily volume of water pumped for each well used in the groundwater flow model is presented in Barr (2021).

C1.6.2.4 Flow Boundaries

Groundwater flow boundaries in the vicinity of Hibbing include the two unnamed tributaries of the East Swan River. High-capacity wells act as local flow boundaries while operating. These flow boundaries are incorporated, as appropriate into the groundwater models used to delineate the HPU WHPAs (see Barr, 2021).

C1.6.2.5 Groundwater Flow Field

The groundwater flow fields used for delineation of the WHPAs were determined by the groundwater flow models. In the glaciofluvial outwash aquifers, the modeled flow fields indicate that groundwater flow is generally toward the southeast. These modeled flow directions are consistent with available data.

C1.6.3 Quantity and Quality of Water Supplying the Public Water Supply Wells

As discussed above, the HPU municipal wells are open to three different aquifers. Construction details for the HPU municipal wells are summarized in Table C-1.

HPU is able to meet current water demand. As noted elsewhere in this Plan, HPU is proactively investigating additional potential source water areas. Currently, there are no known conflicts or interferences with other wells in the DWSMAs related to pumping from the HPU water supply wells.

HPU currently anticipates installation of additional water supply wells to meet future demand. New high-capacity wells constructed by HPU or others in or near the DWSMAs within the 10-year life time of this Plan could, potentially, affect the DWSMA boundaries. If directed to do so by the MDH, HPU will incorporate such new wells into the most current version of HPU’s groundwater model and assess if projected pumping from the new wells would affect the boundaries of the DWSMAs. Any required Plan amendments would be prepared with the help of the Wellhead Protection Consultant.

Water pumped from HPU’s wells currently meets applicable drinking water quality standards. Based on available information, HPU has no concerns regarding water quality. HPU will continue to monitor water quality from its water supply wells to meet regulatory requirements and ensure the water provided to customers continues to been applicable water quality standards.

C1.6.4 Land and Groundwater Uses in the DWSMA

As discussed above, the aquifer vulnerability in approximately 68 percent of the area encompassed by the DWSMAs is classified as High. Aquifer vulnerability in approximately 30 percent of the area in the DWSMAs is classified as Moderate. An aquifer vulnerability classification of Low has been applied to approximately 2 percent of the area in the DWSMAs.

Land uses within the DWSMAs could affect source water protection efforts or the management of the DWSMAs. In addition, unmaintained, damaged, poorly-constructed, unused, or incorrectly abandoned wells could provide a direct route for contaminants to enter one or more of the source water aquifers.

As discussed by Barr (2021), the DWSMAs were delineated to encompass the zones in which groundwater travel time to the HPU municipal wells is ten years or less. The DWSMAs encompass the WHPAs and are defined by geographically identifiable features. The South Wellfield and Airport Well DWSMAs are wholly within Hibbing city limits, but the Scranton Well DWSMA extends beyond the Hibbing city limits into Balkan Township. Public land survey townships, ranges, and sections that are within the DWSMA boundaries are shown in Figure C-1.

Potential contaminant sources within the DWSMAs identified through the PCSI include wells, properties where Class V wells potentially may be, or may have been, located, storage tank sites (including LUST sites), chemical storage locations, wastewater locations, spill locations, properties where SSTS are located, hazardous waste generators, and other properties where contaminants may have been released not included in any of the other categories. These potential contaminant sources will be considered when developing the management strategies for the HPU DWSMAs.

C2.0 References

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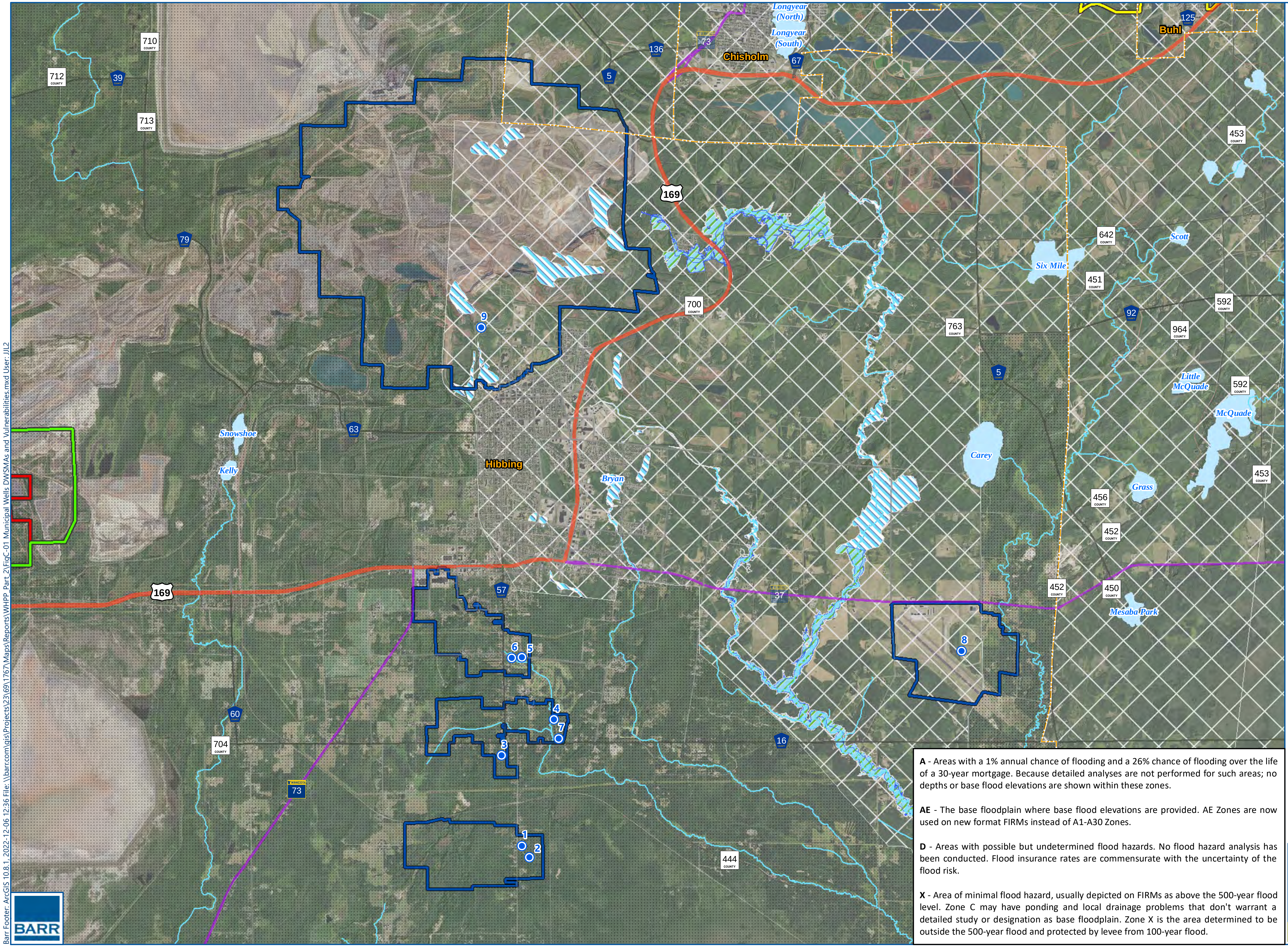
Tables and Figures



Municipal Well

Public Watercourse

Public Waters Basin

Buhl DWSMA

Keetac DWSMA

Keewatin DWSMA

Hibbing DWSMA

Municipal Boundary

FEMA Flood Zone

A

AE

D

X

2 - Municipal Well Location PCSI ID (PCSI ID refers to Table C-3)

0 0.5 1

Miles

A - Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.

AE - The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.

D - Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.

X - Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100-year flood.

MUNICIPAL WELLS, DWSMA, AND VULNERABILITY

Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-1

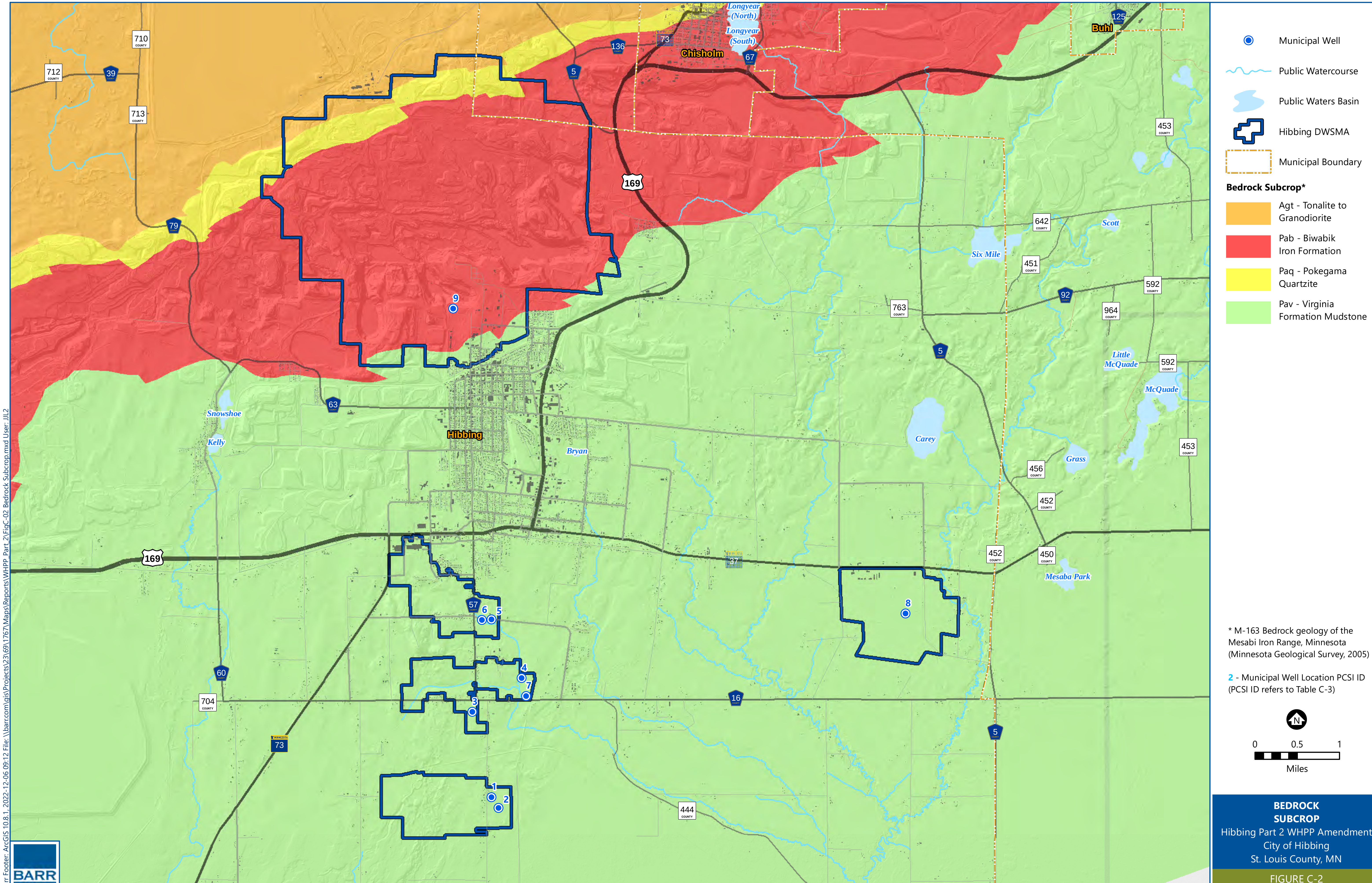
Table C-1

Municipal Well Construction Summary
Hibbing Part 2 WHPP Amendment

Local Well Name	Unique Number	Use/ Status[1]	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed/ Reconstructed	Aquifer[2]	Well Vulnerability
1C	233054	P	12	70	100	1973	QWTA	Vulnerable
2B	792077	P	16	70	103	5/10/2013	QBAA	Vulnerable
3A	233056	P	24x18	105	145	1934	QBAA	Vulnerable
4A	271992	P	36x24x16	53.5	79	1944	QBAA	Vulnerable
8A	233058	P	24x16	108	135	1944	QBAA	Vulnerable
11C	233061	P	12	112	142	1973	QBAA	Vulnerable
17	778015	P	12	95.5	139.5	5/20/2011	QBAA	Vulnerable
18	791017	E	12	59	96.5	3/26/2013	QWTA	Vulnerable
Airport	716190	P	6	89	255	3/5/2005	PEVR	Vulnerable
Scranton	147463	E	24x18	460	535	12/1984	PEBI	Vulnerable

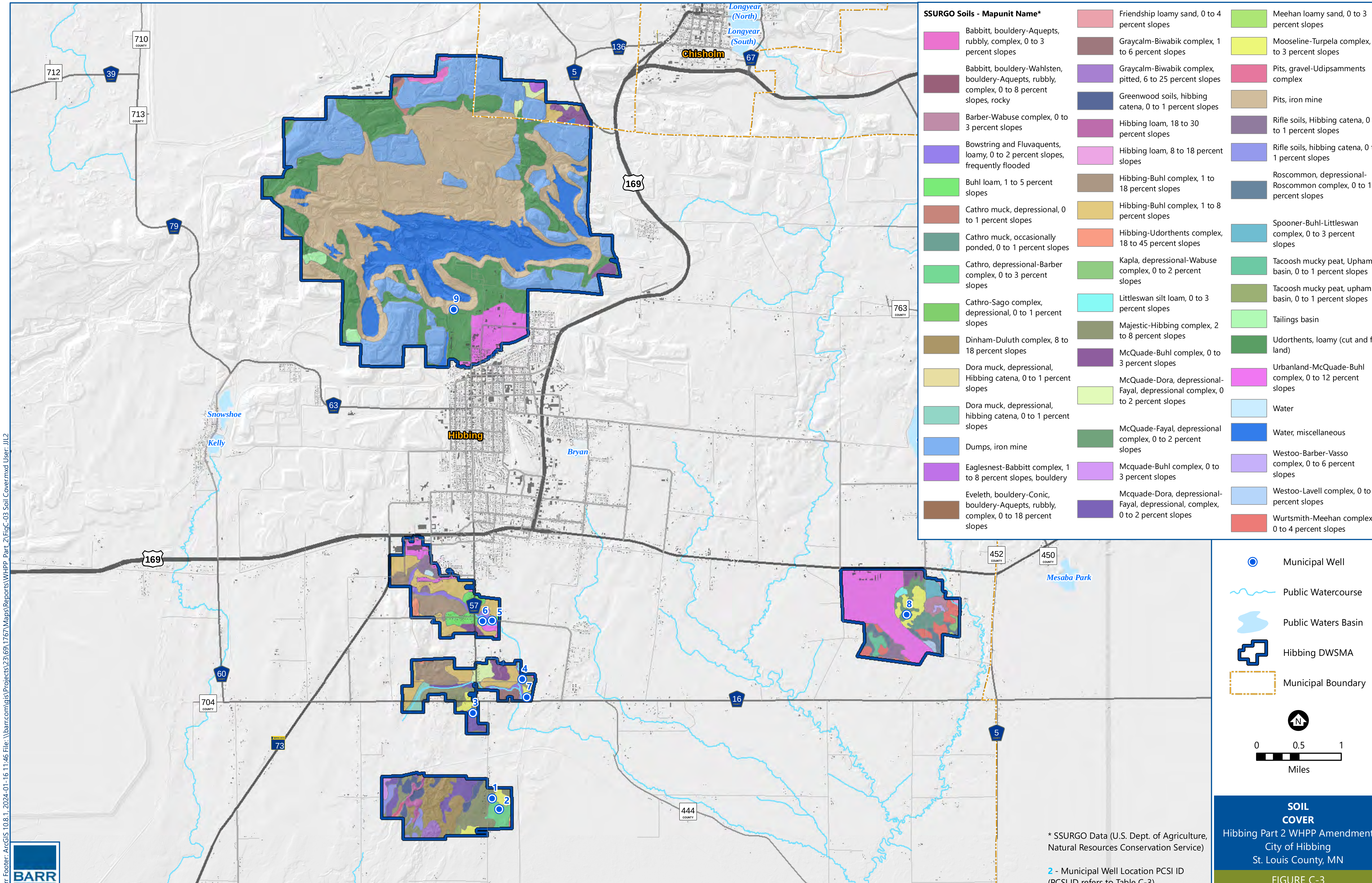
Notes:

1. Primary (P), Emergency (E)
2. QBAA = Quaternary Buried Artesian Aquifer, QWTA = Quaternary Water Table Aquifer, PEBI = Biwabik Iron Formation, PEVR = Virginia Formation



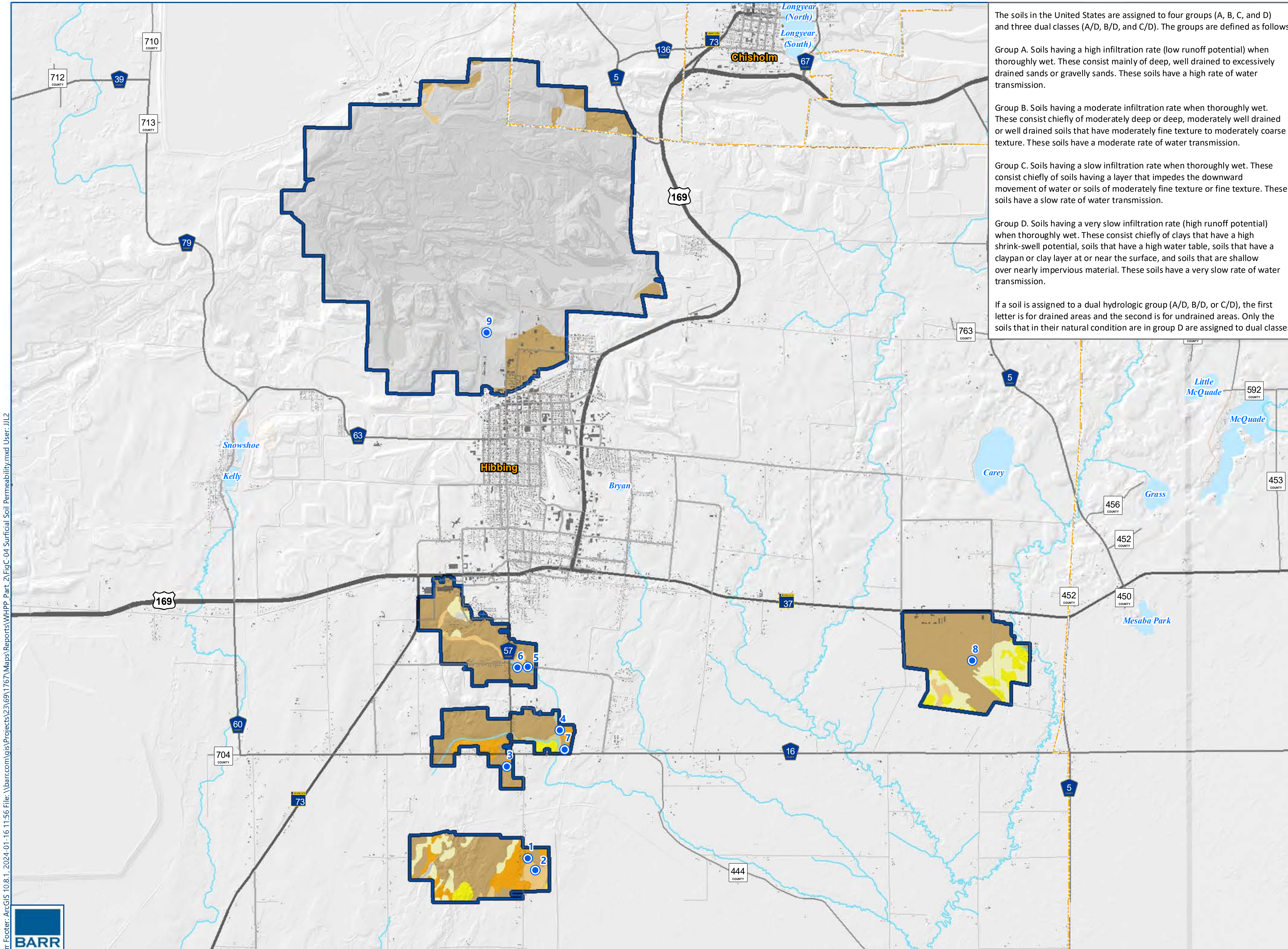
BEDROCK SUBCROP
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-2



SOIL COVER
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-3



The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Municipal Well
Public Watercourse
Public Waters Basin
Hibbing DWSMA
Municipal Boundary

Soil Permeability Classification*

Not rated or not available
A
A/D
B
B/D
C
C/D

* SSURGO Data (U.S. Dept. of Agriculture, Natural Resources Conservation Service)

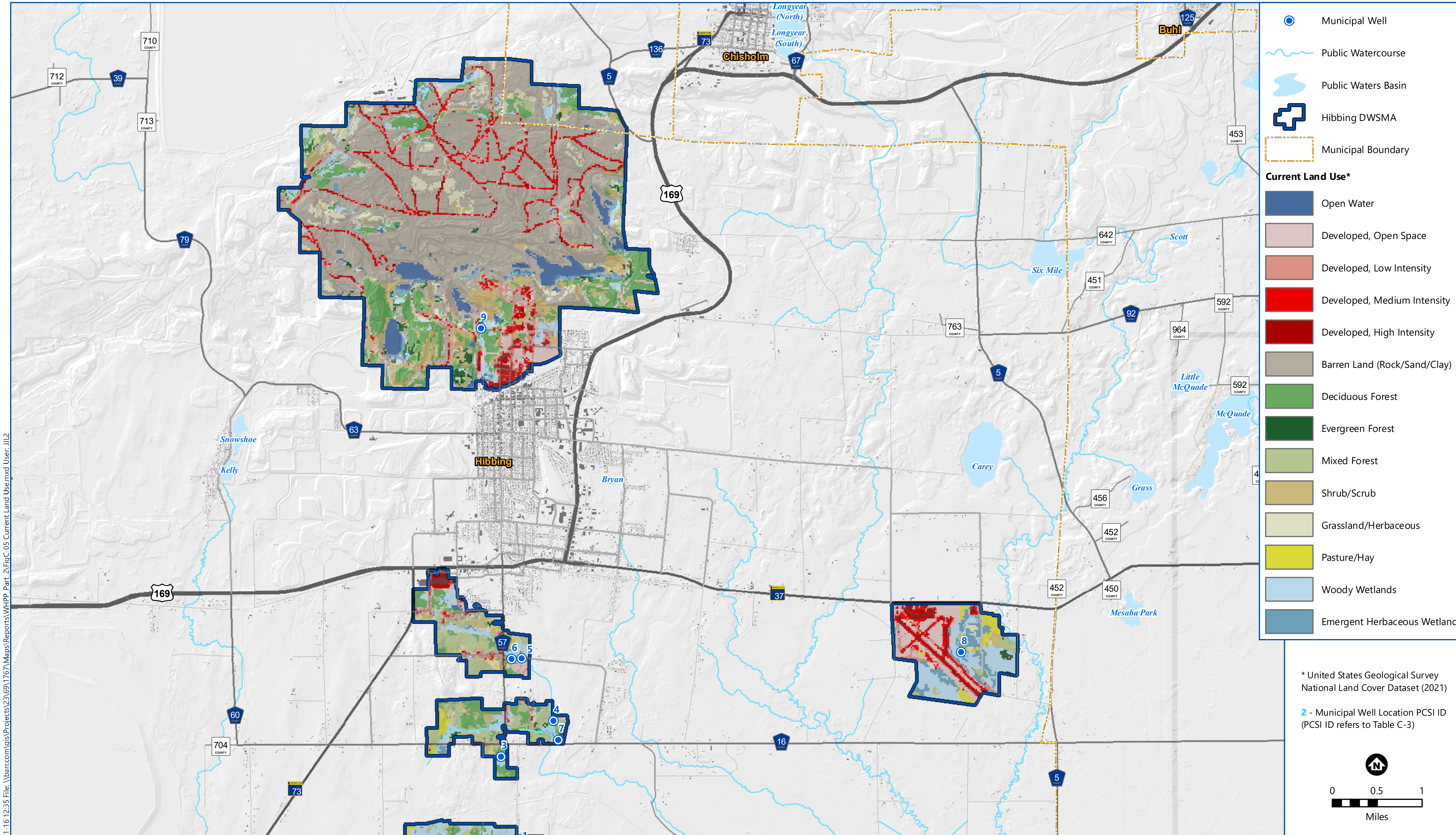
2 - Municipal Well Location PCSI ID (PCSI ID refers to Table C-3)

0 0.5 1
Miles

SURFICIAL SOIL PERMEABILITY
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-4

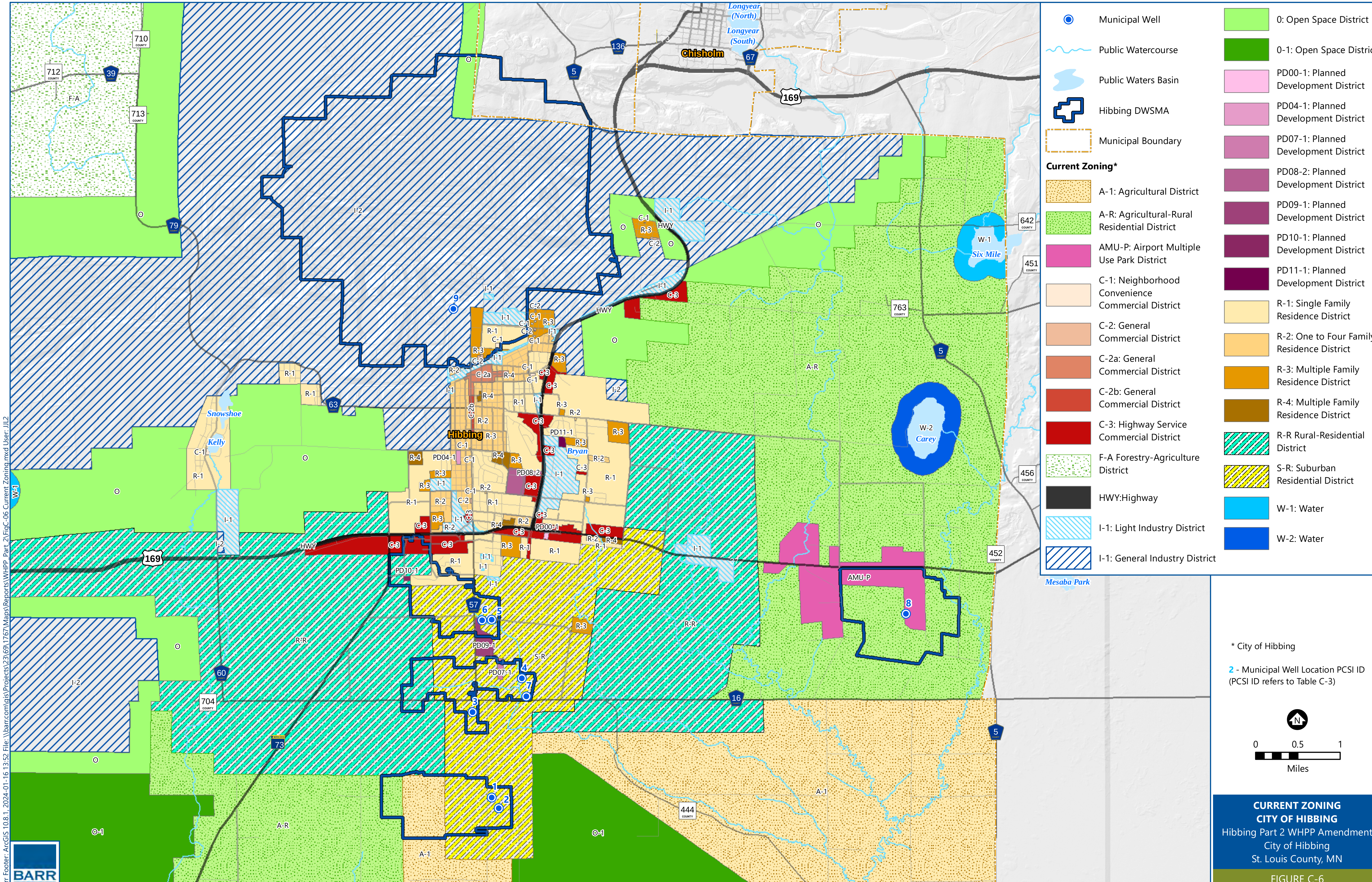
BARR



CURRENT LAND USE
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-5

Barr Footer: ArcGIS 10.8.1, 2024-01-16 12:35 File: \\barr.com\gis\Projects\23\69\1767\Maps\Reports\WHPP_Part_2\FigC-05 Current Land Use.mxd User: JJL2



Municipal Well
Public Watercourse
Public Waters Basin
Hibbing DWSMA
Municipal Boundary
Current Zoning*
A-1: Agricultural District
A-R: Agricultural-Rural Residential District
AMU-P: Airport Multiple Use Park District
C-1: Neighborhood Convenience Commercial District
C-2: General Commercial District
C-2a: General Commercial District
C-2b: General Commercial District
C-3: Highway Service Commercial District
F-A Forestry-Agriculture District
HWY:Highway
I-1: Light Industry District
I-1: General Industry District
0: Open Space District
0-1: Open Space District
PD00-1: Planned Development District
PD04-1: Planned Development District
PD07-1: Planned Development District
PD08-2: Planned Development District
PD09-1: Planned Development District
PD10-1: Planned Development District
PD11-1: Planned Development District
R-1: Single Family Residence District
R-2: One to Four Family Residence District
R-3: Multiple Family Residence District
R-4: Multiple Family Residence District
R-R Rural-Residential District
S-R: Suburban Residential District
W-1: Water
W-2: Water
* City of Hibbing
2 - Municipal Well Location PCSI ID (PCSI ID refers to Table C-3)
0 0.5 1
Miles
Chisholm
Longyear (North)
Longyear (South)
Hibbing
Bryan
Snowshoe
Kelly
Six Mile
Carey
Mesaba Park
CURRENT ZONING
CITY OF HIBBING
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN
FIGURE C-6

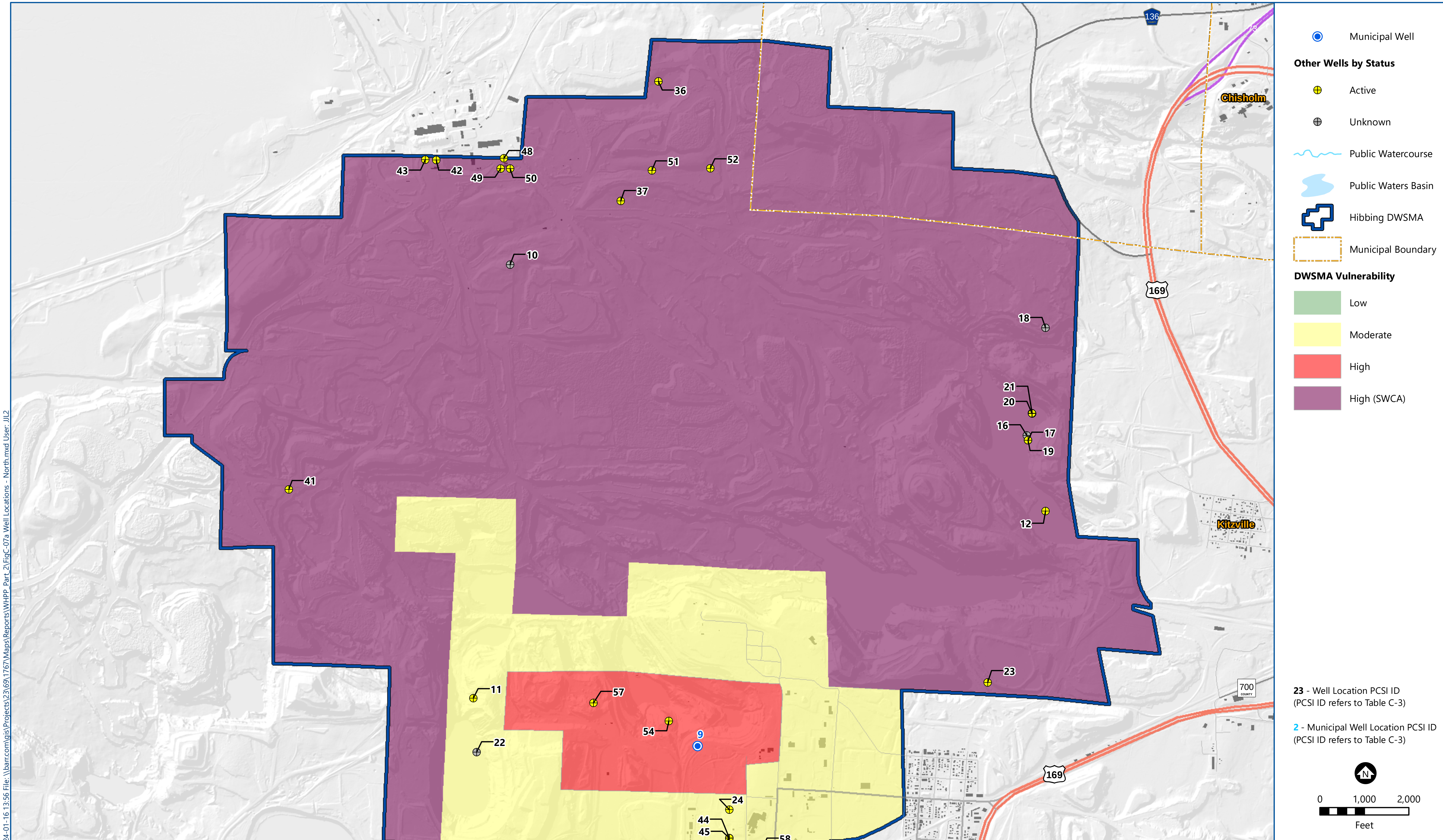
Table C-2

Potential Contaminant Source Inventory Data Sources
Hibbing Public Utilities WHPP Amendment

Potential Contaminant Source Type	Data Source(s)
Animal Feedlot Locations	MPCA WIMN database; MPCA Agency Interests database; Industrial Codes Dictionary
Chemical Storage Tank Locations	MnDPS; MDA Licensing Information Search; Industrial Codes Dictionary
Hazardous Waste Generator Locations	MPCA WIMN database; MPCA Agency Interests database; Industrial Codes Dictionary
Land Application Locations	Minnesota Pollution Control Agency Enterprise Database; Industrial Codes Dictionary
LUST Locations	MPCA WIMN Database; MPCA Agency Interests Database; Industrial Codes Dictionary
Potential Class V Well Locations	MPCA WIMN Database; MPCA Agency Interests Database; U.S. EPA
Potential Contaminant Source Locations (Brownfields and Superfund Sites)	MPCA WIMN Database; MPCA Agency Interests Database
Solid Waste Management Sites	MPCA WIMN Database; MPCA Agency Interests Database
Spill Locations	MDA Small Spill Investigations; MPCA Remediation Sites Database
Storage Tanks	MPCA WIMN Database; MPCA Agency Interests Database; Industrial Codes Dictionary
Stormwater Basin Locations	MPCA WIMN database
SSTS Locations	MPCA WIMN database
Suspected Contaminant of Concern Locations	Industrial Codes Dictionary
Transportation Corridor Water Crossings	MnDOT Office of Transportation Database
Wastewater Locations	MPCA WIMN database; MPCA Agency Interests database
Wells	MGS MWI Database; MDNR MPARS Database
Other Data Type	**Data Source(s)**
Current Land Use	USGS/MRLC NLCD (2021)
Historical Land Use	Rochester Planning Department; Olmsted County Planning Department
Planned Land Use	City of Hibbing; St. Louis County
Bedrock Geology	MGS – Olmsted County Geologic Atlas
Flood Zones	FEMA Digital Flood Insurance Rate Map Database
Roads and Railroads	MnDOT Office of Transportation Database
Pipelines	MGIO & MnOPS
Soil Cover	USDA NRCS SSURGO Soils Database
Soil Permeability	USDA NRCS SSURGO Soils Database
Storm and Sanitary Sewer Networks	Hibbing Public Utilities
Zoning	City of Hibbing

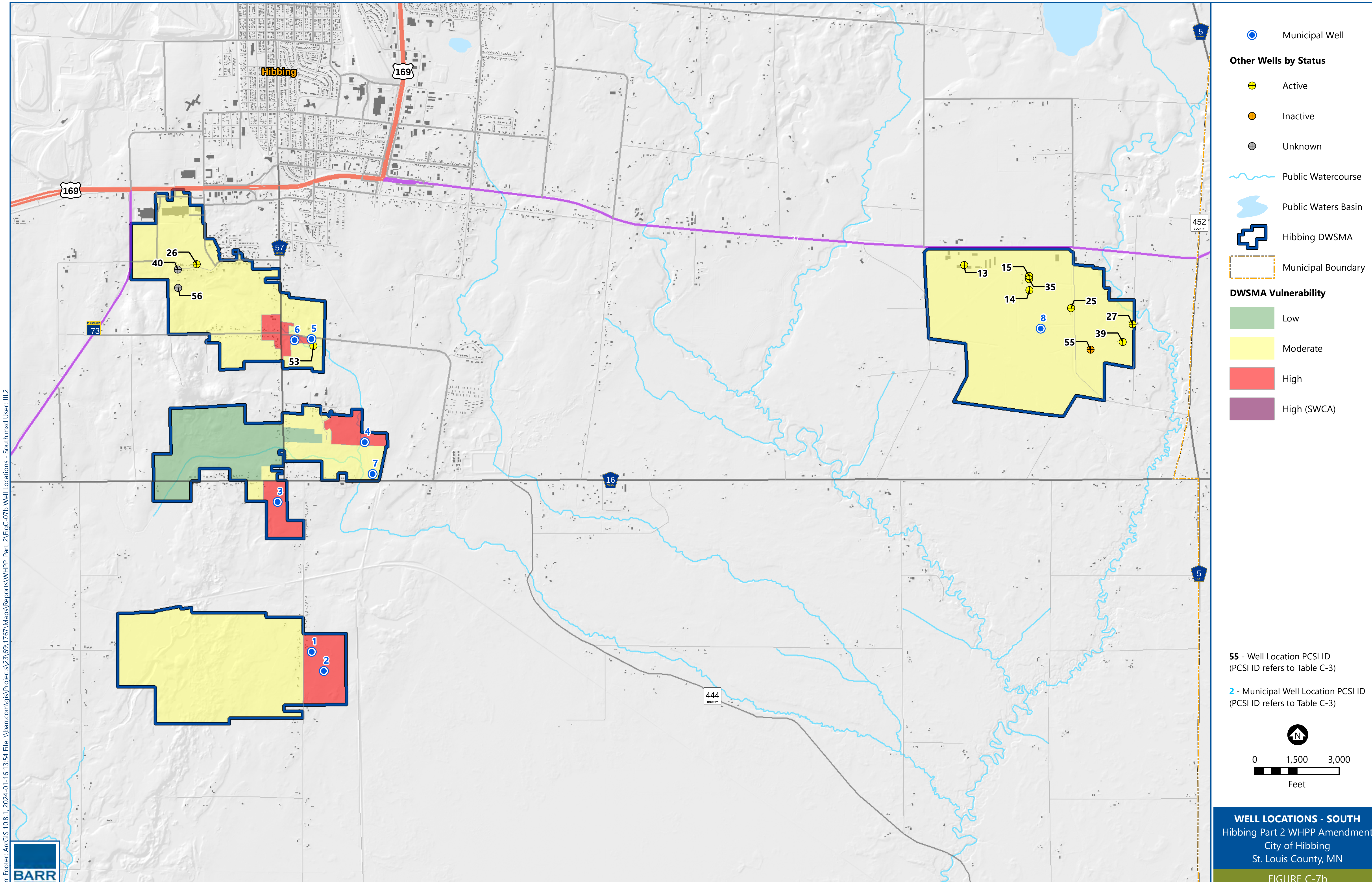
Acronyms

FEMA – Federal Emergency Management Administration
MDA - Minnesota Dept. of Agriculture
MDNR - Minnesota Dept. of Natural Resources
MGIO – Minnesota Geospatial Information Office
MGS – Minnesota Geological Survey
MnDOT – Minnesota Dept. of Transportation
MnDPS – Minnesota Dept. of Public Safety
MnOPS – Minnesota Office of Pipeline Safety
MPARS – Minnesota Permitting and Reporting System
MPCA – Minnesota Pollution Control Agency
MRLC – Multi-Resolution Land Characteristics
MWI – Minnesota Well Index
NLCD – National Land Cover Database
NRCS – Natural Resources Conservation Service
SSURGO – Soil Survey Geographic Database
USDA – United States Department of Agriculture
U.S. EPA – United States Environmental Protection Agency
USGS – United States Geological Survey
WIMN – What's In My Neighborhood



WELL LOCATIONS - NORTH
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-7a



WELL LOCATIONS - SOUTH
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-7b

Table C-3

PCSI Results - Well Locations in the DWSMAs
Hibbing WHPP Amendment

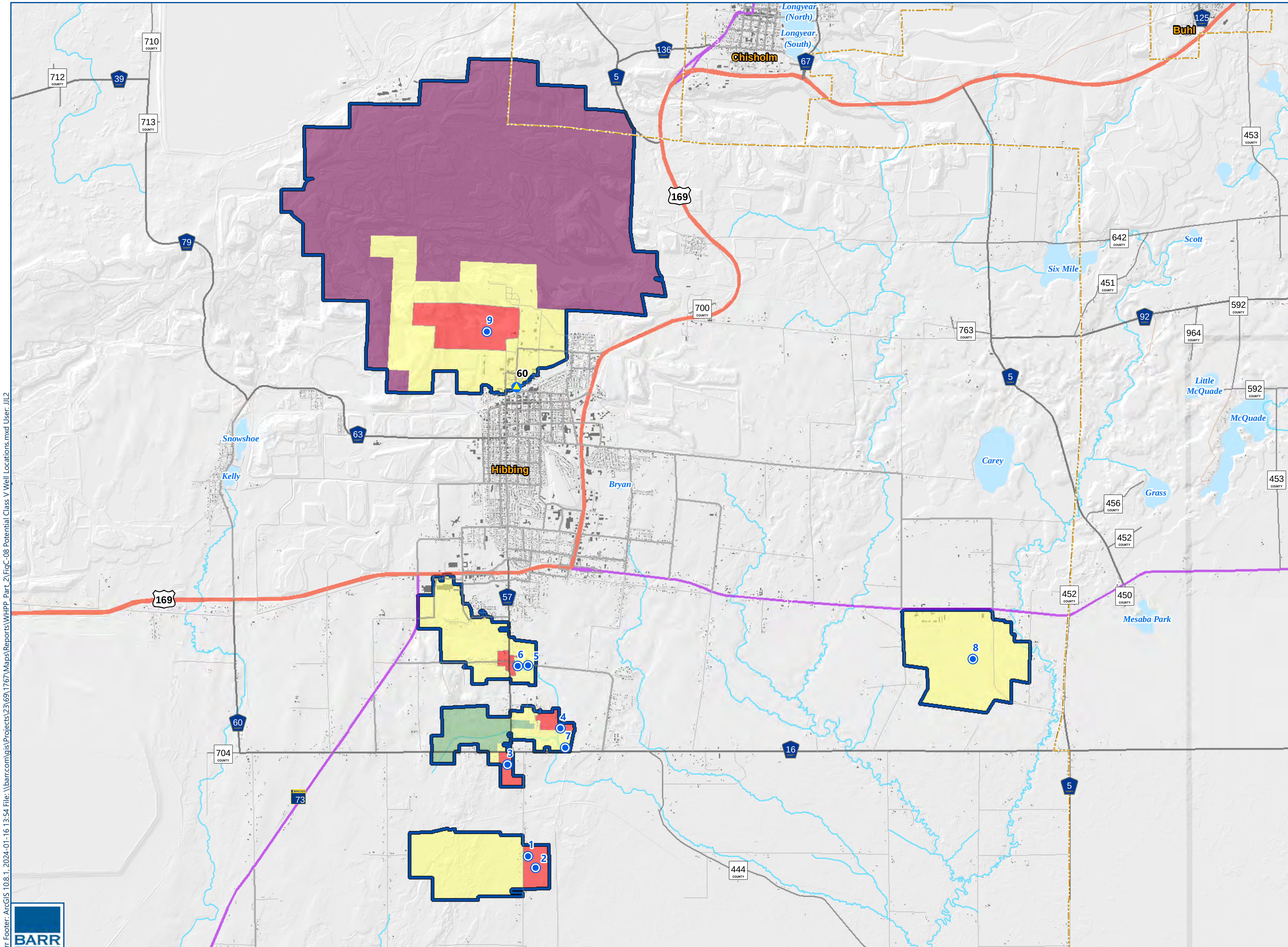
PCSI ID	PID No.	Unique No.	Status	Use	Well Name	Well Location	City	Total Depth (Feet)	Date Completed	Aquifer	PCS Code	Location Verified
1	141-0010-01300	233054	Active	Community Supply (Municipal) - Hibbing	Hibbing 1C	Not Available	Hibbing	100	1973	QWTA	WEL	Yes
2	141-0010-01300	792077	Active	Community Supply (Municipal) - Hibbing	Hibbing 2-B	Not Available	Hibbing	103	05/10/2013	QBAA	WEL	Yes
3	141-0040-00030	233056	Active	Community Supply (Municipal) - Hibbing	Hibbing 3A	Not Available	Hibbing	145	1934	QBAA	WEL	Yes
4	141-0020-04470	271992	Active	Community Supply (Municipal) - Hibbing	Hibbing 4A	Not Available	Hibbing	79	1944	Not Available	WEL	Yes
5	141-0020-04310	233058	Active	Community Supply (Municipal) - Hibbing	Hibbing 8A	Not Available	Hibbing	135	1944	QBAA	WEL	Yes
6	141-0184-00320	233061	Active	Community Supply (Municipal) - Hibbing	Hibbing 11C	Not Available	Hibbing	142	1973	QBAA	WEL	Yes
7	141-0020-04490	778015	Active	Community Supply (Municipal) - Hibbing	Hibbing 17	Not Available	Hibbing	139.5	05/20/2011	QBAA	WEL	Yes
8	141-0020-03550	716190	Active	Community Supply (Municipal) - Hibbing	Hibbing Public Utilities	3837 Hughes Rd S	Hibbing	255	03/05/2005	PEVT	WEL	Yes
9	140-0290-00240	147463	Active	Community Supply (Municipal) - Hibbing	Hibbing Scranton Well	Not Available	Hibbing	535	12/1/1984	PEBI	WEL	Yes
10	141-0060-05450	844172	Unknown	Not Available	"Cancelled Permit"	Not Available	Hibbing	Not Available	Not Available	Not Available	WEL	Uncertain
11	141-0050-01608	229146	Active	Industrial	Agnew Mine	Not Available	Hibbing	338	07/16/1942	Not Available	WEL	Uncertain
12	140-0270-00060	174504	Active	Domestic	Biondich, John	Box 58	Hibbing	29	Not Available	Not Available	WEL	Uncertain
13	141-0020-03450	249409	Active	Public Supply/Non-Comm.-Non-Transient	Chisholm-Hibbing Municip	Not Available	Hibbing	Not Available	Not Available	Not Available	WEL	Uncertain
14	141-0020-03420	181632	Active	Domestic	Chslm-Hbbng Airport	Not Available	Hibbing	155	09/25/1981	PEVT	WEL	Uncertain
15	141-0020-03420	181634	Active	Domestic	Chslm-Hbbng Airport No.1	Not Available	Hibbing	155	09/16/1981	PEVT	WEL	Uncertain
16	140-0280-00243	229173	Unknown	Not Available	Crete Mining Co	Not Available	Hibbing	182	01/28/1941	Not Available	WEL	Uncertain
17	140-0280-00243	239352	Active	Industrial	Crete Mining Co.	Not Available	Hibbing	76	03/00/1941	PEBI	WEL	Uncertain
18	140-0280-00210	229172	Unknown	Industrial	Crete Mining Co.	Not Available	Hibbing	214	07/24/1942	Not Available	WEL	Uncertain
19	140-0280-00243	239351	Active	Industrial	Crete Mining Co. #1	Not Available	Hibbing	182	1941	PEBI	WEL	Uncertain
20	140-0280-00243	239350	Active	Industrial	Crete Mining Co. #2	Not Available	Hibbing	214	Not Available	PEBI	WEL	Uncertain
21	140-0280-00243	239349	Active	Industrial	Crete Mining Co. #3	Not Available	Hibbing	214	12/00/1941	PEBI	WEL	Uncertain
22	141-0050-01648	244398	Unknown	Observation Well	Dnr Ob 69006 M.A. Hanna Company	Not Available	Hibbing	Not Available	12/00/1938	Not Available	WEL	Uncertain
23	140-0270-00270	647068	Active	Environmental Bore Hole	Eb-1	Rr	Hibbing	90	06/06/2000	Not Available	WEL	Uncertain
24	140-0290-00341	647066	Active	Environmental Bore Hole	Eb-2	Rr	Hibbing	70	06/08/2000	Not Available	WEL	Uncertain
25	141-0020-03440	237768	Active	Domestic	Eliason, Ewald	Not Available	Hibbing	12	1920	QWTA	WEL	Uncertain
26	139-0176-00030	272599	Active	Domestic	Hakomaki, Emil	925 47th St W	Hibbing	114	Not Available	Not Available	WEL	Yes
27	141-0020-03320	237774	Active	Domestic	Hansen, Evert	Not Available	Hibbing	110	1949	QBAA	WEL	Uncertain
35	141-0020-03420	181633	Active	Domestic	Hibbing Airport No.2	Not Available	Hibbing	155	09/17/1981	PEVT	WEL	Uncertain
36	141-0060-03860	551372	Active	Monitor Well	Hibbing Taconite Company	5 Cr	Hibbing	30	08/23/1994	Not Available	WEL	Uncertain
37	141-0060-03950	629849	Active	Monitor Well	Hibbing Taconite Company	P.O. Box 589	Hibbing	42	03/03/2000	Not Available	WEL	Uncertain
39	141-0020-03330	237775	Active	Domestic	Latendresse, Leo	Not Available	Hibbing	71	1937	QBAA	WEL	Uncertain
40	139-0050-04830	233185	Unknown	Domestic	Lindgren, Lenord	Not Available	Hibbing	263	1954	Not Available	WEL	Uncertain
41	141-0050-00040	229143	Active	Industrial	Mahoning Ore	Not Available	Hibbing	285	1/1/1959	Not Available	WEL	Uncertain
42	141-0060-04130	718227	Active	Monitor Well	Mw	5 Hy N	Hibbing	68	10/12/2004	QWTA	WEL	Uncertain
43	141-0060-04130	721800	Active	Monitor Well	Mw	5 Hy N	Hibbing	60	06/07/2005	QWTA	WEL	Uncertain
44	140-0290-00360	557587	Active	Monitor Well	Mw-1A Mndnr	Not Available	Hibbing	76	08/28/1995	Not Available	WEL	Uncertain
45	140-0290-00360	557588	Active	Monitor Well	Mw-2B Mndnr	Not Available	Hibbing	68	08/30/1995	Not Available	WEL	Uncertain
46	140-0290-00360	557589	Active	Monitor Well	Mw-3 Mndnr	Not Available	Hibbing	50	07/31/1995	Not Available	WEL	Uncertain
47	140-0290-00360	557590	Active	Monitor Well	Mw-4 Mndnr	Not Available	Hibbing	45	08/01/1995	Not Available	WEL	Uncertain
48	141-0060-04140	519951	Active	Monitor Well	Mwfs-1	P.O. Box 749	Hibbing	20	09/29/1992	MTPL	WEL	Uncertain
49	141-0060-04140	519952	Active	Monitor Well	Mwfs-2	P.O. Box 749	Hibbing	21	09/30/1992	QWTA	WEL	Uncertain
50	141-0060-04140	519953	Active	Monitor Well	Mwfs-3	P.O. Box 749	Hibbing	21	09/30/1992	QWTA	WEL	Uncertain

Table C-3

PCSI Results - Well Locations in the DWSMAs
Hibbing WHPP Amendment

PCSI ID	PID No.	Unique No.	Status	Use	Well Name	Well Location	City	Total Depth (Feet)	Date Completed	Aquifer	PCS Code	Location Verified
51	141-0060-03980	584597	Active	Monitor Well	Mwlf-5	5 Cr	Hibbing	50	11/13/1996	Not Available	WEL	Uncertain
52	141-0060-03980	584598	Active	Monitor Well	Mwlf-6	5 Cr	Hibbing	35	11/12/1996	Not Available	WEL	Uncertain
53	141-0020-04310	229137	Active	Not Available	Not Available	Not Available	Hibbing	138	08/00/1971	Not Available	WEL	Uncertain
54	140-0290-00210	229145	Active	Community Supply (Municipal)	Pickands-Mather Co.	Not Available	Hibbing	200	Not Available	Not Available	WEL	Uncertain
55	141-0020-03340	237767	Inactive	Domestic	Ridlon, Ernest	Not Available	Hibbing	95	Not Available	QBAA	WEL	Uncertain
56	139-0050-04830	228997	Unknown	Domestic	Samson, Chester	Not Available	Hibbing	65	1959	Not Available	WEL	Uncertain
57	140-0290-00246	226637	Active	Community Supply (Municipal)	Scranton Mine	Not Available	Hibbing	291	1958	Not Available	WEL	Uncertain
58	140-0270-00405	544101	Active	Elevator	State Of Minnesota	1525 3rd Ave E	Hibbing	21	08/30/1994	Not Available	WEL	Yes

Uncertain - Not enough address information to verify location



Municipal Well

Potential Class V Well Location

Public Watercourse

Public Waters Basin

Hibbing DWSMA

Municipal Boundary

DWSMA Vulnerability

Low

Moderate

High

High (SWCA)

60 - Potential Class V Well Location PCSI ID (PCSI ID refers to Table C-4)

2 - Municipal Well Location PCSI ID (PCSI ID refers to Table C-3)

N

0 0.5 1
Miles

POTENTIAL CLASS V WELL LOCATIONS
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-8

BARR

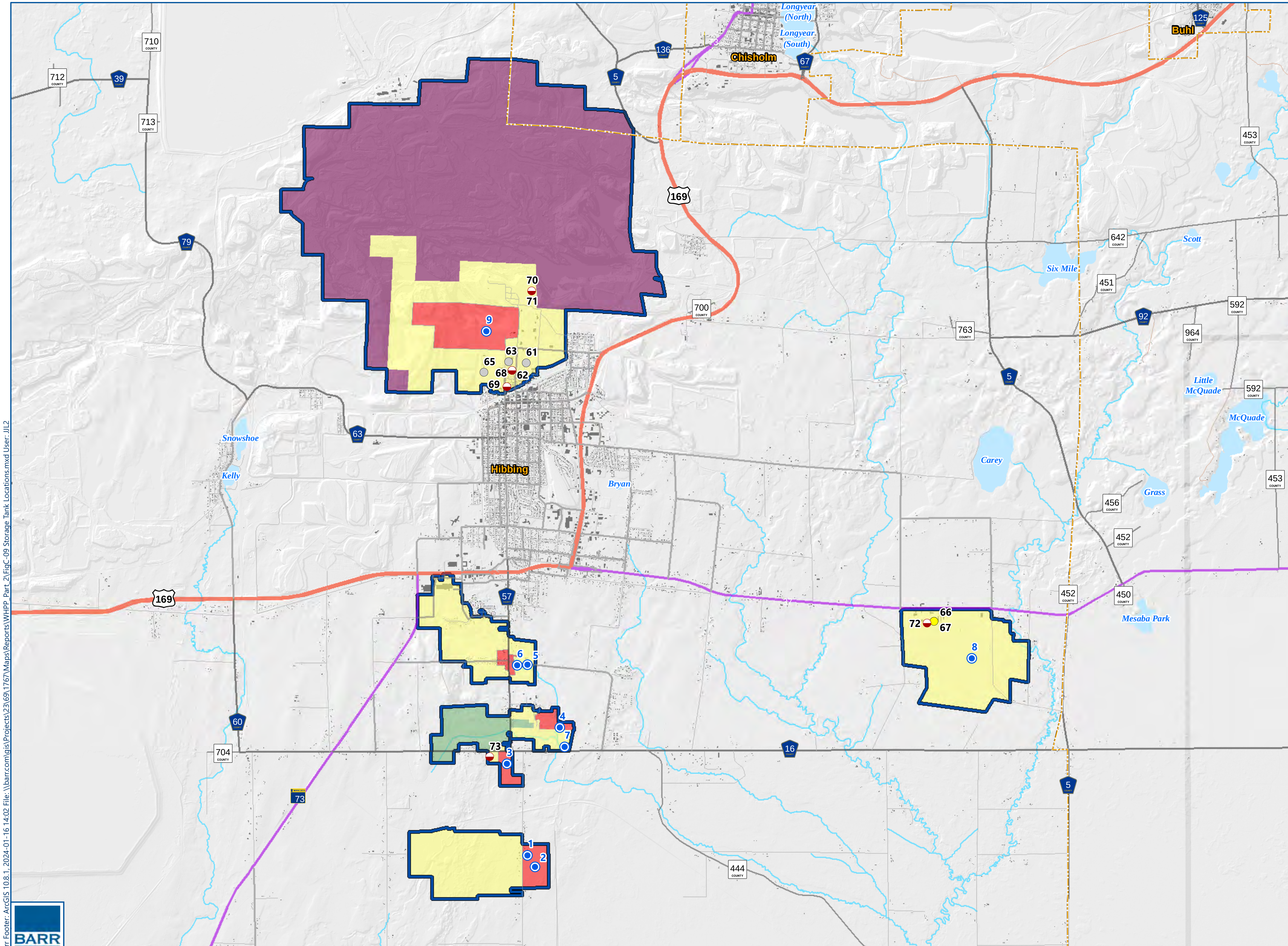
Table C-4

PCSI Results - Potential Class V Well Locations in the DWSMAs
Hibbing WHPP Amendment

PCSI ID	PID No.	MPCA Agency ID	Status	Location Name	Street Address	City or Twp	PCS Code	Location Verified
60	140-0140-02950	42426	Inactive*	Matts Auto Service	1810 3rd Ave E	Hibbing	CVMVW	Yes

Potential Contaminant Source (PCS) Codes:
CVMVW - Motor Vehicle Waste Disposal Well (potential Class V)

* Indicates status of hazardous waste generator permit



STORAGE TANK LOCATIONS
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

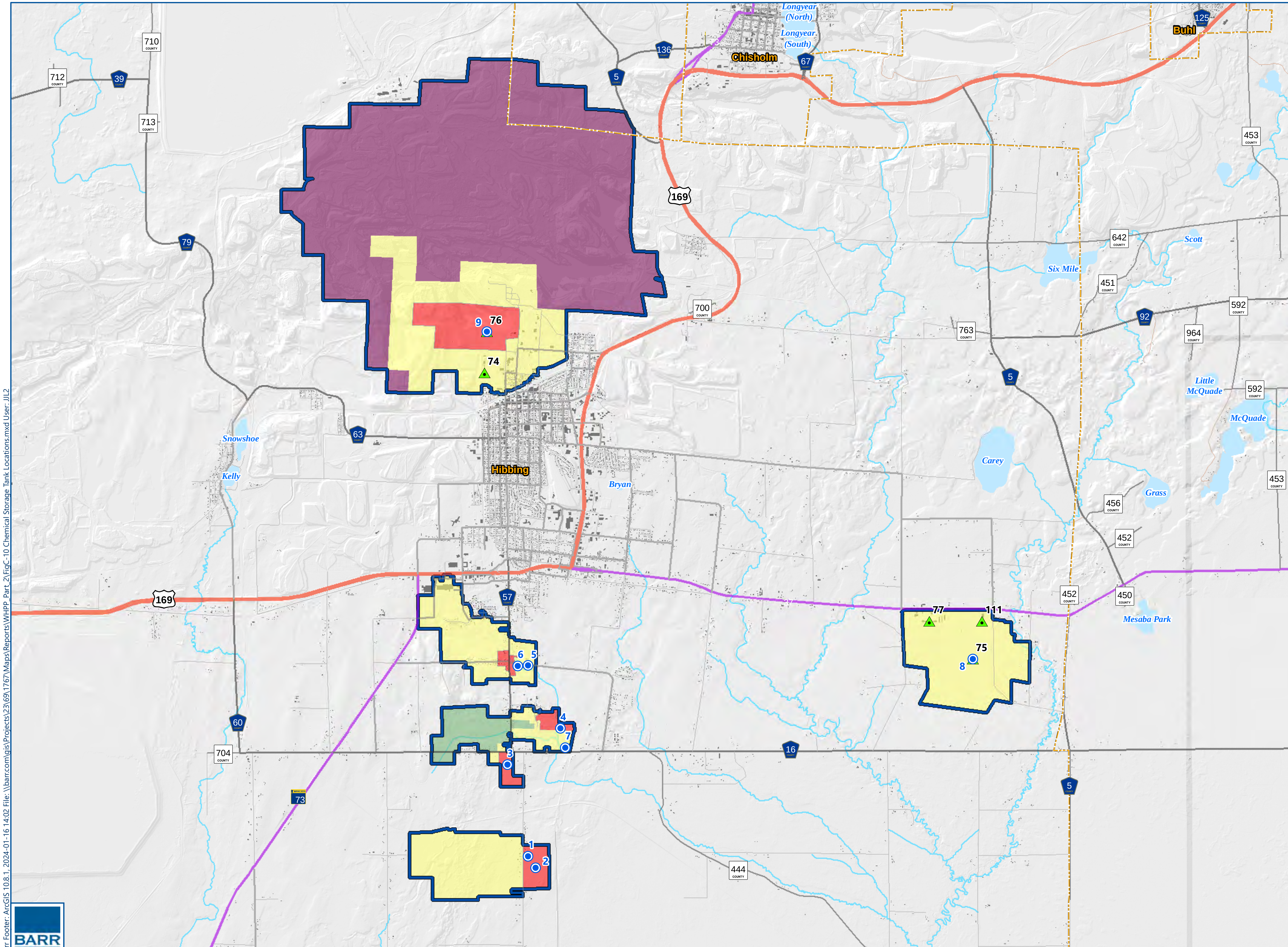
FIGURE C-9

Table C-5

PCSI Results - Storage Tank Locations in the DWSMAs
Hibbing WHPP Amendment

Map ID	PID Number	MPCA Agency Interests ID	Site	Site Address	City	Tank Number	Install Date	Registration Date	Tank Capacity	Tank Status	Tank Product/Product Released	Above or Under Ground	Release Discovered Date	Release Report Date	Complete Site Closure Date	PCS Code-Material Code	Location Verified
61	140-0270-00400	116385	Bennett Park Maintenance Facility	520 E 13th St	Hibbing	001	1/1/1965	1/5/1993	500	Removed	Gasoline	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
62	140-0270-00405	135320	DNR Minerals	1525 E 3rd Ave	Hibbing	235	1/1/1982	9/30/1996	550	Removed	Gasoline	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
63	140-0270-00407	112716	Guardian Angels	1500 3rd Ave E	Hibbing	001	Unknown	Unknown	10000	Removed	Fuel Oil	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
63	140-0270-00407	112716	Guardian Angels	1500 3rd Ave E	Hibbing	002	Unknown	Unknown	500	Removed	Fuel Oil	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
63	140-0270-00407	112716	Guardian Angels	1500 3rd Ave E	Hibbing	003	Unknown	Unknown	500	Removed	Fuel Oil	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
64	140-0140-02570	25506	Hibbing Public Works	1810 1st Ave E	Hibbing	101	Unknown	Unknown	500	Removed	Gasoline	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
64	140-0140-02570	25506	Hibbing Public Works	1810 1st Ave E	Hibbing	102	Unknown	Unknown	500	Removed	Gasoline	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
64	140-0140-02570	25506	Hibbing Public Works	1810 1st Ave E	Hibbing	103	Unknown	Unknown	2000	Removed	Gasoline	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
64	140-0140-02570	25506	Hibbing Public Works	1810 1st Ave E	Hibbing	104	7/1/1982	12/10/1985	2000	Removed	Diesel	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
64	140-0140-02570	25506	Hibbing Public Works	1810 1st Ave E	Hibbing	105	7/1/1984	7/1/1984	265	Removed	Used or waste oil	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
65	140-0290-00339	29294	Lerch Brothers Inc - Hibbing	1600 5th Ave W	Hibbing	001	7/30/1987	7/30/1987	500	Removed	Gasoline	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
65	140-0290-00339	29294	Lerch Brothers Inc - Hibbing	1600 5th Ave W	Hibbing	002	1/1/1980	3/13/1989	1000	Removed	Gasoline	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
65	140-0290-00339	29294	Lerch Brothers Inc - Hibbing	1600 5th Ave W	Hibbing	003	5/21/1999	5/21/1999	500	Removed	Fuel Oil	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
66	141-0020-03450	9590	Range Regional Airport	11038 Highway 37	Hibbing	001	10/1/1993	6/26/2003	12000	Removed	Aviation gasoline	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
66	141-0020-03450	9590	Range Regional Airport	11038 Highway 37	Hibbing	002	10/1/1993	6/26/2003	12000	Removed	Jet Fuel	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
66	141-0020-03450	9590	Range Regional Airport	11038 Highway 37	Hibbing	007	Unknown	7/18/2022	2000	Removed	Other substance	Underground	Not Applicable	Not Applicable	Not Applicable	UST-F000	Yes
67	141-0020-03450	9590	Range Regional Airport	11038 Highway 37	Hibbing	1001	5/14/2014	5/16/2014	12000	Active	Aviation Gas	Aboveground	Not Applicable	Not Applicable	Not Applicable	AST-F000	Yes
67	141-0020-03450	9590	Range Regional Airport	11038 Highway 37	Hibbing	1002	5/14/2014	5/16/2014	12000	Active	Jet Fuel (unspecified)	Aboveground	Not Applicable	Not Applicable	Not Applicable	AST-F000	Yes
67	141-0020-03450	9590	Range Regional Airport	11038 Highway 37	Hibbing	1003	5/14/2014	5/16/2014	2000	Active	Diesel Fuel	Aboveground	Not Applicable	Not Applicable	Not Applicable	AST-F000	Yes
67	141-0020-03450	9590	Range Regional Airport	11038 Highway 37	Hibbing	1004	5/14/2014	5/16/2014	1000	Active	Gasoline Blends (E1-E49)	Aboveground	Not Applicable	Not Applicable	Not Applicable	AST-F000	Yes
68	140-0270-00405	135320	DNR Minerals	1525 E 3rd Ave	Hibbing	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Gasoline, Type Unknown	Not Applicable	6/29/1998	6/29/1998	2/18/2000	LUST	Yes
69	140-0140-02570	25506	Hibbing Public Works	1810 1st Ave E	Hibbing	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Diesel, Gasoline, Unleaded	Not Applicable	4/14/1998	4/15/1998	3/7/2005	LUST	Yes
70	140-0270-00207	190327	The Whitney Mine	3rd Ave & Mckinley	Hibbing	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Diesel	Not Applicable	5/13/1997	5/14/1997	10/20/1997	LUST	Uncertain
71	140-0270-00207	195291	The Whitney Mine	3rd Ave & Mckinley	Hibbing	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Diesel, Fuel Oil #1 & #2	Not Applicable	5/13/1997	5/14/1997	12/24/1997	LUST	Uncertain
72	141-0020-03450	83394	TSA at Hibbing-Range Regional Airport	11038 Highway 37	Hibbing	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Available	Not Applicable	7/1/2000	7/1/2000	12/11/2019	LUST	Yes
72	141-0020-03450	83394	TSA at Hibbing-Range Regional Airport	11038 Highway 37	Hibbing	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Aviation Gas	Not Applicable	10/23/1991	10/23/1991	11/29/1993	LUST	Yes
73	141-0040-00022	185852	Warren Residence	11994 Townline Rd	Hibbing	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Fuel Oil #1 & #2	Not Applicable	6/4/1999	6/4/1999	8/18/1999	LUST	Yes

LUST - Leaking Underground Storage Tank
Uncertain - Not enough address information to verify location



Municipal Well

Chemical Storage Tank Location

Public Watercourse

Public Waters Basin

Hibbing DWSMA

Municipal Boundary

DWSMA Vulnerability

Low

Moderate

High

High (SWCA)

75 - Chemical Storage Location PCSI ID (PCSI ID refers to Table C-6)

2 - Municipal Well Location PCSI ID (PCSI ID refers to Table C-3)

N

0 0.5 1

Miles

CHEMICAL STORAGE TANK LOCATIONS

Hibbing Part 2 WHPP Amendment

City of Hibbing

St. Louis County, MN

FIGURE C-10

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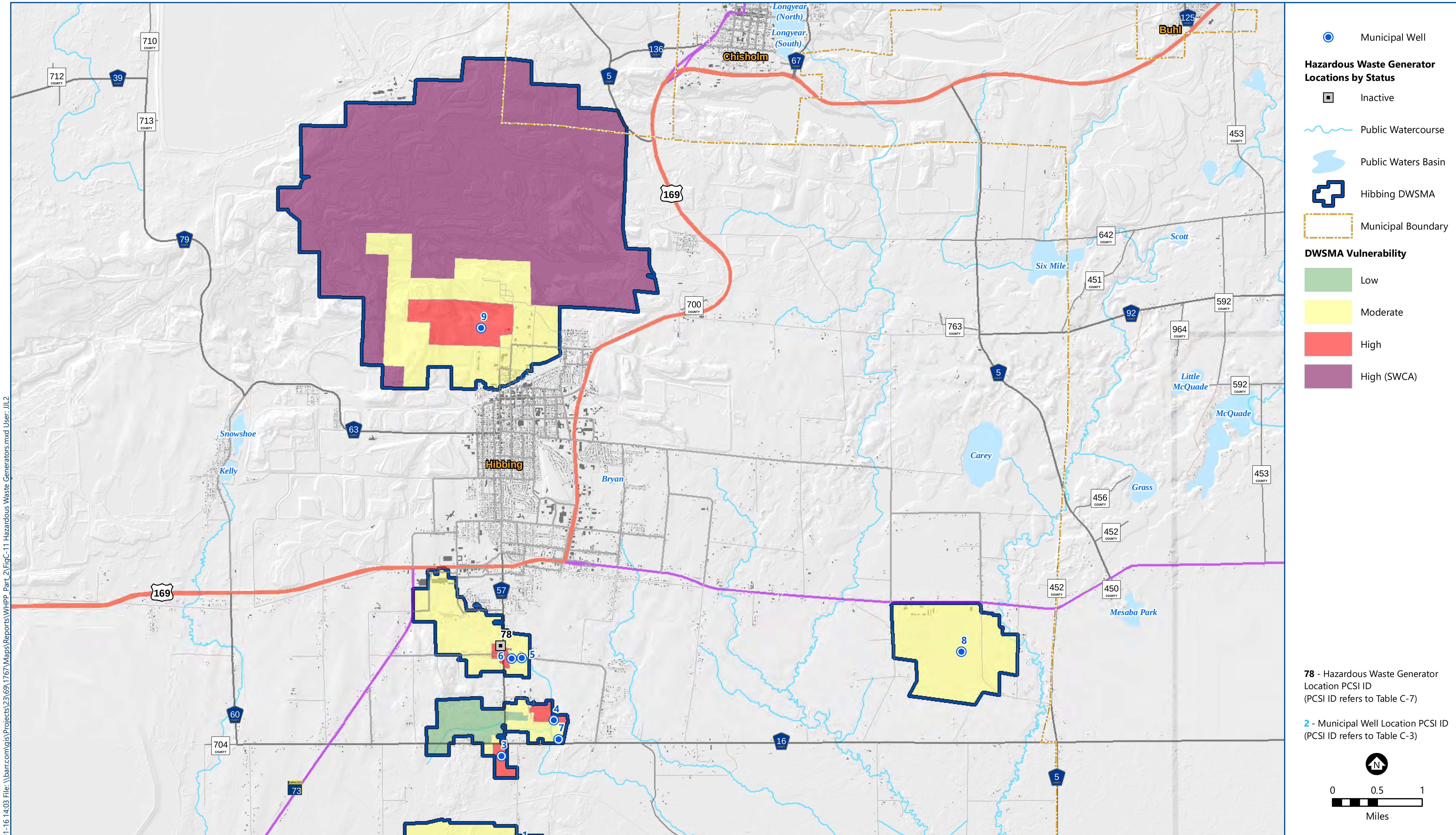
Table C-6

PCSI Results - Chemical Storage Sites in the DWSMAs
Hibbing WHPP Amendment

Non-Agricultural Chemicals								
PCSI ID	**PID Number**	**CAS Number**	**Facility Name**	**Site Address**	**Status**	**Chemicals**	**PCS Code - Material Code**	**Location Verified**
74	140-0290-00339	74986	FERRELLGAS/Lerch Brothers	1600 5th Ave West	Active	Propane (Liquified Petroleum Gas)	STOR-F000	Yes
75	141-0020-03550	7782505	Hibbing Public Utilities - Airport Well	3837 South Hughes Road	Active	Chlorine	STOR-C000	Yes
76	140-0290-00240	7782505	Hibbing Public Utilities - Scranton Well	501 West 11th Street	Active	Chlorine	STOR-C000	Yes
77	141-0020-03450	57556, 8008206, 127082	SkyWest Airlines dba Delta Connection	11038 Highway 37	Active	Propylene Glycol, Avgas 100LI, Kerosine, Potassium Acetate, Propylene Glycol	STOR-C000	Yes
111	141-0020-03410	7439921	Detroit Diesel Remanufacturing LLC	3895 S Hughes Rd	Active	Lead	STOR-C000	Yes



HAZARDOUS WASTE GENERATORS
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

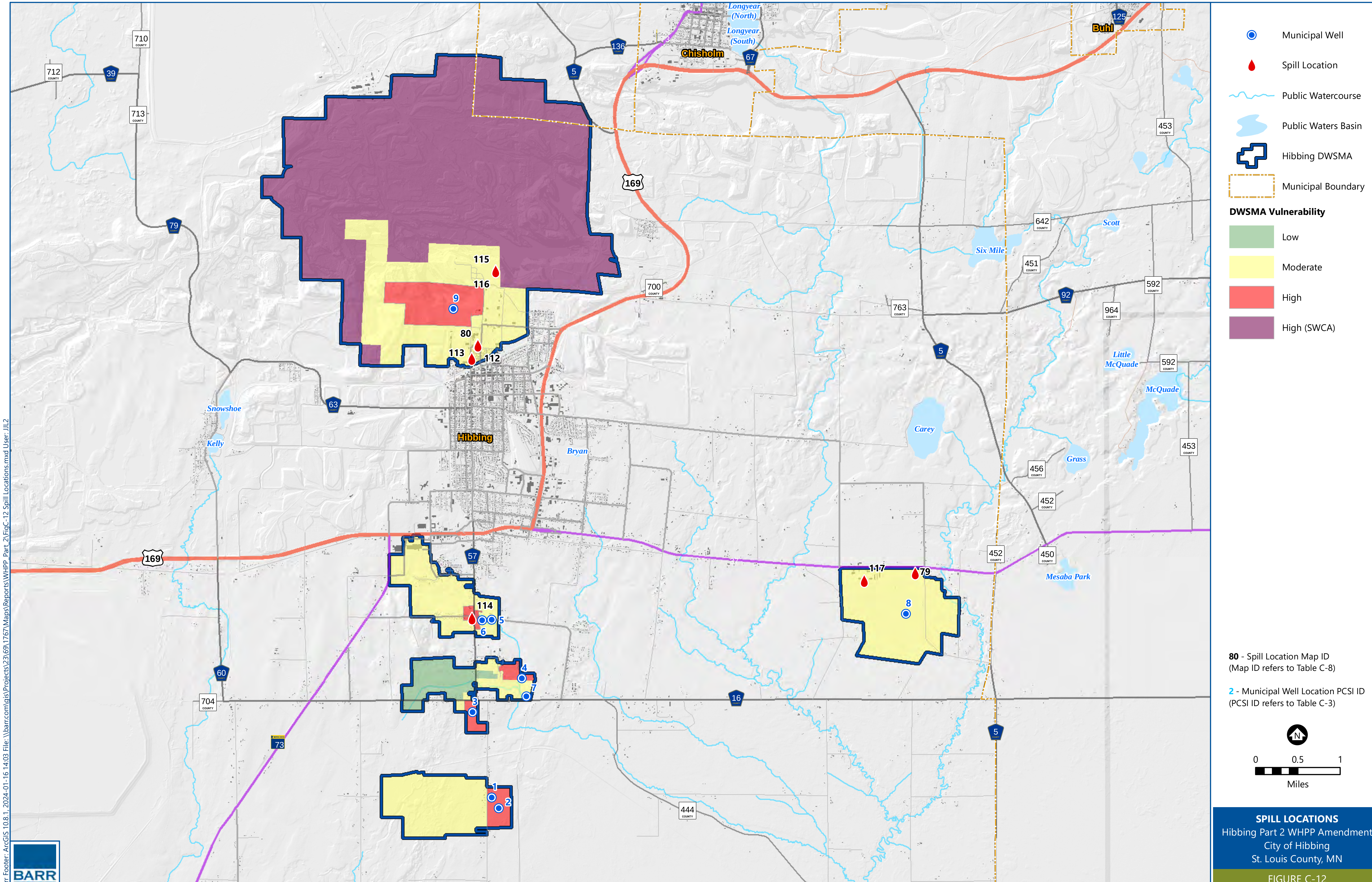
FIGURE C-11

Table C-7

PCSI Results - Hazardous Waste Generators in the DWSMAs
Hibbing WHPP Amendment

Map ID	PID Number	MPCA Agency Interests ID	Generator	Address	City	Generator Size	Generator Status	PCS Code	Location Verified
78	141-0050-04961	13353	Rodneys Radiator Service	4859 1st Ave	Hibbing	Not Available	Inactive	HWG	Yes

LQG - Large Quantity Generator
MQG - Medium Quantity Generator
SQG - Small Quantity Generator
VSQG - Very Small Quantity Generator

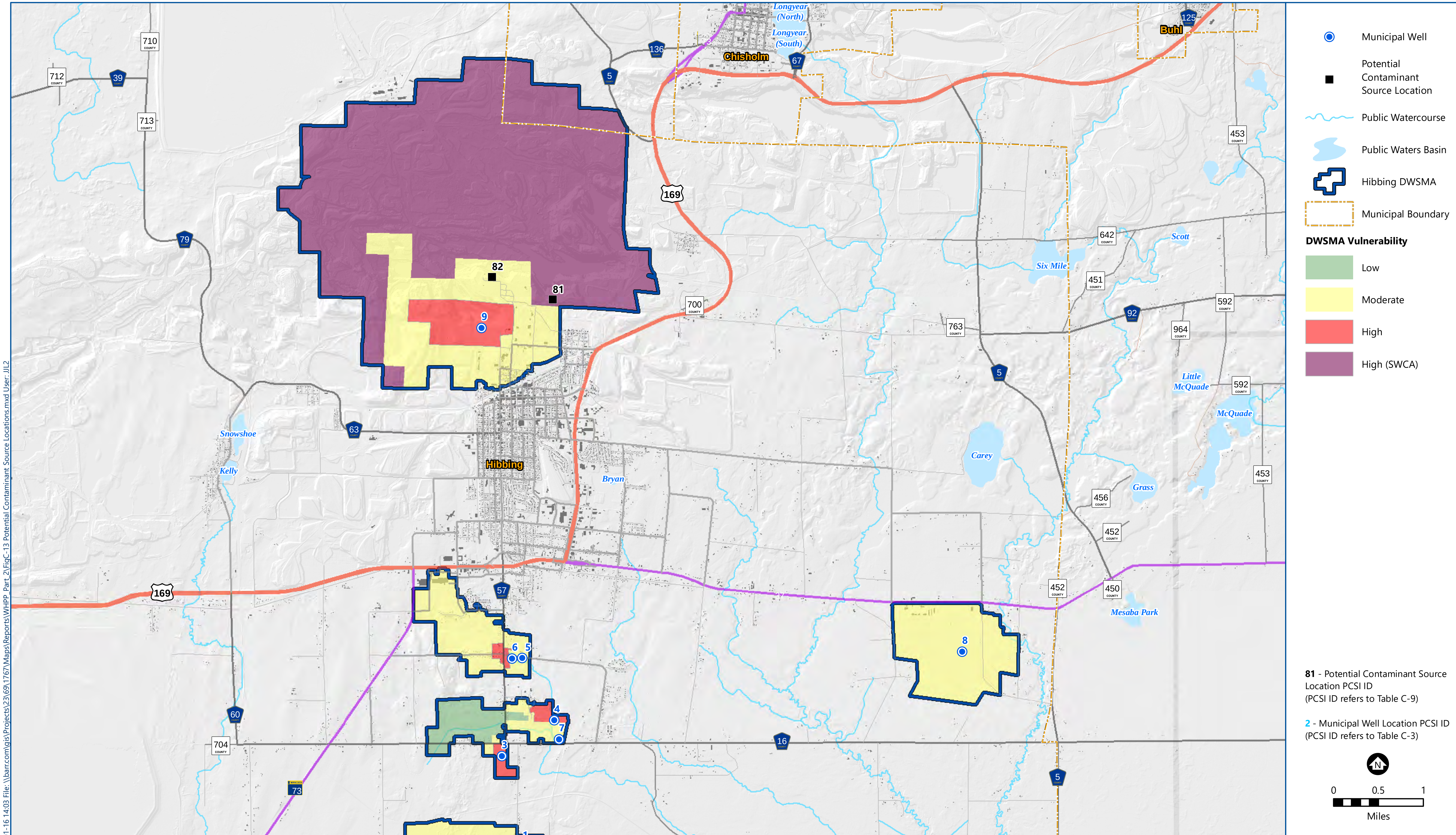


Barr Footer: ArcGIS 10.8.1, 2024-01-16 14:03 File: \\barr.com\gis\Projects\23\69\1767\Maps\Reports\WHPP_Part_2\FigC-12 Spill Locations.mxd User: JIL2

Table C-8

PCSI Results - Spill Locations in the DWSMAs
Hibbing WHPP Amendment

PCSI ID	PID No.	MPCA Incident ID	Location Name	Street Address	City or Twp	Status	Substance	PCS Code	Location Verified
79	141-0020-03410	198017	Aftermarket Solutions	3895 S Hughes Rd	Hibbing	Closed	55 gallons (other substance)	SPL	Yes
80	140-0270-00405	84586	DNR - Lands & Minerals	1525 3rd Ave E	Hibbing	Closed	small amounts Mercury	SPL	Yes
112	140-0270-00405	135320	DNR - Lands & Minerals	1525 E 3rd Ave	Hibbing	Closed	Gasoline	SPL	Yes
113	140-0140-02570	25506	Hibbing Public Works	1810 1st Ave E	Hibbing	Closed	Gasoline, Diesel	SPL	Yes
114	141-0050-07037	191793	Ray Madrid Residence	4905 1st Ave	Hibbing	Closed	Gasoline, leaded	SPL	Yes
115	140-0270-00207	190327	The Whitney Mine	3rd Ave & Mckinley	Hibbing	Closed	Diesel	SPL	Yes
116	140-0270-00207	195291	The Whitney Mine	3rd Ave & Mckinley	Hibbing	Closed	Diesel, Fuel Oil #1 & #2	SPL	Yes
117	141-0020-03450	83394	TSA at Hibbing-Range Regional Airport	11038 Highway 37	Hibbing	Closed	Aviation gas	SPL	Yes



POTENTIAL CONTAMINANT SOURCE LOCATIONS
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-13

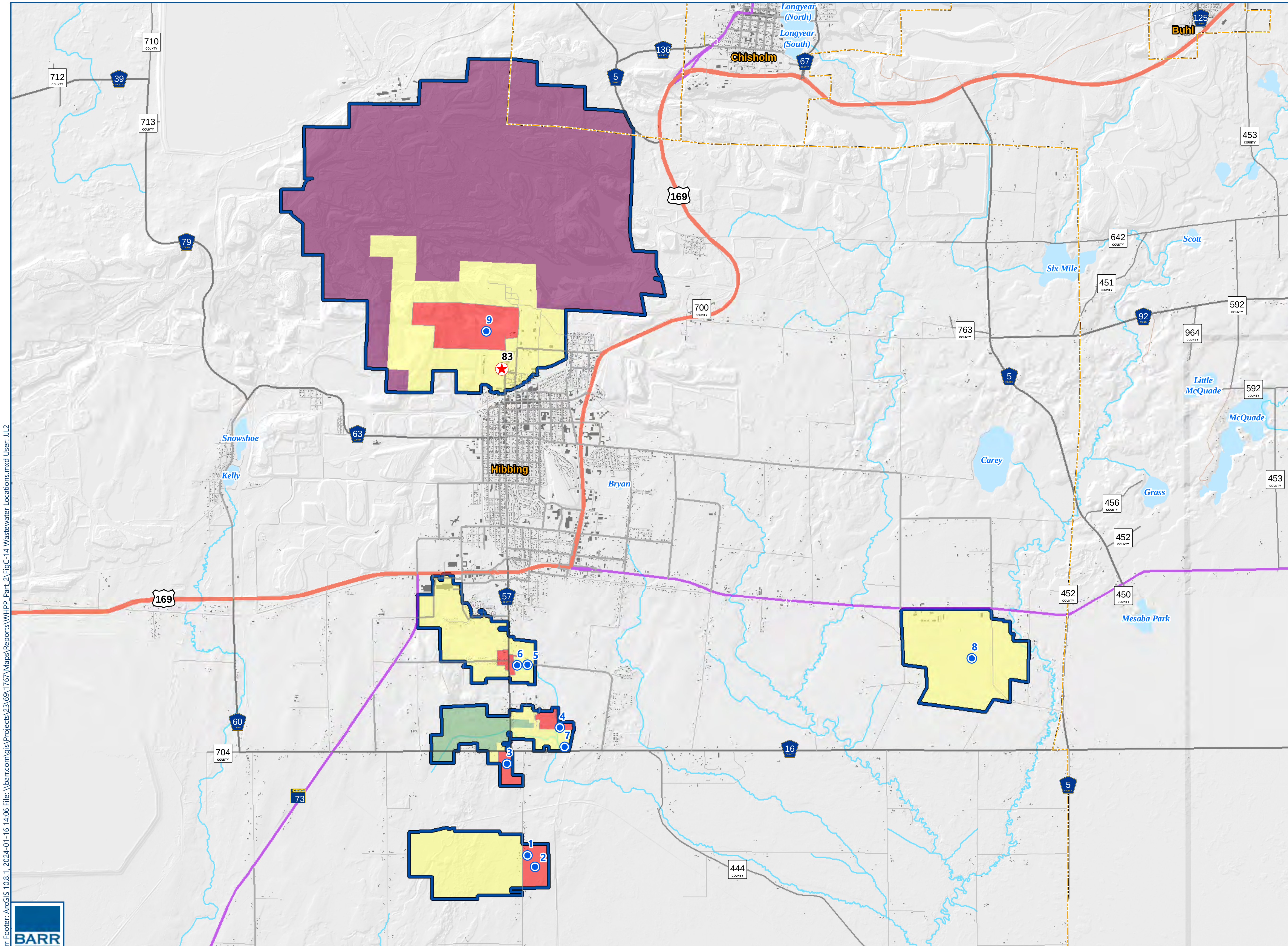
Table C-9

PCSI Results - Potential Contaminant Source Locations in the DWSMAs
Hibbing WHPP Amendment

PCSI ID	PID No.	MPCA Agency Interests ID	Status	Location Name	Street Address	City or Twp	PCS Code	Location Verified
81	140-0270-00240	191065	Active	HCC Mining Training Facility	Old N Hibbing	Hibbing	BMS	Uncertain
82	140-0290-00140	215941	Active	Hull Rust Mahoning Mine View	401 Penobscot Road	Hibbing	BMS	Yes

PCS Codes
BMS - Brownfields

Uncertain - Not enough address information to verify location



WASTEWATER LOCATIONS
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-14

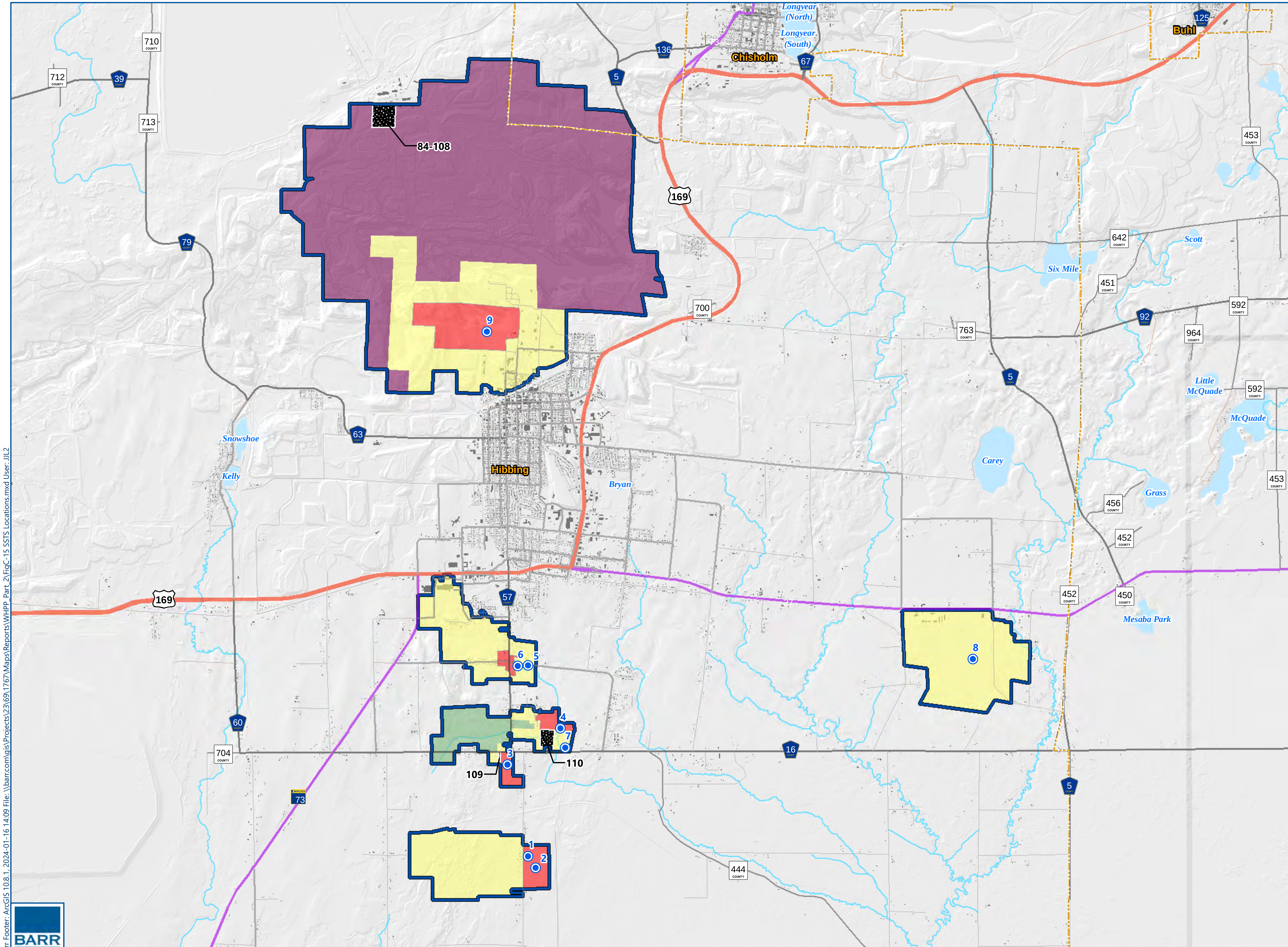
BARR

Barr Footer: ArcGIS 10.8.1, 2024-01-16 14:06 File: \\barr.com\gis\Projects\23\69\1767\Maps\Reports\WHPP_Part_2\FigC-14 Wastewater Locations.mxd User: JIL2

Table C-10

PCSI Results - Wastewater Locations in the DWSMAs
Hibbing WHPP Amendment

PCSI ID	PID No.	MPCA Agency Interests ID	Location Name	Street Address	City or Twp	Status	PCS Code	Location Verified
83	140-0290-00360	153919	Hibbing Public Utilities WTP - Scranton	510 11th St W	Hibbing	Active	WWTD	Yes



Municipal Well

SSTS Location

Public Watercourse

Public Waters Basin

Hibbing DWSMA

Municipal Boundary

DWSMA Vulnerability

Low

Moderate

High

High (SWCA)

84 - SSTS Location PCSI ID
(PCSI ID refers to Table C-11)

2 - Municipal Well Location PCSI ID
(PCSI ID refers to Table C-3)

0 0.5 1
Miles

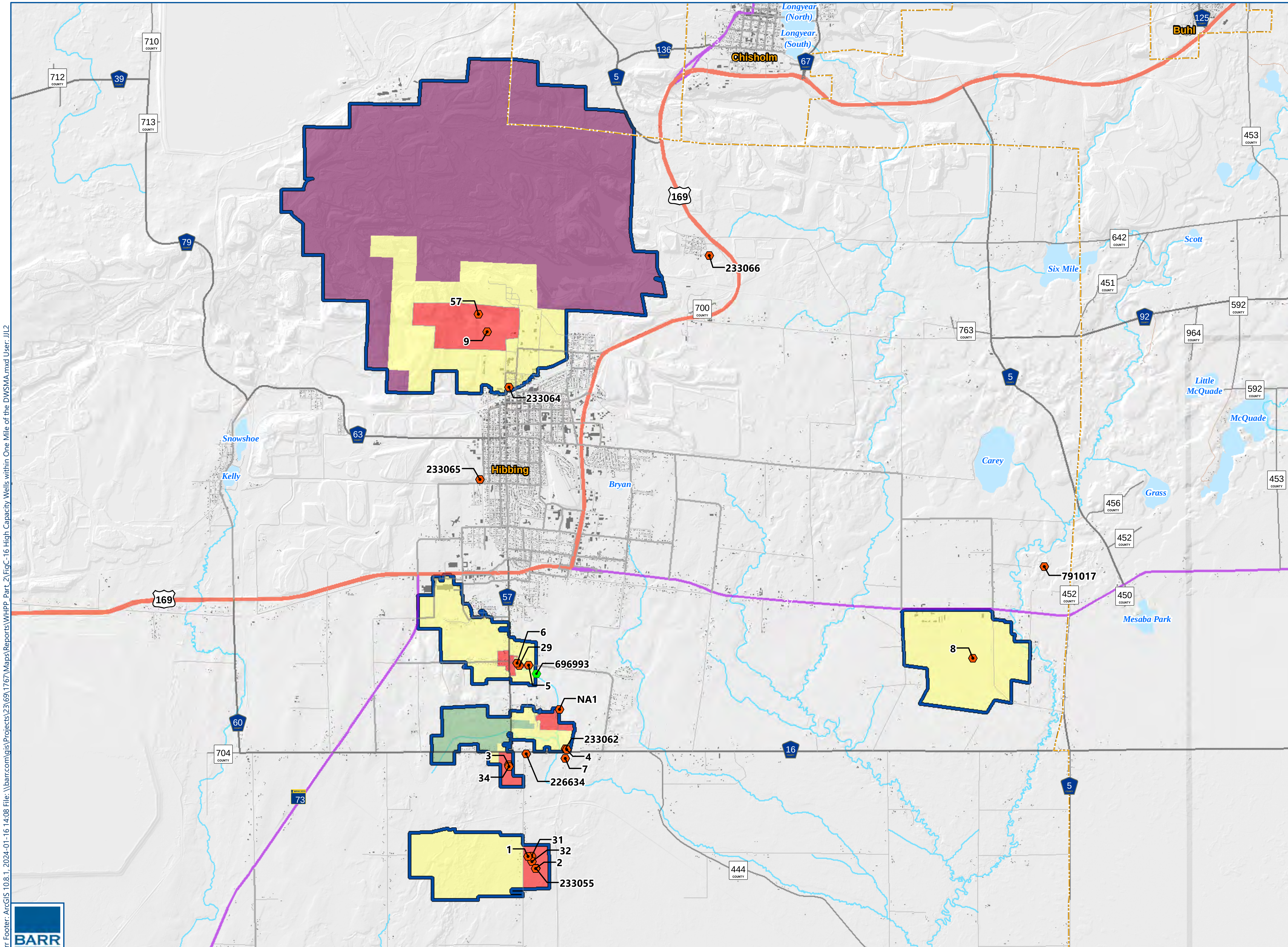
SUBSURFACE SEWAGE TREATMENT SYSTEM LOCATIONS
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-15

Table C-11

PCSI Results - Subsurface Sewage Treatment Systems (SSTS) in the DWSMAs
Hibbing WHPP Amendment

Map ID	PID Number	Program ID	Name	Address	City	Permit Status	PCS Code	Location Verified
84	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
85	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
86	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
87	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
88	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
89	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
90	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
91	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
92	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
93	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
94	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
95	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
96	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
97	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
98	141-0060-04130	27466	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Certificate Issued	SSTS	Yes
99	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
100	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
101	141-0060-04130	25022	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Certificate Issued	SSTS	Yes
102	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
103	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Permit Issued	SSTS	Yes
104	141-0060-04130	17578	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Certificate Issued	SSTS	Yes
105	141-0060-04130	6552	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Inactive	SSTS	Yes
106	141-0060-04130	34528	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Certificate Issued	SSTS	Yes
107	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Pending Plan Review	SSTS	Yes
108	141-0060-04130	Not Available	Hibbing Land Corp	4950 Hwy 5 N	Hibbing	Pending Plan Review	SSTS	Yes
109	141-0040-00021	30087	Kampen Warren	11924 Townline Rd	Hibbing	PTC expired	SSTS	Yes
110	141-0020-04420	30787	Skraba Terry P Etux	11865 Townline Rd	Hibbing	PTC expired	SSTS	Yes



Permitted Water Appropriations (MPARS) Within 1 Mile of DWSMA

- Golf Course Irrigation
- Municipal/Public Water Supply
- Public Watercourse
- Public Waters Basin
- Hibbing DWSMA
- Municipal Boundary

DWSMA Vulnerability

- Low
- Moderate
- High
- High (SWCA)

233062 - MPARS Location PCSI ID
(PCSI ID refers to Table C-12)

0 0.5 1
Miles

BARR

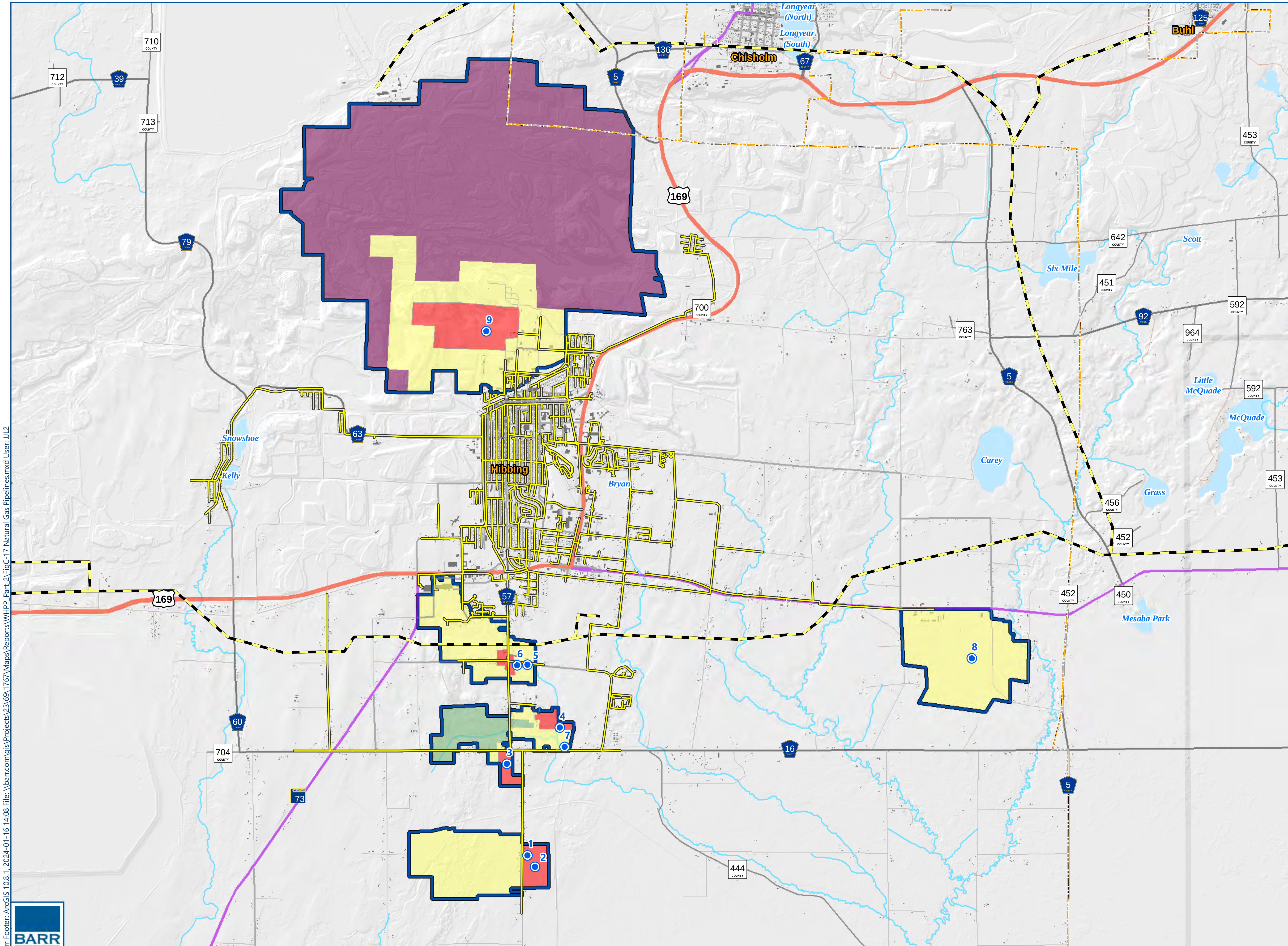
HIGH CAPACITY WELLS WITHIN ONE MILE OF THE DWSMA
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-16

Table C-12

High Capacity Wells within One Mile of DWSMAs
Hibbing WHPP Amendment

PCSI ID	Permit Number	Unique ID	Status	Permittee	Use	Aquifer	Permitted Volume MGY
1	1975-2222	233054	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
2	1975-2222	792077	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
3	1975-2222	233056	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
4	1975-2222	271992	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
5	1975-2222	233058	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
6	1975-2222	233061	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
7	1975-2222	778015	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
8	1975-2222	716190	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Precambrian	1000
9	1975-2222	147463	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Biwabik Iron	1000
29	1975-2222	233060	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
31	1975-2222	233052	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
32	1975-2222	226635	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Water Table	1000
34	1975-2222	233059	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
57	1975-2222	226637	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Biwabik Iron	1000
226634	1975-2222	226634	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Water Table	1000
233055	1975-2222	233055	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
233062	1975-2222	233062	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
233064	1975-2222	233064	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
233065	1975-2222	233065	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
233066	1975-2222	233066	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Quaternary Buried Artesian	1000
696993	2005-2007	696993	Active	Mesaba Country Club	Golf Course Irrigation	Water Table	12
791017	1975-2222	791017	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Water Table	1000
NA1	1975-2222	Not Available	Active	Hibbing Public Utilities	Municipal/Public Water Supply	Not Available	1000



Municipal Well

Gas Distribution Main Lines*

Natural Gas Pipeline**

Public Watercourse

Public Waters Basin

Hibbing DWSMA

Municipal Boundary

DWSMA Vulnerability

Low

Moderate

High

High (SWCA)

* City of Hibbing

** MGIO and MnOPS

2 - Municipal Well Location PCSI ID (PCSI ID refers to Table C-3)

0 0.5 1

Miles

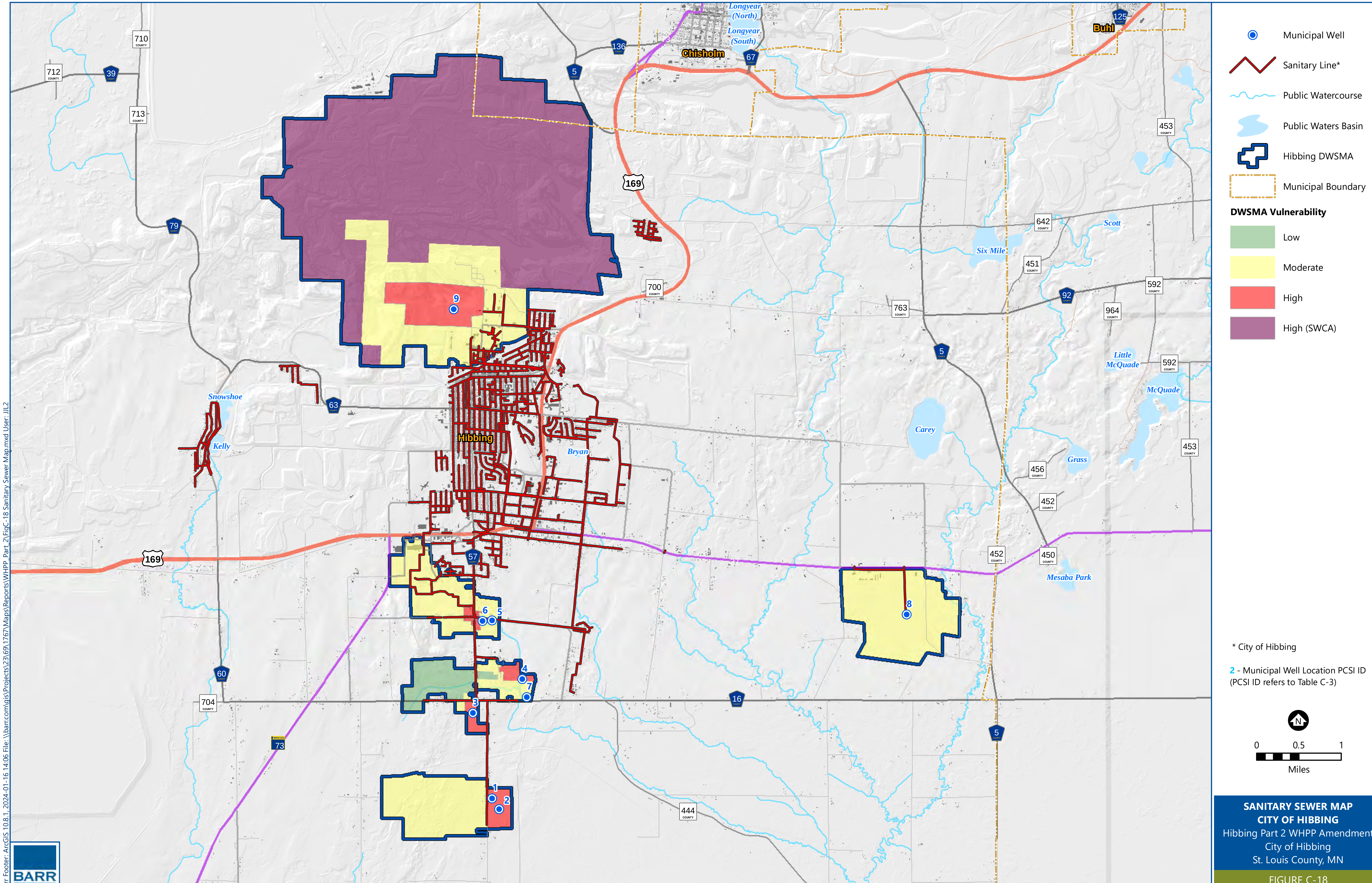
NATURAL GAS PIPELINES

Hibbing Part 2 WHPP Amendment

City of Hibbing

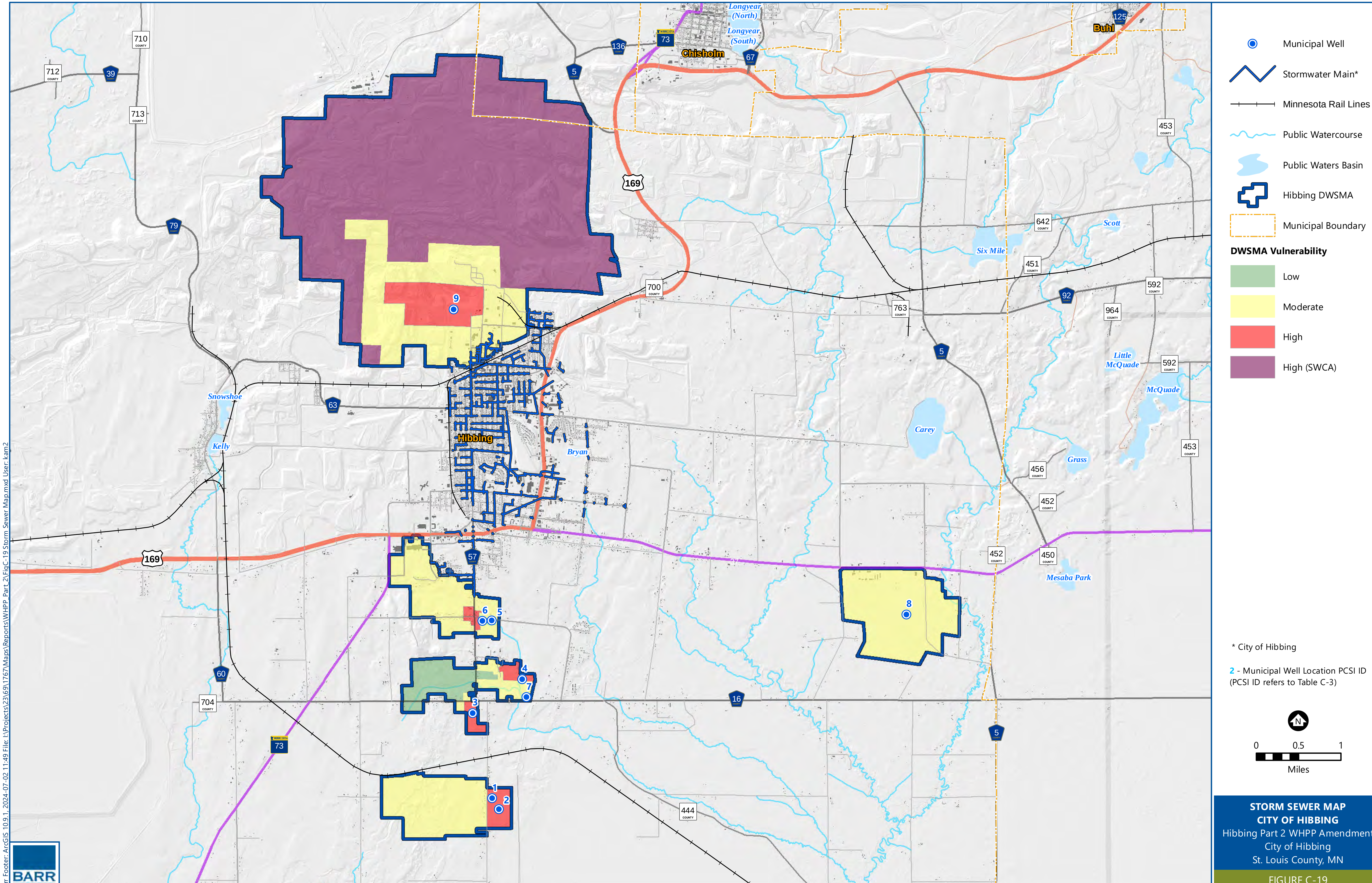
St. Louis County, MN

FIGURE C-17



SANITARY SEWER MAP
CITY OF HIBBING
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-18



STORM SEWER MAP
CITY OF HIBBING
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-19

Attachments

Attachment C-1

Precipitation Data

DEPARTMENT OF NATURAL RESOURCES

Retrieve Climate Data from National Weather Service Reporting Stations - station data as monthly tables

station name: **HIBBING CHISHOLM HIBBING AP**
element: **total precipitation**
units: inches
key: * = some missing data | M = missing data

click on any column header to sort

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2024	0.34*	M	M	M	M	M	M	M	M	M	M	M	M
2023	0.39	0.68	0.18	2.59	1.71	1.97	2.67	1.05	6.62	1.43	0.89	2.59	22.77
2022	0.28	T*	0.84	3.03	6.49*	4.04	5.55	4.35	2.56	0.83	2.00*	0.38	30.35*
2021	0.09	0.02	0.16*	1.61*	0.92	1.61	1.62	1.62	3.46	2.16	1.58	3.01	17.86*
2020	0.62	0.20	T*	0.85*	0.82	3.69	3.93	5.90	1.26	1.17*	0.76*	T*	19.20*
2019	0.27	T*	0.82*	0.95*	1.89	2.34	2.14	2.34	5.13	2.64*	0.61	0.55*	19.68*
2018	T*	T*	0.00*	0.16*	1.80	4.30	3.18	1.08	3.35	2.85*	0.09*	0.07*	16.88*
2017	0.42	1.06	0.81	2.25	2.17	4.43	1.91	6.50	6.51	1.93	0.04*	0.32*	28.35*
2016	T	0.25*	2.75	1.82	1.53	4.86	3.81	5.69	4.46	1.21	1.19	0.92	28.49*
2015	0.25	0.07	0.56	0.33	4.33	4.01	1.61	3.41	5.61	2.22	2.01	0.30	24.71
2014	0.30	1.07	1.09	2.05	7.63	7.49	0.88	1.20	2.99	1.26	0.26	0.34	26.56
2013	1.09	0.36	1.08	1.42	2.49	4.27	3.32	3.45	1.09	3.64	0.70	0.18	23.09
2012	0.21	0.46	1.37	3.03	6.28	6.11	4.19	1.76	0.72	1.33	0.92	0.51	26.89
2011	0.38	0.21	0.21	2.91	1.78	4.41	2.49	3.30	1.13	1.03	0.57	0.13	18.55
2010	0.38	0.01	0.95	1.23	2.09	4.29	4.43	6.46	3.76	3.34	0.49	0.58*	28.01*
2009	0.38	0.42	2.48	1.33	2.18	3.09	2.62	3.23	0.59	2.83	1.28	0.30	20.73
2008	0.09	0.08	0.22	3.93	2.18	6.18	3.40	1.00	3.11	2.51	0.91	0.47	24.08
2007	T	0.05	1.00	1.00	1.07	2.78	2.12	0.26	2.56	4.72	0.34	1.08	16.98

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2006	0.04	0.23	0.88	0.35	1.68	1.69	2.41	1.43	1.38	0.90	0.62	0.53	12.14
2005	1.09	0.10	0.35	0.40	2.30	3.05	1.43	1.88	3.55	1.32	1.28	0.06	16.81
2004	0.25	0.07	0.56	0.69	4.36	1.45	2.84	2.58	3.94	1.91	0.03	0.56	19.24
2003	0.01	T	0.18	0.83	2.49	2.95	4.36	2.14	4.44	1.27	0.23	0.04	18.94
2002	0.36	0.13	0.31	0.96	1.33	6.01	4.78	6.17	2.03	2.36	0.23	0.48	25.15
2001	0.45	0.67	0.39	4.36	4.62	2.74	2.31	3.13	1.50	2.45	1.39	0.38	24.39
2000	0.66	0.71	1.63	1.58	2.85	4.91	3.33	3.92	1.41	2.58	1.88	0.17	25.63
1999	0.73	0.60	1.01	1.70	5.13	3.96	13.51	4.91	5.33	1.48	0.09	0.19	38.64
1998	0.45	1.58	1.40	0.52	2.43	6.38	2.93	1.31	3.34	5.03	1.53	1.36	28.26
1997	1.76	0.54	1.29	1.01	1.84	5.96	2.74	1.29	1.88	3.22	0.62	0.15	22.30
1996	1.32	1.14	0.50	1.11	1.76	7.04	5.12	2.37	2.65	4.10	3.21	1.07	31.39
1995	1.03	0.82	0.83	1.06	2.26	1.94	6.85	3.16	5.39	3.08	0.98	1.67	29.07
1994	0.60	0.29	0.59	3.33	1.83	8.92	3.41	3.39	3.04	2.87	1.31	0.61	30.19
1993	0.93	T	0.44	2.35	3.73	5.34	9.57	3.65	1.97	0.86	2.34	1.41	32.59
1992	0.47	0.73	0.64	1.24	3.04	3.36	4.75	4.48	3.18	0.45	1.23	1.22	24.79
1991	0.59	0.62	1.44	1.93	2.72	2.81	4.97	1.26	4.30	2.07	3.00	1.11	26.82
1990	0.98	0.40	1.74	3.05	0.76	5.69	3.22	0.88	3.13	3.13	0.37	0.70	24.05
1989	1.29	0.41	1.08	0.86	1.85	4.85	2.42	4.04	3.50	1.67	0.35	0.29	22.61
1988	0.65	0.14	1.73	0.85	1.72	2.18	4.93	10.32	3.26	0.89	1.84	1.03	29.54
1987	0.39	0.19	1.34	0.24	3.71	0.80	8.27	2.03	2.05	0.72	0.45	0.31	20.50
1986	0.72	0.75	0.38	3.83	2.50	4.59	4.89	3.19	6.08	0.60	2.48	0.49	30.50
1985	0.31	0.51	1.06	3.24	5.54	3.32	3.15	3.00	3.98	1.75	2.11	0.67	28.64
1984	0.37	0.49	0.56	0.64	1.79	6.42	1.78	1.70	1.74	3.91	0.60	1.51	21.51
1983	1.25	0.34	0.83	1.09	1.36	3.46	4.37	6.79	2.87	3.46	1.95	0.65	28.42
1982	1.05	0.36*	1.18	0.81	4.44	2.89	8.43	2.08	3.31	4.61	2.15	0.59	31.90*
1981	0.41	0.92	0.92	3.56	0.86	5.71	1.78	1.91	2.55	3.62	0.48	0.84	23.56
1980	1.13	0.61	0.96	0.72	0.41	3.59	2.09	5.88	3.64	1.25	0.83	0.50	21.61
1979	0.30	1.51	2.34	0.90	2.79	3.43	4.96	2.18	3.08	2.86	0.68	0.18	25.21
1978	0.43	0.52	0.67	1.34	3.92	1.95	7.19	6.35	2.83	0.45	1.25	0.91	27.81

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1977	0.48	0.71	0.90	1.20	3.05	4.24	2.19	7.21	4.92	2.35	3.58	1.00	31.83
1976	0.52	0.24	1.35	0.80	0.61	6.22	3.86	0.98	0.62	0.42	0.19	0.32	16.13
1975	2.19	0.50	1.09	1.68	2.31	5.57	5.07	3.70	2.83	1.26	1.41	0.40	28.01
1974	0.43	0.29	1.16	2.66	4.57	2.40	4.71	3.30	0.52	3.21	1.62	0.65	25.52
1973	0.50	0.06	0.23	1.08	3.99	4.05	4.17	3.75	3.00	5.03	0.68	0.47	27.01
1972	1.17	0.51	0.45	0.97	1.78	3.21	4.44	3.83	3.51	1.32	0.15	0.73	22.07
1971	0.70	1.62	1.35	0.76	2.52	5.13	2.32	2.55	5.65	5.40	1.07	0.67	29.74
1970	0.28	0.17	0.57	1.20	2.13	1.88	2.53	0.55	1.53	5.68	1.79	0.97	19.28
1969	2.34	0.16	0.09	1.37	3.73	1.83	4.37	3.10	3.46	1.29	0.63	1.07	23.44
1968	0.49	0.06	1.16	2.48	2.63	6.12	1.59	4.05	4.60	3.40	0.10	1.21	27.89
1967	0.79	0.27	0.85	2.88	0.67	4.31	2.15	2.31	1.06	1.25	0.32	0.63	17.49
1966	0.36	0.67	2.27	1.51	1.09	4.19	1.86	5.89	0.95	2.04	0.53	0.49	21.85
1965	0.41	0.33	1.40	0.88	3.78	2.91	3.27	1.63	6.38	1.87	2.77	1.38	27.01
1964	0.33	0.30	0.55	2.63	3.33	6.59	1.16	4.69	3.25	1.01	0.85	0.97	25.66
1963	0.10	0.29	1.49	1.35	3.59	3.70	5.24	4.70	1.67	0.90	1.21	0.47	24.71
1962	M	M	M	M	M	M	M	M	M	M	0.25	0.50	M

(http://www.rcc-acis.org)

Minnesota State Climatology Office

Annual Reports of Monthly Precipitation Totals

This application creates annual summaries of precipitation data gathered by volunteer-based observation networks throughout Minnesota. The data presented are monthly totals and the data are grouped by county. Observer locations are described using township, range, and section numbers.

Choose a county and year, then click on **"Annual report"**.

SAINT LOUIS 2019 Annual report

2019 SAINT LOUIS Monthly Precipitation, Totals

cc	ttt	rr	ss	oooooooo	nnnn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AGR	HYD	ANN	GRO
69	50N	15W	2	DUL WFO	NWS	.72	1.70	1.26	1.94	3.99	4.27	3.90	2.81	4.70	5.58	2.61	2.68	32.35	32.65	36.16	19.67
69	50N	15W	2	DUL WSO	NWS	.80	1.88	1.19	2.19	3.87	4.10	2.63	2.51	5.76	4.42	2.30	2.69	30.79	33.04	34.34	18.87
69	51N	12W	17		SWCD	.79	1.34	1.37	2.58	3.54	3.18	2.11	2.43	6.14	4.50	1.04	3.19	30.02	31.57	32.21	17.40
69	51N	13W	29		SWCD	1.23	1.90	1.34	2.67	4.59	4.38	2.29	2.49	5.23	5.59	1.27	4.20	33.90	34.51	37.18	18.98
69	51N	17W	29		SWCD	.74	1.52	1.16	2.37	4.18	6.48	2.22	2.71	5.76		1.45	3.78	34.18	34.92		21.35
69	52N	12W	30		SWCD	1.08	2.61	1.39	3.00	3.85	3.05	2.75	2.69	6.32	5.73	1.20	4.90	34.79	36.94	38.57	18.66
69	52N	14W	2	ISLANDL	NWS	*	2.37	1.48	2.59	4.11	4.07	2.71	2.95	5.12	5.50	1.35	3.48				18.96
69	52N	20W	21	FLOODWOO	NWS	.44	1.40	1.14	2.53	3.10	3.05	2.20	1.14	6.68	4.49	1.01	3.15	29.08	29.30	30.33	16.17
69	53N	13W	5		SWCD	.90	1.66	1.67	2.81	3.43	3.72	2.95	2.28	4.87	5.51	1.54	2.93	31.78	32.31	34.27	17.25
69	53N	19W	6		SWCD	.67	1.11	1.26	2.64	2.48	3.73	2.00	1.73	6.54	3.67	1.12	2.13	26.50	29.52	29.08	16.48
69	53N	19W	28		SWCD	.60	1.20	1.26	2.63	2.57	3.16	2.90	2.20	7.15	3.90	1.36	3.47	30.06	31.95	32.40	17.98
69	54N	17W	13	COTTON 3	NWS	.87	*	1.16	1.99	2.74	2.54	4.05	3.83	4.33	5.55	.95	1.80				17.49
69	54N	18W	14		SWCD	.65	1.66		1.65	2.44	3.22	1.15	5.65	5.26	3.27	1.19	1.74				17.72
69	55N	12W	4	BRIMSON	NWS	.95	1.89	1.21	2.24	2.77	4.01	4.37	2.63	4.70	4.61	1.71	3.10	31.52	33.42	34.19	18.48
69	55N	12W	16		SWCD	.95	1.89	1.21	2.46	2.77	4.01	4.37	2.63	4.70	4.61	1.71	3.06	31.74	33.64	34.37	18.48
69	55N	21W	17		SWCD	.80	1.40	1.26	2.29	2.41	2.68	2.27	2.97	5.18	4.52	1.25	2.26	30.22	30.12	29.29	15.51
69	56N	19W	3		SWCD	.63	1.41	1.44	2.64	2.78	3.63	2.57	2.86	6.03	3.47	1.18	1.92	28.95	31.35	30.56	17.87
69	57N	17W	4		SWCD			*	1.66	2.41	3.09	3.73	2.94	6.25	2.94						18.42
69	57N	17W	5	EVELETH	NWS	.65	1.18	1.26	2.08	2.44	3.38	3.62	2.65	5.83	3.37	1.11	1.73	27.40	29.33	29.30	17.92
69	57N	17W	29	EVELETH	DNR	.62	1.12	1.26	2.18	2.30	3.15	3.12	2.48	5.21	3.43	1.08	2.28	26.00	27.99	28.23	16.26
69	57N	20W	9		SWCD	.83	1.76	1.48	2.30	2.69	2.90	2.47	2.74	6.34	4.76	1.11	2.38	29.03	30.56	31.76	17.14
69	57N	20W	18	HIBBING	DNR	.78	1.41	1.36	1.95	2.54	2.24	2.49	3.03	5.73	4.92	.96	2.04			29.45	16.03
69	57N	20W	26	HIBBING	NWS	*	*		*		2.34	2.14	2.34	5.13	2.64	*					
69	58N	17W	5		SWCD	.62	1.60	1.26	2.32	2.36	2.48	3.15		6.45	3.15	1.49	2.43				
69	58N	18W	33		SWCD	.80	1.92	1.48	2.73	2.16	3.77	2.80	3.24	6.18	3.60	1.86	2.45	30.41	32.36	32.99	18.15
69	59N	17W	4		SWCD	1.02	2.66	1.35	3.10	2.29	2.65	4.07	3.46	6.65	3.31	2.37	2.65	35.54	35.50	35.58	19.12
69	60N	13W	1	BABBITT	NWS	.71	1.50	1.35	2.14	1.77	3.59	2.95	4.77	4.66	3.10	1.81	1.93	30.23	29.64	30.28	17.74
69	60N	15W	25	EMBARRAS	NWS	.50	1.14	1.20	2.28	2.13	4.06	3.19	3.05	5.10	2.99	1.45	2.10	30.78	29.23	29.19	17.53
69	60N	21W	7		SWCD	.51	1.65	1.08	3.11	1.88	2.17	2.68	3.10	4.81	3.31	1.64	2.28	26.20	26.19	28.22	14.64
69	60N	21W	16	SIDE LAK	DNR	.49	1.57	1.15	3.02	2.33	2.89	2.38	2.87	5.08	3.56	1.11	2.55	27.60	27.79	29.00	15.55
69	61N	15W	17	TOWER 3	NWS	.85	1.35	1.26	2.00	2.09	2.56	4.51	4.43	7.07	3.52	1.48	2.21	34.59	32.77	33.33	20.66
69	62N	15W	32	TOWERDNR	DNR	.66	1.55	1.46	3.11	2.98	3.19	3.44	2.80	7.62	3.82	1.43	1.81	34.98	34.53	33.87	20.03
69	62N	18W	18	COOK	NWS	.58	.91	1.16	2.45	2.13	1.77	3.26	3.07	5.88	3.03	1.25	1.43	25.79	26.69	26.92	16.11
69	62N	18W	18	COOK DNR	DNR	.47	1.56	1.15	2.34	2.17	1.19	3.25	3.09	5.33	3.73	1.15	2.47	24.61	25.77	27.90	15.03
69	62N	21W	9	CELINA2E	NWS	.48	1.58	1.00	3.26	2.37	2.10	3.12	2.79	4.53	5.12	.69	2.70	28.14	26.95	29.74	14.91
69	63N	12W	26	ELY USFS	NWS	.56	2.01	1.25	1.87	1.88	3.12	3.85	2.19	6.66	3.27	1.54	2.12	28.78	30.76	30.32	17.70
69	64N	19W	10	ORR 3E	NWS	.56	1.07	.94	2.26	2.09	1.61	3.33	2.56	4.27	3.85	1.40	1.82	25.03	24.30	25.76	13.86
69	64N	20W	1	ORR DNR	DNR	.51	1.56	.95	2.39	2.08	1.43	5.12	2.40	4.04	3.97	1.90	1.66	27.07	25.69	28.01	15.07
69	69N	21W	4	KABETOGA	NWS	.60	2.27	.87	1.95	2.40	1.26	3.84	3.89	7.18	5.21	1.36	2.37	27.17	29.98	33.20	18.57
county averages						.71	1.62	1.25	2.41	2.71	3.08	3.08	2.91	5.65	4.09	1.42	2.54	29.85	30.66	31.44	17.51
# of obs						36	36	36	38	38	39	39	38	39	38	37	37	32	32	32	37

- Data as received and digitized on or before 1/11/2024. **All values are in inches**.
- 'cc ttt rr ss' is county-township-range-section number, 'oooooooo' is community name (where applicable), 'nnnn' is network type.
- 'AGR', 'HYD', and 'ANN' are 12 month precipitation totals starting in Sep 2018, Oct 2018, and Jan 2019, respectively. 'GRO' is growing season (May 2019 thru Sep 2019) precipitation total.
- '*' denotes a partial monthly record, 'e' denotes that value is wholly or partially estimated.
- Prepared by: State Climatology Office - DNR Eco-Waters, phone: 651-296-4214, web: https://climateapps.dnr.state.mn.us/index.htm

For some purposes, **daily** precipitation data are required. The precipitation data archive allows a user to interactively retrieve daily precipitation data from the site nearest to a target.

Obtaining Data for Legal Purposes

Minnesota State Climatology Office

State Climatology Office - DNR Division of Ecological and Water Resources

Annual Reports of Monthly Precipitation Totals

This application creates annual summaries of precipitation data gathered by volunteer-based observation networks throughout Minnesota. The data presented are monthly totals and the data are grouped by county. Observer locations are described using township, range, and section numbers.

Choose a county and year, then click on **"Annual report"**.

SAINT LOUIS | 2020 | Annual report

2020 SAINT LOUIS Monthly Precipitation, Totals

cc	ttt	rr	ss	oooooooo	nnnn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AGR	HYD	ANN	GRO
69	50N	15W	2	DUL WFO	NWS	1.28	.14	1.72	1.22	.89	.59	5.45	2.07	1.75	2.79	2.70	.86	28.93	25.98	21.46	10.75
69	50N	15W	2	DUL WSO	NWS	1.37	.18	1.74	1.30	.94	.69	5.25	2.72	.85	2.78	2.45	.99	29.36	24.45	21.26	10.45
69	51N	12W	17		SWCD	1.05	.12	1.58	1.44	1.68	1.19	5.98	3.39	1.53	2.15	1.97	.84	31.30	26.69	22.92	13.77
69	51N	13W	29		SWCD	1.57	.18	1.88	1.60		1.64	6.39	3.36	1.63	3.02	2.41	1.24				
69	51N	17W	29		SWCD	1.18	.12	1.56	.95	1.15		6.04	2.96	1.31	3.79	2.17	1.15				
69	52N	12W	30		SWCD	1.45	.32	3.40	.75	.90	1.18	7.84	1.98		2.77	1.48		35.97			
69	52N	14W	2	ISLANDL	NWS	1.36	*														
69	52N	20W	21	FLOODWOO	NWS	1.10	.12	1.62	1.03	.58	1.58	6.08	4.24	1.31	3.01	1.77	1.12	31.68	26.31	23.56	13.79
69	53N	13W	5		SWCD	1.55	.29	1.70	1.31	.94	1.19	8.63	4.61	1.54	2.37	2.68	1.01	35.07	31.74	27.82	16.91
69	53N	19W	6		SWCD	.96	.17	1.63	1.27	.68	1.80	8.12	4.64	1.27	2.43	1.68	.91	32.73	27.46	25.56	16.51
69	53N	19W	28		SWCD	1.97	.10	1.69	1.16	.64	1.82	8.14	4.07	1.30	2.56	1.76	1.02	35.47	29.62	26.23	15.97
69	54N	17W	13	COTTON 3	NWS	1.20	.12	1.33	1.44	.73	2.91	7.50	3.09	2.37	2.67	1.84	.59	30.95	28.99	25.79	16.60
69	54N	18W	14		SWCD	.77	.18	1.61	.93	.76	4.34	6.70	4.71					31.46			
69	55N	12W	4	BRIMSON	NWS	1.43	.29	1.65	1.27	1.19	3.00	5.95	4.70	1.70	2.39	2.25	.92	33.60	30.60	26.74	16.54
69	55N	12W	16		SWCD	1.42	.29	1.65	1.27	1.19	3.00	5.95	4.70	1.70	2.39	2.25	.92	33.55	30.55	26.73	16.54
69	55N	21W	17		SWCD	.83	.33	.76	1.17	.54	2.85	8.15	6.92	1.85	2.50	1.74	1.29	34.76	31.43	28.93	20.31
69	56N	19W	3		SWCD	1.10	.53	1.08	1.23	.66	3.28	5.12	5.24	1.74	2.90	1.87	1.28	30.84	26.55	26.03	16.04
69	57N	17W	4		SWCD				1.23	.89	3.34	4.91	5.38	1.84	2.17						16.36
69	57N	17W	5	EVELETH	NWS	1.08	.10	.91	.99	.84	3.49	4.57	5.34	2.05	*	*	1.23	29.36	25.58		16.29
69	57N	17W	29	EVELETH	DNR	1.05	.06	.69	1.17	.90	2.97	3.76	7.01	1.31	2.73	1.62	.95	29.61	25.71	24.22	15.95
69	57N	20W	9		SWCD	1.47	.42	.92	1.59	.89	3.76	3.92	7.22	1.93	3.18	1.78	1.67	34.78	30.37	28.75	17.72
69	57N	20W	18	HIBBING	DNR	1.24	.40	.67	1.51	.97	3.41	3.91	6.77	1.33	2.71	1.15	.89	32.53	28.13	24.96	16.39
69	58N	17W	5		SWCD	.97	.36	.70	.78	.66	2.77	5.57	4.13	2.08	2.94	1.67	1.06	29.46	25.09	23.69	15.21
69	58N	18W	33		SWCD	1.56	.44	.91	1.26	.67	3.73	5.62	5.18	2.09	3.21	2.18	1.72	33.46	29.37	28.57	17.29
69	59N	17W	4		SWCD	1.75	.51	1.15	1.00	.58	3.08	6.81	4.59	2.14	3.55	1.83	1.39	34.45	29.94	28.38	17.20
69	60N	13W	1	BABBITT	NWS	1.02	.27	1.27	.96	1.03	2.05	6.44	2.68	2.21	3.10	2.55	1.09	27.22	24.77	24.67	14.41
69	60N	15W	25	EMBARRAS	NWS	.91	.32	.90	.84	.69	3.22	4.59	3.20	1.54	3.09	1.33	.80	26.31	22.75	21.43	13.24
69	60N	21W	7		SWCD	1.18	.14	.66	1.11	1.11	2.66	8.19	6.57	1.60	2.39	.94	1.10	33.66	30.45	27.65	20.13
69	60N	21W	16	SIDE LAK	DNR	1.24	.19	.52	1.00	1.26	2.79	7.09	6.62	1.29	2.56	1.21	1.07	33.01	29.22	26.84	19.05
69	61N	15W	17	TOWER 3	NWS	.79	.40	.64	.94	.73	2.38	6.02	4.59	1.92	3.18	1.91	1.06	30.77	25.62	24.56	15.64
69	62N	15W	32	TOWERDNR	DNR	.87	*	.52	.64	2.52	3.76	4.87	4.10	2.46		2.10	1.03				17.71
69	62N	18W	18	COOK	NWS	1.50	.34	.60	1.23	.94	2.55	8.57	4.79	2.35	2.96	1.43	.99	32.11	28.58	28.25	19.20
69	62N	18W	18	COOK DNR	DNR	1.24		.61	.96	1.04	3.57	6.33	5.60	1.90	2.99	.84	.90				18.44
69	62N	21W	9	CELINA2E	NWS	1.02	.13	.44	1.24	1.29	3.35	7.37	6.77	2.11	2.40	.72	.80	34.65	32.23	27.64	20.89
69	63N	12W	26	ELY USFS	NWS	1.04	.24	.84	.80	.73	1.24	7.30	3.14	1.75	2.76	1.32	1.06	28.92	24.01	22.22	14.16
69	64N	19W	10	ORR 3E	NWS	1.14	.16	.65	1.45	.81	2.42	4.38	5.39	2.15	2.70	.82	.82	27.74	25.62	22.89	15.15
69	64N	20W	1	ORR DNR	DNR	1.25	.12	.75	1.35	1.16	2.98	4.27	4.56	1.39	2.52	.71	.90	28.01	25.36	21.96	14.36
69	69N	21W	4	KABETOGA	NWS	1.41	.57	1.22	.82	1.10	5.59	2.90	3.14	1.61	2.70	.98	.74	32.87	27.30	22.78	14.34
county averages						1.22	.25	1.17	1.14	.95	2.67	6.07	4.60	1.74	2.78	1.71	1.04	31.71	27.68	25.26	16.16
# of obs						37	34	36	37	36	36	37	37	35	34	34	34	32	30	29	33

- Data as received and digitized on or before 1/11/2024. **All values are in inches**.
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- Prepared by: State Climatology Office - DNR Eco-Waters, phone: 651-296-4214, web: https://climateapps.dnr.state.mn.us/index.htm

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Choose a county and year, then click on **"Annual report"**.

SAINT LOUIS 2021 Annual report

2021 SAINT LOUIS Monthly Precipitation, Totals

cc	ttt	rr	ss	oooooooo	nnnn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AGR	HYD	ANN	GRO
69	50N	15W	2	DUL WFO	NWS	.51	.49	2.63	2.95	2.09	1.80	3.28	2.47	3.84	2.06	1.82	2.36	24.32	26.41	26.30	13.48
69	50N	15W	2	DUL WSO	NWS	.61	.53	2.64	2.91	1.88	1.79	2.74	2.44	3.59	2.00	1.84	2.72	22.61	25.35	25.69	12.44
69	51N	12W	17		SWCD	.21	1.25	2.56	3.87	2.00	2.38	3.36	1.90	3.03	2.20	2.29	2.22	24.02	25.52	27.27	12.67
69	51N	13W	29		SWCD	.67	.47	3.06	3.29	2.61	2.01	3.11	2.29	3.31	2.87	2.42	4.33	25.81	27.49	30.44	13.33
69	51N	17W	29		SWCD	.48	.38	2.32	3.71	2.70		3.10	4.26	4.56	2.61	1.42	2.73				
69	52N	12W	30		SWCD	.74			3.48		1.84	1.99	2.65	5.29	2.95						
69	52N	20W	21	FLOODWOO	NWS	.41	.11	2.52	3.27	1.80	1.36	1.82	*	4.33	1.87	2.41	3.22				
69	53N	13W	5		SWCD	.45	.49	2.31	3.22	2.51	2.88	2.82	2.64	3.39	4.66	2.26	3.16	24.92	26.77	30.79	14.24
69	53N	19W	6		SWCD	.43	.21	2.05	3.00	1.14	2.02	1.54	3.10	2.31	2.77	1.45	2.93	19.78	20.82	22.95	10.11
69	53N	19W	28		SWCD	.47	.25	2.26	3.21	1.09	1.60	1.67	3.03	2.14	2.69	1.44	3.24	20.22	21.06	23.09	9.53
69	54N	17W	13	COTTON 3	NWS	.04	.16	1.36	2.62	1.60	3.25	1.47	*	2.12	2.99	1.59	2.61				
69	55N	12W	4	BRIMSON	NWS	.45	.40	2.05	3.56	1.21	3.86	2.38	3.75	2.93	2.35	2.42	3.52	24.92	26.15	28.88	14.13
69	55N	12W	16		SWCD	.45	.40	2.05	3.56	.85	3.86	2.39	3.75	2.93	2.35	2.42	3.52	24.57	25.80	28.53	13.78
69	55N	21W	17		SWCD	.57	.27	1.53	3.33	1.68	1.86	1.95	2.53	2.90	3.10	1.35	4.89	21.10	22.15	25.96	10.92
69	56N	19W	3		SWCD	.49	.26	1.67	2.82	.96	2.93	2.53	2.27	3.59	3.02	2.05	4.00	21.72	23.57	26.59	12.28
69	57N	17W	4		SWCD			*	3.05	.97	2.44	2.26	1.62	3.16	2.84	1.45					10.45
69	57N	17W	5	EVELETH	NWS	.47	.22	1.49	3.03	1.37	2.19	1.94	1.32	2.78	2.49	1.42	3.41			22.13	9.60
69	57N	17W	29	EVELETH	DNR	.61		1.74	3.09	.76	3.06	2.09	1.93	3.48	2.62	1.84	2.84				11.32
69	57N	20W	9		SWCD	.56	.10	2.09	3.05	2.43	2.64	2.42	1.69	4.44	3.20	1.81	4.36	23.54	26.05	28.79	13.62
69	57N	20W	18	HIBBING	DNR	.38	.16	1.53	3.14	2.21	1.81	2.23	1.38	3.80	2.64	1.83	3.54	18.92	21.39	24.65	11.43
69	58N	17W	5		SWCD	.52	.18	1.88	3.58	1.01	1.58	1.31	1.34	3.37	2.35	1.82	3.34	19.15	20.44	22.28	8.61
69	58N	18W	33		SWCD	.77	.26	1.92	3.19	1.19	2.45	2.01	1.23	3.53	1.89	2.00	4.05	22.22	23.66	24.49	10.41
69	58N	20W	7		SWCD				2.54	1.87	2.68	3.09	1.60	4.69	2.69	2.34	2.95				13.93
69	59N	17W	4		SWCD	.96	.23	3.30	3.19	1.36	2.22	1.82	1.23	5.03	3.22	2.17	4.89	23.22	26.11	29.62	11.66
69	60N	13W	1	BABBITT	NWS	.56	.35	2.42	3.71	.94	1.59	1.45	1.71	4.73	2.03	2.04	3.09	21.68	24.20	24.62	10.42
69	60N	15W	25	EMBARRAS	NWS	.50	.23	1.65	3.44	1.29	1.61	1.00	1.92	4.07	2.67	1.72	3.46	18.40	20.93	23.56	9.89
69	60N	21W	7		SWCD	.32	.07	1.51	2.61	.70	2.61	2.47	1.82	4.73	3.06	1.67	2.30	18.14	21.27	23.87	12.33
69	60N	21W	16	SIDE LAK	DNR	.39	.06	1.44	2.80	.63	3.50	2.50	1.41	4.07	3.46	1.91	2.50	18.86	21.64	24.67	12.11
69	61N	15W	17	TOWER 3	NWS	.47	.09	1.98	3.47	1.43	2.28	2.16	1.62	4.18	3.18	2.22	2.57	21.57	23.83	25.65	11.67
69	62N	15W	32	TOWERDNR	DNR	.27		1.99	4.73	1.10	2.21	2.11	1.31	3.75	2.61	1.92	3.14				10.48
69	62N	18W	18	COOK	NWS	.60	.28	1.38	2.83	1.66	2.45	1.39	1.77	5.61				20.09	23.35		12.88
69	62N	18W	18	COOK DNR	DNR	.25		1.83	3.08	.94	2.94	1.14	1.92	5.61	2.97	1.66	2.25				12.55
69	62N	20W	5	COOK 12W	NWS					1.66	2.45	1.39	1.77	3.86	2.30	1.24	2.65				11.13
69	62N	21W	9	CELINA2E	NWS	.39	.02	.88	3.15	1.10	2.96	1.15	2.11	4.69	2.84	1.78	2.27	17.79	20.37	23.34	12.01
69	63N	12W	26	ELY USFS	NWS	.65	.20	2.16	4.53	1.47	1.53	2.10	1.21	5.51	1.32	1.19	2.66	20.74	24.50	24.53	11.82
69	64N	19W	10	ORR 3E	NWS	.44	.16	1.22	3.11	1.17	4.09	1.97	1.58	3.14	2.19	1.70	2.27	20.23	21.22	23.04	11.95
69	64N	20W	1	ORR DNR	DNR	.27	.24	1.07	3.06	1.82	4.61	2.13	1.96	3.27	2.84	1.97	2.28	20.68	22.56	25.52	13.79
69	69N	21W	4	KABETOGA	NWS	.68	.23	1.84	3.71	.75	1.39	1.66	2.81	3.52	2.20	1.96	3.00	19.10	21.01	23.75	10.13
county averages						.49	.28	1.95	3.27	1.46	2.45	2.10	2.09	3.82	2.65	1.86	3.12	21.42	23.47	25.59	11.80
# of obs						35	31	34	37	37	37	38	36	38	37	36	35	27	27	27	34

- Data as received and digitized on or before 1/11/2024. **All values are in inches**.
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- Prepared by: State Climatology Office - DNR Eco-Waters, phone: 651-296-4214, web: https://climateapps.dnr.state.mn.us/index.htm

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SAINT LOUIS 2022 Annual report

2022 SAINT LOUIS Monthly Precipitation, Totals

cc	ttt	rr	ss	oooooooo	nnnn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AGR	HYD	ANN	GRO
69	50N	15W	2	DUL WFO	NWS	.52	1.29	1.07	3.13	4.98	3.72	3.80	4.56	2.84	.96	3.33	3.12	33.15	32.15	33.32	19.90
69	50N	15W	2	DUL WSO	NWS	.56	1.51	1.15	4.02	4.79	4.08	3.83	3.69	2.73	.79	3.63	3.27	33.78	32.92	34.05	19.12
69	51N	12W	17		SWCD	.58	1.12	.91	3.34	5.37	4.37	3.56	3.10	3.08	1.08	2.87	1.77	32.09	32.14	31.15	19.48
69	51N	13W	29		SWCD	.82	1.55	2.05	4.18	5.54	4.50	4.16	4.13	3.03	1.01	4.03	2.93	39.86	39.58	37.93	21.36
69	51N	17W	29		SWCD	.49		1.07	3.18		3.76	3.93	4.26	2.45	.87	3.61	3.05				
69	52N	12W	30		SWCD				3.89	5.76	3.52	3.99	4.64								
69	52N	20W	21	FLOODWOO	NWS	.63	1.94	.84	2.52	6.18	3.77	3.44	4.93	2.19	1.99	3.72	2.73	36.08	33.94	34.88	20.51
69	53N	13W	5		SWCD	.68	1.26	.79	2.86	6.70	4.20	5.51	4.41	2.43	1.15	3.17	2.31	39.88	38.92	35.47	23.25
69	53N	19W	6		SWCD	.62	1.09	1.04	3.77	5.96	4.42	2.94	4.86	2.83	1.43	2.95	2.52	34.16	34.68	34.43	21.01
69	53N	19W	28		SWCD	.70	1.45	.93	3.37	6.02	3.93	3.64	6.09	2.41	1.32	3.10	2.24	35.64	35.91	35.20	22.09
69	54N	17W	13	COTTON 3	NWS	.58	1.24	*	2.53	5.58	4.05	4.40	5.11	3.24	1.06	2.89	2.82				22.38
69	55N	12W	4	BRIMSON	NWS	.80	1.61	.99	3.00	5.70	4.90	3.72	5.58	2.74	.87	3.10	3.77	37.52	37.33	36.78	22.64
69	55N	12W	16		SWCD	.81	1.59	.99	3.00	5.70	4.90	3.72	5.58	2.74	.87	3.10	3.77	37.51	37.32	36.77	22.64
69	55N	21W	17		SWCD	1.11	*	1.20	2.78	8.75	5.15	2.99	4.85	2.32	1.31	3.96	3.05				24.06
69	56N	19W	3		SWCD	.92	1.37	1.01	3.64	6.08	4.70	5.14	3.84	2.55	.99	2.62	2.49	39.36	38.32	35.35	22.31
69	56N	20W	6		SWCD						4.17	3.41	3.47	2.68	1.11	2.86	2.41				
69	57N	17W	4		SWCD				*	6.16	4.28	5.53	3.23	1.75	1.43	1.85					20.95
69	57N	17W	5	EVELETH	NWS	.83	1.01	1.04	3.62	5.60	3.55	4.72	3.97	1.61	1.36	2.53	1.73	34.44	33.27	31.57	19.45
69	57N	17W	29	EVELETH	DNR	.54	1.00	.88	3.11	5.49	4.29	6.31	2.84	1.65	1.44	2.57	2.54	35.24	33.41	32.66	20.58
69	57N	20W	9		SWCD	.92	1.74	1.34	3.75	6.77											
69	57N	20W	18	HIBBING	DNR	.61	1.12	1.24	3.43	6.73	4.64	3.69	3.38	2.55	1.00	2.52	2.29	36.65	35.40	33.20	20.99
69	57N	20W	26	HIBBING	NWS				3.02	6.56	4.04	5.55	4.35	2.56							23.06
69	58N	17W	5		SWCD	1.18	1.40	1.04	3.21	6.03	3.39	5.33	4.55	2.59	1.25	2.67	2.83	37.01	36.23	35.47	21.89
69	58N	18W	33		SWCD	1.24	1.70	1.00	3.34	5.99	3.96	5.11	2.56	2.83	1.39	2.73	2.83	36.37	35.67	34.68	20.45
69	58N	20W	7		SWCD	1.20		1.46		7.05	2.16	6.73	3.93	2.13	.92	2.52					22.00
69	59N	17W	4		SWCD	1.29	1.38	1.29	4.41	6.66	3.13	4.82	2.80	2.28	1.52	3.06	2.77	41.09	38.34	35.41	19.69
69	60N	15W	25	EMBARRAS	NWS	.73	1.24	1.21	3.20	5.63	2.37	3.56	5.86	2.25	1.56	2.65	2.25	35.72	33.90	32.51	19.67
69	60N	21W	7		SWCD	.78	1.10	1.59	3.56	4.20	2.36	4.49	4.59	1.91	1.14	1.84	2.07	34.43	31.61	29.63	17.55
69	60N	21W	16	SIDE LAK	DNR	.70	1.16	1.33	3.29	4.59	2.62	4.49	4.80	2.44	1.17	1.76	2.39	34.92	33.29	30.74	18.94
69	61N	15W	17	TOWER 3	NWS	.77	1.25	1.46	4.62	6.45	2.52	4.28	6.43	2.65	2.17	3.16	2.46	39.93	38.40	38.22	22.33
69	62N	15W	32	TOWERDNR	DNR	1.00	1.26	1.30													
69	62N	18W	18	COOK DNR	DNR	1.12	1.02	1.63	3.87	4.85	1.90										
69	62N	20W	5	COOK 12W	NWS	.77	1.12	1.28	3.85	4.90	1.73	4.71	4.01	1.78	.79	2.24	1.60	32.42	30.34	28.78	17.13
69	62N	21W	9	CELINA2E	NWS	.54	.95	1.40	3.68	4.51	2.81	3.92	3.68	2.78	1.27	2.12	1.88	33.07	31.16	29.54	17.70
69	63N	12W	26	ELY USFS	NWS	1.00	1.84	1.36	3.68	4.57	2.49	2.37	4.83	3.26	1.20	2.93	2.69	32.82	30.57	32.22	17.52
69	64N	19W	10	ORR 3E	NWS	.53	.70	1.53	5.43	4.91	1.66	3.65	4.44	1.82	1.13	1.65	1.34	32.15	30.83	28.79	16.48
69	64N	20W	1	ORR DNR	DNR	.62	.73	1.46	5.52	4.50	2.10	2.94	3.56	1.91	1.27	1.40	2.06	31.79	30.43	28.07	15.01
69	69N	21W	4	KABETOGA	NWS	.83	1.19	1.03	*	*	4.29	6.88	3.37	2.73	.94	2.14	2.01				
county averages						.79	1.29	1.21	3.57	5.74	3.57	4.32	4.29	2.46	1.20	2.77	2.52	35.66	34.46	33.34	20.39
# of obs						34	31	33	33	34	36	35	35	34	33	33	31	26	26	26	31

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SAINT LOUIS | 2023 | Annual report

2023 SAINT LOUIS Monthly Precipitation, Totals

cc	ttt	rr	ss	oooooooo	nnnn	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AGR	HYD	ANN	GRO
69	50N	15W	2	DUL WFO	NWS	1.45	1.74	2.33	3.00	.88	3.92	1.33	1.81	8.68	1.03	1.11	3.22	26.71	32.55	30.50	16.62
69	50N	15W	2	DUL WSO	NWS	1.56	1.78	2.49	2.84	.80	4.11	1.37	1.68	10.36	1.50	1.32	3.17	27.05	34.68	32.98	18.32
69	51N	12W	17		SWCD	1.23	2.39	1.80	2.61	.59	3.05	2.18	1.80	9.85	2.09			24.45	31.22		17.47
69	51N	13W	29		SWCD	1.76	2.41	2.03	3.47	.93	4.17	2.30	2.02	11.64	1.73			30.09	38.70		21.06
69	51N	17W	29		SWCD	1.39	1.45	1.94	3.29	1.07	4.55	.99	1.47	6.20	1.78			26.13	29.88		14.28
69	52N	12W	30		SWCD		2.03	3.48	3.19	.36	3.05	2.06	1.78	11.29	1.97						18.54
69	52N	20W	21	FLOODWOO	NWS	1.18	1.38	2.08	3.47	2.22	4.06	1.76	2.22	6.12	1.98	1.00	3.23	29.00	32.93	30.70	16.38
69	53N	13W	5		SWCD	1.10	1.56	1.43	2.79	.41	4.08	3.31	1.37	9.08	1.45	1.51		25.11	31.76		18.25
69	53N	19W	28		SWCD	.89	1.22	1.79	3.87	1.43	2.02	1.58	1.10	8.31	1.68			22.97	28.87		14.44
69	54N	17W	13	COTTON 3	NWS	.75	1.17	1.27	2.96	.75	2.91	2.50	*	6.89	*	1.63	2.37				
69	55N	12W	4	BRIMSON	NWS	1.39	1.48	2.03	2.89	.60	3.90	2.11	1.42	7.18	*	1.42	2.35	26.30	30.74		15.21
69	55N	12W	16		SWCD	1.39	1.48	2.03	2.85	.60	3.90	2.11	1.42	7.19	1.80	1.42		26.26	30.71		15.22
69	55N	21W	17		SWCD	1.88	2.41	2.21	4.12	1.00	1.93	1.91	1.85	4.56	2.18	.98		27.95	30.19		11.25
69	56N	19W	3		SWCD	.45	2.48	1.65	3.59	1.49	1.73	2.65	1.24	6.93	1.99	1.31		23.93	28.31		14.04
69	57N	17W	4		SWCD				*	1.93	1.80	2.30	1.48	7.35	1.71						14.86
69	57N	17W	5	EVELETH	NWS	.77	1.29	1.44	2.88	2.41	1.22	2.22	1.26	7.89	1.71	1.27	*	20.72	27.00		15.00
69	57N	17W	29	EVELETH	DNR	.69	1.02	1.06	3.20	1.67	1.99	3.66	.86	8.36	1.43	1.06		22.35	29.06		16.54
69	57N	20W	9		SWCD	.69	1.49	1.86	3.73	2.21	3.43	2.82	1.06	6.56	1.58	1.15					16.08
69	57N	20W	18	HIBBING	DNR	.76	1.26	1.55	2.83	1.84	2.28	2.30	.80	5.99	2.27	1.06		21.98	25.42		13.21
69	57N	20W	26	HIBBING	NWS				2.25	1.71	1.96	2.67	1.05	6.60	1.43	.89	2.58				13.99
69	58N	17W	5		SWCD	.89	1.23	1.33	3.34	2.24	1.90	2.51	.93	6.40	1.75			23.71	27.52		13.98
69	58N	18W	33		SWCD	.91	1.35	1.72	3.71	1.64	3.67	3.74	1.28	6.67	2.25	1.13	2.69	27.80	31.64	30.76	17.00
69	58N	20W	7		SWCD	.49	1.04	1.04	2.76	3.34	2.50	2.93	1.02	4.70	2.25						14.49
69	59N	17W	4		SWCD	1.24	1.49	2.07	5.49	2.62	4.17	2.34	1.34	6.01	2.07	1.33		30.39	34.12		16.48
69	60N	15W	25	EMBARRAS	NWS	.71	1.23	1.20	3.52	1.60	4.23	2.69	1.39	5.49	1.63	1.28	1.61	25.28	28.52	26.58	15.40
69	60N	21W	7		SWCD	.60	1.30	1.44	3.04	3.08	1.56	2.70	1.09	3.87	2.27			21.77	23.73		12.30
69	60N	21W	16	SIDE LAK	DNR	.61	1.22	1.23	2.30	2.85	1.79	3.15	1.35	4.12	2.31	.98		22.26	23.94		13.26
69	61N	15W	17	TOWER 3	NWS	.65	1.34	1.37	3.79	1.50	3.57	3.12	2.51	4.87	2.24	1.28	1.88	28.29	30.51	28.12	15.57
69	62N	15W	32	TOWERDNR	DNR		1.27		*												
69	62N	18W	18	COOK	NWS	.71	1.11	.74													
69	62N	18W	18	COOK DNR	DNR		1.16	.85	2.26	2.92	2.20	3.93	1.51	3.39	2.51	1.26	1.95				13.95
69	62N	20W	5	COOK 12W	NWS	.71	.94	.74	1.78	2.02	2.39	2.77	2.20	3.84	2.36	1.42	2.14	19.96	22.02	23.31	13.22
69	62N	21W	9	CELINA2E	NWS	.79	1.06	.85	3.16	3.13	2.35	3.74	.99	4.59	2.22	1.29	2.01	24.12	25.93	26.18	14.80
69	63N	12W	26	ELY USFS	NWS	.83	1.57	1.41	3.80	1.11	3.20	3.15	2.85	2.94	1.66	1.54	1.60	28.00	27.68	25.66	13.25
69	64N	19W	10	ORR 3E	NWS	.50	.98	1.27	2.92	2.11	2.17	2.98	1.86	3.79	1.92	1.36	2.07	20.73	22.70	23.93	12.91
69	64N	20W	1	ORR DNR	DNR	.53		1.18	3.38	2.37	2.24			3.74	3.13	1.61					
69	69N	21W	4	KABETOGA	NWS	.77	.98	1.95	2.51	2.07	2.37	4.61	1.68	3.39	2.72	1.45	1.46	24.76	25.42	25.96	14.12
county averages						.95	1.45	1.61	3.16	1.70	2.87	2.60	1.51	6.42	1.96	1.27	2.29	25.11	29.10	27.70	15.20
# of obs						32	34	34	34	35	35	34	33	35	33	26	15	27	27	11	33

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- Prepared by: State Climatology Office - DNR Eco-Waters, phone: 651-296-4214, web: https://climateapps.dnr.state.mn.us/index.htm

For some purposes, **daily** precipitation data are required. The precipitation data archive allows a user to interactively retrieve daily precipitation data from the site nearest to a target.

Obtaining Data for Legal Purposes

Attachment C-2

IWMZ Inventories

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

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

PUBLIC WATER SYSTEM INFORMATION

PWS ID	1690022 COMMUNITY
NAME	Hibbing
ADDRESS	Hibbing Water Superintendent, PO Box 249, 1902 Sixth Avenue East, Hibbing, MN 55746

FACILITY (WELL) INFORMATION

NAME	Well #1C
SAMPLE POINT ID	S03
UNIQUE WELL NO.	233054
COUNTY	St. Louis

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1690022 S03	UNIQUE WELL NO.	233054

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	1690022 S03	UNIQUE WELL NO.	233054

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		Y	30	
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		

PWS ID / SAMPLE POINT ID	1690022 S03	UNIQUE WELL NO.	233054

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

* New potential contaminant source.

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

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

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

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

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

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

PWS ID / SAMPLE POINT ID	1690022 S03	UNIQUE WELL NO.	233054
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	Strodtman, Mike	DATE	1 - 19 - 2024

PWS ID / SAMPLE POINT ID	1690022 S03	UNIQUE WELL NO.	233054

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Determine the status and location of former city well #1A (#233052).		

COMMENTS

9/7/2003 - Location for PCSI Type SBM (bearing = 0, distance = 0 , inventory date: 12/17/1998) could not be determined.10/12/2004 - SBM from 12/17/1998 was verified to be outside the IWMZ using information from city. The sewer lines run along the west side of the asphalt roadway, which is outside the IWMZ.

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	1690022	**COMMUNITY**
NAME	Hibbing	
ADDRESS	Hibbing Water Superintendent, PO Box 249, 1902 Sixth Avenue East, Hibbing, MN 55746	

FACILITY (WELL) INFORMATION

NAME	Well #2B	**IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?**
SAMPLE POINT ID	S18	☐ YES (Please attach a copy)
UNIQUE WELL NO.	792077	☐ NO ☐ UNDETERMINED
COUNTY	St. Louis	

PWS ID / SAMPLE POINT ID	1690022 S18	**UNIQUE WELL NO.**	792077

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET): Minimum Distances: Community	Non-community	Sensitive Well[1]	Within 200 Ft. Y / N / U	LOCATION: Dist. from Well	Est. (?)
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	1690022 S18	UNIQUE WELL NO.	792077

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		N		
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		

PWS ID / SAMPLE POINT ID	1690022 S18	UNIQUE WELL NO.	792077

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		

Additional Sources (If there is more than one source listed above, please indicate here).

Potential Contamination Sources and Codes Based on Previous Versions of this Form

	none found within 200' of this well.						

* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.
[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.
[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.
[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

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

PWS ID / SAMPLE POINT ID	1690022 S18	UNIQUE WELL NO.	792077

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

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

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

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

INSPECTOR	Strodtman, Mike	DATE	1 - 19 - 2024

PWS ID / SAMPLE POINT ID	1690022 S18	UNIQUE WELL NO.	792077

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 1690022 **COMMUNITY**
NAME Hibbing
ADDRESS Hibbing Water Superintendent, PO Box 249, 1902 Sixth Avenue East, Hibbing, MN 55746

FACILITY (WELL) INFORMATION

NAME Well #3A
SAMPLE POINT ID S05
UNIQUE WELL NO. 233056
COUNTY St. Louis

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?
☐ YES (Please attach a copy)
☐ NO ☐ UNDETERMINED

PWS ID / SAMPLE POINT ID	1690022 S05	UNIQUE WELL NO.	233056

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET) Minimum Distances Community	Non-community	Sensitive Well[1]	Within 200 Ft. Y / N / U	LOCATION Dist. from Well	Est. (?)
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	1690022 S05	UNIQUE WELL NO.	233056

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well¹	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)²	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)²	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well² (Class V well - illegal³)	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		Y	133	
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		

PWS ID / SAMPLE POINT ID	1690022 S05	UNIQUE WELL NO.	233056

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		

Additional Sources (If there is more than one source listed above, please indicate here).

Potential Contamination Sources and Codes Based on Previous Versions of this Form

	none found within 200' of this well.						

* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.
[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.
[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.
[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

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

PWS ID / SAMPLE POINT ID	1690022 S05	UNIQUE WELL NO.	233056
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	Strodtman, Mike	DATE	1 - 19 - 2024

PWS ID / SAMPLE POINT ID	1690022 S05	UNIQUE WELL NO.	233056

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

COMMENTS

9/7/2003 - Location for PCSI Type ETL (bearing = 0, distance = 0 , inventory date: 12/17/1998) could not be determined.10/12/04 - Location distance for ETL estimated at 180 feet.07/01/2008 - Location distance for ETL remains unchanged from 2004.

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	1690022 — **COMMUNITY**
NAME	Hibbing
ADDRESS	Hibbing Water Superintendent, PO Box 249, 1902 Sixth Avenue East, Hibbing, MN 55746

FACILITY (WELL) INFORMATION

NAME	Well #4A
SAMPLE POINT ID	S15
UNIQUE WELL NO.	271992
COUNTY	St. Louis

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1690022 S15	UNIQUE WELL NO.	271992

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET) Minimum Distances Community	Non-community	Sensitive Well[1]	Within 200 Ft. Y / N / U	LOCATION Dist. from Well	Est. (?)
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	1690022 S15	UNIQUE WELL NO.	271992

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		Y	132	
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		

PWS ID / SAMPLE POINT ID	1690022 S15	UNIQUE WELL NO.	271992

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
IWD	Industrial waste disposal well (Class V well)[2]	illegal[3]	illegal[3]		N		
IWS	Interceptor, including a flammable waste or sediment	50	50		N		
OH1	Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more)	50	35		N		
*PP1	Petroleum buried piping	50	50		N		
*PP2	Petroleum or crude oil pipeline to a refinery or distribution center	100	100		N		
PT1	Petroleum tank or container, 1100 gal. or more, without safeguards	150	150		N		
PT2	Petroleum tank or container, 1100 gal. or more, with safeguards	100	100		N		
PT3	Petroleum tank or container, buried, between 56 and 1100 gal.	50	50		N		
PT4	Petroleum tank or container, not buried, between 56 and 1100 gal.	50[5]	20		N		
PU1	Pit or unfilled space more than four feet in depth	20	20		N		
PC1	Pollutant or contaminant that may drain into the soil	50	50	100	N		
SP1	Swimming pool, in-ground	20	20		N		
*VH1	Vertical heat exchanger, horizontal piping conforming to rule	50	10		N		
*VH2	Vertical heat exchanger (vertical) piping, conforming to rule	50	35		N		
*WR1	Wastewater rapid infiltration basin, municipal or industrial	300	300	600	N		
*WA1	Wastewater spray irrigation area, municipal or industrial	150	150	300	N		
*WS1	Wastewater stabilization pond, industrial	150	150	300	N		
*WS2	Wastewater stabilization pond, municipal, 500 or more gal./acre/day of leakage	300	300	600	N		
*WS3	Wastewater stabilization pond, municipal, less than 500 gal./acre/day of leakage	150	150	300	N		
*WT1	Wastewater treatment unit tanks, vessels and components (Package plant)	100	100		N		
*WT2	Water treatment backwash disposal area	50	50	100	N		

Additional Sources (If there is more than one source listed above, please indicate here).

Potential Contamination Sources and Codes Based on Previous Versions of this Form

	none found within 200' of this well.						

* New potential contaminant source.

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

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

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

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

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

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

PWS ID / SAMPLE POINT ID	1690022 S15	UNIQUE WELL NO.	271992

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

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

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

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

INSPECTOR	Strodtman, Mike	DATE	1 - 19 - 2024

PWS ID / SAMPLE POINT ID	1690022 S15	UNIQUE WELL NO.	271992

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	1690022	**COMMUNITY**
NAME	Hibbing	
ADDRESS	Hibbing Water Superintendent, PO Box 249, 1902 Sixth Avenue East, Hibbing, MN 55746	

FACILITY (WELL) INFORMATION

NAME	Well #8A
SAMPLE POINT ID	S07
UNIQUE WELL NO.	233058
COUNTY	St. Louis

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1690022 S07	**UNIQUE WELL NO.**	233058

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET): Minimum Distances – Community	Minimum Distances – Non-community	Sensitive Well[1]	Within 200 Ft. Y / N / U	LOCATION: Dist. from Well	Est. (?)
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	1690022 S07	UNIQUE WELL NO.	233058

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET) Minimum Distances Community	Non-community	Sensitive Well[1]	Within 200 Ft. Y / N / U	LOCATION Dist. from Well	Est. (?)
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		N		
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		

PWS ID / SAMPLE POINT ID	1690022 S07	UNIQUE WELL NO.	233058

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

* New potential contaminant source.

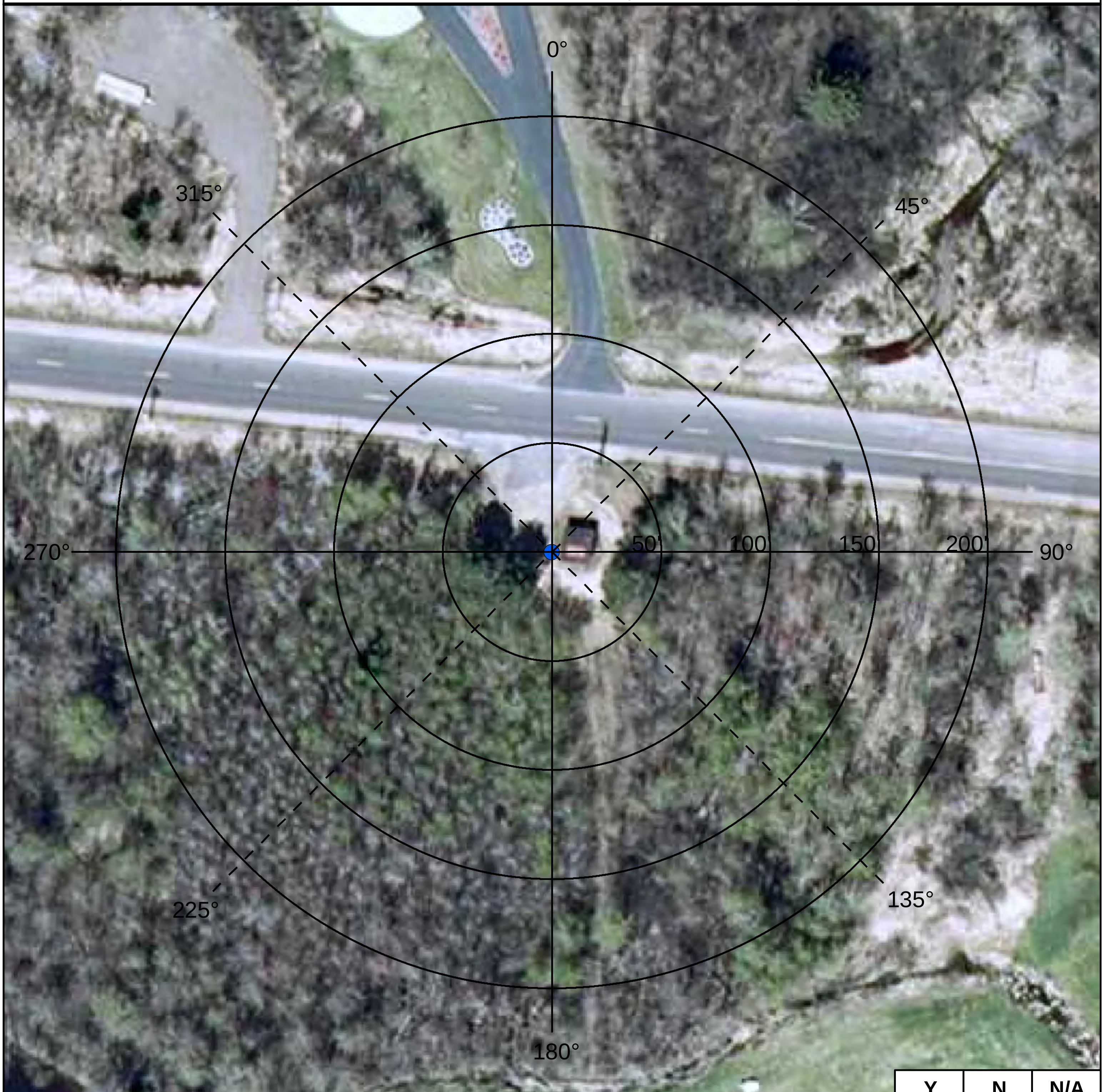
[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.
[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.
[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.
[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

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

PWS ID / SAMPLE POINT ID	1690022 S07	UNIQUE WELL NO.	233058

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	Strodtman, Mike	DATE	1 - 19 - 2024

PWS ID / SAMPLE POINT ID	1690022 S07	UNIQUE WELL NO.	233058

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Any sewer lines that are observed to be leaking, cracked, or deteriorated, should be replaced.	Y	07/01/2008

COMMENTS

9/7/2003 - Location for PCSI Type ETL (bearing = 0, distance = 0 , inventory date: 12/17/1998) could not be determined.9/7/2003 - Location for PCSI Type SBM (bearing = 0, distance = 62 , inventory date: 12/17/1998) could not be determined.10/12/2004 - Location for SBM measured.10/12/2004 - Distance for ETL estimated at 35 feet.07/01/2008 - Distance for ETL estimated at 35 feet.

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	1690022 **COMMUNITY**
NAME	Hibbing
ADDRESS	Hibbing Water Superintendent, PO Box 249, 1902 Sixth Avenue East, Hibbing, MN 55746

FACILITY (WELL) INFORMATION

NAME	Well #11C
SAMPLE POINT ID	S09
UNIQUE WELL NO.	233061
COUNTY	St. Louis

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1690022 S09	**UNIQUE WELL NO.**	233061

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET) Minimum Distances: Community	Minimum Distances: Non-community	Sensitive Well[1]	Within 200 Ft. Y / N / U	LOCATION: Dist. from Well	Est. (?)
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	1690022 S09	UNIQUE WELL NO.	233061

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		Y	175	
WEL	Operating well	record dist.	record dist.		Y	49	
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	1690022 S09	UNIQUE WELL NO.	233061

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	1690022 S09	UNIQUE WELL NO.	233061

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	Strodtman, Mike	DATE	1 - 19 - 2024

PWS ID / SAMPLE POINT ID	1690022 S09	UNIQUE WELL NO.	233061

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Determine the location and status of former city well #11B (233060).		
Any sewer lines that are observed to be leaking, cracked, or deteriorated, should be replaced.	Y	07/01/2008

COMMENTS

9/7/2003 - Location for PCSI Type ETL (bearing = 0, distance = 0 , inventory date: 12/17/1998) could not be determined.9/7/2003 - Location for PCSI Type SBM (bearing = 0, distance = 0 , inventory date: 12/17/1998) could not be determined.10/12/2004 - Distance for ETL is estimated at 45 feet.

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 1690022 — **COMMUNITY**
NAME Hibbing
ADDRESS Hibbing Water Superintendent, PO Box 249, 1902 Sixth Avenue East, Hibbing, MN 55746

FACILITY (WELL) INFORMATION

NAME Well #17
SAMPLE POINT ID S16
UNIQUE WELL NO. 778015
COUNTY St. Louis

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?
☐ YES (Please attach a copy)
☐ NO ☐ UNDETERMINED

PWS ID / SAMPLE POINT ID	1690022 S16	UNIQUE WELL NO.	778015

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET) Minimum Distances Community	Non-community	Sensitive Well[1]	Within 200 Ft. Y / N / U	LOCATION Dist. from Well	Est. (?)
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	1690022 S16	UNIQUE WELL NO.	778015

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		Y	137	
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		

PWS ID / SAMPLE POINT ID	1690022 S16	UNIQUE WELL NO.	778015

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

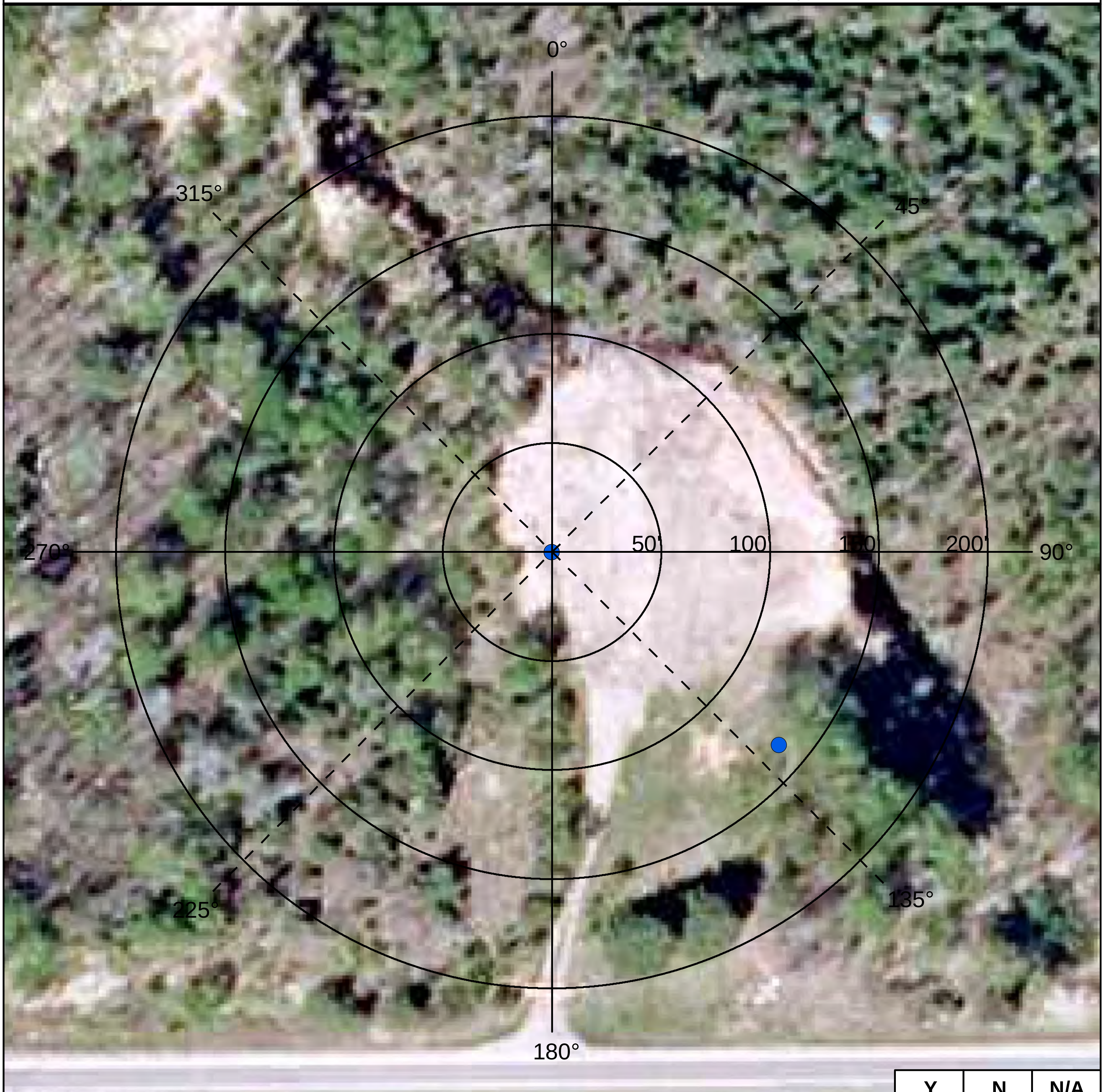
* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.
[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.
[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.
[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

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

PWS ID / SAMPLE POINT ID	1690022 S16	UNIQUE WELL NO.	778015
SETBACK DISTANCES	All potential contaminant sources must be noted on sketch.		

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



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

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

INSPECTOR	Strodtman, Mike	DATE	1 - 19 - 2024

PWS ID / SAMPLE POINT ID	1690022 S16	UNIQUE WELL NO.	778015

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 1690022 **COMMUNITY**
NAME Hibbing
ADDRESS Hibbing Water Superintendent, PO Box 249, 1902 Sixth Avenue East, Hibbing, MN 55746

FACILITY (WELL) INFORMATION

NAME Well #18
SAMPLE POINT ID S19
UNIQUE WELL NO. 791017
COUNTY St. Louis

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?
☐ YES (Please attach a copy)
☐ NO ☐ UNDETERMINED

PWS ID / SAMPLE POINT ID	1690022 S19	UNIQUE WELL NO.	791017

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET) Minimum Distances Community	Non-community	Sensitive Well¹	Within 200 Ft. Y / N / U	LOCATION Dist. from Well	Est. (?)
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 well² (Class V well - illegal³)	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	50/300/150⁴	50/300/150⁴	100/600/300⁴	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	1690022 S19	UNIQUE WELL NO.	791017

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		N		
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		

PWS ID / SAMPLE POINT ID	1690022 S19	UNIQUE WELL NO.	791017

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

* New potential contaminant source.

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

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

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

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

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

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

PWS ID / SAMPLE POINT ID	1690022 S19	UNIQUE WELL NO.	791017

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

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

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

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

INSPECTOR	Strodtman, Mike	DATE	1 - 19 - 2024

PWS ID / SAMPLE POINT ID	1690022 S19	UNIQUE WELL NO.	791017

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	1690022 — **COMMUNITY**
NAME	Hibbing
ADDRESS	Hibbing Water Superintendent, PO Box 249, 1902 Sixth Avenue East, Hibbing, MN 55746

FACILITY (WELL) INFORMATION

NAME	Airport Well
SAMPLE POINT ID	S17
UNIQUE WELL NO.	716190
COUNTY	St. Louis

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1690022 S17	UNIQUE WELL NO.	716190

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET) Minimum Distances: Community	Non-community	Sensitive Well¹	Within 200 Ft. Y / N / U	LOCATION: Dist. from Well	Est. (?)
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 well² (Class V well - illegal³)	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	50/300/150⁴	50/300/150⁴	100/600/300⁴	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	1690022 S17	UNIQUE WELL NO.	716190

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		N		
UUW	Unused, unsealed well or boring	50	50		N		
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		

PWS ID / SAMPLE POINT ID	1690022 S17	UNIQUE WELL NO.	716190

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

* New potential contaminant source.

[1] A sensitive well has less than 50 feet of watertight casing, and which is not cased below a confining layer or confining materials of at least 10' in thickness.
[2] These sources, known as Class V underground injection wells, are regulated by the federal U.S. Environmental Protection Agency.
[3] These sources are classified as illegal by Minnesota Rules, Chapter 4725.
[4] Isolation distance is determined by average flow per day or if a facility handles infectious or pathological wastes.
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls; or is protected with secondary containment.

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

PWS ID / SAMPLE POINT ID	1690022 S17	UNIQUE WELL NO.	716190

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

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

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

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

INSPECTOR	Strodtman, Mike	DATE	1 - 19 - 2024

PWS ID / SAMPLE POINT ID	1690022 S17	UNIQUE WELL NO.	716190

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	1690022	**COMMUNITY**
NAME	Hibbing	
ADDRESS	Hibbing Water Superintendent, PO Box 249, 1902 Sixth Avenue East, Hibbing, MN 55746	

FACILITY (WELL) INFORMATION

NAME	Scranton Well
SAMPLE POINT ID	S01
UNIQUE WELL NO.	147463
COUNTY	St. Louis

IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?

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

PWS ID / SAMPLE POINT ID	1690022 S01	UNIQUE WELL NO.	147463

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	1690022 S01	UNIQUE WELL NO.	147463

PCSI CODE	ACTUAL OR POTENTIAL CONTAMINATION SOURCE	ISOLATION DISTANCES (FEET)				LOCATION	
		Minimum Distances		Sensitive Well[1]	Within 200 Ft. Y / N / U	Dist. from Well	Est. (?)
		Community	Non-community				
*GW1	Gray-water dispersal area	50	50	100	N		
LC1	Large capacity cesspools (Class V well - illegal)[2]	75	75	150	N		
MVW	Motor vehicle waste disposal (Class V well - illegal)[2]	illegal	illegal		N		
PR1	Privy, nonportable	50	50	100	N		
PR2	Portable (privy) or toilet	50	20		N		
*SF1	Watertight sand filter; peat filter; or constructed wetland	50	50		N		
SET	Septic tank	50	50		N		
HTK	Sewage holding tank, watertight	50	50		N		
SS1	Sewage sump capacity 100 gal. or more	50	50		N		
SS2	Sewage sump capacity less than 100 gal., tested, conforming to rule	50	20		N		
*ST1	Sewage treatment device, watertight	50	50		N		
SB1	Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences	50	20		N		
SB2	Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials	50	50		N		
*WB1	Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection	50	50		N		
*WB2	Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection	20	20		N		
Land Application							
SPT	Land spreading area for sewage, septage, or sludge	50	50	100	N		
Solid Waste Related							
COS	Commercial compost site	50	50		N		
CD1	Construction or demolition debris disposal area	50	50	100	N		
*HW1	Household solid waste disposal area, single residence	50	50	100	N		
LF1	Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons	300	300	600	N		
SVY	Scrap yard	50	50		N		
SWT	Solid waste transfer station	50	50		N		
Storm Water Related							
SD1	Storm water drain pipe, 8 inches or greater in diameter	50	20		N		
SWI	Storm water drainage well[2] (Class V well - illegal[3])	50	50		N		
SM1	Storm water pond greater than 5000 gal.	50	35		N		
Wells and Borings							
*EB1	Elevator boring, not conforming to rule	50	50		N		
*EB2	Elevator boring, conforming to rule	20	20		N		
MON	Monitoring well	record dist.	record dist.		N		
WEL	Operating well	record dist.	record dist.		N		
UUW	Unused, unsealed well or boring	50	50		Y	106	
General							
*CR1	Cistern or reservoir, buried, nonpressurized water supply	20	20		N		
PLM	Contaminant plume	50	50		N		
*CW1	Cooling water pond, industrial	50	50	100	N		
DC1	Deicing chemicals, bulk road	50	50	100	N		
*ET1	Electrical transformer storage area, oil-filled	50	50		N		
GRV	Grave or mausoleum	50	50		N		
GP1	Gravel pocket or French drain for clear water drainage only	20	20		N		
*HS1	Hazardous substance buried piping	50	50		N		
HS2	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards	150	150		N		
HS3	Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards	100	100		N		
HS4	Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding	50	50		N		
HWF	Highest water or flood level	50	N/A		N		
*HG1	Horizontal ground source closed loop heat exchanger buried piping	50	50		N		
*HG2	Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid	50	10		N		

PWS ID / SAMPLE POINT ID	1690022 S01	UNIQUE WELL NO.	147463

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

* New potential contaminant source.

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

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

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

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

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

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

PWS ID / SAMPLE POINT ID	1690022 S01	UNIQUE WELL NO.	147463

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	Strodtman, Mike	DATE	1 - 19 - 2024

PWS ID / SAMPLE POINT ID	1690022 S01	UNIQUE WELL NO.	147463

RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES	WHP MEASURE IMPLEMENTED? Y or N	DATE VERIFIED
Properly manage NRRI Exploration Well (#310769) to prevent potential contamination of the aquifer.	Y	07/01/2008

COMMENTS

9/7/2003 - Location for PCSI Type ETL (bearing = 0, distance = 0 , inventory date: 12/17/1998) could not be determined.9/7/2003 - Location for PCSI Type PLE (bearing = 0, distance = 0 , inventory date: 12/17/1998) could not be determined.10/12/2004 Distance for ETL estimated at 30 feet.7/1/2008 - Pump station building constructed by mining company to house the dewatering equipment located approximately 45 feet west/southwest.

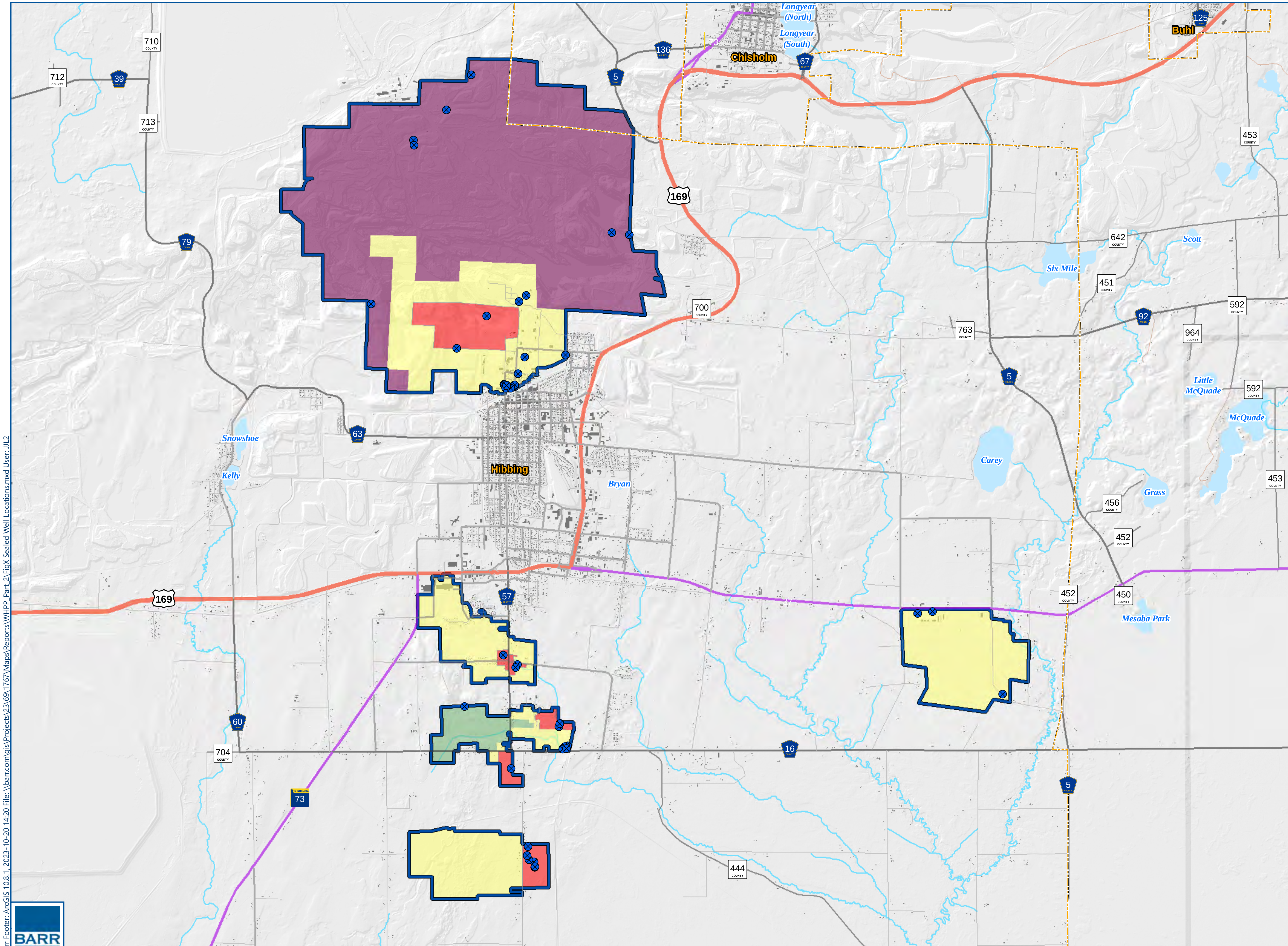
For further information, please contact:

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

Attachment C-3

Sealed Wells



Sealed Well

Public Watercourse

Public Waters Basin

Sealed Well

Hibbing DWSMA

Municipal Boundary

DWSMA Vulnerability

Low

Moderate

High

High (SWCA)

0 0.5 1
Miles

BARR

SEALED WELL LOCATIONS
Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE X

Table C-3-1

Sealed Wells in the DWSMAs
Hibbing WHPP Amendment

PCSI ID	PID No.	Unique No.	Status	Use	Well Name	Well Location	City	Total Sealed Depth (Feet)	Date Completed/Sealed	Aquifer	PCS Code	Location Verified
1	140-0270-00060	31120	Sealed	Exploration	2018-44	Not Available	Hibbing	236	6/29/2018	Not Available	WEL	No
2	140-0290-00210	32402	Sealed	Exploration	2021-12	Not Available	Hibbing	538	12/1/2021	Not Available	WEL	No
3	140-0270-00060	32401	Sealed	Exploration	2021-13	Not Available	Hibbing	675	12/10/2021	Not Available	WEL	No
4	141-0020-03355	H21963	Sealed	Not Available	Chisholm-hibbing Airport Commission	10784 Wegener Rd E	Hibbing	93	7/8/1992	Not Available	WEL	No
5	140-0140-00920	568744	Sealed	Not Available	Erickson Lumber	13th (& 16th Av E) St N	Hibbing	48	10/23/1998	Not Available	WEL	No
6	140-0140-00920	568745	Sealed	Not Available	Erickson Lumber	13th (& 16th Av E) St N	Hibbing	48	10/23/1998	Not Available	WEL	No
7	140-0140-00920	540219	Sealed	Not Available	Erickson, Paul	13th (& 16th Av E) St N	Hibbing	48	10/23/1998	Not Available	WEL	No
8	140-0140-00920	540220	Sealed	Not Available	Erickson, Paul	13th (& 16th Av E) St N	Hibbing	6	10/23/1998	Not Available	WEL	No
9	140-0140-00920	540221	Sealed	Not Available	Erickson, Paul	13th (& 16th Av E) St N	Hibbing	48	10/23/1998	Not Available	WEL	No
10	140-0270-00201	H105135	Sealed	Not Available	Frieberger, Rhude	Whitney Mine	Hibbing	16	5/14/1997	Not Available	WEL	No
11	141-0020-04490	233062	Sealed	Community Supply (Municipal)	Hibbing 12	11769 Town Line Rd	Hibbing	137	7/17/1997	MTPL	WEL	No
12	140-0140-02570	233064	Sealed	Community Supply (Municipal)	Hibbing 13	1840 1St Ave	Hibbing	108	7/19/1994	QBAA	WEL	No
13	141-0020-04470	778014	Sealed	Community Supply (Municipal)	Hibbing 16	1902 6th Ave E	Hibbing	84	6/13/2011	QWTA	WEL	No
14	141-0020-04490	278005	Sealed	Community Supply (Municipal)	Hibbing 17 (First Attempt)	11769 Town Line Rd	Hibbing	116	8/1/2010	QBAA	WEL	No
15	141-0010-01300	233055	Sealed	Community Supply (Municipal)	Hibbing 2A	3294 Bunker Rd	Hibbing	100	4/9/1905	QBAA	WEL	No
16	141-0020-04470	229140	Sealed	Community Supply (Municipal)	Hibbing 4 (Dnr Ob 69005)	11769 Town Line Rd	Hibbing	92	3/28/2011	QWTA	WEL	No
17	141-0020-04490	H0291256	Sealed	Not Available	Hibbing Public Utilities	11769 Town Line Rd	Hibbing	116	6/7/2011	Not Available	WEL	No
18	140-0270-00390	774865	Sealed	Not Available	Hibbing Public Utilities	1902 Sixth Av E	Hibbing	110	1/17/2012	Not Available	WEL	No
19	141-0020-04490	781734	Sealed	Test Well	Hibbing Public Utilities	1902 Sixth Ave E	Hibbing	149	3/10/2011	QBAA	WEL	No
20	141-0020-04490	332037	Sealed	Environmental Bore Hole	Hibbing Public Utilities	1902 6th Ave E	Hibbing	280	4/20/2010	Not Available	WEL	No
21	141-0020-04470	332040	Sealed	Environmental Bore Hole	Hibbing Public Utilities	1902 6th Ave E	Hibbing	220	4/28/2010	Not Available	WEL	No
22	141-0060-03860	551373	Sealed	Monitor Well	Hibbing Taconite Company	5 Cr	Hibbing	36	8/23/1994	Not Available	WEL	No
23	141-0060-03860	551371	Sealed	Monitor Well	Hibbing Taconite Company	5 Cr	Hibbing	23	8/22/1994	Not Available	WEL	No
24	141-0010-01300	784480	Sealed	Test Well	Hibbing Test Well	3294 Bunker Rd	Hibbing	110	4/17/2012	QBAA	WEL	No
25	141-0020-03450	332462	Sealed	Test Well	Hibbing Th-2	37 Hy	Hibbing	150	11/16/2006	Not Available	WEL	No
26	Not Available	680851	Sealed	Not Available	Hibbing, City Of	1810 First Av	Hibbing	40	4/6/2005	Not Available	WEL	No
27	140-0290-00354	661432	Sealed	Not Available	Hibbing, City Of	1801 First Av	Hibbing	43	4/6/2005	Not Available	WEL	No
28	141-0010-01300	H98894	Sealed	Not Available	Hibbing, City Of	3294 Bunker Rd	Hibbing	82	7/1/1989	Not Available	WEL	No
29	141-0010-01300	H98895	Sealed	Not Available	Hibbing, City Of	3294 Bunker Rd	Hibbing	82	7/1/1989	Not Available	WEL	No
30	140-0140-02800	H136819	Sealed	Not Available	Hibbing, City Of	1813 Third Av E	Hibbing	40	7/27/1998	Not Available	WEL	No
31	141-0010-01150	H129696	Sealed	Not Available	Hibbing, City Of	County Road 16 (& 57)	Hibbing	113	9/24/1997	Not Available	WEL	No
32	Not Available	H145653	Sealed	Not Available	Hibbing, City Of	1810 First Av	Hibbing	32	10/12/1998	Not Available	WEL	No
33	141-0010-01150	H139271	Sealed	Not Available	Hibbing, City Of	3316 Bunker Rd	Hibbing	132	9/3/1998	Not Available	WEL	No
34	Not Available	H145701	Sealed	Not Available	Hibbing, City Of	1810 First Av	Hibbing	44	12/15/1998	Not Available	WEL	No
35	141-0010-01150	H155281	Sealed	Not Available	Hibbing, City Of	3316 Bunker Rd	Hibbing	161	9/17/1999	Not Available	WEL	No
36	141-0010-01150	H155296	Sealed	Not Available	Hibbing, City Of	3316 Bunker Rd	Hibbing	161	9/22/1999	Not Available	WEL	No
37	140-0290-00354	H179596	Sealed	Not Available	Hibbing, City Of	1801 First Av	Hibbing	57	5/5/2001	Not Available	WEL	No
38	Not Available	H193819	Sealed	Not Available	Hibbing, City Of	1810 First Av	Hibbing	52	6/13/2002	Not Available	WEL	No
39	Not Available	H211786	Sealed	Not Available	Hibbing, City Of	1810 First Av	Hibbing	16	10/2/2003	Not Available	WEL	No
40	140-0290-00283	H6560	Sealed	Not Available	Hibbing, City Of Public Utilities	Not Available	Hibbing	120	10/16/1990	Not Available	WEL	No

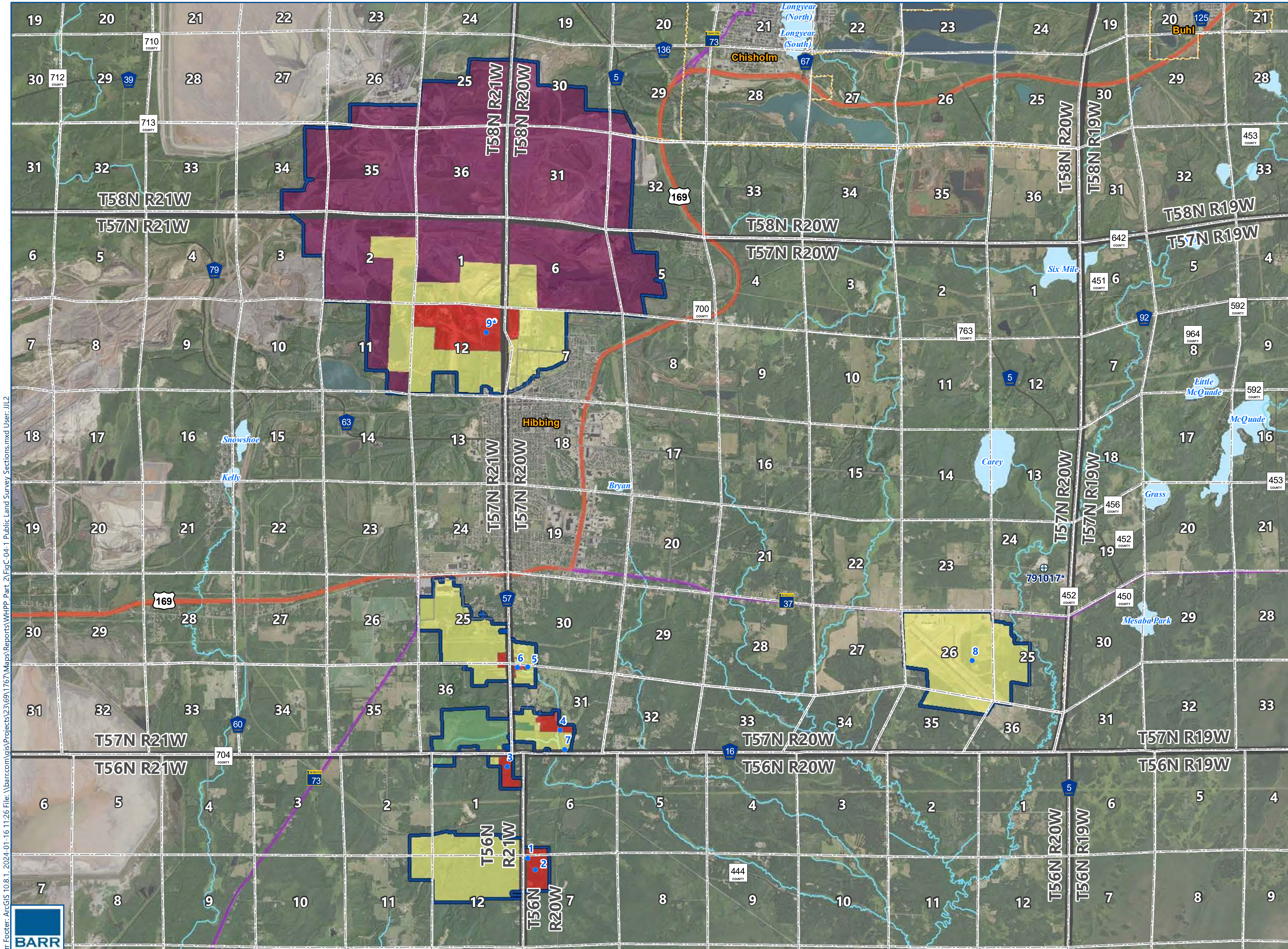
Table C-3-1

Sealed Wells in the DWSMAs
Hibbing WHPP Amendment

PCSI ID	PID No.	Unique No.	Status	Use	Well Name	Well Location	City	Total Sealed Depth (Feet)	Date Completed/Sealed	Aquifer	PCS Code	Location Verified
41	141-0060-05450	341858	Sealed	Environmental Bore Hole	Hole 1 Hib Tac	Not Available	Hibbing	240	11/8/2019	Not Available	WEL	No
42	141-0060-05450	341859	Sealed	Environmental Bore Hole	Hole 2 Hib Tac	Not Available	Hibbing	250	11/20/2019	Not Available	WEL	No
43	140-0270-00201	H109789	Sealed	Not Available	Markham Company, The	Whitney Mine	Hibbing	29	7/11/1997	Not Available	WEL	No
44	140-0140-02570	661430	Sealed	Monitor Well	Mw-1	1801 1st Ave	Hibbing	38	5/6/2005	QBUA	WEL	No
45	140-0140-02570	661431	Sealed	Monitor Well	Mw-2	1801 1st Ave W	Hibbing	38	4/6/2005	QBUA	WEL	No
46	140-0140-02570	686697	Sealed	Monitor Well	Mw-5	1810 1st Ave W	Hibbing	40	4/7/2005	QWTA	WEL	No
47	141-0020-03450	657266	Sealed	Monitor Well	Mw-5 Chisolm-Hibbing Airport	11038 Hwy 37	Hibbing	21	11/20/2000	Not Available	WEL	No
48	141-0020-03450	644727	Sealed	Monitor Well	Mw-9 Chisholm-Hibbing Airport	11038 37 Hy	Hibbing	20	1/25/2001	Not Available	WEL	No
49	141-0060-03950	584596	Sealed	Monitor Well	Mwlf-4	5 Cr	Hibbing	45	11/15/1996	Not Available	WEL	No
50	Not Available	H116228	Sealed	Not Available	Range Cable Tv	1818 Third Av E	Hibbing	40	4/24/1997	Not Available	WEL	No
51	Not Available	H136817	Sealed	Not Available	Range T.v. Cable	1818 Third Av E	Hibbing	60	7/27/1998	Not Available	WEL	No
52	Not Available	H126883	Sealed	Not Available	Range Tv Cable	1818 Third Av E	Hibbing	30	10/3/1997	Not Available	WEL	No
53	140-0270-00202	H167419	Sealed	Not Available	Rhude & Fryberger, Inc.	Not Available	Hibbing	28	6/30/2000	Not Available	WEL	No
54	140-0270-00400	H167422	Sealed	Not Available	Rhude & Fryberger, Inc.	N 13th St	Hibbing	16	7/18/2000	Not Available	WEL	No
55	Not Available	H136820	Sealed	Not Available	Rigging & Wear, Inc.	1800 Third Av E	Hibbing	40	7/27/1998	Not Available	WEL	No
56	140-0140-02570	794657	Sealed	Test Well	Th-13	1902 Sixth Ave E	Hibbing	115	11/8/2012	QBAA	WEL	No
57	140-0270-00390	548133	Sealed	Not Available	Troutwine, Phil	1121 Howard St E	Hibbing	40	5/9/1996	Not Available	WEL	No
58	140-0270-00390	548134	Sealed	Not Available	Troutwine, Phil	1121 Howard St E	Hibbing	37	5/9/1996	Not Available	WEL	No
59	140-0270-00390	548182	Sealed	Not Available	Troutwine, Phil	1121 Howard St E	Hibbing	40	5/9/1996	Not Available	WEL	No
60	141-0050-01650	23102	Sealed	Exploration	Y5302 (C-15)	801 Howard E	Hibbing	187	5/5/2007	Not Available	WEL	No
61	141-0050-04960	229148	Unknown	Municipal	Hibbing	Not Available	Hibbing	73	1915	Not Available	WEL	No
62	141-0184-00320	233060	Active	Community Supply (Municipal)	Hibbing 11B	Not Available	Hibbing	96	1956	QBAA	WEL	No
63	141-0020-04490	233063	Active	Public Supply/Non-Community	Hibbing 12A	Not Available	Hibbing	138	1954	QBAA	WEL	No
64	141-0010-01300	233052	Active	Public Supply/Non-Community	Hibbing 1A	Not Available	Hibbing	100	1924	QBAA	WEL	No
65	141-0010-01300	226635	Active	Public Supply/Non-Community	Hibbing 1B	Not Available	Hibbing	112	1951	QWTA	WEL	No
66	141-0050-07330	229149	Unknown	Public Supply/Non-Community	Hibbing 2	Not Available	Hibbing	119	01/27/1975	Not Available	WEL	No
67	141-0040-00030	233059	Active	Community Supply (Municipal)	Hibbing 9	Not Available	Hibbing	183	1944	QBAA	WEL	No
68	140-0140-02570	239970	Unknown	Test Well	Hibbing Th2	Not Available	Hibbing	217	11/00/1955	Not Available	WEL	No
69	141-0184-00320	784455	Active	Environmental Bore Hole	Well 8A-Test	11856 Wagner Rd	Hibbing	134	07/21/2011	Not Available	WEL	No

Attachment C-4

Public Land Survey Sections



Municipal Well

Carey Valley Well #18

Public Watercourse

Public Waters Basin

Hibbing DWSMA

PLS Section

PLS Township

Municipal Boundary

DWSMA Vulnerability

Low

Moderate

High

High (SWCA)

* Scranton Well (#9) and Carey Valley Well (#18) - Emergency Use Only

2 - Municipal Well Location PCSI ID (PCSI ID refers to Table C-3)

0 0.5 1

Miles

PUBLIC LAND SURVEY SECTIONS

Hibbing Part 2 WHPP Amendment
City of Hibbing
St. Louis County, MN

FIGURE C-4-1

Appendix D

Water Quality Information

Hibbing 2022 Drinking Water Report

Making Safe Drinking Water

Your drinking water comes from a groundwater source: nine wells ranging from 79 to 535 feet deep, that draw water from the Virginia Formation, Quaternary Buried Artesian, Biwabik Iron-Formation and Quaternary Water Table aquifers.

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

Contact Stefanie Dickinson, Utility Operations Manager, at 218-969-3106 or stefanie.dickinson@hpuc.com if you have questions about Hibbing's drinking water. You can also ask for information about how you can take part in decisions that may affect water quality.

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

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

Hibbing Monitoring Results

This report contains our monitoring results from January 1 to December 31, 2022.

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

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

How to Read the Water Quality Data Tables

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

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

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

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

Definitions

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

Monitoring Results – Regulated Substances

LEAD AND COPPER – Tested at customer taps.						
Contaminant (Date, if sampled in previous year)	**EPA's Ideal Goal** (MCLG)	**EPA's Action Level**	**90% of Results Were Less Than**	**Number of Homes with High Levels**	**Violation**	**Typical Sources**
Lead	0 ppb	90% of homes less than 15 ppb	8.62 ppb	3 out of 60	NO	Corrosion of household plumbing.
Copper	0 ppm	90% of homes less than 1.3 ppm	0.96 ppm	4 out of 60	NO	Corrosion of household plumbing.

INORGANIC & ORGANIC CONTAMINANTS – Tested in drinking water.						
Contaminant (Date, if sampled in previous year)	**EPA's Ideal Goal** (MCLG)	**EPA's Limit** (MCL)	**Highest Average or Highest Single Test Result**	**Range of Detected Test Results**	**Violation**	**Typical Sources**
Barium (12/01/20)	2 ppm	2 ppm	0.04 ppm	N/A	NO	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposit.
Combined Radium (2019)	0 pCi/l	5.4 pCi/l	2 pCi/l	N/A	NO	Erosion of natural deposits.

Potential Health Effects and Corrective Actions (If Applicable)

The City of Hibbing received a Notice of Violation for not completing the 2021 Consumer Confidence Report requirements. We distributed the report on time but did not complete the required Certification Form to the state within the time allowed. The Certification Form has now been completed as of 3-28-2023 and Hibbing is now in compliance with the Consumer Confidence Report Rule.

CONTAMINANTS RELATED TO DISINFECTION – Tested in drinking water.						
Substance (Date, if sampled in previous year)	**EPA's Ideal Goal** (MCLG or MRDLG)	**EPA's Limit** (MCL or MRDL)	**Highest Average or Highest Single Test Result**	**Range of Detected Test Results**	**Violation**	**Typical Sources**
Total Trihalomethanes (TTHMs)	N/A	80 ppb	56.5 ppb	44.60 - 56.50 ppb	NO	By-product of drinking water disinfection.
Total Haloacetic Acids (HAA)	N/A	60 ppb	4.5 ppb	0.00 - 4.50 ppb	NO	By-product of drinking water disinfection.
Total Chlorine	4.0 ppm	4.0 ppm	0.14 ppm	0.07 - 0.21 ppm	NO	Water additive used to control microbes.

Total HAA refers to HAA5

OTHER SUBSTANCES – Tested in drinking water.						
Substance (Date, if sampled in previous year)	**EPA's Ideal Goal** (MCLG)	**EPA's Limit** (MCL)	**Highest Average or Highest Single Test Result**	**Range of Detected Test Results**	**Violation**	**Typical Sources**
Fluoride	4.0 ppm	4.0 ppm	0.56 ppm	0.43 - 0.47 ppm	NO	Erosion of natural deposits; Water additive to promote strong teeth.

Potential Health Effects and Corrective Actions (If Applicable)

Fluoride: If your drinking water fluoride levels are below the optimal concentration range of 0.5 to 0.9 ppm, please talk with your dentist about how you can protect your teeth and your family's teeth from tooth decay and cavities. For more information, visit: MDH Drinking Water Fluoridation (https://www.health.state.mn.us/communities/environment/water/com/fluoride.html).

Monitoring Results – Unregulated Substances

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

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

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

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

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

UNREGULATED CONTAMINANTS – Tested in drinking water.

Contaminant	Comparison Value	Highest Average Result or Highest Single Test Result	Range of Detected Test Results
Sodium*	20 ppm	32.7 ppm	N/A
Sulfate	500 ppm	4.02 ppm	N/A

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

Some People Are More Vulnerable to Contaminants in Drinking Water

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

Learn More about Your Drinking Water

Drinking Water Sources

Groundwater supplies 75 percent of Minnesota's drinking water, and is found in aquifers beneath the surface of the land. Surface water supplies 25 percent of Minnesota's drinking water, and is the water in lakes, rivers, and streams above the surface of the land. Contaminants can get in drinking water sources from the natural environment and from people's daily activities. There are five main types of contaminants in drinking water sources.

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

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

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

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

Lead in Drinking Water

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

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

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

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

Learn more:

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

Water systems have ongoing infrastructure, operations and maintenance costs in supplying safe drinking water, and many are implementing additional efforts to help insure health equity and manageable water bills with:

- Turn the faucet off while brushing teeth.
- Shower instead of bathing to reduce water use.
- Fix running toilets by replacing flapper valves.
- Run full loads of laundry and use a minimal water use setting.
- Our water system partners with others to help consumers with limited resources make payments to their water bills.
- Contact us to learn more.

Appendix E

Wellhead Protection Program Evaluation Report Template

WHP PLAN EVALUATION

for

Hibbing Public Utilities
PWS ID #1690022
Date

Date of Most Recent Plan Approval:

Evaluation Completed By:

Copies Presented or Sent To:		
☐	Minnesota Department of Health Attn: Chris Parthun Environmental Health Division Source Water Protection Unit 705 5th Street NW, Suite A Bemidji, MN 56601*2933 Chris.Parthun@state.mn.us	☐MDH ☐Wellhead Protection File ☐HPU Commission

Note: delete the italicized notes text after completing a draft of this document.

A. Changes to Water System
(Note: table should include all WHP measures)

List the unique number and locations of new wells installed since the last plan evaluation:

Unique Well Number	Date Online	Delineation Completed?
.		

B. Implementation of Wellhead Protection Management Strategies.
(Note: table should include all WHP measures)

WHP Measure	Implemented? Y or N	Comments

C. Financial Concerns
(Note: Include a summary of SWP Grants)

Have local, state, or federal financial resources (such as Well Sealing Grants, SWP Grants, Clean Water Fund Grants or LCCMR funds) been accessed to help the wellhead protection plan?

YES ☐ NO ☐

SWP Grants History:

Estimate the annual expense of plan implementation for each plan year including staff time and actual dollar amount spent.

Year	Annual Expense	Year	Annual Expense
1	$	6	$
2	$	7	$
3	$	8	$
4	$	9	$
5	$	10	$

Estimate full-time equivalency (FTE) spent on wellhead protection implementation in terms of percentage of FTE.

FTE =_____%

Has the wellhead protection budget been adequate to conduct wellhead protection implementation activities during the last evaluation period?

Yes ☐ No ☐

If no, where could it improve?

Itemize difficulties incurred during your plan implementation.

1.

2.

3.

4.

D. Status of Inner Wellhead Management Zone Work (IWMZ Work)

Date of the most recent IWMZ inventory for each well in the public water supply system:

Does the IWMZ need to be updated for the amendment? YES ☐ NO ☐

E. Sealing Old Municipal Wells

Have any old municipal public water supply wells been sealed? YES ☐ NO ☐

Comments:

E. Water Quality Sampling and Data Collection

Has sampling of the quality of the groundwater in the DWSMAs been performed by RPU or MDH? YES ☐ NO ☐

Comments:

Has additional data to improve the wellhead protection area delineation or assess vulnerability (e.g., tritium, isotopes, groundwater elevations) been collected? YES☐ NO☐

Comments:

Has a monitoring plan for water quality developed in cooperation with MDH been implemented? YES☐ NO☐

Comments:

List any new data that relates to wellhead protection delineations or source management (i.e., groundwater study results, water quality monitoring data, well construction logs, etc.) that may be used during the next update of the wellhead protection plan:

Nature of Data	**Source of Data**

F. Potential Contaminant Source Inventory (PCSI)

Has the PCSI been maintained or updated? YES ☐ NO ☐

Have any new PCS been identified in the DWSMAs and added to the PCSI? YES ☐ NO ☐

List any new facilities or changes in current facilities in the drinking water supply management area(s) that may be of concern with regard to groundwater quality (list the facility name and nature of concern):

Facility Name	**Change**	**Distance to Well**	**Well Number**	**Date Change Made**

G. Using SDWA Monitoring Data

Are there any changes in SDWA compliance monitoring results? YES ☐ NO ☐

Comments:

H. Contingency Plan

Has it been necessary to implement any part of the Contingency Plan? YES☐ NO☐

Comments:

Was any component of the contingency plan implemented by your system at any time since the last program evaluation?

☐ Yes (What was the reason?____________________________)
☐ No

List changes that are needed in the contingency plan and <u>update the plan accordingly</u>:

1.

2.

3.

Appendix F

Water Supply Plan Documentation

MINNESOTA DEPARTMENT OF NATURAL RESOURCES
NORTHEASTERN REGION
525 Lake Ave South Suite 415
Duluth, MN 55802
218-302-3249

July 8th, 2020

City of Hibbing
Corey L. Lubovich
1902 6th Avenue East
Hibbing, MN 55746

Dear Mr. Luvovich:

RE: WATER EMERGENCY AND CONSERVATION PLAN APROVAL, CITY OF HIBBING, ST. LOUIS COUNTY

Our office has completed the review of your Water Supply Plan for public water supply authorized under DNR Water Appropriation Permit #1975-2222. I am pleased to advise you that in accordance with Minnesota Statutes, Section 103G.291, Subdivision 3, and on behalf of the Commissioner of the Department of Natural Resources, I hereby approve your Water Supply Plan. We encourage cities to complete the attached "Certification of Adoption" form. Please upload the form to MPARS as soon as the city officially adopts the Plan.

The DNR, Minnesota Rural Water Association, and The Metropolitan Council encourage the city to educate its customers on how they can reduce household water use. As mentioned at the Water Supply Planning Workshops, the DNR will be contacting you periodically about progress the city has made on their water conservation goals. We encourage you to keep records of your success.

Thank you for your efforts in planning for the future of the City of Hibbing's 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 Hydrologist Greg Root at (218) 302-3249.

Sincerely,

Greg Root
Regional Water Appropriations Hydrologist

Cc: Darrell Schindler, EWR Regional Manager
St. Louis County SWCD
Ann Pierce, Deputy Director
Carmelita Nelson, Water Conservation Consultant

CERTIFICATION OF ADOPTION
WATER EMERGENCY AND CONSERVATION PLAN

City or Water System Name:

Name of Person Authorized to Sign
Certification on Behalf of the System:

Title:

Address:

Telephone: Fax:

E-mail:

I certify that the Water Emergency and Conservation Plan approved by the Department of Natural Resources has been adopted by the city council or utility board that has authority over water supply services.

Signed: Date:

Fax (218/327-4263) or mail this certification to:

DNR Ecological & Water Resources
525 Lake Ave South Suite 415
Duluth, MN 55802

Or email to:

greg.root@state.mn.us

Hibbing Public Utilities Water Supply Plan 2017

MNDNR

Table of contents

DEPARTMENT OF NATURAL RESOURCES – DIVISION OF ECOLOGICAL AND WATER RESOURCES AND METROPOLITAN COUNCIL

INTRODUCTION TO WATER SUPPLY PLANS (WSP)

Who needs to complete a Water Supply Plan

Public water suppliers serving more than 1,000 people, large private water suppliers in designated Groundwater Management Areas, and all water suppliers in the Twin Cities metropolitan area are required to prepare and submit a water supply plan.

The goal of the WSP is to help water suppliers: 1) implement long term water sustainability and conservation measures; and 2) develop critical emergency preparedness measures. Your community needs to know what measures will be implemented in case of a water crisis. A lot of emergencies can be avoided or mitigated if long term sustainability measures are implemented.

Groundwater Management Areas (GWMA)

The DNR has designated three areas of the state as Groundwater Management Areas (GWMAs) to focus groundwater management efforts in specific geographies where there is an added risk of overuse or water quality degradation. A plan directing the DNRs actions within each GWMA has been prepared. Although there are no specific additional requirements with respect to the water supply planning for communities within designated GWMAs, communities should be aware of the issues and actions planned if they are within the boundary of one of the GWMAs. The three GWMAs are the North and East Metro GWMA (Twin Cities Metro), the Bonanza Valley GWMA and the Straight River GWMA (near Park Rapids). Additional information and maps are included in the DNR webpage at http://www.dnr.state.mn.us/gwmp/areas.html

Benefits of completing a WSP

Completing a WSP using this template, fulfills a water supplier's statutory obligations under M.S. M.S.103G.291 to complete a water supply plan. For water suppliers in the metropolitan area, the WSP will help local governmental units to fulfill their requirements under M.S. 473.859 to complete a local comprehensive plan. Additional benefits of completing WSP template:

- The standardized format allows for quicker and easier review and approval.
- Help water suppliers prepare for droughts and water emergencies.
- Create eligibility for funding requests to the Minnesota Department of Health (MDH) for the Drinking Water Revolving Fund.
- Allow water suppliers to submit requests for new wells or expanded capacity of existing wells.
- Simplify the development of county comprehensive water plans and watershed plans.
- Fulfill the contingency plan provisions required in the MDH wellhead protection and surface water protection plans.
- Fulfill the demand reduction requirements of Minnesota Statutes, section 103G.291 subd 3 and 4.

- Upon implementation, contribute to maintaining aquifer levels, reducing potential well interference and water use conflicts, and reducing the need to drill new wells or expand system capacity.
- Enable DNR to compile and analyze water use and conservation data to help guide decisions.
- Conserve Minnesota's water resources

If your community needs assistance completing the Water Supply Plan, assistance is available from your area hydrologist or groundwater specialist, the MN Rural Waters Association circuit rider program, or in the metropolitan area from Metropolitan Council staff. Many private consultants are also available.

WSP Approval Process

10 Basic Steps for completing a 10-Year Water Supply Plan

1. Download the DNR/Metropolitan Council Water Supply Plan Template www.mndnr.gov/watersupplyplans
2. Save the document with a file name with this naming convention: WSP_cityname_permitnumber_date.doc.
3. The template is a form that should be completed electronically.
4. Compile the required water use data (Part 1) and emergency procedures information (Part 2)
5. The Water Conservation section (Part 3) may need discussion with the water department, council, or planning commission, if your community does not already have an active water conservation program.
6. Communities in the seven-county Twin Cities metropolitan area should complete all the information discussed in Part 4. The Metropolitan Council has additional guidance information on their webpage http://www.metrocouncil.org/Handbook/Plan-Elements/Water-Resources/Water-Supply.aspx. All out-state water suppliers do *not* need to complete the content addressed in Part 4.
7. Use the Plan instructions and Checklist document to insure all data is complete and attachments are included. This will allow for a quicker approval process. www.mndnr.gov/watersupplyplans
8. Plans should be submitted electronically – no paper documents are required. https://webapps11.dnr.state.mn.us/mpars/public/authentication/login
9. DNR hydrologist will review plans (in cooperation with Metropolitan Council in Metro area) and approve the plan or make recommendations.
10. Once approved, communities should complete a Certification of Adoption form, and send a copy to the DNR.

Complete Table 1 with information about the public water supply system covered by this WSP.

Table 1. General information regarding this WSP

Requested Information	Description
DNR Water Appropriation Permit Number(s)	**1975-2222**
Ownership	☒ Public or ☐ Private
Metropolitan Council Area	☐ Yes or ☒ No (and county name)
Street Address	**1902 6th Avenue East**
City, State, Zip	**Hibbing, MN 55746**
Contact Person Name	Corey L. Lubovich
Title	Director of Utility Operations
Phone Number	218-262-7725
MDH Supplier Classification	Municipal, Non-municipal transient, non-municipal non-transient, etc.

PART 1. WATER SUPPLY SYSTEM DESCRIPTION AND EVALUATION

The first step in any water supply analysis is to assess the current status of demand and availability. Information summarized in Part 1 can be used to develop Emergency Preparedness Procedures (Part 2) and the Water Conservation Plan (Part 3). This data is also needed to track progress for water efficiency measures.

A. Analysis of Water Demand

Complete Table 2 showing the past 10 years of water demand data.

- Some of this information may be in your Wellhead Protection Plan.
- If you do not have this information, do your best, call your engineer for assistance or if necessary leave blank.

If your customer categories are different than the ones listed in Table 2, please describe the differences below:

Table 2. Historic water demand (see definitions in the glossary after Part 4 of this template)

Year	Pop. Served	Total Connections	Residential Water Delivered (MG)	C/I/I Water Delivered (MG)	Water used for Non-essential	Wholesale Deliveries (MG)	Total Water Delivered (MG)	Total Water Pumped (MG)	Water Supplier Services	Percent Unmetered/ Unaccounted	Average Daily Demand (MGD)	Max. Daily Demand (MGD)	Date of Max. Demand	Residential Per Capita Demand (GPCD)	Total per capita Demand (GPCD)
2005	17071	5722	337.19	120.47	28.01		485.67	832.37		41.7%	1.33	2.90	08/02/2005	54.11	77.95
2006	17071	5803	291.56	160.96	31.21		483.73	869.51		44.3%	1.32	2.82	07/25/2006	46.79	77.63
2007	17071	5805	280.77	413.71	26.10		720.58	852.01		15.4%	1.97	3.25	06/05/2007	45.06	115.65
2008	17071	5808	265.41	564.46	22.84		852.71	944.60		10.0%	2.33	2.79	07/09/2008	42.60	136.85
2009	17071	5798	237.13	552.76	36.80		826.69	957.49		13.7%	2.26	3.12	06/09/2009	38.06	132.68
2010	17071	5822	228.48	269.58	24.81		522.87	667.09		21.6%	1.43	2.80	07/28/2010	36.67	84.92
2011	16237	5818	277.62	252.39	21.40		551.41	774.43		28.8%	1.51	2.76	08/26/2011	46.84	93.04
2012	16364	5746	276.75	271.79	22.87		571.41	715.12		20.0%	1.57	2.54	03/30/2012	46.33	95.67
2013	16302	6381	276.30	244.62	72.22		593.14	707.99		16.0%	1.63	2.70	08/20/2013	46.43	99.68
2014	16302	5684	268.03	240.25	170.34		678.62	789.30		14.0%	1.86	2.65	06/02/2014	45.05	114.05
2015	16302	5732	257.90	110.73	286.04		654.67	715.17		8.5%	1.79	2.70	06/24/2015	43.34	110.02
Avg. 2010-2015	16430	5864	264.18	231.56	99.61		595.35	728.18		14.6%	1.63	2.69		44.11	99.56

MG – Million Gallons **MGD –** Million Gallons per Day **GPCD** – Gallons per Capita per Day

See Glossary for definitions

Complete Table 3 by listing the top 10 water users by volume, from largest to smallest. For each user, include information about the category of use (residential, commercial, industrial, institutional, or wholesale), the amount of water used in gallons per year, the percent of total water delivered, and the status of water conservation measures.

Table 3. Large volume users

Customer	Use Category (Residential, Industrial, Commercial, Institutional, Wholesale)	Amount Used (Gallons per Year)	Percent of Total Annual Water Delivered	Implementing Water Conservation Measures? (Yes/No/Unknown)
1 AMERIPRIDE SERVICES INC.	COMMERCIAL	17,612,000	2.7	NO
2 RANGE REGIONAL HEALTH SVCS.	COMMERCIAL	12,768,000	2.0	NO
3 NORTHERN FOUNDRY	COMMERCIAL	5,605,000	0.9	NO
4 I.S.D. 701	INSTITUTIONAL	3,669,000	0.6	NO
5 ERICKSON PETROLEUM	COMMERCIAL	3,543,000	0.5	NO
6 WESTGATE APTS.	RESIDENTIAL	3,087,000	0.5	NO
7 PARK PLACE APTS.	RESIDENTIAL	2,838,000	0.4	NO
8 THIES TALLE MGMT. INC.	RESIDENTIAL	2,639,000	0.4	NO
9 ALS/COUNTRY ESTATES LLC.	RESIDENTIAL	2,614,000	0.4	NO
10 PARK PLACE APTS.	RESIDENTIAL	2,611,000	0.4	NO

B. Treatment and Storage Capacity

Complete Table 4 with a description of where water is treated, the year treatment facilities were constructed, water treatment capacity, the treatment methods (i.e. chemical addition, reverse osmosis, coagulation, sedimentation, etc.) and treatment types used (i.e. fluoridation, softening, chlorination, Fe/MN removal, coagulation, etc.). Also describe the annual amount and method of disposal of treatment residuals. Add rows to the table as needed.

Table 4. Water treatment capacity and treatment processes

Treatment Site ID (Plant Name or Well ID)	Year Constructed	Treatment Capacity (GPD)	Treatment Method	Treatment Type	Annual Amount of Residuals	Disposal Process for Residuals	Do You Reclaim Filter Backwash Water?
Water Treatment Plant	1984	4-million	Manganese Greensand Filtration	Fe/MN Removal	5,695,000	Lagoons	No

Treatment Site ID (Plant Name or Well ID)	Year Constructed	Treatment Capacity (GPD)	Treatment Method	Treatment Type	Annual Amount of Residuals	Disposal Process for Residuals	Do You Reclaim Filter Backwash Water?
Total	NA		NA	NA		NA	

Complete Table 5 with information about storage structures. Describe the type (i.e. elevated, ground, etc.), the storage capacity of each type of structure, the year each structure was constructed, and the primary material for each structure. Add rows to the table as needed.

Table 5. Storage capacity, as of the end of the last calendar year

Structure Name	Type of Storage Structure	Year Constructed	Primary Material	Storage Capacity (Gallons)
1 Highland	Elevated storage	1984	Fluted Column	1-Million
2 WTP Reservoir	Ground storage	1915	Cylindrical/Concrete	1-Million
3 Ansley	Elevated Storage	2001	Fluted Column	1-Million
Total	NA	NA	NA	3-Million

Treatment and storage capacity versus demand

It is recommended that total storage equal or exceed the average daily demand.

Discuss the difference between current storage and treatment capacity versus the water supplier's projected average water demand over the next 10 years (see Table 7 for projected water demand):

Hibbing's current water storage capability and treatment capacity exceed the projected average water demand over the next ten years.

C. Water Sources

Complete Table 6 by listing all types of water sources that supply water to the system, including groundwater, surface water, interconnections with other water suppliers, or others. Provide the name of each source (aquifer name, river or lake name, name of interconnecting water supplier) and the Minnesota unique well number or intake ID, as appropriate. Report the year the source was installed or established and the current capacity. Provide information about the depth of all wells. Describe the status of the source (active, inactive, emergency only, retail/wholesale interconnection) and if the source facilities have a dedicated emergency power source. Add rows to the table as needed for each installation.

Include copies of well records and maintenance summary for each well that has occurred since your last approved plan in **Appendix 1.**

Table 6. Water sources and status

Resource Type (Groundwater, Surface water, Interconnection)	Resource Name	MN Unique Well # or Intake ID	Year Installed	Capacity (Gallons per Minute)	Well Depth (Feet)	Status of Normal and Emergency Operations (active, inactive, emergency only, retail/wholesale interconnection))	Does this Source have a Dedicated Emergency Power Source? (Yes or No)
Ground Water	Scranton Well	147463	1984	560	501	Active/Retail	No
Ground Water	Airport Well	716190	2005	50	255	Active/Retail	No
Ground Water	Well 1C	233054	1973	200	81	Active/Retail	No
Ground Water	Well 2B	792077	2013	540	105	Active/Retail	No
Ground Water	Well 3A	233056	1934	320	105	Active/Retail	No
Ground Water	Well 4A	271992	1956	160	79	Active/Retail	No
Ground Water	Well 8A	233058	1944	270	134	Active/Retail	No
Ground Water	Well 11C	233061	1973	400	155	Active/Retail	No
Ground Water	Well 17	778015	2011	250	140	Active/Retail	No
Ground Water	Well 18	791017	2013	600	96.5	Emergency/Retail	No

Limits on Emergency Interconnections

Discuss any limitations on the use of the water sources (e.g. not to be operated simultaneously, limitations due to blending, aquifer recovery issues etc.) and the use of interconnections, including capacity limits or timing constraints (i.e. only 200 gallons per minute are available from the City of Prior Lake, and it is estimated to take 6 hours to establish the emergency connection). If there are no limitations, list none.

Well 18 is Hibbing's only current emergency source of water. Well 18 is connected (but valved off) to the water distribution system. It would be a matter of opening two valves and starting Well 18 in an effort to produce approximately 600 GPM of emergency water supply. However, the water produced from Well 18 is high in iron and manganese. Pre-treatment needs to be done before the water would meet the MDH secondary standard level for these metals. There are no interconnects with surrounding towns.

D. Future Demand Projections – *Key Metropolitan Council Benchmark*

Water Use Trends

Use the data in Table 2 to describe trends in 1) population served; 2) total per capita water demand; 3) average daily demand; 4) maximum daily demand. Then explain the causes for upward or downward trends. For example, over the ten years has the average daily demand trended up or down? Why is this occurring?

Hibbing's population has dropped substantially over the past 10 years. Subsequently, the average daily demand has decreased as well. The residential per capita demand has dropped and the total per capita demand has gone through a couple of different swings. This is due in part to commercial and industrial use over time increasing then slightly decreasing. We are a taconite mining area which plays a large part in population shifts.

Use the water use trend information discussed above to complete Table 7 with projected annual demand for the next ten years. Communities in the seven-county Twin Cities metropolitan area must also include projections for 2030 and 2040 as part of their local comprehensive planning.

Projected demand should be consistent with trends evident in the historical data in Table 2, as discussed above. Projected demand should also reflect state demographer population projections and/or other planning projections.

Table 7. Projected annual water demand

Year	Projected Total Population	Projected Population Served	Projected Total Per Capita Water Demand (GPCD)	Projected Average Daily Demand (MGD)	Projected Maximum Daily Demand (MGD)
2016	16302	16302	112.00	1.82	2.60
2017	16302	16302	112.00	1.84	2.70
2018	16500	16500	114.00	1.86	2.80
2019	16500	16500	114.00	1.89	2.90
2020	16700	16700	115.00	1.92	2.95
2021	16700	16700	115.00	1.93	2.99
2022	16900	16900	116.00	1.95	3.10
2023	16900	16900	116.00	1.97	3.18
2024	17200	17200	118.00	1.99	3.20
2025	17200	17200	118.00	2.10	3.22
2030	17500	17500	120.00	2.30	3.28
2040	18000	18000	124.00	2.80	3.37

GPCD – Gallons per Capita per Day **MGD** – Million Gallons per Day

Projection Method

Describe the method used to project water demand, including assumptions for population and business growth and how water conservation and efficiency programs affect projected water demand:

Projections are based on such factors as steadily but slow population growth, limited additions for commercial and industrial expansion, and a steady increase in residential usage. Water conservation and efficiency programs will play a limited role in the increase for domestic and commercial water demand throughout the coming years.

E. Resource Sustainability

Monitoring – *Key DNR Benchmark*

Complete Table 8 by inserting information about source water quality and quantity monitoring efforts. List should include all production wells, observation wells, and source water intakes or reservoirs. Add rows to the table as needed. Find information on groundwater level monitoring program at: http://www.dnr.state.mn.us/waters/groundwater_section/obwell/index.html

Table 8. Information about source water quality and quantity monitoring

MN Unique Well # or Surface Water ID	Type of monitoring point	Monitoring program	Frequency of monitoring	Monitoring Method
147463 Scranton Well	☒ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☒ routine MDH sampling ☐ routine water utility sampling ☐ other	☐ continuous ☐ hourly ☐ daily ☒ monthly ☐ quarterly ☐ annually	☒ SCADA ☐ grab sampling ☐ steel tape ☐ stream gauge
716190 Airport Well	☒ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☒ routine MDH sampling ☐ routine water utility sampling ☐ other	☐ continuous ☐ hourly ☐ daily ☒ monthly ☐ quarterly ☐ annually	☐ SCADA ☐ grab sampling ☒ steel tape ☐ stream gauge
233054 Well 1C	☒ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☒ routine MDH sampling ☐ routine water utility sampling ☐ other	☐ continuous ☐ hourly ☐ daily ☒ monthly ☐ quarterly ☐ annually	☐ SCADA ☐ grab sampling ☒ steel tape ☐ stream gauge
792077 Well 2B	☒ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☒ routine MDH sampling ☐ routine water utility sampling ☐ other	☐ continuous ☐ hourly ☐ daily ☒ monthly ☐ quarterly ☐ annually	☐ SCADA ☐ grab sampling ☒ steel tape ☐ stream gauge

MN Unique Well # or Surface Water ID	Type of monitoring point	Monitoring program	Frequency of monitoring	Monitoring Method
233056 Well 3A	☒ production well ☐ observation well ☐ source water intake ☐ source water reservoir	☒ routine MDH sampling ☐ routine water utility sampling ☐ other	☐ continuous ☐ hourly ☐ daily ☒ monthly ☐ quarterly ☐ annually	☐ SCADA ☐ grab sampling ☒ steel tape ☐ stream gauge
271992 Well 4A	Production well	Routine MDH sampling	Monthly	Steel Tape
233058 Well 8A	Production well	Routine MDH sampling	Monthly	Steel Tape
233061 Well 11C	Production well	Routine MDH sampling	Monthly	Steel Tape
778015 Well 17	Production well	Routine MDH sampling	Monthly	Steel Tape
791017 Well 18	Production well	Routine MDH sampling	Monthly	Steel Tape

Water Level Data

A water level monitoring plan that includes monitoring locations and a schedule for water level readings must be submitted as **Appendix 2**. If one does not already exist, it needs to be prepared and submitted with the WSP. Ideally, all production and observation wells are monitored at least monthly.

Complete Table 9 to summarize water level data for each well being monitored. Provide the name of the aquifer and a brief description of how much water levels vary over the season (the difference between the highest and lowest water levels measured during the year) and the long-term trends for each well. If water levels are not measured and recorded on a routine basis, then provide the static water level when each well was constructed and the most recent water level measured during the same season the well was constructed. Also include all water level data taken during any well and pump maintenance. Add rows to the table as needed.

Provide water level data graphs for each well in **Appendix 3** for the life of the well, or for as many years as water levels have been measured. See DNR website for Date Time Water Level http://www.dnr.state.mn.us/groundwater/hydrographs.html

Table 9. Water level data

Unique Well Number or Well ID	Aquifer Name	Seasonal Variation (Feet)	Long-term Trend in water level data	Water level measured during well/pumping maintenance
147643 Scranton Well	Biwabic Iron Formation	0.4	☒ Falling ☐ Stable ☐ Rising	12/1984: 251 ft. 2008: 369 ft. 2107: 393 ft.
716190 Airport Well	Clay & Slate Formation	0.5	☐ Falling ☒ Stable ☐ Rising	2005: 7.8 ft. 2009: 7.0 ft.
233054 Well 1C	Glacial Till	1.0	☐ Falling ☒ Stable ☐ Rising	1981: 17.5 ft. 2003:14.4 ft. 2017: 16 ft.
792077 Well 2B	Glacial Till	1.0	☐ Falling ☒ Stable ☐ Rising	2013: 10.0 ft. 2017: 12.4 ft.
233056 Well 3A	Glacial Till	1.0	☒ Falling ☐ Stable ☒ Rising	1981:26.5 ft. 1998: 16.7 ft. 2017: 18.8 ft.
271992 Well 4A	Glacial Till	2.0	Falling	2011: 9.0 ft. 2016: 11.5 ft. 2017: 13.3 ft.
233058 Well 8A	Glacial Till	2.0	Stable	1944: 20.0 ft. 1981: 33.0 ft. 1996: 10.5 ft. 2009: 49.0 ft. 2017: 38.1 ft.
233061 Well 11C	Glacial Till	2.0	Stable	1981: 32.0 ft. 1999: 10.1 ft. 2009: 52.0 ft. 2017: 48 ft.
778015 Well 17	Glacial Till	2.0	Falling	2011: 13.8 ft. 2017: 23.7 ft.
791017 Well 18	Glacial Till	1.0		2013: 23.0 ft.

Potential Water Supply Issues & Natural Resource Impacts – *Key DNR & Metropolitan Council Benchmark*

Complete Table 10 by listing the types of natural resources that are or could be impacted by permitted water withdrawals. If known, provide the name of specific resources that may be impacted. Identify what the greatest risks to the resource are and how the risks are being assessed. Identify any resource protection thresholds – formal or informal – that have been established to identify when actions should be taken to mitigate impacts. Provide information about the potential mitigation actions that may be taken, if a resource protection threshold is crossed. Add additional rows to the table as needed. See glossary at the end of the template for definitions.

Some of this baseline data should have been in your earlier water supply plans or county comprehensive water plans. When filling out this table, think of what are the water supply risks, identify the resources, determine the threshold and then determine what your community will do to mitigate the impacts.

Your DNR area hydrologist is available to assist with this table.

For communities in the seven-county Twin Cities metropolitan area, the *Master Water Supply Plan Appendix 1 (Water Supply Profiles*, provides information about potential water supply issues and natural resource impacts for your community.

Table 10. Natural resource impacts

Resource Type	Resource Name	Risk	Risk Assessed Through	Describe Resource Protection Threshold*	Mitigation Measure or Management Plan	Describe How Changes to Thresholds are Monitored
☐ River or stream		☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐ Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	
☐ Calcareous fen		☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐ Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	
☐ Lake		☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation	

Resource Type	Resource Name	Risk	Risk Assessed Through	Describe Resource Protection Threshold*	Mitigation Measure or Management Plan	Describe How Changes to Thresholds are Monitored
		endangered, threatened, or special concern species habitat or other natural resource impacts ☐ Other: _____			☐ Other	
☐ Wetland		☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐ Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	
☐ Trout stream		☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐ Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	
☒ Aquifer		☒ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered,	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☒ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☒ Increase conservation ☐ Other	

Resource Type	Resource Name	Risk	Risk Assessed Through	Describe Resource Protection Threshold*	Mitigation Measure or Management Plan	Describe How Changes to Thresholds are Monitored
		threatened, or special concern species habitat or other natural resource impacts ☐ Other: _____				
☐ Endangered, threatened, or special concern species habitat, other natural resource impacts		☐ Flow/water level decline ☐ Degrading water quality trends and/or MCLs exceeded ☐ Impacts on endangered, threatened, or special concern species habitat or other natural resource impacts ☐ Other: _____	☐ GIS analysis ☐ Modeling ☐ Mapping ☐ Monitoring ☐ Aquifer testing ☐ Other: ___		☐ Revise permit ☐ Change groundwater pumping ☐ Increase conservation ☐ Other	

* Examples of thresholds: a lower limit on acceptable flow in a river or stream; water quality outside of an accepted range; a lower limit on acceptable aquifer level decline at one or more monitoring wells; withdrawals that exceed some percent of the total amount available from a source; or a lower limit on acceptable changes to a protected habitat.

Wellhead Protection (WHP) and Surface Water Protection (SWP) Plans

Complete Table 11 to provide status information about WHP and SWP plans.

The emergency procedures in this plan are intended to comply with the contingency plan provisions required in the Minnesota Department of Health's (MDH) Wellhead Protection (WHP) Plan and Surface Water Protection (SWP) Plan.

Table 11. Status of Wellhead Protection and Surface Water Protection Plans

Plan Type	Status	Date Adopted	Date for Update
WHP	☒ In Process ☐ Completed ☐ Not Applicable	Phase-1 completed in 2004 Phase-2 completed in 2008	2017-2018
SWP	☐ In Process ☐ Completed ☒ Not Applicable		

F. Capital Improvement Plan (CIP)

Please note that any wells that received approval under a ten-year permit, but that were not built, are now expired and must submit a water appropriations permit.

Adequacy of Water Supply System

Complete Table 12 with information about the adequacy of wells and/or intakes, storage facilities, treatment facilities, and distribution systems to sustain current and projected demands. List planned capital improvements for any system components, in chronological order. Communities in the seven-county Twin Cities metropolitan area should also include information about plans through 2040.

The assessment can be the general status by category; it is not necessary to identify every single well, storage facility, treatment facility, lift station, and mile of pipe.

Please attach your latest Capital Improvement Plan as **Appendix 4**.

Table 12. Adequacy of Water Supply System

System Component	Planned action	Anticipated Construction Year	Notes
Wells/Intakes	☐ No action planned - adequate ☒ Repair/replacement ☐ Expansion/addition	2018-2020	As needed
Water Storage Facilities	☒ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		
Water Treatment Facilities	☒ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		
Distribution Systems (pipes, valves, etc.)	☐ No action planned - adequate ☒ Repair/replacement ☐ Expansion/addition		As needed
Pressure Zones	☒ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		

System Component	Planned action	Anticipated Construction Year	Notes
Other:	☐ No action planned - adequate ☐ Repair/replacement ☐ Expansion/addition		

Proposed Future Water Sources

Complete Table 13 to identify new water source installation planned over the next ten years. Add rows to the table as needed.

Table 13. Proposed future installations/sources

Source	Installation Location (approximate)	Resource Name	Proposed Pumping Capacity (gpm)	Planned Installation Year	Planned Partnerships
Groundwater					
Surface Water					
Interconnection to another supplier					

Water Source Alternatives - *Key Metropolitan Council Benchmark*

Do you anticipate the need for alternative water sources in the next 10 years? Yes ☐ No ☒

For metro communities, will you need alternative water sources by the year 2040? Yes ☐ No ☐

If you answered yes for either question, then complete table 14. If no, insert NA.

Complete Table 14 by checking the box next to alternative approaches that your community is considering, including approximate locations (if known), the estimated amount of future demand that could be met through the approach, the estimated timeframe to implement the approach, potential partnerships, and the major benefits and challenges of the approach. Add rows to the table as needed.

For communities in the seven-county Twin Cities metropolitan area, these alternatives should include approaches the community is considering to meet projected 2040 water demand.

Table 14. Alternative water sources

Alternative Source Considered	Source and/or Installation Location (approximate)	Estimated Amount of Future Demand (%)	Timeframe to Implement (YYYY)	Potential Partners	Benefits	Challenges
☐ Groundwater	N/A					
☐ Surface Water	N/A					
☐ Reclaimed stormwater	N/A					
☐ Reclaimed wastewater	N/A					
☐ Interconnection to another supplier	N/A					

Part 2. Emergency Preparedness Procedures

The emergency preparedness procedures outlined in this plan are intended to comply with the contingency plan provisions required by MDH in the WHP and SWP. Water emergencies can occur as a result of vandalism, sabotage, accidental contamination, mechanical problems, power failings, drought, flooding, and other natural disasters. The purpose of emergency planning is to develop emergency response procedures and to identify actions needed to improve emergency preparedness. In the case of a municipality, these procedures should be in support of, and part of, an all-hazard emergency operations plan. Municipalities that already have written procedures dealing with water emergencies should review the following information and update existing procedures to address these water supply protection measures.

A. Federal Emergency Response Plan

Section 1433(b) of the Safe Drinking Water Act, (Public Law 107-188, Title IV- Drinking Water Security and Safety) requires community water suppliers serving over 3,300 people to prepare an Emergency Response Plan.

Do you have a federal emergency response plan? Yes ☒ No ☐

If yes, what was the date it was certified? 2004

Complete Table 15 by inserting the noted information regarding your completed Federal Emergency Response Plan.

Table 15. Emergency Preparedness Plan contact information

Emergency Response Plan Role	Contact Person	Contact Phone Number	Contact Email
Emergency Response Lead	COREY LUBOVICH	218-262-7725	COREYL@HPUC.COM
Alternate Emergency Response Lead	SCOTT HAUTALA	218-262-7721	SCOTTH@HPUC.COM

B. Operational Contingency Plan

All utilities should have a written operational contingency plan that describes measures to be taken for water supply mainline breaks and other common system failures as well as routine maintenance.

Do you have a written operational contingency plan? Yes ☒ No ☐

At a minimum, a water supplier should prepare and maintain an emergency contact list of contractors and suppliers.

C. Emergency Response Procedures

Water suppliers must meet the requirements of MN Rules 4720.5280 . Accordingly, the Minnesota Department of Natural Resources (DNR) requires public water suppliers serving more than 1,000 people to submit Emergency and Conservation Plans. Water emergency and conservation plans that have been approved by the DNR, under provisions of Minnesota Statute 186 and Minnesota Rules, part 6115.0770, will be considered equivalent to an approved WHP contingency plan.

Emergency Telephone List

Prepare and attach a list of emergency contacts, including the MN Duty Officer (1-800-422-0798), as **Appendix 5**. A template is available at www.mndnr.gov/watersupplyplans

The list should include key utility and community personnel, contacts in adjacent water suppliers, and appropriate local, state and federal emergency contacts. Please be sure to verify and update the contacts on the emergency telephone list and date it. Thereafter, update on a regular basis (once a year is recommended). In the case of a municipality, this information should be contained in a notification and warning standard operating procedure maintained by the Emergency Manager for that community. Responsibilities and services for each contact should be defined.

Current Water Sources and Service Area

Quick access to concise and detailed information on water sources, water treatment, and the distribution system may be needed in an emergency. System operation and maintenance records should be maintained in secured central and back-up locations so that the records are accessible for emergency purposes. A detailed map of the system showing the treatment plants, water sources, storage facilities, supply lines, interconnections, and other information that would be useful in an emergency should also be readily available. It is critical that public water supplier representatives and emergency response personnel communicate about the response procedures and be able to easily obtain this kind of information both in electronic and hard copy formats (in case of a power outage).

Do records and maps exist? Yes ☒ No ☐

Can staff access records and maps from a central secured location in the event of an emergency?

Yes ☒ No ☐

Does the appropriate staff know where the materials are located?

Yes ☒ No ☐

Procedure for Augmenting Water Supplies

Complete Tables 16 – 17 by listing all available sources of water that can be used to augment or replace existing sources in an emergency. Add rows to the tables as needed.

In the case of a municipality, this information should be contained in a notification and warning standard operating procedure maintained by the warning point for that community. Municipalities are encouraged to execute cooperative agreements for potential emergency water services and copies should be included in **Appendix 6**. Outstate Communities may consider using nearby high capacity wells (industry, golf course) as emergency water sources.

WSP should include information on any physical or chemical problems that may limit interconnections to other sources of water. Approvals from the MDH are required for interconnections or the reuse of water.

Table 16. Interconnections with other water supply systems to supply water in an emergency

Other Water Supply System Owner	Capacity (GPM & MGD)	Note Any Limitations On Use	List of services, equipment, supplies available to respond
NONE AT THIS TIME			

GPM – Gallons per minute MGD – million gallons per day

Table 17. Utilizing surface water as an alternative source

Surface Water Source Name	Capacity (GPM)	Capacity (MGD)	Treatment Needs	Note Any Limitations On Use
N/A				

If not covered above, describe additional emergency measures for providing water (obtaining bottled water, or steps to obtain National Guard services, etc.)

Hibbing Public Utilities Well #18 is considered the only long term source of emergency water. This well has a sustained yield of approximately 650 GPM. Bottled water and other outsourced services would be enacted if needed.

Allocation and Demand Reduction Procedures

Complete Table 18 by adding information about how decisions will be made to allocate water and reduce demand during an emergency. Provide information for each customer category, including its priority ranking, average day demand, and demand reduction potential for each customer category. Modify the customer categories as needed, and add additional lines if necessary.

Water use categories should be prioritized in a way that is consistent with Minnesota Statutes 103G.261 (#1 is highest priority) as follows:

1. Water use for human needs such as cooking, cleaning, drinking, washing and waste disposal; use for on-farm livestock watering; and use for power production that meets contingency requirements.
2. Water use involving consumption of less than 10,000 gallons per day (usually from private wells or surface water intakes)

3. Water use for agricultural irrigation and processing of agricultural products involving consumption of more than 10,000 gallons per day (usually from private high-capacity wells or surface water intakes)
4. Water use for power production above the use provided for in the contingency plan.
5. All other water use involving consumption of more than 10,000 gallons per day.
6. Nonessential uses – car washes, golf courses, etc.

Water used for human needs at hospitals, nursing homes and similar types of facilities should be designated as a high priority to be maintained in an emergency. Lower priority uses will need to address water used for human needs at other types of facilities such as hotels, office buildings, and manufacturing plants. The volume of water and other types of water uses at these facilities must be carefully considered. After reviewing the data, common sense should dictate local allocation priorities to protect domestic requirements over certain types of economic needs. Water use for lawn sprinkling, vehicle washing, golf courses, and recreation are legislatively considered non-essential.

Table 18. Water use priorities

Customer Category	Allocation Priority	Average Daily Demand (GDP)	Short-Term Emergency Demand Reduction Potential (GPD)
Residential	1	724,000	605,750
Institutional			
Commercial	2	634,400	507,400
Industrial			
Irrigation			
Wholesale			
Non-Essential	3	272,900	232,300
TOTAL	NA	NA	

GPD – Gallons per Day

Tip: Calculating Emergency Demand Reduction Potential

The emergency demand reduction potential for all uses will typically equal the difference between maximum use (summer demand) and base use (winter demand). In extreme emergency situations, lower priority water uses must be restricted or eliminated to protect priority domestic water requirements. Emergency demand reduction potential should be based on average day demands for customer categories within each priority class. Use the tables in Part 3 on water conservation to help you determine strategies.

Complete Table 19 by selecting the triggers and actions during water supply disruption conditions.

Table 19. Emergency demand reduction conditions, triggers and actions (Select all that may apply and describe)

Emergency Triggers	Short-term Actions	Long-term Actions
☒ Contamination ☒ Loss of production ☐ Infrastructure failure ☐ Executive order by Governor ☒ Other: Pump, booster station or well out of service.	☐ Supply augmentation through ____ ☐ Adopt (if not already) and enforce a critical water deficiency ordinance to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses. ☒ Water allocation through emergency distribution procedures. ☐ Meet with large water users to discuss their contingency plan.	☐ Supply augmentation through ____ ☒ Adopt (if not already) and enforce a critical water deficiency ordinance to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses. ☐ Water allocation through____ ☒ Meet with large water users to discuss their contingency plan.

Notification Procedures

Complete Table 20 by selecting trigger for informing customers regarding conservation requests, water use restrictions, and suspensions; notification frequencies; and partners that may assist in the notification process. Add rows to the table as needed.

Table 20. Plan to inform customers regarding conservation requests, water use restrictions, and suspensions

Notification Trigger(s)	Methods (select all that apply)	Update Frequency	Partners
☒ Short-term demand reduction declared (< 1 year)	☒ Website ☐ Email list serve ☐ Social media (e.g. Twitter, Facebook) ☐ Direct customer mailing, ☒ Press release (TV, radio, newspaper), ☐ Meeting with large water users (> 10% of total city use) ☐ Other: ________	☐ Daily ☐ Weekly ☒ Monthly ☐ Annually	
☒ Long-term Ongoing demand reduction declared	☒ Website ☐ Email list serve ☐ Social media (e.g. Twitter, Facebook) ☒ Direct customer mailing, ☐ Press release (TV, radio, newspaper), ☒ Meeting with large water users (> 10% of total city use) ☐ Other: ________	☐ Daily ☐ Weekly ☒ Monthly ☐ Annually	
☒ Governor's critical water deficiency declared	☒ Website ☐ Email list serve ☐ Social media (e.g. Twitter, Facebook)	☐ Daily ☐ Weekly ☐ Monthly ☐ Annually	

Notification Trigger(s)	Methods (select all that apply)	Update Frequency	Partners
	☐ Direct customer mailing, ☐ Press release (TV, radio, newspaper), ☐ Meeting with large water users (> 10% of total city use) ☐ Other: ________		

Enforcement

Prior to a water emergency, municipal water suppliers must adopt regulations that restrict water use and outline the enforcement response plan. The enforcement response plan must outline how conditions will be monitored to know when enforcement actions are triggered, what enforcement tools will be used, who will be responsible for enforcement, and what timelines for corrective actions will be expected.

Affected operations, communications, and enforcement staff must then be trained to rapidly implement those provisions during emergency conditions.

Important Note:

Disregard of critical water deficiency orders, even though total appropriation remains less than permitted, is adequate grounds for immediate modification of a public water supply authority's water use permit (2013 MN Statutes 103G.291)

Does the city have a critical water deficiency restriction/official control in place that includes provisions to restrict water use and enforce the restrictions? (This restriction may be an ordinance, rule, regulation, policy under a council directive, or other official control) Yes ☐ No ☒

If yes, attach the official control document to this WSP as **Appendix 7**.

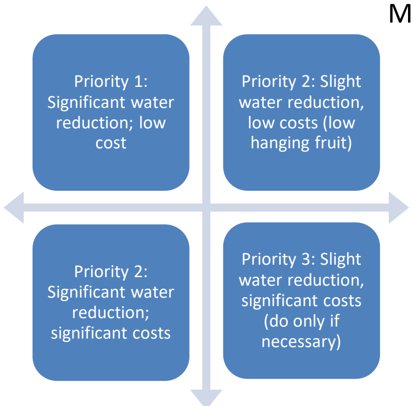
If no, the municipality must adopt such an official control within 6 months of submitting this WSP and submit it to the DNR as an amendment to this WSP.

Irrespective of whether a critical water deficiency control is in place, does the public water supply utility, city manager, mayor, or emergency manager have standing authority to implement water restrictions? Yes ☒ No ☐

If yes, cite the regulatory authority reference: Public Water Supply Utility.

If no, who has authority to implement water use restrictions in an emergency?

PART 3. WATER CONSERVATION PLAN



Minnesotans have historically benefited from the state's abundant water supplies, reducing the need for conservation. There are however, limits to the available supplies of water and increasing threats to the quality of our drinking water. Causes of water supply limitation may include: population increases, economic trends, uneven statewide availability of groundwater, climatic changes, and degraded water quality. Examples of threats to drinking water quality include: the presence of contaminant plumes from past land use activities, exceedances of water quality standards from natural and human sources, contaminants of emerging concern, and increasing pollutant trends from nonpoint sources.

There are many incentives for conserving water; conservation:

- reduces the potential for pumping-induced transfer of contaminants into the deeper aquifers, which can add treatment costs
- reduces the need for capital projects to expand system capacity
- reduces the likelihood of water use conflicts, like well interference, aquatic habitat loss, and declining lake levels
- conserves energy, because less energy is needed to extract, treat and distribute water (and less energy production also conserves water since water is use to produce energy)
- maintains water supplies that can then be available during times of drought

It is therefore imperative that water suppliers implement water conservation plans. The first step in water conservation is identifying opportunities for behavioral or engineering changes that could be made to reduce water use by conducting a thorough analysis of:

- Water use by customer
- Extraction, treatment, distribution and irrigation system efficiencies
- Industrial processing system efficiencies
- Regulatory and barriers to conservation
- Cultural barriers to conservation
- Water reuse opportunities

Once accurate data is compiled, water suppliers can set achievable goals for reducing water use. A successful water conservation plan follows a logical sequence of events. The plan should address both conservation on the supply side (leak detection and repairs, metering), as well as on the demand side (reductions in usage). Implementation should be conducted in phases, starting with the most obvious and lowest-cost options. In some cases one of the early steps will be reviewing regulatory constraints to water conservation, such as lawn irrigation requirements. Outside funding and grants may be available for implementation of projects. Engage water system operators and maintenance staff and customers in brainstorming opportunities to reduce water use. Ask the question: "How can I help save water?"

Progress since 2006

Is this your community's first Water Supply Plan? Yes ☐ No ☒

If yes, describe conservation practices that you are already implementing, such as: pricing, system improvements, education, regulation, appliance retrofitting, enforcement, etc.

If no, complete Table 21 to summarize conservation actions taken since the adoption of the 2006 water supply plan.

Table 21. Implementation of previous ten-year Conservation Plan

2006 Plan Commitments	Action Taken?
Change water rates structure to provide conservation pricing	☐ Yes ☒ No
Water supply system improvements (e.g. leak repairs, valve replacements, etc.)	☒ Yes ☐ No
Educational efforts	☒ Yes ☐ No
New water conservation ordinances	☐ Yes ☒ No
Rebate or retrofitting Program (e.g. for toilet, faucets, appliances, showerheads, dish washers, washing machines, irrigation systems, rain barrels, water softeners, etc.	☐ Yes ☒ No
Enforcement	☐ Yes ☐ No
Describe other	☐ Yes ☐ No

What are the results you have seen from the actions in Table 21 and how were results measured?

Significant reduction in the average daily demand. Faster response and repair times on main/service failures. The HPU Power Plant now has its own well which supplies the majority of its daily process water usage.

A. Triggers for Allocation and Demand Reduction Actions

Complete table 22 by checking each trigger below, as appropriate, and the actions to be taken at various levels or stages of severity. Add in additional rows to the table as needed.

Table 22. Short and long-term demand reduction conditions, triggers and actions

Objective	Triggers	Actions

Objective	Triggers	Actions
Protect surface water flows	☐ Low stream flow conditions ☐ Reports of declining wetland and lake levels ☐ Other: ______________	☐ Increase promotion of conservation measures ☐ Other: ____________
Short-term demand reduction (less than 1 year	☐ Extremely high seasonal water demand (more than double winter demand) ☒ Loss of treatment capacity ☐ Lack of water in storage ☐ State drought plan ☐ Well interference ☐ Other: _____________	☐ Adopt (if not already) and enforce the critical water deficiency ordinance to restrict or prohibit lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses. ☐ Supply augmentation through ____ ☒ Water allocation through water emergency plan. ☒ Meet with large water users to discuss user's contingency plan.
Long-term demand reduction (>1 year)	☐ Per capita demand increasing ☒ Total demand increase (higher population or more industry)Water level in well(s) below elevation of optimal pumping level. ☐ Other: _____________	☐ Develop a critical water deficiency ordinance that is or can be quickly adopted to penalize lawn watering, vehicle washing, golf course and park irrigation & other nonessential uses. ☐ Enact a water waste ordinance that targets overwatering (causing water to flow off the landscape into streets, parking lots, or similar), watering impervious surfaces (streets, driveways or other hardscape areas), and negligence of known leaks, breaks, or malfunctions. ☒ Meet with large water users to discuss user's contingency plan. ☐ Enhanced monitoring and reporting: audits, meters, billing, etc.
Governor's "Critical Water Deficiency Order" declared	☐ Describe	☐ Describe

B. Conservation Objectives and Strategies – *Key benchmark for DNR*

This section establishes water conservation objectives and strategies for eight major areas of water use.

Objective 1: Reduce Unaccounted (Non-Revenue) Water loss to Less than 10%

The Minnesota Rural Waters Association, the Metropolitan Council and the Department of Natural Resources recommend that all water uses be metered. Metering can help identify high use locations and times, along with leaks within buildings that have multiple meters.

It is difficult to quantify specific unmetered water use such as that associated with firefighting and system flushing or system leaks. Typically, water suppliers subtract metered water use from total water pumped to calculate unaccounted or non-revenue water loss.

Is your five-year average (2005-2014) unaccounted Water Use in Table 2 higher than 10%?

Yes ☒ No ☐

What is your leak detection monitoring schedule? (e.g. monitor 1/3rd of the city lines per year)

Hibbing Public Utilities leak detection monitoring schedule is 1/4 of the system per year and supplemented during our annual flushing program.

Water Audits - are intended to identify, quantify and verify water and revenue losses. The volume of unaccounted-for water should be evaluated each billing cycle. The American Water Works Association (AWWA) recommends that ten percent or less of pumped water is unaccounted-for water. Water audit procedures are available from the AWWA and MN Rural Water Association www.mrwa.com . Drinking Water Revolving Loan Funds are available for purchase of new meters when new plants are built.

What is the date of your most recent water audit? 2016

Frequency of water audits: ☐ **yearly** ☐ **other (specify frequency) ________**
Leak detection and survey: ☐ **every year** ☐ **every other year** ☒ **periodic as needed**
Year last leak detection survey completed: A system wide formal leak detection survey has not been conducted for many years.

If Table 2 shows annual water losses over 10% or an increasing trend over time, describe what actions will be taken to reach the <10% loss objective and within what timeframe

Hibbing Public Utilities will continue to actively search for and repair water distribution system failures. Metering for production, treatment and distribution will be routinely tested for accuracy with repair, calibration or replacement done as needed.

Metering -AWWA recommends that every water supplier install meters to account for all water taken into its system, along with all water distributed from its system at each customer's point of service. An effective metering program relies upon periodic performance testing, repair, maintenance or replacement of all meters. AWWA also recommends that water suppliers conduct regular water audits to ensure accountability. Some cities install separate meters for interior and exterior water use, but some research suggests that this may not result in water conservation.

Complete Table 23 by adding the requested information regarding the number, types, testing and maintenance of customer meters.

Table 23. Information about customer meters

Customer Category	Number of Customers	Number of Metered Connections	Number of Automated Meter Readers	Meter testing intervals (years)	Average age/meter replacement schedule (years
Residential	5178	5178		10	_7__ / _15__
Irrigation meters					___ / ___
Institutional					___ / ___

Customer Category	Number of Customers	Number of Metered Connections	Number of Automated Meter Readers	Meter testing intervals (years)	Average age/meter replacement schedule (years
Commercial	623	623			_7__ / _15__
Industrial					___ / ___
Public facilities					___ / ___
Other					___ / ___
TOTALS	5801			NA	NA

For unmetered systems, describe any plans to install meters or replace current meters with advanced technology meters. Provide an estimate of the cost to implement the plan and the projected water savings from implementing the plan.

Table 24. Water source meters

	Number of Meters	Meter testing schedule (years)	Number of Automated Meter Readers	Average age/meter replacement schedule (years
Water source (wells/intakes)	10	3		_10__ / __15_
Treatment plant	3	3		__7_ / __15_

Objective 2: Achieve Less than 75 Residential Gallons per Capita Demand (GPCD)

The 2002 average residential per capita demand in the Twin Cities Metropolitan area was 75 gallons per capita per day.

Is your average 2010-2015 residential per capita water demand in Table 2 more than 75? Yes ☐ No ☒

What was your 2010 – 2015 five-year average residential per capita water demand? 44.11 g/person/day

Describe the water use trend over that timeframe:

The residential per capita water demand use has trended downward over this timeframe.

Complete Table 25 by checking which strategies you will use to continue reducing residential per capita demand and project a likely timeframe for completing each checked strategy (Select all that apply and add rows for additional strategies):

Table 25. Strategies and timeframe to reduce residential per capita demand

Strategy to reduce residential per capita demand	Timeframe for completing work
☐ Revise city ordinances/codes to encourage or require water efficient landscaping.	
☐ Revise city ordinance/codes to permit water reuse options, especially for non-potable purposes like irrigation, groundwater recharge, and industrial use. Check with plumbing authority to see if internal buildings reuse is permitted	
☐ Revise ordinances to limit irrigation. Describe the restricted irrigation plan:	
☐ Revise outdoor irrigation installations codes to require high efficiency systems (e.g. those with soil moisture sensors or programmable watering areas) in new installations or system replacements.	
☒ Make water system infrastructure improvements	This is an ongoing process year to year
☐ Offer free or reduced cost water use audits) for residential customers.	
☐ Implement a notification system to inform customers when water availability conditions change.	
☐ Provide rebates or incentives for installing water efficient appliances and/or fixtures indoors (e.g., low flow toilets, high efficiency dish washers and washing machines, showerhead and faucet aerators, water softeners, etc.)	
☐ Provide rebates or incentives to reduce outdoor water use (e.g., turf replacement/reduction, rain gardens, rain barrels, smart irrigation, outdoor water use meters, etc.)	
☒ Identify supplemental Water Resources	New Well Site Investigation Program Ongoing
☐ Conduct audience-appropriate water conservation education and outreach.	
☐ Describe other plans	

Objective 3: Achieve at least a 1.5% per year water reduction for Institutional, Industrial, Commercial, and Agricultural GPCD over the next 10 years or a 15% reduction in ten years.

Complete Table 26 by checking which strategies you will used to continue reducing non-residential customer use demand and project a likely timeframe for completing each checked strategy (add rows for additional strategies).

Where possible, substitute recycled water used in one process for reuse in another. (For example, spent rinse water can often be reused in a cooling tower.) Keep in mind the true cost of water is the amount on the water bill PLUS the expenses to heat, cool, treat, pump, and dispose of/discharge the water. Don't just calculate the initial investment. Many conservation retrofits that appear to be prohibitively expensive are actually very cost-effective when amortized over the life of the equipment. Often reducing water use also saves electrical and other utility costs. Note: as of 2015, water reuse, and is not allowed by the state plumbing code, M.R. 4715 (a variance is needed). However several state agencies are addressing this issue.

Table 26. Strategies and timeframe to reduce institutional, commercial industrial, and agricultural and non-revenue use demand

Strategy to reduce total business, industry, agricultural demand	Timeframe for completing work

Strategy to reduce total business, industry, agricultural demand	Timeframe for completing work
☐ Conduct a facility water use audit for both indoor and outdoor use, including system components	
☐ Install enhanced meters capable of automated readings to detect spikes in consumption	
☐ Compare facility water use to related industry benchmarks, if available (e.g., meat processing, dairy, fruit and vegetable, beverage, textiles, paper/pulp, metals, technology, petroleum refining etc.)	
☐ Install water conservation fixtures and appliances or change processes to conserve water	
☒ Repair leaking system components (e.g., pipes, valves)	Ongoing Program Year to Year
☐ Investigate the reuse of reclaimed water (e.g., stormwater, wastewater effluent, process wastewater, etc.)	
☐ Reduce outdoor water use (e.g., turf replacement/reduction, rain gardens, rain barrels, smart irrigation, outdoor water use meters, etc.)	
☒ Train employees how to conserve water	Annual Training Conducted Year to Year
☒ Implement a notification system to inform non-residential customers when water availability conditions change.	e-mail and Phone Call System Conducted by Staff.
☐ Rainwater catchment systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, industrial processes, water features, vehicle washing facilities, cooling tower makeup, and similar uses shall be approved by the commissioner. Proposed plumbing code 4714.1702.1 http://www.dli.mn.gov/PDF/docket/4714rule.pdf	
☐ Describe other plans:	

Objective 4: Achieve a Decreasing Trend in Total Per Capita Demand

Include as **Appendix 8** one graph showing total per capita water demand for each customer category (i.e., residential, institutional, commercial, industrial) from 2005-2014 and add the calculated/estimated linear trend for the next 10 years.

Describe the trend for each customer category; explain the reason(s) for the trends, and where trends are increasing.

Residential as well as commercial customers throughput has been on the decline over the past 10 years. Reasons for this are attributed to smaller family sizes, commercial facilities relocating to other towns and decreasing population.

Objective 5: Reduce Peak Day Demand so that the Ratio of Average Maximum day to the Average Day is less than 2.6

Is the ratio of average 2005-2014 maximum day demand to average 2005-2014 average day demand reported in Table 2 more than 2.6? Yes ☐ No ☒

Calculate a ten year average (2005 – 2014) of the ratio of maximum day demand to average day demand: 1.64

The position of the DNR has been that a peak day/average day ratio that is above 2.6 for in summer indicates that the water being used for irrigation by the residents in a community is too large and that efforts should be made to reduce the peak day use by the community.

It should be noted that by reducing the peak day use, communities can also reduce the amount of infrastructure that is required to meet the peak day use. This infrastructure includes new wells, new water towers which can be costly items.

Objective 6: Implement a Conservation Water Rate Structure and/or a Uniform Rate Structure with a Water Conservation Program

Water Conservation Program

Municipal water suppliers serving over 1,000 people are required to adopt demand reduction measures that include a conservation rate structure, or a uniform rate structure with a conservation program that achieves demand reduction. These measures must achieve demand reduction in ways that reduce water demand, water losses, peak water demands, and nonessential water uses. These measures must be approved before a community may request well construction approval from the Department of Health or before requesting an increase in water appropriations permit volume (*Minnesota Statutes*, section 103G.291, subd. 3 and 4). Rates should be adjusted on a regular basis to ensure that revenue of the system is adequate under reduced demand scenarios. If a municipal water supplier intends to use a Uniform Rate Structure, a community-wide Water Conservation Program that will achieve demand reduction must be provided.

Current Water Rates

Include a copy of the actual rate structure in **Appendix 9** or list current water rates including base/service fees and volume charges below.

Volume included in base rate or service charge: 1000 gallons or ____ cubic feet ___ other

Frequency of billing: ☒ Monthly ☐ Bimonthly ☐ Quarterly ☐ Other: _________________

Water Rate Evaluation Frequency: ☒ every year ☐ every ___ years ☐ no schedule

Date of last rate change: 1/1/2017

Table 27. Rate structures for each customer category (Select all that apply and add additional rows as needed)

Customer Category	Conservation Billing Strategies in Use *	Conservation Neutral Billing Strategies in Use **	Non-Conserving Billing Strategies in Use ***
Residential	☒ Monthly billing ☒ Increasing block rates (volume tiered rates) ☐ Seasonal rates ☐ Time of use rates ☒ Water bills reported in	☐ Uniform ☐ Odd/even day watering	☐ Service charge based on water volume ☐ Declining block ☐ Flat ☐ Other (describe)

Customer Category	Conservation Billing Strategies in Use *	Conservation Neutral Billing Strategies in Use **	Non-Conserving Billing Strategies in Use ***
	gallons ☐ Individualized goal rates ☐ Excess use rates ☐ Drought surcharge ☐ Use water bill to provide comparisons ☐ Service charge not based on water volume ☐ Other (describe)		
Commercial/ Industrial/ Institutional	☒ Monthly billing ☐ Increasing block rates (volume tiered rates) ☐ Seasonal rates ☐ Time of use rates ☒ Water bills reported in gallons ☐ Individualized goal rates ☐ Excess use rates ☐ Drought surcharge ☐ Use water bill to provide comparisons ☐ Service charge not based on water volume ☐ Other (describe)	☒ Uniform	☐ Service charge based on water volume ☐ Declining block ☐ Flat ☐ Other (describe)
☐ Other			

*** Rate Structures components that may promote water conservation:**

- **Monthly billing:** is encouraged to help people see their water usage so they can consider changing behavior.
- **Increasing block rates (also known as a tiered residential rate structure):** Typically, these have at least three tiers: should have at least three tiers.
  - The first tier is for the winter average water use.
  - The second tier is the year-round average use, which is lower than typical summer use. This rate should be set to cover the full cost of service.
  - The third tier should be above the average annual use and should be priced high enough to encourage conservation, as should any higher tiers. For this to be effective, the difference in block rates should be significant.
- **Seasonal rate:** higher rates in summer to reduce peak demands
- **Time of Use rates:** lower rates for off peak water use
- **Bill water use in gallons:** this allows customers to compare their use to average rates
- **Individualized goal rates:** typically used for industry, business or other large water users to promote water conservation if they keep within agreed upon goals. **Excess Use rates**: if water use goes above an agreed upon amount this higher rate is charged
- **Drought surcharge:** an extra fee is charged for guaranteed water use during drought
- **Use water bill to provide comparisons**: simple graphics comparing individual use over time or compare individual use to others.
- **Service charge or base fee that does not include a water volume** – a base charge or fee to cover universal city expenses that are not customer dependent and/or to provide minimal water at a lower rate (e.g., an amount less than the average residential per capita demand for the water supplier for the last 5 years)

- **Emergency rates** -A community may have a separate conservation rate that only goes into effect when the community or governor declares a drought emergency. These higher rates can help to protect the city budgets during times of significantly less water usage.

****Conservation Neutral****
- **Uniform rate**: rate per unit used is the same regardless of the volume used
- **Odd/even day watering** –This approach reduces peak demand on a daily basis for system operation, but it does not reduce overall water use.

***** Non-Conserving *****
- **Service charge or base fee with water volume:** an amount of water larger than the average residential per capita demand for the water supplier for the last 5 years
- **Declining block rate:** the rate per unit used decreases as water use increases.
- **Flat rate:** one fee regardless of how much water is used (usually unmetered).

Provide justification for any conservation neutral or non-conserving rate structures. If intending to adopt a conservation rate structure, include the timeframe to do so:

Objective 7: Additional strategies to Reduce Water Use and Support Wellhead Protection Planning

Development and redevelopment projects can provide additional water conservation opportunities, such as the actions listed below. If a Uniform Rate Structure is in place, the water supplier must provide a Water Conservation Program that includes at <u>least two</u> of the actions listed below. Check those actions that you intent to implement within the next 10 years.

Table 28. Additional strategies to Reduce Water Use & Support Wellhead Protection

☐	Participate in the GreenStep Cities Program, including implementation of at least one of the 20 "Best Practices" for water
☐	Prepare a master plan for smart growth (compact urban growth that avoids sprawl)
☐	Prepare a comprehensive open space plan (areas for parks, green spaces, natural areas)
☐	Adopt a water use restriction ordinance (lawn irrigation, car washing, pools, etc.)
☐	Adopt an outdoor lawn irrigation ordinance
☐	Adopt a private well ordinance (private wells in a city must comply with water restrictions)
☐	Implement a stormwater management program
☐	Adopt non-zoning wetlands ordinance (can further protect wetlands beyond state/federal laws-for vernal pools, buffer areas, restrictions on filling or alterations)
☐	Adopt a water offset program (primarily for new development or expansion)
☐	Implement a water conservation outreach program
☐	Hire a water conservation coordinator (part-time)
☒	Implement a rebate program for water efficient appliances, fixtures, or outdoor water management
☒	Other: Consider adopting an increasing block rate for Commercial/Industrial Customers

Objective 8: Tracking Success: How will you track or measure success through the next ten years?

The adoption of an Increasing Block Rate for our Water Commercial and Industrial Customers should satisfy the need for a Water Conservation Program. An Increasing Block Rate is currently in place for Hibbing's Water Residential Customers.

Tip: The process to monitor demand reduction and/or a rate structure includes:

a) The DNR Hydrologist will call or visit the community the first 1-3 years after the water supply plan is completed.
b) They will discuss what activities the community is doing to conserve water and if they feel their actions are successful. The Water Supply Plan, Part 3 tables and responses will guide the discussion. For example, they will discuss efforts to reduce unaccounted for water loss if that is a problem, or go through Tables 33, 34 and 35 to discuss new initiatives.
c) The city representative and the hydrologist will discuss total per capita water use, residential per capita water use, and business/industry use. They will note trends.
d) They will also discuss options for improvement and/or collect case studies of success stories to share with other communities. One option may be to change the rate structure, but there are many other paths to successful water conservation.
e) If appropriate, they will cooperatively develop a simple work plan for the next few years, targeting a couple areas where the city might focus efforts.

A. Regulation

Complete Table 29 by selecting which regulations are used to reduce demand and improve water efficiencies. Add additional rows as needed.

Copies of adopted regulations or proposed restrictions or should be included in **Appendix 10** (a list with hyperlinks is acceptable).

Table 29. Regulations for short-term reductions in demand and long-term improvements in water efficiencies

Regulations Utilized	When is it applied (in effect)?
☐ Rainfall sensors required on landscape irrigation systems	☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
☐ Water efficient plumbing fixtures required	☐ New development ☐ Replacement ☐ Rebate Programs
☐ Critical/Emergency Water Deficiency ordinance	☐ Only during declared Emergencies
☐ Watering restriction requirements (time of day, allowable days, etc.)	☐ Odd/even ☐ 2 days/week ☐ Only during declared Emergencies
☐ Water waste prohibited (for example, having a fine for irrigators spraying on the street)	☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
☐ Limitations on turf areas (requiring lots to have 10% - 25% of the space in natural areas)	☐ New development ☐ Shoreland/zoning ☐ Other
☐ Soil preparation requirement s (after construction, requiring topsoil	☐ New Development

Regulations Utilized	When is it applied (in effect)?
to be applied to promote good root growth)	☐ Construction Projects ☐ Other
☐ Tree ratios (requiring a certain number of trees per square foot of lawn)	☐ New development ☐ Shoreland/zoning ☐ Other
☐ Permit to fill swimming pool and/or requiring pools to be covered (to prevent evaporation)	☐ Ongoing ☐ Seasonal ☐ Only during declared Emergencies
☐ Ordinances that permit stormwater irrigation, reuse of water, or other alternative water use (Note: be sure to check current plumbing codes for updates)	☐ Describe

B. Retrofitting Programs

Education and incentive programs aimed at replacing inefficient plumbing fixtures and appliances can help reduce per capita water use, as well as energy costs. It is recommended that municipal water suppliers develop a long-term plan to retrofit public buildings with water efficient plumbing fixtures and appliances. Some water suppliers have developed partnerships with organizations having similar conservation goals, such as electric or gas suppliers, to develop cooperative rebate and retrofit programs.

A study by the AWWA Research Foundation (Residential End Uses of Water, 1999) found that the average indoor water use for a non-conserving home is 69.3 gallons per capita per day (gpcd). The average indoor water use in a conserving home is 45.2 gpcd and most of the decrease in water use is related to water efficient plumbing fixtures and appliances that can reduce water, sewer and energy costs. In Minnesota, certain electric and gas providers are required (Minnesota Statute 216B.241) to fund programs that will conserve energy resources and some utilities have distributed water efficient showerheads to customers to help reduce energy demands required to supply hot water.

Retrofitting Programs

Complete Table 30 by checking which water uses are targeted, the outreach methods used, the measures used to identify success, and any participating partners.

Table 30. Retrofitting programs (Select all that apply)

Water Use Targets	Outreach Methods	Partners
☐ Low flush toilets, ☐ Toilet leak tablets, ☐ Low flow showerheads, ☐ Faucet aerators;	☐ Education about ☐ Free distribution of ☐ Rebate for ☐ Other	☐ Gas company ☐ Electric company ☐ Watershed organization
☐ Water conserving washing machines, ☐ Dish washers, ☐ Water softeners;	☐ Education about ☐ Free distribution of ☐ Rebate for ☐ Other	☐ Gas company ☐ Electric company ☐ Watershed organization

Water Use Targets	Outreach Methods	Partners
☐ Rain gardens, ☐ Rain barrels, ☐ Native/drought tolerant landscaping, etc.	☐ Education about ☐ Free distribution of ☐ Rebate for ☐ Other	☐ Gas company ☐ Electric company ☐ Watershed organization

Briefly discuss measures of success from the above table (e.g. number of items distributed, dollar value of rebates, gallons of water conserved, etc.):

C. Education and Information Programs

Customer education should take place in three different circumstances. First, customers should be provided information on how to conserve water and improve water use efficiencies. Second, information should be provided at appropriate times to address peak demands. Third, emergency notices and educational materials about how to reduce water use should be available for quick distribution during an emergency.

Proposed Education Programs

Complete Table 31 by selecting which methods are used to provide water conservation and information, including the frequency of program components. Select all that apply and add additional lines as needed.

Table 31. Current and Proposed Education Programs

Education Methods	General summary of topics	#/Year	Frequency
Billing inserts or tips printed on the actual bill			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Consumer Confidence Reports	Water quality/production	1	☒ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Press releases to traditional local news outlets (e.g., newspapers, radio and TV)	Temporary water conservation measures to be taken.		☐ Ongoing ☐ Seasonal ☒ Only during declared emergencies
Social media distribution (e.g., emails, Facebook, Twitter)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Paid advertisements (e.g., billboards, print media, TV, radio, web sites, etc.)	Temporary water conservation measures to be taken.		☒ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Presentations to community groups	Ways to conserve water.		☐ Ongoing ☒ Seasonal ☐ Only during declared emergencies
Staff training	Ways to concern water.		☒ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Facility tours	Water towers, water treatment plant, well houses.		☒ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Displays and exhibits			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Marketing rebate programs (e.g., indoor fixtures & appliances and outdoor practices)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Community news letters			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Direct mailings (water audit/retrofit kits, showerheads, brochures)			☐ Ongoing ☐ Seasonal

Education Methods	**General summary of topics**	**#/Year**	**Frequency**
			☐ Only during declared emergencies
Information kiosk at utility and public buildings			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Public service announcements	Temporary water conservation measures to be taken.		☐ Ongoing ☐ Seasonal ☒ Only during declared emergencies
Cable TV Programs	Tips for conserving water and temporary water conservation measures to be taken		☒ Ongoing ☐ Seasonal ☒ Only during declared emergencies
Demonstration projects (landscaping or plumbing)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
K-12 education programs (Project Wet, Drinking Water Institute, presentations)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Community events (children's water festivals, environmental fairs)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Community education classes			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Water week promotions			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Website (include address:)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Targeted efforts (large volume users, users with large increases)			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Notices of ordinances			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies
Emergency conservation notices			☐ Ongoing ☐ Seasonal

Education Methods	General summary of topics	#/Year	Frequency
			☐ Only during declared emergencies
Other:			☐ Ongoing ☐ Seasonal ☐ Only during declared emergencies

Briefly discuss what future education and information activities your community is considering in the future:

Hibbing Public Utilities is looking into enhancing their local water conservation campaign with additional handout information and public education notices.

Part 4. ITEMS FOR METROPOLITAN AREA COMMUNITIES

Minnesota Statute 473.859 requires WSPs to be completed for all local units of government in the seven-county Metropolitan Area as part of the local comprehensive planning process.

Much of the information in Parts 1-3 addresses water demand for the next 10 years. However, additional information is needed to address water demand through 2040, which will make the WSP consistent with the Metropolitan Land Use Planning Act, upon which the local comprehensive plans are based.

This Part 4 provides guidance to complete the WSP in a way that addresses plans for water supply through 2040.

A. Water Demand Projections through 2040

Complete Table 7 in Part 1D by filling in information about long-term water demand projections through 2040. Total Community Population projections should be consistent with the community's system statement, which can be found on the Metropolitan Council's website and which was sent to the community in September 2015.

Projected Average Day, Maximum Day, and Annual Water Demands may either be calculated using the method outlined in *Appendix 2* of the *2015 Master Water Supply Plan* or by a method developed by the individual water supplier.

B. Potential Water Supply Issues

Complete Table 10 in Part 1E by providing information about the potential water supply issues in your community, including those that might occur due to 2040 projected water use.

The *Master Water Supply Plan* provides information about potential issues for your community in *Appendix 1 (Water Supply Profiles).* This resource may be useful in completing Table 10.

You may document results of local work done to evaluate impact of planned uses by attaching a feasibility assessment or providing a citation and link to where the plan is available electronically.

C. Proposed Alternative Approaches to Meet Extended Water Demand Projections

Complete Table 12 in Part 1F with information about potential water supply infrastructure impacts (such as replacements, expansions or additions to wells/intakes, water storage and treatment capacity, distribution systems, and emergency interconnections) of extended plans for development and redevelopment, in 10-year increments through 2040. It may be useful to refer to information in the community's local Land Use Plan, if available.

Complete Table 14 in Part 1F by checking each approach your community is considering to meet future demand. For each approach your community is considering, provide information about the amount of future water demand to be met using that approach, the timeframe to implement the approach, potential partners, and current understanding of the key benefits and challenges of the approach.

As challenges are being discussed, consider the need for: evaluation of geologic conditions (mapping, aquifer tests, modeling), identification of areas where domestic wells could be impacted, measurement and analysis of water levels & pumping rates, triggers & associated actions to protect water levels, etc.

D. Value-Added Water Supply Planning Efforts (Optional)

The following information is not required to be completed as part of the local water supply plan, but completing this can help strengthen source water protection throughout the region and help Metropolitan Council and partners in the region to better support local efforts.

Source Water Protection Strategies

Does a Drinking Water Supply Management Area for a neighboring public water supplier overlap your community? Yes ☐ No ☒

If you answered no, skip this section. If you answered yes, please complete Table 32 with information about new water demand or land use planning-related local controls that are being considered to provide additional protection in this area.

Table 32. Local controls and schedule to protect Drinking Water Supply Management Areas

Local Control	Schedule to Implement	Potential Partners
☐ None at this time		
☐ Comprehensive planning that guides development in vulnerable drinking water supply management areas		
☐ Zoning overlay		
☐ Other:		

Technical assistance

From your community's perspective, what are the most important topics for the Metropolitan Council to address, guided by the region's Metropolitan Area Water Supply Advisory Committee and Technical Advisory Committee, as part of its ongoing water supply planning role?

☐ Coordination of state, regional and local water supply planning roles
☐ Regional water use goals
☐ Water use reporting standards
☐ Regional and sub-regional partnership opportunities
☐ Identifying and prioritizing data gaps and input for regional and sub-regional analyses
☐ Others: ____

GLOSSARY

Agricultural/Irrigation Water Use - Water used for crop and non-crop irrigation, livestock watering, chemigation, golf course irrigation, landscape and athletic field irrigation.

Average Daily Demand - The total water pumped during the year divided by 365 days.

Calcareous Fen - Calcareous fens are rare and distinctive wetlands dependent on a constant supply of cold groundwater. Because they are dependent on groundwater and are one of the rarest natural communities in the United States, they are a protected resource in MN. Approximately 200 have been located in Minnesota. They may not be filled, drained or otherwise degraded.

Commercial/Institutional Water Use - Water used by motels, hotels, restaurants, office buildings, commercial facilities and institutions (both civilian and military). Consider maintaining separate institutional water use records for emergency planning and allocation purposes. Water used by multi-family dwellings, apartment buildings, senior housing complexes, and mobile home parks should be reported as Residential Water Use.

Commercial/Institutional/Industrial (C/I/I) Water Sold - The sum of water delivered for commercial/institutional or industrial purposes.

Conservation Rate Structure - A rate structure that encourages conservation and may include increasing block rates, seasonal rates, time of use rates, individualized goal rates, or excess use rates. If a conservation rate is applied to multifamily dwellings, the rate structure must consider each residential unit as an individual user. A community may have a separate conservation rate that only goes into effect when the community or governor declares a drought emergency. These higher rates can help to protect the city budgets during times of significantly less water usage.

Date of Maximum Daily Demand - The date of the maximum (highest) water demand. Typically this is a day in July or August.

Declining Rate Structure - Under a declining block rate structure, a consumer pays less per additional unit of water as usage increases. This rate structure does not promote water conservation.

Distribution System - Water distribution systems consist of an interconnected series of pipes, valves, storage facilities (water tanks, water towers, reservoirs), water purification facilities, pumping stations, flushing hydrants, and components that convey drinking water and meeting fire protection needs for cities, homes, schools, hospitals, businesses, industries and other facilities.

Flat Rate Structure - Flat fee rates do not vary by customer characteristics or water usage. This rate structure does not promote water conservation.

Industrial Water Use - Water used for thermonuclear power (electric utility generation) and other industrial use such as steel, chemical and allied products, paper and allied products, mining, and petroleum refining.

Low Flow Fixtures/Appliances - Plumbing fixtures and appliances that significantly reduce the amount of water released per use are labeled “low flow”. These fixtures and appliances use just enough water to be effective, saving excess, clean drinking water that usually goes down the drain.

Maximum Daily Demand - The maximum (highest) amount of water used in one day.

Metered Residential Connections - The number of residential connections to the water system that have meters. For multifamily dwellings, report each residential unit as an individual user.

Percent Unmetered/Unaccounted For - Unaccounted for water use is the volume of water withdrawn from all sources minus the volume of water delivered. This value represents water “lost” by miscalculated water use due to inaccurate meters, water lost through leaks, or water that is used but unmetered or otherwise undocumented. Water used for public services such as hydrant flushing, ice skating rinks, and public swimming pools should be reported under the category “Water Supplier Services”.

Population Served - The number of people who are served by the community’s public water supply system. This includes the number of people in the community who are connected to the public water supply system, as well as people in neighboring communities who use water supplied by the community’s public water supply system. It should not include residents in the community who have private wells or get their water from neighboring water supply.

Residential Connections - The total number of residential connections to the water system. For multifamily dwellings, report each residential unit as an individual user.

Residential Per Capita Demand - The total residential water delivered during the year divided by the population served divided by 365 days.

Residential Water Use - Water used for normal household purposes such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens. Should include all water delivered to single family private residences, multi-family dwellings, apartment buildings, senior housing complexes, mobile home parks, etc.

Smart Meter - Smart meters can be used by municipalities or by individual homeowners. Smart metering generally indicates the presence of one or more of the following:

- Smart irrigation water meters are controllers that look at factors such as weather, soil, slope, etc. and adjust watering time up or down based on data. Smart controllers in a typical summer will reduce water use by 30%-50%. Just changing the spray nozzle to new efficient models can reduce water use by 40%.
- Smart Meters on customer premises that measure consumption during specific time periods and communicate it to the utility, often on a daily basis.
- A communication channel that permits the utility, at a minimum, to obtain meter reads on demand, to ascertain whether water has recently been flowing through the meter and onto the

premises, and to issue commands to the meter to perform specific tasks such as disconnecting or restricting water flow.

Total Connections - The number of connections to the public water supply system.

Total Per Capita Demand - The total amount of water withdrawn from all water supply sources during the year divided by the population served divided by 365 days.

Total Water Pumped - The cumulative amount of water withdrawn from all water supply sources during the year.

Total Water Delivered - The sum of residential, commercial, industrial, institutional, water supplier services, wholesale and other water delivered.

Ultimate (Full Build-Out) - Time period representing the community's estimated total amount and location of potential development, or when the community is fully built out at the final planned density.

Unaccounted (Non-revenue) Loss - See definitions for "percent unmetered/unaccounted for loss".

Uniform Rate Structure - A uniform rate structure charges the same price-per-unit for water usage beyond the fixed customer charge, which covers some fixed costs. The rate sends a price signal to the customer because the water bill will vary by usage. Uniform rates by class charge the same price-per-unit for all customers within a customer class (e.g. residential or non-residential). This price structure is generally considered less effective in encouraging water conservation.

Water Supplier Services - Water used for public services such as hydrant flushing, ice skating rinks, public swimming pools, city park irrigation, back-flushing at water treatment facilities, and/or other uses.

Water Used for Nonessential Purposes - Water used for lawn irrigation, golf course and park irrigation, car washes, ornamental fountains, and other non-essential uses.

Wholesale Deliveries - The amount of water delivered in bulk to other public water suppliers.

Acronyms and Initialisms

AWWA – American Water Works Association

C/I/I – Commercial/Institutional/Industrial

CIP – Capital Improvement Plan

GIS – Geographic Information System

GPCD – Gallons per capita per day

GWMA – Groundwater Management Area – North and East Metro, Straight River, Bonanza,

MDH – Minnesota Department of Health

MGD – Million gallons per day

MG – Million gallons

MGL – Maximum Contaminant Level

MnTAP – Minnesota Technical Assistance Program (University of Minnesota)

MPARS – MN/DNR Permitting and Reporting System (new electronic permitting system)

MRWA – Minnesota Rural Waters Association

SWP – Source Water Protection

WHP – Wellhead Protection

APPENDICES TO BE SUBMITTED BY THE WATER SUPPLIER

Appendix 1: Well records and maintenance summaries – see Part 1C

Appendix 2: Water level monitoring plan – see Part 1E

Appendix 3: Water level graphs for each water supply well - see Part 1E

Appendix 4: Capital Improvement Plan - see Part 1E

Appendix 5: Emergency Telephone List – see Part 2C

Appendix 6: Cooperative Agreements for Emergency Services – see Part 2C

Appendix 7: Municipal Critical Water Deficiency Ordinance – see Part 2C

Appendix 8: Graph showing annual per capita water demand for each customer category during the last ten-years – see Part 3 Objective 4

Appendix 9: Water Rate Structure – see Part 3 Objective 6

Appendix 10: Adopted or proposed regulations to reduce demand or improve water efficiency – see Part 3 Objective 7

Appendix 11: Implementation Checklist – summary of all the actions that a community is doing, or proposes to do, including estimated implementation dates – see www.mndnr.gov/watersupplyplans

Hibbing South Field:
Unique Well # 233054

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
1C	1973	Built			400.0	13.5	10" x 30' slot (0.06") screen
	1978	Data			250.0	8.3	Having sand problems
	1981	Test Pump	17.5			4.5	Found hole in column pipe, couldn't test.
	1981	Rebuild/Redevelop	13.0	30.0	150.0	8.8	Repaired column pipe, rebuilt pump, cleaned well
	1984	Sand Filter					Lakos sand filter installed
	1989	Redevelopment	24.0	44.0	375.0	18.8	
	1995	Test Pump	8.0	40.0	600.0	18.8	
	1995	Reconstructed	11.0	33.0	500.0	22.7	New Pump, new screen 10" x 40' 40 slot
	1996	Data	6.5	37.5	460.0	14.8	
	1998	Data	8.2	39.8	550.0	17.4	Well 2A off
	1998	Pump Work	13.0	36.5	550.0	23.4	Replaced 4 impellers, wrong ones installed in 1995
	2002	Redevelopment	9.5	51.8	675.0	16.0	
	2003	Data	14.4	51.6	550.0	14.8	
	2004	Data	20.4	45.8			
	2005	Data	16.2	48.2	500.0	15.6	
	2008	Data		62.5	425.0		Throttled
	10/2009	Redevelopment	21.0	45.0	200.0	8.33	
	2/2012	Data	19.0				
	03/2015	Data	24.0	57.6	81.0	2.41	
	07/2015	Redevelopment	23.0	72.0	190.0	3.88	New Motor
	2017	Data	16.0	64.0	203.0	4.23	

Hibbing South Field:
Unique Well #

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
2A	1926	Built					
	1960	Reconstructed	33.0	68.0	524.0	15.0	14" casing and screen put inside old 24"
	1969	Data	21.5	58.5	400.0	11.0	
	1972	Redeveloped	30.0	70.0	600.0	15.0	Well Cleaned
	1978	Data			150.0	5.2	
	1981	Test Pump	10.0	54.5	270.0	6.1	On alone, 60 minute test
	1981	Redeveloped	20.0	40.0	160.0	8.0	Well 1B and 1C also on, interference
	1983	Test Pump	8.0	53.0	492.0	11.0	On alone, 60 minute test
	1987	Redeveloped	11.5	64.0	600.0	11.4	Gravel Pack, new pump, motor and base
	1988	Data	27.8	56.4	550.0	19.2	
	1990	Data	12.9	46.4	680.0	20.3	
	1991	Data	10.4	44.7	630.0	18.4	
	1996	Data	4.6	46.2	580.0	13.9	
	1998	Data	6.0	56.0	400.0	8.0	Well 1C on
	1998	Redeveloped	8.3	44.3	500.0	13.9	
	2002	Data	7.5	40.7	400.0	12.0	
	2003	Data	12.7	51.0	510.0	13.30	
	2004	Data	19.0	54.1			
	2005	Redeveloped	14.5	56.7	550.0	13.00	
	2008	Data		52.0	450.0		
	2013						Sealed & Abandoned

Hibbing South Field:
Unique Well # 233056

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
3A	1934	Built					
	1960	Reconstructed			750.0	17.0	16" casing, 10" casing, 12" screen in old casing
	1969	Data			560.0	12.0	
	1970	Redeveloped			820.0	16.0	
	1972	Data			566.0	13.8	
	1978	Data			390.0	9.3	
	1981	Test Pump	26.5	75.0	420.0	8.6	Breaking suction at 50 min., stopped test
	1981	Redeveloped	24.0	72.0	100.0	8.3	8" screen put inside of 12" which had voids
	1983	Test Pump	24.0	67.0	444.0	10.3	
	1994	Rebuilt					New casing and screen
	1996	Redeveloped	16.4	65.2	550.0	11.3	H.E.R.D. shots and chemical cleaning
	1996	Data	15.1	73.4	580.0	10.0	
	1998	Data	16.7	69.9	575.0	10.8	
	2002	Data	16.8	72.8	700.0	12.5	
	2003	Data	20.5	59.3	525.0	13.5	
	2005	Data	21.7	86.6	700.0	10.8	
	2008	Data	23.0	83.7	600.0	10.1	
	01/2009	Data	27.0	95.0	550.0		
	04/2009	Data		100.5	500.0		
	08/2009	Redeveloped	25.0	75.0	400.0	8.0	Stainless steel shaft, column piping, spiders, packing, tail pipe
	03/2015	Data	24.0	78.0	144.0	2.67	
	07/2015	Redeveloped	24.0	101.0	275.0	3.6	New submersable pump/motor; new VFD with Level Transducer
	2017	Data	18.8	93.1	318.0	4.3	

Hibbing South Field:
unique Well # 233058

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
8A	1944	Built	20.0	55.0	600.0	11.0	
	1970	Data	6.5	111.5	262.0	6.0	
	1972	Redeveloped	8.8	97.8	566.0	6.3	
	1978	Data			325.0	5.9	
	1981	Test Pump	35.0	73.5	170.0	4.4	
	1981	Redeveloped	33.0	86.0	310.0	5.8	Also had repair work done on pump. Throttled.
	1983	Test Pump	24.0	83.0	335.0	5.6	
	1987	Redeveloped					Gravel pack and new pump base
	1996	Data	10.5	53.0	270.0	6.4	
	1998	Data	9.4	37.2	160.0	5.7	
	1999	Test Pump	8.2	80.5	400.0	5.5	
	1999	Redeveloped	8.2	95.0	640.0	7.4	New pump installed.
	1999	Data	8.5	87.6	600.0	7.6	
	2002	Data	9.4	80.5	540.0	7.6	
	2003	Data	22.2	89.4	570.0	8.5	
	2004	Data	30.1	97.0			
	2005	Data	17.3	90.1	575.0	7.90	
	2007	Data		105.2	560.0		Throttled
	2009	Data	49.0	67.0	145.0	8.00	
	2009	Redeveloped	49.0	85.0	400.0	11.1	Jetting, surging, shock chlorinate.
	2012	Data	64.0	105.0	212.0	5.20	
	2012	Data	65.0		280.0		New stainless steel pump & motor
	2017	Data	38.1	100.0	271.0	4.4	

Hibbing South Field:
Unique Well # 233061

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
11C	1973	Built			400.0	9.3	
	1978	Data			350.0	9.3	
	1981	Test Pump	36.0	77.0	400.0	9.8	
	1981	Redeveloped	32.0	90.0	450.0	7.8	Had problems with screen "floating".
	1983	Test Pump	27.0	90.0	500.0	7.7	
	1991	Data	11.5	63.8	440.0	8.4	
	1995	Data	12.7	71.0	460.0	7.9	
	1996	Data	9.0	60.4	410.0	8.0	
	1998	Data	11.5	68.1	400.0	7.1	
	1999	Data	10.0	74.5	410.0	6.4	
	1999	Test Pump	9.7	68.4	400.0	6.8	
	1999	Redeveloped	10.1	57.3	400.0	8.5	30' screen floated up half way. Anchored there.
	2002	Data	7.8	73.7	450.0	6.8	
	2003	Data	24.0	71.6	400.0	8.4	
	2005	Data	20.7	79.5	475.0	8.1	
	2007	Data		90.5	450.0		
	2009	Redeveloped	52.0	69.0	173.0	10.17	New pump, new headshaft, jetting, surging, pumping, acid chlorine
	2012	Data	64.0	104.0	405.0	10.1	
	2014	Data	58.1				
	2017	Data	48.0	90.0	401.0	9.6	

Hibbing South Field:
Unique Well # 271992

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
4A	1956	Built					
	2011	Redevelopment	9.0	50.0	192.0	4.68	New Wellhouse, Pump/motor, column piping & Wellhouse Piping
	2015	Data		50.0	165.0		
	2016	Data	11.5				
	2016	Redevelopment		47.0	177.0		New Motor / 55 Lf of SS Drop Pipe
	2017	Data	13.3	47.2	156.0	4.60	

Hibbing South Field:
Unique Well # 778015

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
17	2011	Built	13.8	86.1	250.0	3.46	New Wellhouse, pump/motor, column piping, & wellhouse piping
	2015	Data		94.9	256.0		
	2017	Data	23.7	90.0	254.0	3.83	

Hibbing East Field:
Unique Well # 791017

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
18	2013	Built	23.0	41.0	650.0	36.11	

Hibbing South Field:
Unique Well # 792077

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
2B	2013	Built	10.0	44.0	650.0	19.12	
	2015	New VFD/Motor					Due to Lightning strike in July
	2017	Data	12.4	69.9	535.0	9.30	

Hibbing North Field:
Unique Well # 147643

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
Scranton	1984	Built	251.0		2500.0		Design Capacity
	1993				1500.0		Hibbing Taconite begins dewatering the scranton pit
	1999				1150.0		pump/motor lowered 5 ft.
	2003				950.0		pump/motor lowered
	2004				925.0		pump/motor lowered
	2006				900.0		pump/motor lowered for repairs
	2007				810.0		pump/motor lowered for repairs
	2008		369.0	431.0	618.0	9.97	pump/motor lowered
	2009				565.0		Well shut off temperarily for bad water quality
	2010				500.0		Well shut off temperarily for bad water quality
	2011				414.0		Well shut off temperarily for bad water quality
	2012		393.0		310.0		Well shut off temperarily for bad water quality
	2013		388.0	446.0	645.0	11.12	New stainless steel pump/motor installed
	2015				600.0		
	2016		396.0	419.0	358.0	15.57	
	2016		393.0	431.5	572.0	14.86	New stainless 4-Stage Hydroflow pump & Rebuilt 200 HP Hitachi Motor. Two New check valves. New (sch 40) 5' Section of Drop Pipe Mated to pump.
	2017	Data	393.4	433.0	565.0	14.27	

Hibbing East Field:
Unique Well # 716190

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
Airport	2005	Built	7.8	77.0	87.0	1.26	
	2009		7.0	35.8	50.0	1.74	Redevelopment with test pump
	2015				87.0		Installed new pump set at 147 feet

Hibbing South Field:
Unique Well # 233054

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
1C	1973	Built			400.0	13.5	10" x 30' slot (0.06") screen
	1978	Data			250.0	8.3	Having sand problems
	1981	Test Pump	17.5			4.5	Found hole in column pipe, couldn't test.
	1981	Rebuild/Redevelop	13.0	30.0	150.0	8.8	Repaired column pipe, rebuilt pump, cleaned well
	1984	Sand Filter					Lakos sand filter installed
	1989	Redevelopment	24.0	44.0	375.0	18.8	
	1995	Test Pump	8.0	40.0	600.0	18.8	
	1995	Reconstructed	11.0	33.0	500.0	22.7	New Pump, new screen 10" x 40' 40 slot
	1996	Data	6.5	37.5	460.0	14.8	
	1998	Data	8.2	39.8	550.0	17.4	Well 2A off
	1998	Pump Work	13.0	36.5	550.0	23.4	Replaced 4 impellers, wrong ones installed in 1995
	2002	Redevelopment	9.5	51.8	675.0	16.0	
	2003	Data	14.4	51.6	550.0	14.8	
	2004	Data	20.4	45.8			
	2005	Data	16.2	48.2	500.0	15.6	
	2008	Data		62.5	425.0		Throttled
	10/2009	Redevelopment	21.0	45.0	200.0	8.33	
	2/2012	Data	19.0				
	03/2015	Data	24.0	57.6	81.0	2.41	
	07/2015	Redevelopment	23.0	72.0	190.0	3.88	New Motor
	2017	Data	16.0	64.0	203.0	4.23	

Hibbing South Field:
Unique Well #

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
2A	1926	Built					
	1960	Reconstructed	33.0	68.0	524.0	15.0	14" casing and screen put inside old 24"
	1969	Data	21.5	58.5	400.0	11.0	
	1972	Redeveloped	30.0	70.0	600.0	15.0	Well Cleaned
	1978	Data			150.0	5.2	
	1981	Test Pump	10.0	54.5	270.0	6.1	On alone, 60 minute test
	1981	Redeveloped	20.0	40.0	160.0	8.0	Well 1B and 1C also on, interference
	1983	Test Pump	8.0	53.0	492.0	11.0	On alone, 60 minute test
	1987	Redeveloped	11.5	64.0	600.0	11.4	Gravel Pack, new pump, motor and base
	1988	Data	27.8	56.4	550.0	19.2	
	1990	Data	12.9	46.4	680.0	20.3	
	1991	Data	10.4	44.7	630.0	18.4	
	1996	Data	4.6	46.2	580.0	13.9	
	1998	Data	6.0	56.0	400.0	8.0	Well 1C on
	1998	Redeveloped	8.3	44.3	500.0	13.9	
	2002	Data	7.5	40.7	400.0	12.0	
	2003	Data	12.7	51.0	510.0	13.30	
	2004	Data	19.0	54.1			
	2005	Redeveloped	14.5	56.7	550.0	13.00	
	2008	Data		52.0	450.0		
	2013						Sealed & Abandoned

Hibbing South Field:
Unique Well # 233056

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
3A	1934	Built					
	1960	Reconstructed			750.0	17.0	16" casing, 10" casing, 12" screen in old casing
	1969	Data			560.0	12.0	
	1970	Redeveloped			820.0	16.0	
	1972	Data			566.0	13.8	
	1978	Data			390.0	9.3	
	1981	Test Pump	26.5	75.0	420.0	8.6	Breaking suction at 50 min., stopped test
	1981	Redeveloped	24.0	72.0	100.0	8.3	8" screen put inside of 12" which had voids
	1983	Test Pump	24.0	67.0	444.0	10.3	
	1994	Rebuilt					New casing and screen
	1996	Redeveloped	16.4	65.2	550.0	11.3	H.E.R.D. shots and chemical cleaning
	1996	Data	15.1	73.4	580.0	10.0	
	1998	Data	16.7	69.9	575.0	10.8	
	2002	Data	16.8	72.8	700.0	12.5	
	2003	Data	20.5	59.3	525.0	13.5	
	2005	Data	21.7	86.6	700.0	10.8	
	2008	Data	23.0	83.7	600.0	10.1	
	01/2009	Data	27.0	95.0	550.0		
	04/2009	Data		100.5	500.0		
	08/2009	Redeveloped	25.0	75.0	400.0	8.0	Stainless steel shaft, column piping, spiders, packing, tail pipe
	03/2015	Data	24.0	78.0	144.0	2.67	
	07/2015	Redeveloped	24.0	101.0	275.0	3.6	New submersable pump/motor; new VFD with Level Transducer
	2017	Data	18.8	93.1	318.0	4.3	

Hibbing South Field:
unique Well # 233058

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
8A	1944	Built	20.0	55.0	600.0	11.0	
	1970	Data	6.5	111.5	262.0	6.0	
	1972	Redeveloped	8.8	97.8	566.0	6.3	
	1978	Data			325.0	5.9	
	1981	Test Pump	35.0	73.5	170.0	4.4	
	1981	Redeveloped	33.0	86.0	310.0	5.8	Also had repair work done on pump. Throttled.
	1983	Test Pump	24.0	83.0	335.0	5.6	
	1987	Redeveloped					Gravel pack and new pump base
	1996	Data	10.5	53.0	270.0	6.4	
	1998	Data	9.4	37.2	160.0	5.7	
	1999	Test Pump	8.2	80.5	400.0	5.5	
	1999	Redeveloped	8.2	95.0	640.0	7.4	New pump installed.
	1999	Data	8.5	87.6	600.0	7.6	
	2002	Data	9.4	80.5	540.0	7.6	
	2003	Data	22.2	89.4	570.0	8.5	
	2004	Data	30.1	97.0			
	2005	Data	17.3	90.1	575.0	7.90	
	2007	Data		105.2	560.0		Throttled
	2009	Data	49.0	67.0	145.0	8.00	
	2009	Redeveloped	49.0	85.0	400.0	11.1	Jetting, surging, shock chlorinate.
	2012	Data	64.0	105.0	212.0	5.20	
	2012	Data	65.0		280.0		New stainless steel pump & motor
	2017	Data	38.1	100.0	271.0	4.4	

Hibbing South Field:
Unique Well # 233061

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
11C	1973	Built			400.0	9.3	
	1978	Data			350.0	9.3	
	1981	Test Pump	36.0	77.0	400.0	9.8	
	1981	Redeveloped	32.0	90.0	450.0	7.8	Had problems with screen "floating".
	1983	Test Pump	27.0	90.0	500.0	7.7	
	1991	Data	11.5	63.8	440.0	8.4	
	1995	Data	12.7	71.0	460.0	7.9	
	1996	Data	9.0	60.4	410.0	8.0	
	1998	Data	11.5	68.1	400.0	7.1	
	1999	Data	10.0	74.5	410.0	6.4	
	1999	Test Pump	9.7	68.4	400.0	6.8	
	1999	Redeveloped	10.1	57.3	400.0	8.5	30' screen floated up half way. Anchored there.
	2002	Data	7.8	73.7	450.0	6.8	
	2003	Data	24.0	71.6	400.0	8.4	
	2005	Data	20.7	79.5	475.0	8.1	
	2007	Data		90.5	450.0		
	2009	Redeveloped	52.0	69.0	173.0	10.17	New pump, new headshaft, jetting, surging, pumping, acid chlorine
	2012	Data	64.0	104.0	405.0	10.1	
	2014	Data	58.1				
	2017	Data	48.0	90.0	401.0	9.6	

Hibbing South Field:
Unique Well # 271992

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
4A	1956	Built					
	2011	Redevelopment	9.0	50.0	192.0	4.68	New Wellhouse, Pump/motor, column piping & Wellhouse Piping
	2015	Data		50.0	165.0		
	2016	Data	11.5				
	2016	Redevelopment		47.0	177.0		New Motor / 55 Lf of SS Drop Pipe
	2017	Data	13.3	47.2	156.0	4.60	

Hibbing South Field:
Unique Well # 778015

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
17	2011	Built	13.8	86.1	250.0	3.46	New Wellhouse, pump/motor, column piping, & wellhouse piping
	2015	Data		94.9	256.0		
	2017	Data	23.7	90.0	254.0	3.83	

Hibbing East Field:
Unique Well # 791017

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
18	2013	Built	23.0	41.0	650.0	36.11	

Hibbing South Field:
Unique Well # 792077

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
2B	2013	Built	10.0	44.0	650.0	19.12	
	2015	New VFD/Motor					Due to Lightning strike in July
	2017	Data	12.4	69.9	535.0	9.30	

Hibbing North Field:
Unique Well # 147643

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
Scranton	1984	Built	251.0		2500.0		Design Capacity
	1993				1500.0		Hibbing Taconite begins dewatering the scranton pit
	1999				1150.0		pump/motor lowered 5 ft.
	2003				950.0		pump/motor lowered
	2004				925.0		pump/motor lowered
	2006				900.0		pump/motor lowered for repairs
	2007				810.0		pump/motor lowered for repairs
	2008		369.0	431.0	618.0	9.97	pump/motor lowered
	2009				565.0		Well shut off temperarily for bad water quality
	2010				500.0		Well shut off temperarily for bad water quality
	2011				414.0		Well shut off temperarily for bad water quality
	2012		393.0		310.0		Well shut off temperarily for bad water quality
	2013		388.0	446.0	645.0	11.12	New stainless steel pump/motor installed
	2015				600.0		
	2016		396.0	419.0	358.0	15.57	
	2016		393.0	431.5	572.0	14.86	New stainless 4-Stage Hydroflow pump & Rebuilt 200 HP Hitachi Motor. Two New check valves. New (sch 40) 5' Section of Drop Pipe Mated to pump.
	2017	Data	393.4	433.0	565.0	14.27	

Hibbing East Field:
Unique Well # 716190

Well	Year	Activity	Static Feet	P.L. Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
Airport	2005	Built	7.8	77.0	87.0	1.26	
	2009		7.0	35.8	50.0	1.74	Redevelopment with test pump
	2015				87.0		Installed new pump set at 147 feet

Hibbing Wells:
Monthly Readings

Date: 2/21/2017

Well	Static Level Feet	Pumping Level Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
4A	13.3	47.2	156.0	4.60	
17	23.7	90.0	254.0	3.83	
8A	38.1	100.0	271.0	4.38	
1C	16.0	64.0	203.0	4.23	
2B	12.4	69.9	535.0	9.30	
11C	48.0	90.0	401.0	9.55	
3A	18.8	93.1	318.0	4.28	
Scranton	393.4	433.0	565.0	14.27	
Airport					

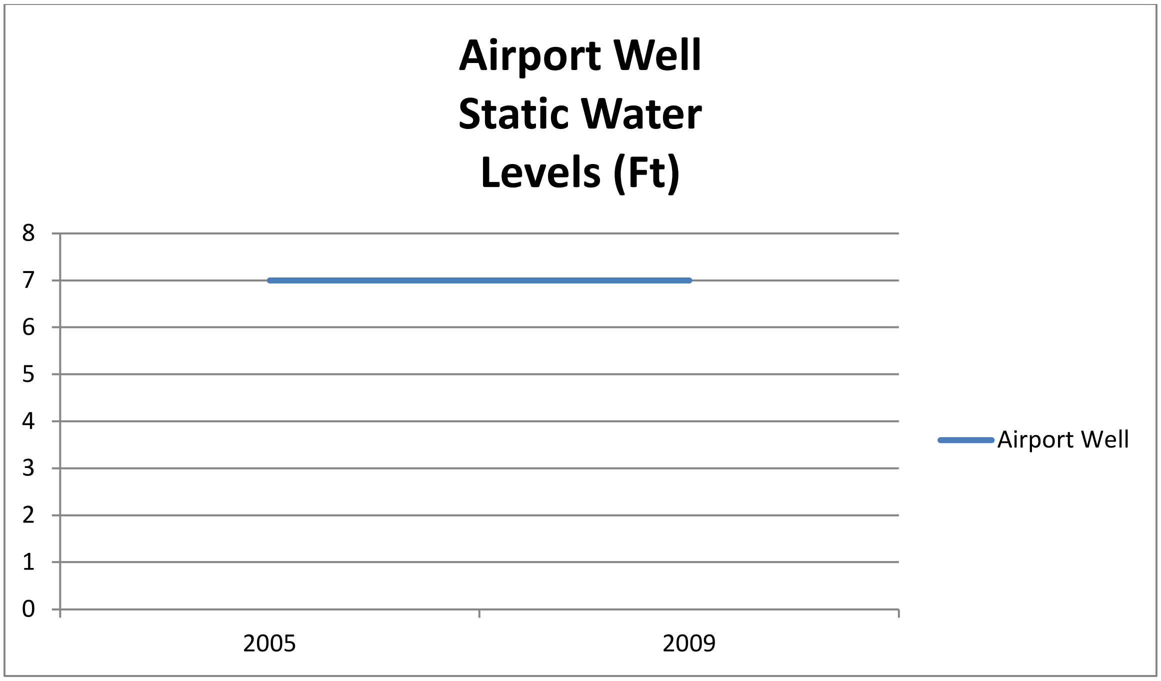
Sample of HPU Water Level Monitoring Spreadsheet

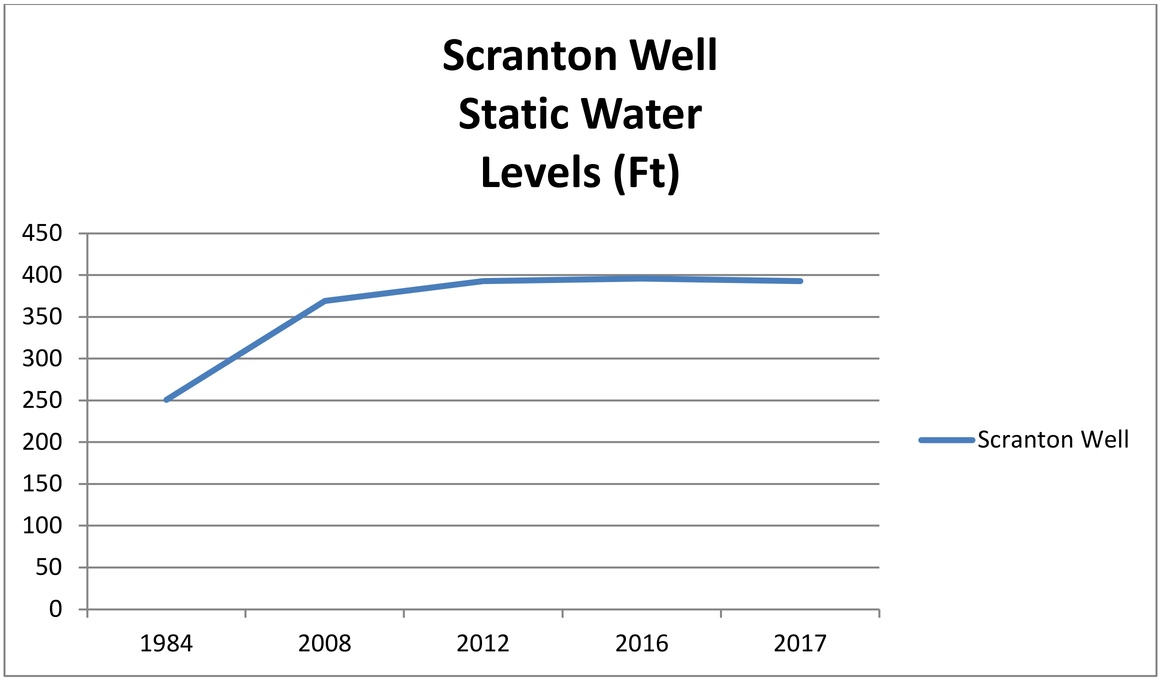
Date: March 2017

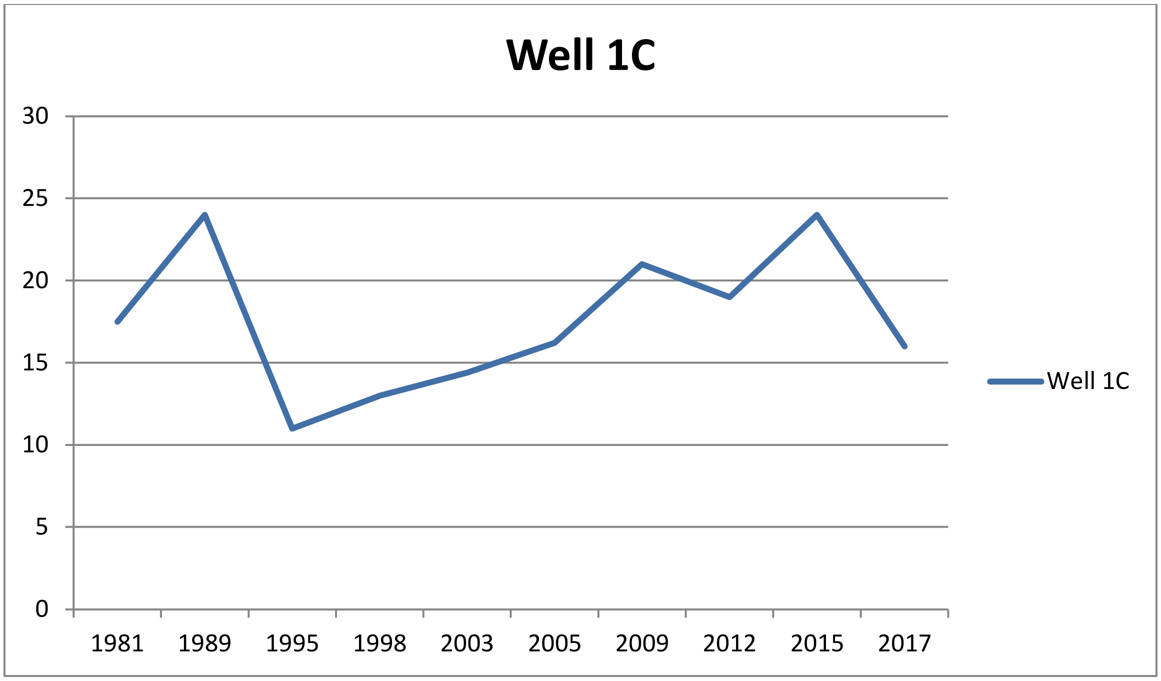
Well	Static Level Feet	Pumping Level Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
4A	12.7	47.2	156.0	4.52	
17	22.9	90.0	254.0	3.79	
8A		100.0	271.0	2.71	
1C	17.6	64.0	203.0	4.38	
2B	13.7	69.9	535.0	9.52	
11C	48.6	90.0	401.0	9.69	
3A	18.4	93.1	318.0	4.26	
Scranton	392.8	433.0	565.0	14.05	

Date: April 2017

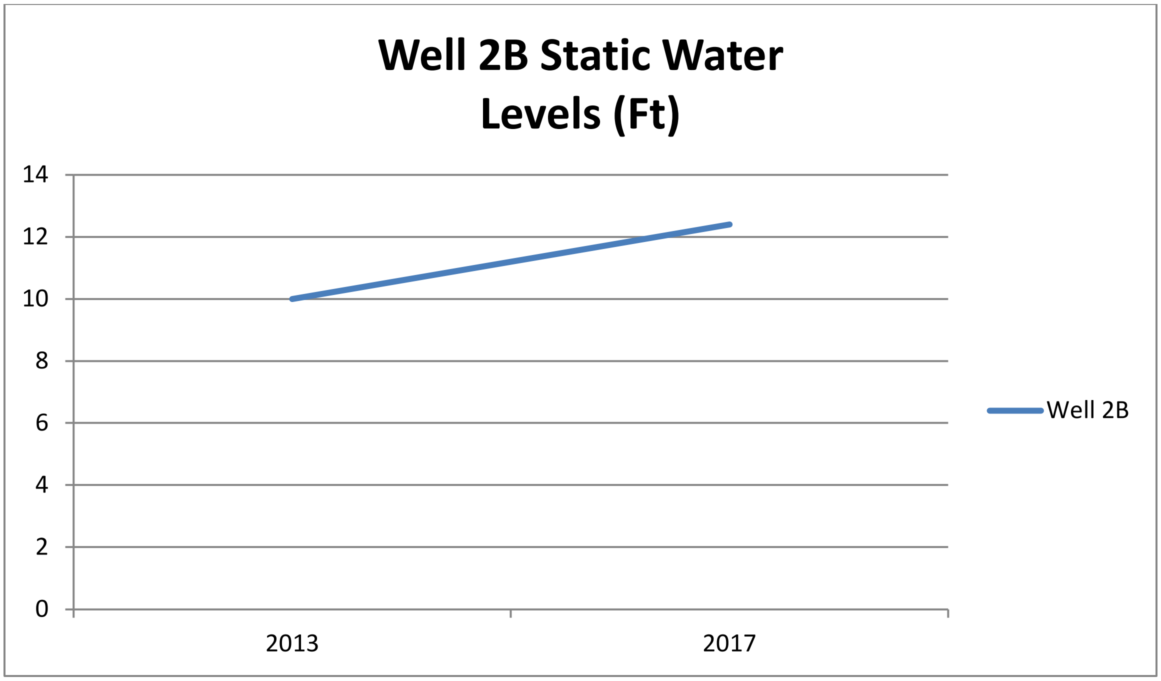
Well	Static Level Feet	Pumping Level Feet	Rate GPM	Specific Capacity GPM/Ft.	Remarks
4A	11.7	47.2	156.0	4.39	
17	22.2	90.0	254.0	3.75	
8A	37.8	100.0	271.0	4.36	
1C	15.0	64.0	203.0	4.14	
2B	12.0	69.9	535.0	9.24	
11C	47.9	90.0	401.0	9.52	
3A	17.8	93.1	318.0	4.22	
Scranton	392.2	433.0	565.0	13.85	

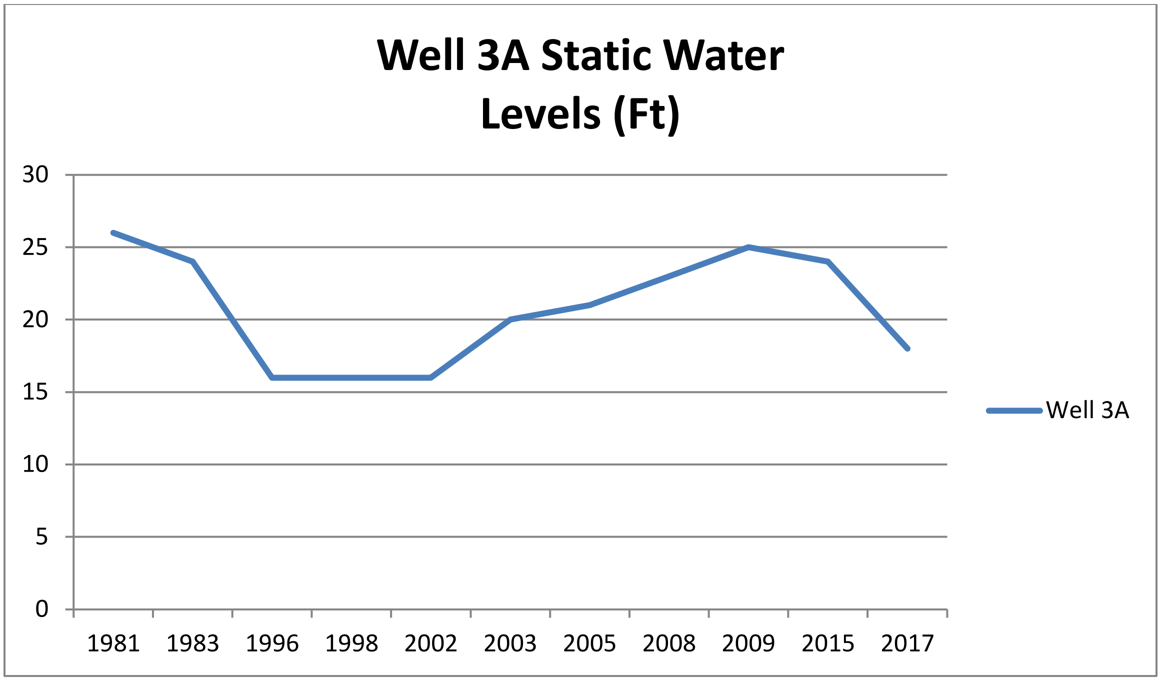

Airport Well
Static Water
Levels (Ft)
8
7
6
5
4
3
2
1
0
2005
2009
Airport Well


Scranton Well
Static Water
Levels (Ft)
450
400
350
300
250
200
150
100
50
0
1984
2008
2012
2016
2017
Scranton Well

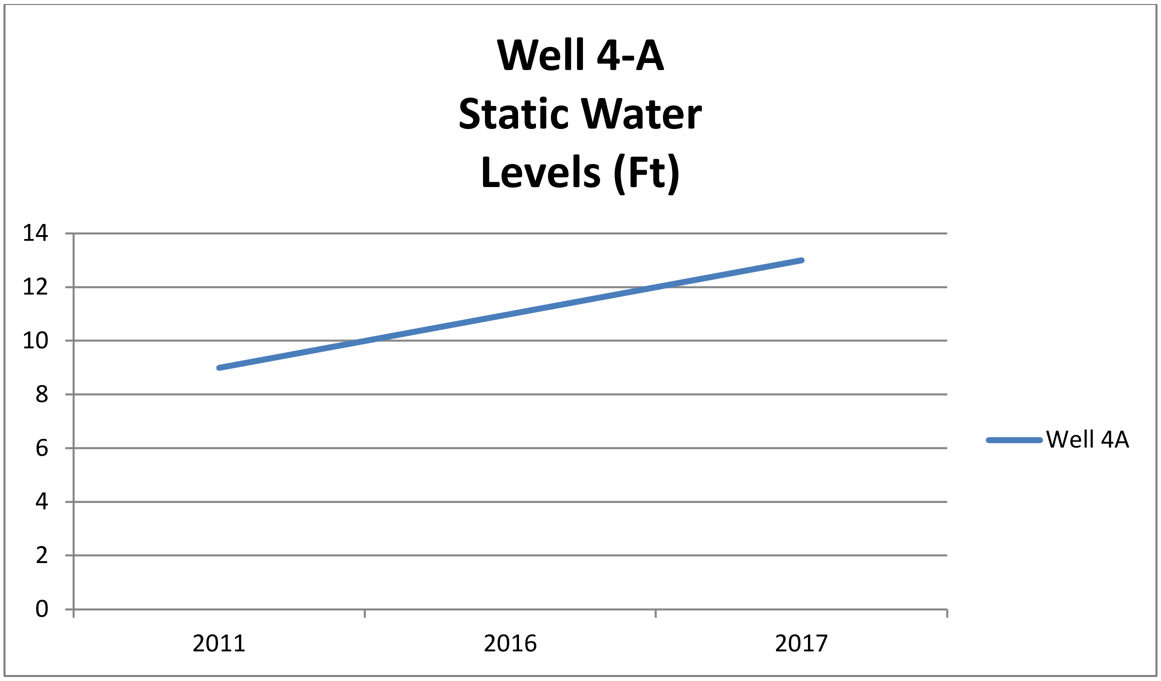


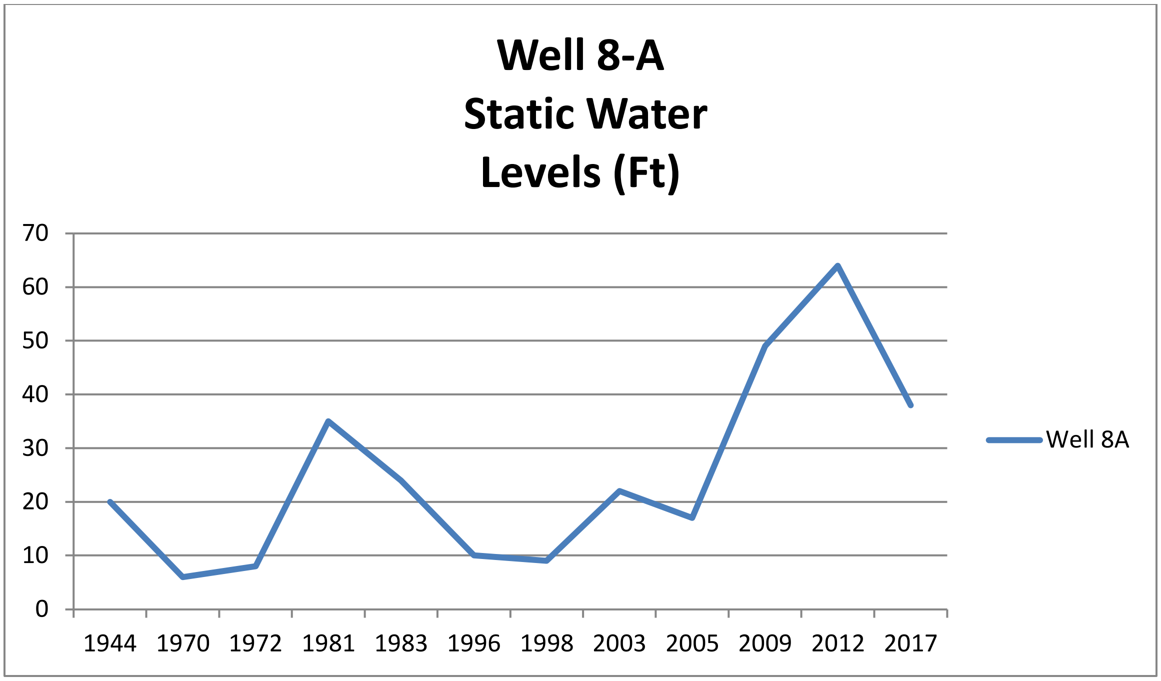
Static Water Level (Ft) 1

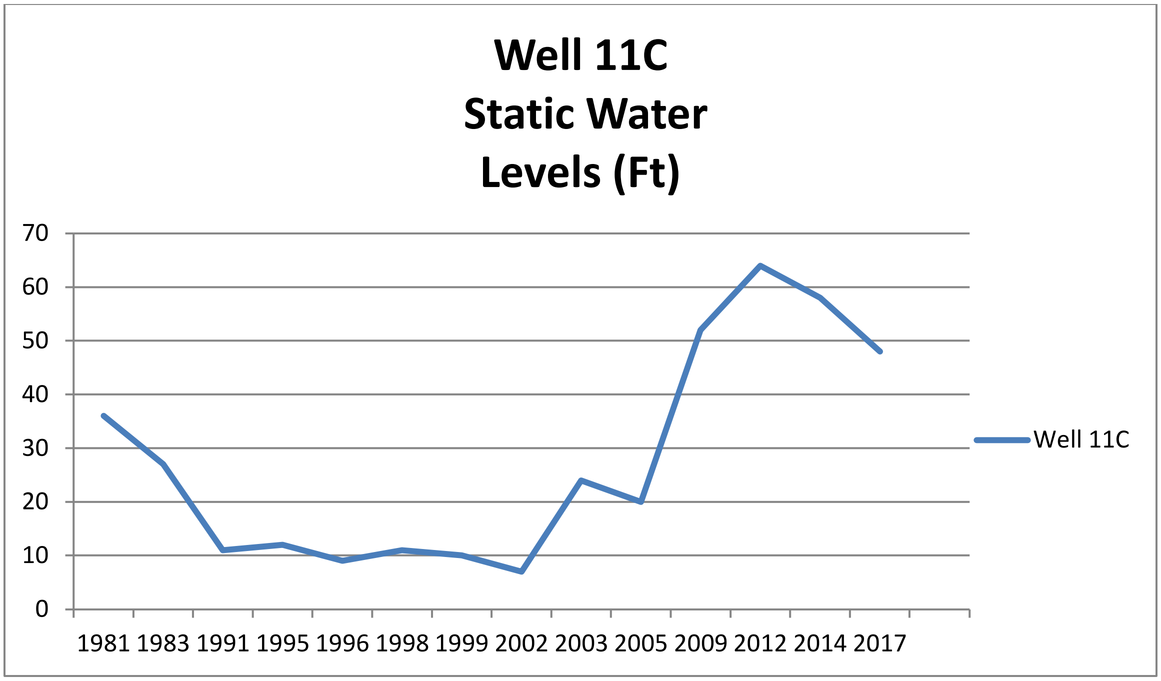

Well 2B Static Water Levels (Ft)
14
12
10
8
6
4
2
0
2013
2017
Well 2B

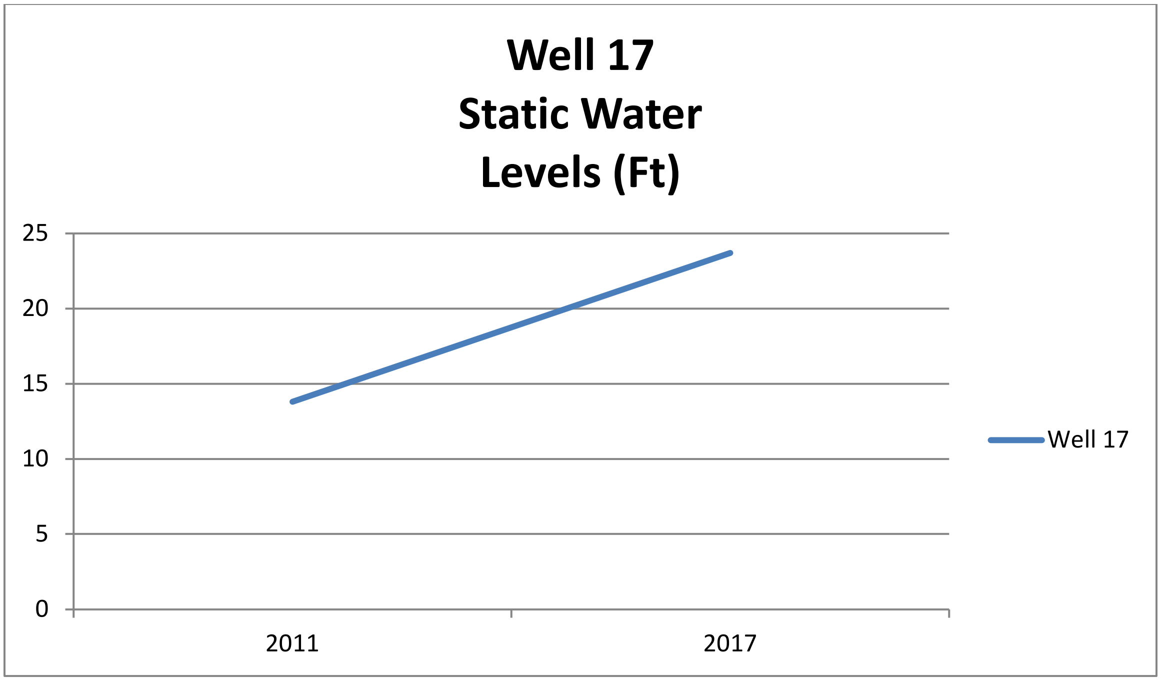


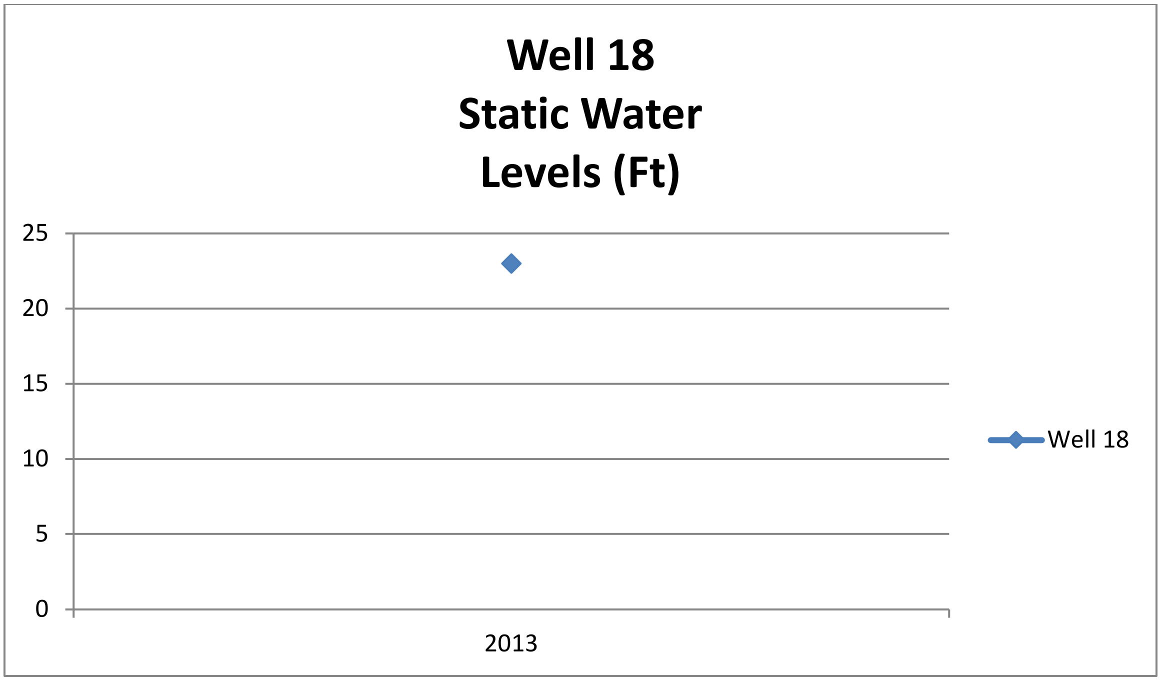
Well 3A Static Water
Levels (Ft)
30
25
20
15
10
5
0
1981
1983
1996
1998
2002
2003
2005
2008
2009
2015
2017
Well 3A


Well 4-A
Static Water
Levels (Ft)
14
12
10
8
6
4
2
0
2011
2016
2017
Well 4A


Well 8-A
Static Water
Levels (Ft)
70
60
50
40
30
20
10
0
1944
1970
1972
1981
1983
1996
1998
2003
2005
2009
2012
2017
Well 8A


Well 11C
Static Water
Levels (Ft)
70
60
50
40
30
20
10
0
1981 1983 1991 1995 1996 1998 1999 2002 2003 2005 2009 2012 2014 2017
Well 11C


Well 17
Static Water
Levels (Ft)
25
20
15
10
5
0
2011
2017
Well 17


Well 18
Static Water
Levels (Ft)
25
20
15
10
5
0
2013
Well 18

Hibbing Public Utilities Water Capital Improvement Plan

- Hibbing Public Utilities has in place an ongoing water main replacement program. Based on budget allowance, each year a selected area of town is scheduled for replacement. The selection is based on frequency of repair as well as age of pipe for a give location. Historical data has shown that many areas of town are in need of main replacement. However, limited dollars make it mandatory to prioritize which locations get attention first.
- Hibbing also has in place a lead service replacement program. If a lead service is found when first conducting a water service repair, Hibbing Public Utilities will (if feasible) replace that section of lead service from the tap at the main to the service shut off valve in the boulevard or sidewalk. Water service and main breaks are usually repaired within a week of being detected. Best efforts are made in determining the water losses due to these failures.
- From 2015-2017, filter media was changed out in four (4) pressure filters at the Hibbing Water Treatment Plant. This media is made up of anthracite, manganese greensand and a gravel base.
- In 2016 and 2017, Hibbing Public Utilities conducted full scale painting of the influent, effluent, and wash water piping at the Hibbing Water Treatment Plant.
- In 2018, the four pressure filter vessels will be sandblasted and repainted.
- In 2019, consideration will be given to establishing a water treatment plant near where our Well 18 is located just across the Range Regional Airport in Hibbing. This well sits on a potential well field. The water drawn is relatively high in iron and manganese. Future well site investigation is also being considered for this timeframe.

Attachment

Emergency Telephone List

Emergency Response Team	Name	Work Telephone	Alternate Telephone
Emergency Response Lead	Luke Peterson	218-262-7759	218-262-7700
Alternate Emergency Response Lead	Stefanie Dickinson	218-969-3106	
Water Operator	Gary Jarmer	218-969-7404	
Alternate Water Operator			
Public Communications	Eliot Dixon	218-262-7737	

State and Local Emergency Response Contacts	Name	Work Telephone	Alternate Telephone
State Incident Duty Officer	Minnesota Duty Officer	800/422-0798 Out State	651-649-5451 Metro
County Emergency Director			
National Guard	Minnesota Duty Officer	800/422-0798 Out State	651-649-5451 Metro
Mayor/Board Chair	Peter Hyduke	218-969-3067	
Fire Chief	Erik Jankila	218-326-5966	218-262-6161
Sheriff			
Police Chief	Steve Estey	218-262-0285	
Ambulance		218-262-6161	
Hospital		218-262-4881	
Doctor or Medical Facility			

State and Local Agencies	Name	Work Telephone	Alternate Telephone
MDH District Engineer	Mike Lurson	218-302-6178	
MDH	Drinking Water Protection	651-201-4700	
State Testing Laboratory	Minnesota Duty Officer	800/422-0798 Out State	651-649-5451 Metro
MPCA			
DNR Area Hydrologist	Mike Liljegren	651-259-5689	
County Water Planner			

Utilities	Name	Work Telephone	Alternate Telephone
Electric Company	Hibbing Public Utilities	218-262-7700	
Gas Company	Hibbing Public Utilites	218-262-7700	
Telephone Company			
Gopher State One Call	Utility Locations	800-252-1166	651-454-0002
Highway Department			

Mutual Aid Agreements	Name	Work Telephone	Alternate Telephone
Neighboring Water System			
Emergency Water Connection			
Materials			

Technical/Contracted Services/Supplies	Name	Work Telephone	Alternate Telephone
MRWA Technical Services	MN Rural Water Association	800-367-6792	
Well Driller/Repair			
Pump Repair			
Electrician			
Plumber			
Backhoe			
Chemical Feed	Hawkins Chemical	715-392-5121	

Meter Repair			
Generator			
Valves			
Pipe & Fittings			
Water Storage			
Laboratory			
Engineering firm			

Communications	Name	Work Telephone	Alternate Telephone
News Paper	Hibbing Daily Tribune		
Radio Station	Hibbing Local		
School Superintendent			
Property & Casualty Insurance			

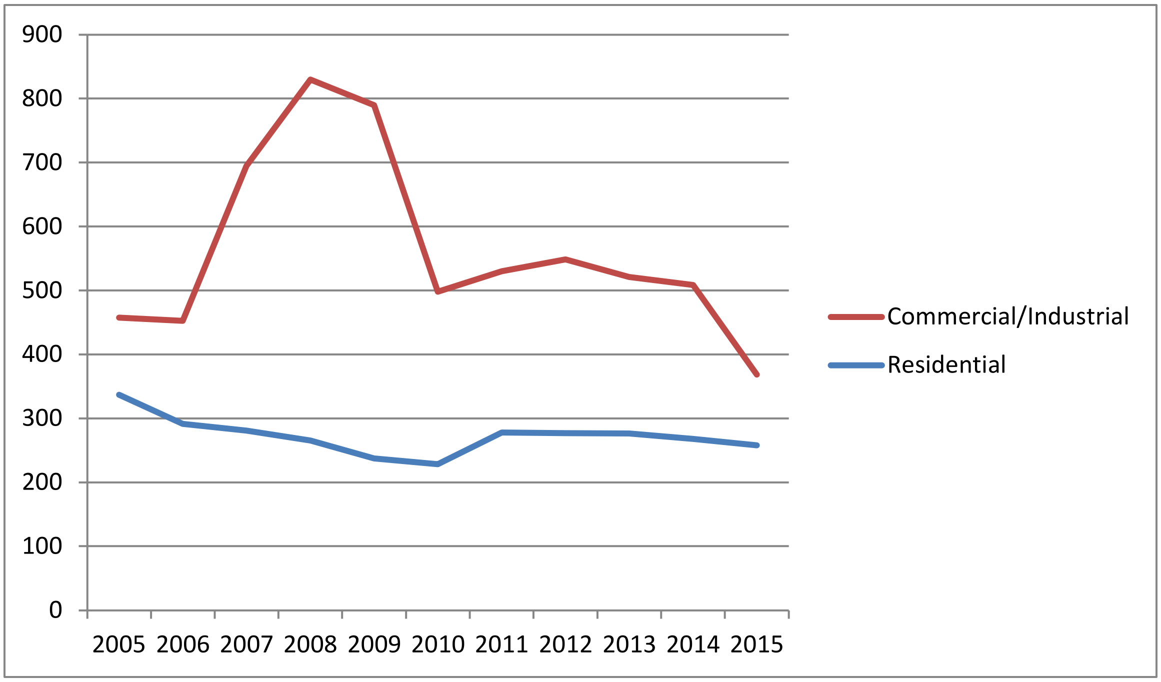
Critical Water Users	Name	Work Telephone	Alternate Telephone
Hospital Critical Use:	Fairview	218-262-4881	
Nursing Home Critical Use:			
Public Shelter Critical Use:			

Appendix 6: Cooperative Agreements for Emergency Services

See Part 2C for more information

Appendix 7: Municipal Critical Water Deficiency Ordinance

See Part 2C for more information



Annual Per Capita Water Demand (MGAL) 1

PUBLIC UTILITIES COMMISSION
HIBBING, MINNESOTA

WATER SERVICE
GENERAL SERVICE (GSW) RATE 18001 RESIDENTIAL

Applicability:

This rate is available to all single family residences, and commercial water customers for potable and process water use. It is also available for multiple units or for multiple family occupancy on the basis that the minimum bill and each energy block (5 apartments or more) of the rate shall be multiplied by the number of families or residences (whichever is greater) served through a single meter before computing the incremental energy block charges.

CONSERVATION RATE STRUCTURE

Rate:

Customer Charge - $15.23*

Commodity Charge – 1 - 6 Units $3.04 per unit (thousand gallons)
7 - 12 Units $3.24 per unit (thousand gallons)
13 - 24 Units $3.47 per unit (thousand gallons)
Over 24 Units $3.68 per unit (thousand gallons)

Minimum Monthly Charges:

The minimum monthly charge shall be $15.23*.

Delayed Payment Charge:

Five (5) percent of the above computed billing or minimum charge if not paid by due date on bill or within fifteen (15) days from rendition of bill.

Terms and Conditions:

All water service of the Public Utilities Commission is rendered under and subject to the General Service Rules and Regulations of the Public Utilities Commission, but in no event shall the Service Rules and Regulations override the service conditions described herein in this rate schedule.

Effective Date October 15, 1978
First Revision February 1, 1980
Thirteenth Revision January 1, 2006
Fourteenth Revision January 1, 2007
Fifteenth Revision January 1, 2008
Sixteenth Revision January 1, 2009
Seventeenth Revision June 1, 2009 *
Eighteenth Revision January 1, 2013
Nineteenth Revision January 1, 2015
Twentieth Revision January 1, 2016
Twenty-first Revision July 1, 2016
Twenty-second Revision January 1, 2017
All Previous Revisions See Index

WHEN IT WENT INTO EFFECT.

Appendix 10: Adopted or proposed regulations to reduce demand or improve water efficiency

See Part 3 Objective 7 for more information

Water Supply Plan Checklist

All sections of the plan must be completed in order for the plan to be approved. The following checklist can be used to make sure all elements of the plan have been completed.

Part 1. Water Supply System Description and Evaluation

☑	Table 1. DNR Water Appropriation Permit Number & Utility Contact Information
☑	Table 2. Historic Water Demand (Part 1, A)
☑	Table 1. Large volume users (Part 1, A)
☑	Table 2. Water treatment capacity and treatment processes (Part 1, B
☑	Table 3. Storage capacity, as of the end of the last calendar year (Part 1, B)) & discussion of current and future storage capacity needs
☑	Table 4. Water sources & status (Part 1, C) & discussion of limitations
☑	Table 5. Projected annual water demand (Part 1, D) & discussion of water use trends & projection method
☑	Table 6. Source water quality monitoring (Part 1, E)
☑	Table 9. Water level data (Part 1, E)
☑	Table 10. Natural resource impacts (Part 1, E)
☑	Table 11. Status of Wellhead Protection and Source Water Protection Plans (Part 1, E)
☑	Table 12. Adequacy of Water Supply System (Part 1, F)
☑	Table 13. Proposed future installations/sources (Part 1, F)
☑	Table14. Alternative water sources (Part 1, F)
☑	Appendix 1: Well records and maintenance summaries
☑	Appendix 2: Water level monitoring plan
☑	Appendix 3: Water level graphs for each water supply well
☑	Appendix 4: Capital Improvement Plan

Part 2. Emergency Planning and Response Procedures

☑	Table 15. Emergency response plan contact information (Part 2, A) & Y/N questions
☑	Table 16. Interconnections with other water supply systems to supply water in an emergency (Part 2, C) & Y/N questions
☑	Table 17. Utilizing Surface Water as an Alternative Source (Part 2, C) & discussion of additional emergency water provisions
☑	Table 18. Water use priorities (Part 2, C)
☑	Table 19. Emergency demand reduction conditions, triggers and actions (Part 2, C)
☑	Table 20. Plan to Inform Customers Regarding Conservation Requests, Water Use Restrictions, and Suspensions (Part 2, C) & discussion of restriction authority
☑	Appendix 5: Emergency Telephone List
☐	Appendix 6: Cooperative Agreements for Emergency Services
☐	Appendix 7: Municipal Critical Water Deficiency Ordinance

NOTHING IN PLACE AT THIS TIME

Part 3. Water Conservation Plan

☑	Table 21. Implementation of previous ten-year Conservation Plan (Part 3, A) & discussion of progress and results
☑	Table 22. Short and long-term demand reduction conditions, triggers & actions (Part 3, A)
☑	Y/N & discussion of leak detection monitoring , water audits & water loss (Part 3, B)
☑	Table 23. Customer Meters (Part 3, B)
☑	Table 24. Water Source Meters (Part 3, B)
☑	Y/N & discussion of water use trends in residential GPCD (Part 3, B)
☑	Table 25. Strategies and timeframe to reduce residential per capita demand (Part 3, B)
☑	Table 26. Strategies and timeframe to reduce institutional, commercial, industrial, and agricultural and non-revenue use demand (Part 3, B)
☑	Describe trends in customer use categories (Part 3, B)
☑	Calculate ratio of maximum day demand to average day demand (Part 3, B)
☑	Table 27. Rate structures for each customer category (add additional rows as needed)
☑	Table 28. Additional strategies to Reduce Water Use & Support Wellhead Protection (Part 3, B)
☑	Discuss how you will track success (Part 3, B)
NONE APPLY → ☐	Table 29. Regulations for short-term reductions in demand and long-term improvements in water efficiencies (Part 3, B)
☐	Table 30. Retrofitting programs (Part 3, B)
☑	Table 31. Current and Proposed Education Programs (Part 3, C) and discussion of future education plans
☑	Appendix 8: Graph showing annual per capita water demand for each customer category during the last ten-years
☑	Appendix 9: Water Rate Structure
N/A → ☐	Appendix 10: Adopted or proposed regulations to reduce demand/improve water efficiency
☐	Appendix 11: Implementation Checklist

Part 4. Items Metropolitan Area Water Suppliers

☐	Table 32. Alternative Approaches (Part IV, D)
☐	Complete Technical Assistance question

Plan Submittal and Adoption

☐ Follow MPARS submission guidelines on page 1 of this document (preferred) or
Mail to: DNR Ecological & Water Resources
Water Permit Programs Supervisor
500 Lafayette Road
St. Paul, MN 55155-4032 Or e-mail to http://www.dnr.state.mn.us/mpars/index.html

☐ *(Metro communities with less than 1,000 people only)*
Follow MPARS submission guidelines on page 1 of this document (preferred) or
Mail to: Metropolitan Council
Reviews Coordinator
390 N Robert St
St. Paul, MN 55101 Or e-mail to ReviewsCoordinator@metc.state.mn.us