# Engineer's Report

**To:** Honorable Mayor and City Council Members

Mr. John Olinger, City Administrator

**From:** Jon Herdegen, P.E. – City Engineer

**Date:** September 12, 2019 – For the September 19 City Council Meeting

**Wellhead Protection Plan**

Staff has completed Part II of the City's Wellhead Protection Plan. This plan outlines the goals, objectives and strategies the City will undertake to ensure the viability of the two (2) municipal supply wells. The draft version of Part II is included for your reference and will be distributed to local stakeholders including neighboring Chisago County, municipalities, SWCD, emergency services and the Department of Health for a 60-day review and comment period. Applicable comments will be incorporated into the plan and finalize for formal acceptance at your November 21st City Council Meeting. We welcome Council input on the draft plan. Please reach out to staff directly with your feedback.

**Action Requested:** None

# WELLHEAD PROTECTION PLAN

## City of Lindstrom, Minnesota

**Project No. 9992064**

September 2019

# WELLHEAD PROTECTION PLAN

## City of Lindstrom, Minnesota

**Project No. 9992064**

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# DOCUMENTATION LIST

| Step | Date Performed |
|---|---|
| Scoping II Meeting | January 15, 2019 |
| Scoping II Decision Notice | January 31, 2019 |
| Plan Submitted to Local Units of Government | September 9, 2019 |
| Comments Received From Local Units of Government | November 9, 2019 |
| Public Hearing | November 21, 2019 |
| Comments Reviewed | September – December 2019 |
| Part II Wellhead Protection Plan Submitted to MDH | December 12, 2019 |

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# Executive Summary

The City of Lindstrom has completed Part I of their Wellhead Protection Plan (WHPP) for both of its active municipal wells (Municipal Wells No. 3 and 4) in 2017. The Minnesota Unique Well Numbers of these wells are 217913 and 659877 respectively. The City of Lindstrom first created its Wellhead Protection Plan in 2007. The requirements through the Minnesota Rules for Wellhead Protection planning state a plan must be revisited every ten years and updated.

This report is Part II of the WHPP and it includes the following:

- A review of the data elements.
- The results of the potential contaminant source inventory.
- A review of changes, issues, problems, and opportunities related to the public water supply and the identified potential contaminant sources.
- A discussion of the potential contaminant source management strategies and corresponding goals, objectives, and action plans.
- A review of the wellhead and source water protection evaluation program and alternative water supply contingency strategy.

Part I of the Plan was completed in December 2017. In Part I, in compliance with the Minnesota Wellhead Protection Rules (MN Rules 4720.5100 through 4720.5590), the Wellhead Protection Areas (WHPA) and Drinking Water Supply Management Areas (DWSMA) were delineated, and vulnerability assessments of the wells and corresponding DWSMA were completed. The vulnerability assessment for the aquifer found the DWSMA to be non-vulnerable. The vulnerability for both of the wells 3 and 4 were determined to be low. Lindstrom's wells are relatively uninfluenced by the surface activities occurring near the well locations.

The information and data contained in Chapters 1 through 4 of this Plan provide support and a basis for the approaches taken in addressing and managing the identified potential contaminant sources within the delineated DWSMAs. The City of Lindstrom wellhead and source water protection program is concentrating its efforts on addressing unsealed, abandoned wells within the City and continued monitoring of groundwater samples for analysis of isotopic and water quality indicators and regulated contaminants.

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## 1. DATA ELEMENTS

In accordance with Minnesota Rules Chapter 4720.5200, and the October 6, 2012 Scoping 2 Decision Notice and Meeting Summary, the following subsections discuss and assess the required data elements as they relate to the City of Lindstrom wellhead and source water protection program. Since DWSMAs for Municipal Wells 3 and 4 were determined to be non-vulnerable, selected data elements have been addressed for those DWSMAs.

### *A. PHYSICAL ENVIRONMENTAL DATA ELEMENTS*

1. Precipitation

   Precipitation values can be used to determine the local recharge in the groundwater model. Water sampling was performed to assess the vulnerability of Lindstrom's wells. The results of these samples are contained in Part 1 of the Plan (Location). The sampling found a low chloride/bromide ratio which is reflective of water that has not been impacted by human-caused chloride contamination such as road deicing. The low chloride/bromide ratio is also indicative of low infiltration from surface waters.

   Tritium is a naturally occurring radioactive isotope of hydrogen, which decays as a beta emitter. It is produced in small quantities in the upper atmosphere where it is incorporated into water molecules and, therefore, present in rainwater and surface recharge to aquifer systems. With a half-life of 12.3 years, tritium can be used to trace and date ground water.

   In comparison to many other atmospheric radioactive isotopes, tritium is extremely rare and not affected by chemical processes. The naturally occurring tritium level in rainwater (pre-bomb) is estimated at 5 to 10 tritium unit (TU), where one TU = one Tritium atom per 1018 Hydrogen atoms and an equivalent gross beta radiation 3.2 picocuries/liter. However, the amount of tritium in the atmosphere was greatly increased as a result of nuclear weapons testing causing recharge waters to be "tagged" with excess tritium beginning in about 1954.

   Tritium analysis may be used to estimate the time since recharge to the ground water system occurred and the susceptibility of the ground water system to contamination. Ground water systems with recharge occurring prior to the 1950's will have a tritium level decreased by radioactive decay to levels at or below one TU. These ground water systems are considered "not vulnerable." Conversely, ground water systems which have been recharged after the early 1950's will contain tritium levels at, or significantly above, the natural "pre-bomb" background concentrations are considered to be "vulnerable."

   Due to the lack of rapid infiltration of surface water to groundwater in the city, any contaminants in the rainwater or collected during surface runoff events are not considered potential well contaminants at this time.

   The closest weather observation station to the City of Lindstrom is located along the west shoreline of Green Lake in Chisago County. Weather data for this station is summarized in Table 1.

***Table 1 Precipitation Data for Chisago County***

| Year | Average Monthly Precipitation (inches) | Annual Precipitation (inches) |
|---|---|---|
| 2018 | 2.85 | 34.18 |
| 2017 | 2.61 | 31.31 |
| 2016 | 3.23 | 38.74 |
| 2015 | 3.29 | 39.42 |
| 2014 | 3.36 | 40.27 |

*Precipitation data retrieved from the National Weather Service Reporting Station (Forest Lake, MN) https://www.dnr.state.mn.us/climate/historical/annual.html

2. Geology

The hydrologic setting for the Mt. Simon Aquifer is described in the 2007 WHPA Part I report (Djerrari, 2007). Unconsolidated deposits more than 300 feet thick are present above bedrock in the city of Lindstrom area. Variations in the thickness occur primarily due to relief on the bedrock surface, but are also due to topography. The principal subsurface feature that affects the thickness of these materials is a bedrock valley that likely had been incised into the bedrock surface prior to the last glaciation. The valley is largely filled with fine-grained glacial deposits, although a few horizons of sand are present locally (Meyer and others, 2010).

The rocks comprising the uppermost bedrock surface near the city of Lindstrom are the Tunnel City and the Wonewoc Sandstones. Below the Wonewoc, and separating it from the Mt. Simon, is the Eau Claire Formation, which grades from a glauconitic fine-grained sandstone to siltstone to shale. The Eau Claire is typically 100 to 125 feet thick. However, in the Lindstrom area, the Eau Claire has been eroded, and is even absent in the deepest portion of the bedrock valley.

The Mt. Simon Sandstone is the lowermost Paleozoic formation. Lindstrom Wells 3 and 4 draw water from the Mt. Simon Aquifer.

The MDH has assigned a low vulnerability to the DWSMA in Lindstrom due to its geologic characteristics. The clay-rich sediments and/or the Eau Claire Formation that overlie the city's aquifer prevents water and contaminants from moving quickly from moving quickly from the land surface into the city's aquifer. The principal threats to this aquifer are unsealed abandoned wells that penetrate through this clay layer. Such wells are 450 feet or greater in depth in the Lindstrom area. Groundwater flow in the Mt. Simon is generally to the east-southeast and discharges to the St. Croix River. Locally, a groundwater mound creates a southwestern component of flow near the city of Lindstrom wells.

As shown in Figure 4 of the WHP Part 1 (Appendix A), vulnerability of the Mt. Simon aquifer within the DWSMA for the City of Lindstrom is "Low".

## *B. LAND USE DATA ELEMENTS*

1. Land use

Land use in Lindstrom is an important factor to consider for the wellhead protection due to their potential impact on the groundwater aquifer.

**Historical Land Use**

The City of Lindstrom was incorporated in 1894. The population of Lindstrom has grown steadily since the 1900s to a 2014 population of 4,412 residents, roughly doubling since the years between 1980 and 1990.

Lindstrom has historically had a mix of agricultural, residential, and commercial land use, with land use shifting currently to predominantly residential and commercial purposes.

**Current Land Use**

A map showing the boundaries of land parcels within the WHPA/DWSMA is attached to this plan as Figure 4, with a Land Use map attached as Figure 3.

The City of Lindstrom has its own land use control ordinance (Chapter 154, City of Lindstrom Code of Ordinances). These control ordinances include the city's land use zoning (Figure 8)

Existing land uses located within the Lindstrom DWSMA consist of residential, commercial, industrial, and some public lands.

**Future Land Use**

As outlined in the 2017 City of Lindstrom Comprehensive Plan, land use within the DWSMAs is not expected to change imminently, but land use could change in the future. Community development will focus on areas where water and sewer lines have already been extended, especially the area identified as an area for Efficient Use of Existing Infrastructure in the Comprehensive Plan. This area is coincident with the DWSMA for Well No. 4. The DWSMA for Well No. 3 includes the city's industrial park, and while no land use changes are imminent, there could be future changes.

**Review of Existing Land Uses**

Existing land uses, management, and local land use controls within the Inner Well Management Zone and the immediate one year time of travel area was reviewed and considered by the WHP Team during the development of this plan. This is done to identify land use issues and related potential contaminants which may have the most immediate impact upon the public water supply well. Presently, the public water supply wells have no noncomplying or nonconforming uses in either well's IWMZ.

The City of Lindstrom owns a small portion of the land where the public water supply wells are located, with the rest of the land completely within city jurisdiction, but developed for residential use. Generally, these land uses are thought to have little to no immediate impact on the public water supply wells due to the geologic properties of the materials protecting the aquifer. Overall, existing land uses and safe guards are thought to be sufficient in protecting the public water supply wells at this time.

Existing and future land use changes were also considered within the 1 year time of travel. There are few expected changes in land use within the 1 year time of travel. All the areas of both DWSMAs in Lindstrom have been given a designation of low vulnerability. Therefore, only Class V wells must be inventoried and managed. However, locating and monitoring unsealed, abandoned wells will be important for the management of Lindstrom's DWSMAs.

2. Public utility services

Well construction for Lindstrom Well #4 (659877) meets current State Minnesota Water Well Construction Code specifications (Minnesota Rules, part 4725). Therefore, the well does not provide a pathway for contaminants to enter the aquifer used by the public water supplier. Lindstrom Well #3 (217913) does not meet construction standards as grouting information is unknown. If the well was not grouted, it has the potential for acting as a conduit for flow of surface water and contaminants into the buried aquifer. The wells draw from an aquifer that is geologically protected.

## *C. WATER QUALITY DATA ELEMENTS*

1. Surface water quantity

The DWSMA for Well No. 3 contains portions of Center Lake. Although surface water activities are expected to have minimal impact on the water quality for Well No. 3, it is important to note that due to the proximity of the lake, it is possible that surface activities could affect the well in the future.

The same should be noted for the DWSMA for Well No. 4, which is located near the North and South Lindstrom Lakes.

The Minnesota Pollution Control Agency (MPCA) classifies water resources by their use as outlined in Minnesota Rules Chapter 7050. North Center Lake and South Center Lake are considered impaired by the MPCA, and the North and South Lindstrom Lakes form a chain of lakes with Chisago Lakes, which is considered impaired as well. Limits for mercury have been approved for North Center, South Center, and Lindstrom Lakes and limits for nutrients have been approved for North Center and South Center Lakes.

2. Groundwater quantity

The groundwater quantity for the City of Lindstrom's public water supply was reviewed and discussed in Part I of the Wellhead Protection Plan (Appendix A). Lindstrom continues a steady growth pattern, with a population of 6,200 expected by 2040. Although groundwater quantity or scarcity has not been an issue to date, future growth could affect groundwater supply.

There have not been any known problems with the Lindstrom area groundwater quality. At present, none of the human-caused contaminants for which the Safe Drinking Water Act has established health-based standards has been found above maximum allowable levels in the city's water supply.

## 2. ASSESSMENT OF DATA ELEMENTS

### *A. USE OF THE WELL*

The City of Lindstrom Public Works operates a public water supply system serving the city. The City of Lindstrom has two public water supply wells:

| Well No | Unique Well No. | Depth (ft) | Year Constructed/ Reconstructed |
|---|---|---|---|
| 3 | 217913 | 615 | 1972 |
| 4 | 659877 | 595 | 2001 |

In 2016, the City of Lindstrom pumped an average of 153,460 gallons per day or 56,017,000 gallons for the year. Lindstrom one (1) water storage tank with a total storage capacity of 500,000 gallons. The water system serves 1,822 residential and commercial customers. The City's wells operate at 1,000 – 1,100 gallons per minute. The total daily capacity of the well system is approximately 3,024,000 gallons per day.

Currently, there are no serious issues affecting the use of the wells, however it should be noted that during the summer months the use of the wells increases due to recreation activities and maintenance purposes. The City wells do not experience any difficulty in responding to the increase in water use and meeting the additional demands. A large growth of population is not expected in the City of Lindstrom. Future demand is estimated to be 334,000 gallons per day in 2025, which is below the current storage capacity in Lindstrom.

### *B. WHPA DELINEATION CRITERIA*

Information used to perform the computer modeling and delineation of the WHPA is described in detail in Part 1 of this Plan. Specifically, the WHPA delineation criteria for the source water aquifer were addressed and discussed. The topics addressed include time of travel, flow boundaries, daily volume, ground water flow field, and aquifer transmissivity. The quality of this data analysis was considered good by the City. Therefore, the WHPA delineation criteria will not effect of influence the development of the DWSMA management strategies.

### *C. QUALITY AND QUANTITY OF WATER SUPPLYING THE PUBLIC WATER SUPPLY WELL*

It does not appear from the information collected in this plan that groundwater quantity issues will have a significant impact on the management of the DWSMA. Both Wells 3 and 4 are monitored by regular grab sampling. Stable water levels have been observed in both wells since their installation.

The placement of an additional high capacity well in or near the DWSMA, or significant changes in current groundwater appropriations by existing wells, could have an important impact on the aquifer and local water supplies. The City will work with the MDH Sourcewater Protection Unit

to identify proposed high-capacity wells and provide interaction with the proposed well owner to minimize problems.

### *D. THE LAND AND GROUNDWATER USES IN THE DRINKING WATER SUPPLY MANAGEMENT AREA*

Both city wells are used for residential, commercial, and industrial purposes. While there is little impact to the City's DWSMA and wells from surface water resources, the City will continue to promote water conservation and monitor future growth rates in the immediate area.

## 3. IMPACT OF CHANGES ON PUBLIC WATER SUPPLY

### *A. CHANGES IDENTIFIED:*

1. Physical Environment
   No significant changes in the physical environment are anticipated within the WHPA or DWSMA or any of the of the PWS wells of the City of Lindstrom. However, if changes to the physical environment should be made within the DWSMA in the future, the City will work to anticipate the impacts of these changes on the City's wells and groundwater supply.

2. Land Use
   The future land use plan for Lindstrom will focus on the remaining vacant lands in the community where new growth will occur, and on the areas considered most susceptible to change or redevelop in the next 20 years. The general land use pattern in the community will not alter drastically from that which exists today.

3. Surface Water
   The City of Lindstrom DWSMA for Well No. 3 incorporates areas of South Center Lake. Due to the geologic formation covering the aquifer in this area…. Something to the effect that the well water is not impacted by the surface water activities but that surface water quality is still important for recreational purposes……

   Stormwater runoff and management are addressed in the action plan presented in Chapter 6.

4. Groundwater
   Changes in groundwater quality and quantity are not anticipated within the DWSMA itself. It should be noted, however, that the area within the City of Lindstrom's DWSMA is almost completely developed. However, industrial changes within the DWSMA for Well No. 3 could trigger water demand changes. This will place pressure on the area's water resources. Groundwater levels should continue to be monitored in the future.

## *B. IMPACT OF CHANGES*

1. Expected Changes in Water Use
   Lindstrom's population has been steadily growing since 1970, and population is expected to grow to 6,200 people by 2040. This growth will cause an increase in water demand for the city. The addition of any industrial large capacity water using businesses is not anticipated at this time. The City wells have always been able to meet demand in the past, and no future problems in meeting demand are anticipated.

2. Influence of Existing Water and Land Government Programs and Regulation
   Regulations and government programs are created to maintain and protect water resources and groundwater quality. Existing programs are not anticipated to negatively impact the City's source water aquifer.

   The addition of any new large water users to the City will fall under the responsibility of the Minnesota Department of Natural Resources (DNR). The City of Lindstrom will communicate and work with the DNR regarding issues that may affect either the aquifer the City utilizes for its drinking water supply, or the City's DWSMA.

   The US Environmental Protection Agency regulates the treatment and utilization of water as a source of public drinking water is the federal Safe Drinking Water Act with state implementation by the Minnesota Department of Health. The City has a strong history of meeting PWS standards set by the US EPA and does anticipate and future challenges in this area nor does not anticipate any changes to the operation of its public water supply system at this time.

   Other governmental agencies with regulatory responsibility within the DWSMA include:

| **Agency** | **Responsibility** |
|---|---|
| Minnesota Pollution Control Agency (MPCA) | Contamination sites, pollution control |
| MN Department of Agriculture | Agricultural chemical storage sites, runoff |
| Chisago County Emergency & Homeland Security | Assistance with response to spill and other emergencies |
| Chisago County | Above- and below-ground storage tanks, wells, septic systems |

   The City of Lindstrom will continue communications with these agencies to discuss the goals and objectives of this plan. Government programs and technical assistance will be resources for educational materials, regulatory programs, or funding for implementation activities in Section 6.

   The City of Lindstrom has an existing Comprehensive Plan to address future development of the City. Development of the City will be carried out following the updated plans and zoning and land use ordinances of the City of Lindstrom.

All forms of government noted above provide unique opportunities to protect the Lindstrom water supply. It is the City's intention to accomplish many of the goals and objectives in this plan by building on existing partnerships, resources, and programs presently offered through these organizations.

3. Administrative, Technical, and Financial Considerations

There are a number of administrative, technical and financial considerations for the City to consider in adopting and maintaining its WHPP and WHPP activities.

For this plan to continue to be effective, the City will need to continue to reach out to the public and raise public awareness of WHP issues.

The administrative and financial constraints for this plan are the same as other smaller Cities. Lindstrom has a limited staff, tax base and budget to work from. Therefore, the actions and activities that have been selected to be carried forward in this iteration of the WHPP are those that the City believes has the highest impact with the highest chance of being implemented with the Cities relatively modest budget and staff availability. The City will also look for ways to utilize government funds and programs to maximize their efforts and get outside technical assistance.

## 4. ISSUES, PROBLEMS, AND OPPORTUNITIES

### *A. LAND USE*

1. The Aquifer

The population of the City of Lindstrom is project to continue to grow steadily over the next 20 years. This population growth will place additional stresses on the aquifer that provides drinking water for many of the communities in the area. There have not been prolonged issues with meeting public demand for water in the past, but there is an opportunity to plan for the future where groundwater might become less available.

Other WHP issues involving the aquifer include the future placement of an additional high capacity well in or near the DWSMA, or significant changes in current groundwater appropriations by existing wells. In the city's Comprehensive Plan, it is noted that the city has selected a location for a future well. Either of these actions could have an important impact on the aquifer and local water supplies. The City will work with the MDH Sourcewater Protection Unit and the MnDNR to identify proposed high-capacity wells and determine the effect that these wells may have on Lindstrom's DWSMA.

Wells other than high-capacity wells may also pose a threat to the water quality of the aquifer. The City places high priority on verifying the location of all wells within the DWSMA and monitoring these wells to reduce the risk that these wells may become a source of contamination to the aquifer.

2. The Well Water

The well water quality for Lindstrom's City wells has been good and complies with all federal safe drinking water standards. All wells have been constructed in accordance with the state well code requirements. Maintaining good communication with the MDH, and continuing to monitor the municipal wells on a yearly basis will ensure the ongoing quality of Lindstrom's wells. The City will continue to monitor land uses within the inner wellhead management zone to ensure that land uses that may endanger ground water quality will not exist.

3. The Drinking Water Supply Management Area

The principal concern expressed by the City of Lindstrom is to ensure consistent management of the City's water wells and to promote the management of groundwater resources for future sustainability. While the City of Lindstrom faces the challenge of having limited available staff time and funds to dedicate to the implementation of the WHP plan, the City will work to obtain resources and funds from federal, state, and county governments and existing programs as well as budgeting an adequate amount of City resources for each year's projected activities.

## *B. IDENTIFICATION OF:*

1. Problems and Opportunities Disclosed at Public Meetings and in Written Comment

The City of Lindstrom held a Public Information Meeting November 2019 to give the general public and local units of government an opportunity to comment on the city's WHP delineation and vulnerability assessment. To this date no public comments have been received.

2. Data Elements

The state's Wellhead Protection Rule requires that existing information be utilized in developing the initial Wellhead Protection Plan. Much of the data collected and utilized to delineate the City's WHPA and DWSMA, and to determine the vulnerability of the aquifer to possible contamination comes from Part 1 of Lindstrom's WHP Plan and Chisago County Geologic Atlas.

Additional water quality and geologic information collected as a result of ongoing or future efforts would be useful in refining existing data and may be used in future updates of this plan. The State WHP Rule requires that plans be updated every ten years utilizing current data and information. The City will continue to perform pump tests on its wells as noted in the Section 6 Management Strategies.

Information and data presented in Chapters 1-3 provide a strong background of information from which to develop management strategies to address both issues of concern and opportunities for the further protection of Lindstrom's DWSMA. The following two chapters present the goals and implementation strategies to achieve them.

3. Status and Adequacy of Official Controls, Plans, and Other Local, State, and Federal Programs on Water Use and Land Use
   The Lindstrom community has the option to utilize existing regulatory options such as land use ordinances, sewer ordinances, state well permits and state groundwater appropriation permits as control tools to address issues identified in the WHP Plan.

   There are many tools and opportunities available to the city and other regulating agencies that may be used to achieve the wellhead protection planning goals identified by the Wellhead Planning Committee. Federal, state and local governmental units will work in ensuring Lindstrom's quality of water.

   The WHP Committee does not anticipate promoting additional local regulations to protect the wellhead at this time. Instead, it will monitor existing regulated activity to insure that the existing regulations are sufficient to protect the source water of the Lindstrom DWSMA. In addition the WHP Committee will utilize public education, adoption of best management practices and good communication with landowners within the DWSMA as well as continued communications with all relevant regulating agencies.

## 5. WELLHEAD PROTECTION GOALS

### *A. GOALS*

The goals and objectives presented in this section are the main intent of the plan. These goals were selected based on the information gathered and compiled from the data elements, the delineations of the WHPA and the DWSMA, and the results of the potential contaminant source inventory.

The overall goal of the City of Lindstrom is to maintain a safe drinking water supply for all residents of the community, both now and into the future. The City of Lindstrom is also committed to providing this water supply to all future developments in a cost effective and efficient manner following state and federal regulated guidelines. Other WHP goals for the City of Lindstrom are to:

- Collect groundwater samples from both wells to monitor water quality indicators and analysis of regulated contaminants
- Determine risk of DWSMA contamination by unused or abandoned wells

### *B. PRIORITIZING MANAGEMENT STRATEGIES*

The WHP Committee listed wellhead protection management issues in the following order of priority for the vulnerable area:

1. Sealing of unused or abandoned wells
2. Ongoing monitoring of well water quality, groundwater contamination and regional contaminant issues

3. Educating landowners regarding turf management, proper storage and disposal of hazardous materials, maintaining the integrity of storage tanks, maintaining individual septic tanks, and other pertinent groundwater protection issues
4. Maintaining an ongoing active role in the local watershed collaboration, promoting stormwater management and advocating for regional groundwater protection strategies
5. Updating the PCSI inventory with well and potential contaminant source locations as new information develops
6. Developing and revisiting existing emergency management plans for addressing contaminant spills along transportation and pipeline routes, floods, drought, and other emergencies
7. Monitoring large water users in the City and recommending technical services for water conservation and wellhead protection issues

## 6. MANAGEMENT STRATEGIES

### *A. MANAGEMENT OF WELLS*

**Management Objective 1:** Prevent pollution of City municipal drinking wells through the identification, maintenance, abandonment, and sealing of privately owned wells.

- **Action 1-1:** Develop and maintain a database of all private wells and all other potential contaminant sources listed in the Potential Contaminant Source Inventory (PCSI) within the DWSMA. As future new information is gathered regarding new, existing, wells and other contaminant sources with the DWSMA, the PCSI will be updated with the new information.

  **Source of Action:** Lindstrom Public Works

  **Cooperator(s):** Chisago County, Minnesota Pollution Control Agency, Minnesota Department of Health

  **Time Frame:** As Needed

  **Estimated Cost:** Staff Time as Needed

  **Goal Achieved:** The goal will be achieved on an ongoing basis as the City maintains and updates their well database as new data becomes available.

- **Action 1-2:** Continue the City program to promote the proper sealing of high priority unused/unsealed wells in DWSMA and identify any cost-share programs with Chisago County. Information on well sealing will be added to the City newsletter with resources to more information displayed on the City website. The MDH has grants available for the implementation of source water protection grants through their source water protection plan implementation grant program.

  **Source of Action:** Lindstrom Public Works

  **Cooperator(s):** Chisago County Department of Public Health, Chisago County Department of Environmental Services, Chisago County Soil and Water Conservation District

  **Time Frame:** Yearly at a minimum

**Estimated Cost:** Cost share opportunities will be investigated based on potential for contamination

**Goal Achieved:** Accelerate the sealing of unused wells which will reduce the risk of contamination to the aquifer.

- **Action 1-3:** Notify the Chisago County Well Program to request a well evaluation and inspection when old wells are found.

  **Source of Action:** Lindstrom Public Works

  **Cooperator(s):** Chisago County Department of Environmental Services

  **Time Frame:** As Needed

  **Estimated Cost:** Staff time

  **Goal Achieved:** Insuring wells are properly abandoned as buildings are demolished and areas are redeveloped.

- **Action 1-4:** Upon sale or transfer of property ownership, the City will review its ordinances to determine if it has the legal authority to require wells on the properties to be sealed. If so, it will require sealing of the well upon sale. The City will also verify the date of construction for sealed wells and update the City well database with this information upon verification of a new sealed well.

  **Source of Action:** Lindstrom Public Works

  **Cooperator(s):** Chisago County Department of Environmental Services

  **Time Frame:** As Needed

  **Estimated Cost:** Staff time

  **Goal Achieved:** Insuring wells are properly sealed and that well sealing is documented within the well database.

**Objective 2:** Recognize critical importance of the Inner Wellhead Management Zone (IWMZ, 200' radius) and pay special attention to any potential contaminants in the area immediately adjacent to the wells. Also recognize that any new development within the IWMZ will have to comply with WHPP strategies and goals.

- **Action 2-1:** The Wellhead Protection Committee will work cooperatively with MDH staff to review and update the current IWMZ PCSI for both of the public drinking water supply wells in the system. The PCSI shall be updated for the entire DWSMA as new information becomes available.

  **Source of Action:** Wellhead Protection Committee

  **Cooperator(s):** MDH or MRWA

  **Time Frame:** Annual

**Estimated Cost:** Staff time

**Goal Achieved:** Staff and WHP Committee remain informed and up-to-date on activities within the IWHZ and have an increased understanding of the area surrounding the wells.

**Objective 3:** If any Class V Wells are identified, notify land owners about Federal EPA registration, permitting and reporting requirements for Class V Wells.

- **Action 3-1:** In the event a potential Class V well is identified, provide information to the landowner on technical services available thru Minnesota Technical Assistance Program (MNTAP) to assess management and / or disposal alternatives. Provide them with local contacts for reporting information from the Region 5 EPA. Note: there are no Class V wells identified in Lindstrom currently.

  **Source of Action:** WHP Committee and City Staff

  **Cooperator(s):** MDH, MRWA Planners, landowners, MNTAP

  **Time Frame:** As needed.

  **Estimated Cost:** Staff time, Postage & copying costs

  **Goal Achieved:** Alternative management strategies for Class V Wells are identified and the potential for groundwater contamination is reduced.

### *B. MONITORING, INVENTORY, AND HYDROGEOLOGICAL STUDY*

**Objective 4:** Evaluate groundwater chemistry information and potential contaminant sources to anticipate changes in the water quality of source water.

- **Action 4-1:** Continue to monitor the groundwater and PWS for contaminants of concern including nitrate, disinfection related chemicals, and other natural potential contaminants that have historically been found in the City's drinking water in low levels.

  **Source of Action:** City of Lindstrom

  **Cooperator(s):** Chisago County, MPCA

  **Time Frame:** Yearly

  **Estimated Cost:** Staff time

  **Goal Achieved:** The City will be better able to make informed decisions relating to ground water quality and the protection of the City's drinking water supply.

**Objective 5:** Work to increase the understanding of the nature of groundwater movement in the vicinity of the City's DWSMA.

- **Action 5-1:** Conduct periodic draw down pumping tests on the City water supply wells when the City needs to perform annual maintenance to determine pump performance and well condition. The City will call the MDH when planning to do well maintenance to see if MDH would like to take the opportunity to gather information during the pumping test. The City will alternate years performing the test as each individual well is currently tested every other year.

  **Source of Action:** Public Works

  **Cooperator(s):** City of Lindstrom, MDH

  **Time Frame:** One well annually as needed for maintenance

  **Estimated Cost:** Staff time

  **Goal Achieved:** An updated test on Lindstrom's PWS will serve to improve the accuracy of the City's WHPA delineation for future WHP Plan revisions.

**Objective 6:** Identify new high-capacity wells that are proposed for construction in or near Lindstrom's WHPA/DWSMA, and/or major changes to groundwater appropriations for existing high-capacity wells, to determine whether the pumping of said wells will alter the current boundaries of the WHPA/DWSMA delineations or other portions of Lindstrom's WHP Plan.

**Action 6-1:** The City will monitor for any new well drilling activity in the DWSMA, and contact MDH SWP Unit if they become aware of the construction, or planned construction of high capacity wells that have the potential to impact the city's drinking water supply. The City will coordinate efforts with staff in the MDH Wellhead Protection Unit and the DNR Water Appropriations Program to identify proposed high capacity wells in the City of Lindstrom WHP Area, and/or major changes to groundwater appropriation for existing high capacity wells.

**Source of Action:** City of Lindstrom, MDH, DNR

**Cooperator(s):** Adjacent and nearby landowners, and well operators

**Time Frame:** Yearly

**Estimated Cost:** In-kind

**Goal Achieved:** Awareness of the City of potential boundary changes to the City of Lindstrom WHPA/DWSMA

### *C. HAZARDOUS WASTES AND HOUSEHOLD HAZARDOUS WASTE*

**Objective 7:** Promote the use of the Chisago County Household Hazardous Waste Collection facility.

- **Action 7-1:** Insure that businesses and households are familiar with Hazardous Waste Collection Programs. Notify residents through the billing inserts, the Lindstrom Ledger, social media and on the City of Lindstrom's website.

  **Source of Action:** City of Lindstrom

  **Cooperator(s):** Chisago County Department of Public Health, Chisago County Department of Environmental Services

  **Time Frame:** Quarterly, with newsletter

  **Estimated Cost:** Staff time

  **Goal Achieved:** Utilization of the collection facility by businesses and households will help to reduce the risk that hazardous chemicals will contaminate the City's drinking water source. The hours for the collection site will be included on the City's website, Lindstrom Ledger and social media in addition to any other awareness raising.

- **Action 7-2:** The City of Lindstrom will identify any new hazardous waste generators in the DWSMA and notify Chisago County.

  **Source of Action:** City of Lindstrom

  **Cooperator(s):** Lindstrom, Chisago County

  **Time Frame:** As Needed

  **Estimated Cost:** Staff Time

  **Goal Achieved:** Chisago County notified of all new hazardous waste generators that the City is aware of.

### *D. STORAGE TANKS AND UNDERGROUND PIPELINES, SPILL PREVENTION AND MANAGEMENT*

**Objective 8:** Insure that storage tanks within the DWSMA are adequately maintained to prevent leaks and spills. Reduce the risk of contamination to the City wells from spills and leaks.

- **Action 8-1:** Notify responsible government agencies to inform them of the city's DWSMA area and request that they take this information into consideration when they are insuring that all tanks and pipelines within the DWSMA meet state requirements for spill containment, spill contingency plans and leak detection. The City will also proactively contact the relevant agencies to get status updates and any new information that has been report for the City.

  **Source of Action:** City of Lindstrom

  **Cooperator(s):** MPCA, Chisago County Environmental Services

  **Time Frame:** As Needed

  **Estimated Cost:** Staff time

  **Goal Achieved:** City will be assured that storage tank and pipeline owners have spill and emergency response plans in place that meet regulatory requirements.

- **Action 8-2:** Work with the Chisago County Environmental Services to promote the removal of non-commercial underground storage tanks and the need for containment structures and other anti-spill devices on above ground storage tanks through displaying information on their website and including information in their newsletter. Due to the vulnerability of the City's wells, this is a high priority activity.

  **Source of Action:** Lindstrom Public Works, MDH

  **Cooperator(s):** MPCA, Lindstrom Public Works

  **Time Frame:** As Needed

  **Estimated Cost:** Costs will be determined at later date

  **Goal Achieved:** The removal of storage tanks and the prevention of spills will reduce the risk of contamination to the City's drinking water supply.

- **Action 8-3:** Promote the development of emergency action plans by all storage tank facilities by distributing existing information on the subject by promoting existing upcoming workshops for tank owners

  **Source of Action:** Lindstrom Public Works

  **Cooperator(s):** TBD

  **Time Frame:** Next available meeting opportunity

  **Estimated Cost:** Staff time, postage costs $50.00

  **Goal Achieved:** Minimize spill impact on water resources

- **Action 8-4: The** City proposes to obtain copies of the site files from the MPCA for all existing leaking underground storage tank sites within the DWSMA. The MPCA records should provide detailed information regarding the status and history of the sites, and should highlight any future risks to the source water aquifer and/or residual contamination left in place. In addition, the City will request that it be copied on all future correspondence regarding existing and future leaking underground storage tank sites within the DWSMAs.

  **Source of Action:** Lindstrom Public Works

  **Cooperator(s):** MPCA

  **Time Frame:** 2022, or sooner as time and resources are available

  **Estimated Cost:** Staff time

  **Goal Achieved:** By obtaining detailed information regarding the existing and future leaking underground storage tank sites, the City will be in a better position to determine the risks to the source water aquifer. Once informed, the City can make future decisions on whether additional action is warranted at these sites to prevent contamination of the aquifer used for public water supplies.

## *E. TURF AND STORMWATER MANAGEMENT*

**Objective 9:** Promote landscaping and lawn care best management practices that will serve to minimize fertilizer and pesticide contamination risks to groundwater. Ensure that storm water discharged within the DWSMA is of a quality that will not be a potential contaminant source for the City's wells.

- **Action 9-1:** Educate the general public about the impact to groundwater that may occur due to illicit discharges to storm drains within the DWSMA through information displayed on the Cities website and distributed through the Cities newsletter.

  **Source of Action:** Lindstrom Public Works

  **Cooperator(s):** Lindstrom Public Works, Minnesota Rural Water, MDH

  **Time Frame:** Annually

  **Estimated Cost:** Staff Time

  **Goal Achieved:** Providing information to the general public will reduce the likelihood that they will participate in practices that will adversely impact the City's drinking water supply.

## *F. DRINKING WATER SUPPLY AND WELLHEAD PROTECTION EDUCATION (COMMUNITY WIDE)*

**Objective 10:** Ensure that public officials and the citizens of Lindstrom understand the importance of WHP.

- **Action 10-1:** Host a presentation about groundwater protection and WHP to each new City Council and Planning Committee to underscore the importance of WHP and ongoing WHP efforts. Audiences include Planning Commission and City Council, general public.

  **Source of Action:** City of Lindstrom

  **Cooperator(s):** MDH, Minnesota Rural Water

  **Time Frame:** Start of each new council term

  **Estimated Cost:** Staff time

  **Goal Achieved:** The City will possess an educational tool that will provide another route with which to convey information pertaining to Lindstrom's WHP efforts to the general public and its governing officials.

- **Action 10-2:** Insure that citizens are aware of the consumer confidence reports as a source of information regarding the City's drinking water supply quality and WHP efforts. They will be informed through the City website.

  **Source of Action:** Lindstrom Public Works

**Cooperator(s):** City of Lindstrom

**Time Frame:** Yearly, beginning in 2019

**Estimated Cost:** Staff Time

**Goal Achieved:** The Consumer Confidence Report can be used as an educational tool to inform citizens about their drinking water quality and to raise awareness of groundwater issues.

**Objective 11:** Incorporate objectives and goals of WHP Plan into the City of Lindstrom Comprehensive Plan.

- **Action 11-1:** Implement WHP goals and objectives when the Comprehensive Plan needs revisions.

  **Source of Action:** WHP Committee

  **Cooperator(s):** City of Lindstrom

  **Time Frame:** 2020-2024

  **Estimated Cost:** $400

  **Goal Achieved:** Land use development is in accordance with the WHP Plan.

**Objective 12:** Ensure that source water protection is considered in development and redevelopment plans.

- **Action 12-1:** Incorporate WHP considerations into the existing City zoning and permitting activities by collecting information about proposed potential sources of contamination at the time of permit consideration.

  **Source of Action:** City Administrator

  **Cooperator(s):** City staff

  **Time Frame:** Ongoing as needed per application

  **Estimated Cost:** Staff time

  **Goal Achieved:** The City will gain information regarding the location of proposed potential sources of contamination to the drinking water supply and be in a position to place additional requirements on permits, if necessary, for groundwater protection purposes.

## *G. WATER SUPPLY CONSERVATION AND EMERGENCY PLANNING*

**Objective 13:** Ensure adequate water supply for the City of Lindstrom

- **Action 13-1:** Advocate water conservation through public education efforts such as the distribution of fliers in the City office as part of public displays, and placing articles in the City's website and other social media.

  **Source of Action:** City of Lindstrom

  **Cooperator(s):** Lindstrom Public Works

  **Time Frame:** 2020-2024

  **Estimated Cost:** Staff time, cost of fliers $50.00

  **Goal Achieved:** Informing the public about groundwater availability and the need for conservation will help to ensure the sustainability of the water supply for future use.

- **Action 13-2:** Maintain current tiered billing system for water. The City will continue to implement the tiered water pricing system and notify customers of rate increases due to high water usage to promote conservation of water.

  **Source of Action:** Lindstrom Public Works

  **Cooperator(s):** Users of city water

  **Time Frame:** Ongoing, quarterly with bills

  **Estimated Cost:** Staff time

  **Goal Achieved:** By maintaining the current tiered billing system, the City will promote water conservation through its regular bills to customers.

- **Action 13-3:** Obtain MDH funding and develop an emergency spill response plan to plan for potential emergencies related to the pipelines, railroads and highways that go through the City of Lindstrom

  **Source of Action:** Lindstrom Public Works

  **Cooperator(s):** MDH, Chisago County Emergency Management Department

  **Time Frame:** 2022, or sooner as time and resources are available

  **Estimated Cost:** Staff time

  **Goal Achieved:** Having a coordinated spill response plan in place that addresses the various potential spill threats to the City of Lindstrom.

- **Action 13-4:** Perform a table-top exercise involving the various players that would be involved in the event of a spill in the City's DWSMA.

  **Source of Action:** Lindstrom Public Works

  **Cooperator(s):** MDH, Chisago County Emergency Management Department, fire department, police department, MPCA

  **Time Frame:** 2022, or sooner as time and resources are available

**Estimated Cost:** Staff time

**Goal Achieved:** Better coordination and improved communication between the various players involved should a spill occur in the City of Lindstrom's DWSMA.

## 7. EVALUATION PROGRAM

In order to ensure the success of the wellhead protection plan, an evaluation program must in place to insure its implementation and level of impact.

In order to evaluate the success of its wellhead protection program, the WHP Team is committing to meet yearly in order to perform the following tasks:

1. Track the implementation of the objectives identified in the previous section of this plan;
2. Determine the effectiveness of specific management strategies regarding the protection of the City of Lindstrom public drinking water supply;
3. Identify possible changes to these strategies that may improve their effectiveness
4. Determine the adequacy of financial resources and staff availability to carry out the management strategies planned for the coming year;
5. Update the Potential Contaminant Source Inventory with new information.

The Wellhead Protection Plan Manager collect information throughout the year on new potential contaminant sources and land use changes in the drinking water supply management area, which may adversely impact the water supply.

The Wellhead Protection Plan Manager will update the Lindstrom City Council regarding progress in implementing the wellhead management objectives and the results of their management activities after the yearly meeting of the WHP Team. The intent of the annual reports is to inform local decision makers about the progress being made on WHP goals and measures and to make sure that WHP goals are being considered in decision making.

## 8. ALTERNATIVE WATER SUPPLY; CONTINGENCY STRATEGY

**Alternative Water Supply; Contingency Strategy (4720.5280)**
**City of Lindstrom**

**Index**

## A. Purpose

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

## B. Public Water Supply Characteristics

a. Current Supply Source:

The City of Lindstrom provides drinking water to its residents from two wells that draw water from the Mt. Simon Aquifer. Well number three (3) is 615 feet deep and was installed in 1972. The capacity of the well production is 1000 gallons per minute. Well number four (4) is 595 feet deep and was installed in 2001. The capacity of the well production is 1,100 gallons per minute, bringing the total capacity for both wells to 2,100 gallons per minute.

b. Treatment

The City of Lindstrom treats its raw water with fluoride.

c. Storage and Distribution

Lindstrom has one (1) elevated storage tank constructed in 1992. This tank has a capacity of 500,000. The water system serves 1,684 residential and business customers. The City's wells operate at 900 to 1100 gallons a minute. The total daily capacity of the well system is approximately 3.024 million gallons a day.

II. Priority of Water Users During Water Supply Emergency

| Type of Use | Average Daily Demand (GPD) | Short-Term Emergency Demand Reduction Potential (GPD |
|---|---|---|
| Residential (1) | 235,000 | 145,000 |
| Institutional (2) | 20,000 | 12,000 |
| Commercial (3) | 21,000 | 19,000 |
| Industrial (4) | Included Above | Included Above |
| Irrigation (5) | 8,000 | 4,000 |
| Unaccounted (6) | N/A | N/A |
| Wholesale (7) | N/A | N/A |
| Total | 294,000 | 180,000 |

III. Alternative Water Supply

A. Surface Water Sources and Treatment Needs – The most obvious surface water source for the City of Lindstrom is one of the many adjacent lakes – North Lindstrom, South Lindstrom, North Center, South Center, Chisago Lake, Kroon Lake and Lynn Lake. However, due to the complexity of treatment necessary to use surface water as a Citywide water supply backup, and the wide range of potential contaminants present in the surface water, utilizing the area lakes as a backup water source is not deemed feasible.

In the event that surface water is needed as a backup water supply, the MN National Guard has the ability to provide the emergency treatment of surface waters for human consumption. The MN National Guard has the ability to provide Reverse Osmosis Water Purification Units capable of supplying 1500 gph or 25 gpm of potable water.

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

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

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

C. Bottled Water Supplies, Delivery, and Distribution

Another option for temporary water supply is for the City and its residents to rely on bottled water supplies. Major retail outlets are capable of providing bottled water supplies in the event of an emergency. Below are the contact details for some of the closest major retail outlets to the City of Lindstrom:

Walmart Super Center
2212 Glacier Drive
St. Croix Falls, WI 54024
Ph. (715) 483-1399

Walmart Super Center
200 12th St SW
Forest Lake, MN 55025
Ph. (651) 464-9740

Target
356 12th Street SW
Forest Lake, MN 55025
Ph. (651) 464-4700

D. System Interconnects

In the event of an emergency that limits the City's water supply, the City of Lindstrom would enact an interconnect with the Cities of Chisago City and Center City.

E. Other Water Supply Alternatives

New well – in the event of an emergency where the two primary wells the City currently relies upon for City water are down, a new well could be sited and constructed. See below for the contact details for a list of potential well drillers:

E H Renner
Well Drilling Contractor
Address: 15688 Jarvis St NW, Elk River, MN 55330
Phone:(763) 427-6100

Klimek Brothers Well Drilling
Well Drilling Contractor
Address: 702 County Rd 22 NW, Alexandria, MN 56308

McCarthy Well Company
Well Drilling Contractor
Address: 590 Citation Dr, Shakopee, MN 55379

Bergerson Caswell Inc
Well Drilling Contractor
Address: 5115 Industrial St, Maple Plain, MN 55359
Phone:(763) 479-3121

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

IV. Inventory of Available Emergency Equipment and Materials

In the event of an emergency, the follow services are available to the City in order to construct and repair an out of service well or provide emergency chemical treatment and supplies.

| **Description** | **Owner** | **Telephone** | **Location** | **Acquisition Time** |
|---|---|---|---|---|
| **Well Repair** | E H Renner and Sons, Inc. | (763) 427-6100 | Elk River MN | 1 day |

| | | | | |
|---|---|---|---|---|
| **Pump Repair** | E H Renner and Sons, Inc. | (763) 427-6100 | Elk River MN | 1 day |
| **Electrician** | NEI Electric | (651) 771-1000 | St Paul, MN | 1day |
| **Chemical Feed** | Hawkins Inc | (612) 617-8500 | Minneapolis, MN | 2 day |
| **Meter Repair** | Hawkins Inc | (612) 617-8500 | Minneapolis, MN | 2 day |
| **Valves** | USA Bluebook | 800-548-1234 | Midwest | 2 day |
| **Pipe & Fittings** | USA Bluebook | 800-548-1234 | Midwest | 2 day |

## F. EMERGENCY IDENTIFICATION PROCEDURES

### Table F-1 Procedural Operations

### Emergency Response Coordinator

Name: Matt Fraley, Director of Public Works
Address: 13292 Sylvan Avenue, Lindstrom, MN55045
Work Phone: (651) 325-1769
E-mail contact: mfraley@cityoflindstrom.us

### Alternate

Name: John Olinger, City Administrator
Address: 13292 Sylvan Avenue, Lindstrom, MN55045
Work Phone: (651) 257-0625
E-mail contact: jolinger@cityoflindstrom.us

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

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

V. Notification Procedures

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

**Table 2: Emergency Contact Listing**

| Contact | Phone | Address | Email |
|---|---|---|---|
| Matt Fraley, Director of Public Works | (651) 325-1769 | 13292 Sylvan Avenue, Lindstrom, MN 55045 | mfraley@cityoflindstrom.us |
| John Olinger, City Administrator | (651) 257-0625 | 13292 Sylvan Avenue, Lindstrom, MN 55045 | jolinger@cityoflindstrom.us |
| Jon Herdegen, City Engineer | W: 612-548-3124<br>C: 651-233-8286 | 60 Plato Blvd East, Suite 140 St Paul, MN 55107 | jherdegen@msa-ps.com |
| Kevin Stenson, Mayor | C: (651) 318-8854 | 30256 Broadway Street Lindstrom, MN 55045 | kstenson@cityoflindstrom.us |
| Bill Schlumbohm, Council Member | C: (651) 338-7300 | 28432 Lakeside Trail Lindstrom, MN 55045 | bschlumbohm@cityoflindstrom.us |
| Laurie Burington, Council Member | C: (651) 307-0135 | 29335 Moringside Ct. Lindstrom, MN 55045 | lburington@cityoflindstrom.us |
| David Waldoch, Council Member | C: (612) 308-7669 | PO Box 95 Lindstrom, MN 55045 | dwaldoch@cityoflindstrom.us |
| AnnMarie Brink, Council Member | C: (651) 304-7027 | PO Box 602 Lindstrom, MN 55045 | abrink@cityoflindstrom.us |
| State Incident Duty Officer | 651-649-5451<br>1-800-422-0798 | NA | NA |
| Justin Wood, Deputy Director of Emergency Management | W: 651-213-6300 | Chisago County<br>313 N Main St., Rm 131<br>Center City, MN 55012 | Justin.wood@chisagocounty.us |
| Scott Sellman, Director Emergency Management | 651-213-6313 | Chisago County<br>313 N Main St., Rm 131<br>Center City, MN 55012 | srsellm@co.chisago.mn.us |
| Jeanna Hayes, Region 6 (METRO) Program Coordinator | (320) 428-3184 | 313 N Main St, Sheriff's Office, Rm 100<br>Center City, MN 55012 | |
| Chief Sellman, Assistant Fire Chief | Non- Emergency<br>(651) 257-0628 | 12955 Lake Boulevard Lindstrom, MN 55045 | |
| Chisago County Law Enforcement<br><br>Brandon Thyen, County Sheriff | Business Hours<br>Ph: 651-213-6301<br><br>Emergency: 911<br>Non-Emergency:<br>651-257-4100 | 15230 Per Road<br>Center City, MN 55012 | <br><br>Brandon.Thyen@chisagocounty.us |

V. Notification Procedures - Continued

**Table 3: Other Emergency Contacts**

| Contact | Work Phone | Address | Email |
|---|---|---|---|
| Chisago Lakes School District | (651) 213-2000 | 13185 St.Croix Avenue Lindstrom, MN 55045 | |
| St. Croix Regional Medical Center | (715) 483-3261 | 235 E State Street Saint Croix Falls, WI 54024 | |
| Fairview Clinic | (651) 257-8499 | 11725 Stinson Avenue Chisago City, MN 55013 | |
| Fairview Lakes Medical Center | (651) 982-7000 | 5200 Fairview Blvd. Wyoming, MN 55092 | |
| Lakes Region EMS Aarron Reinert, Executive Director - Emergency Medical Services | Non-Emergency Dispatch: 651-227-4911 Emergency Dispatch: 911 | 40245 Fletcher Avenue North Branch, MN 55056 | |
| Xcel Energy, Power Company | Customer service: 1 (800) 895-4999 Emergency: 1 (800) 895-1999 | 3000 Maxwell Avenue, Newport, MN 55055 | |
| MNDOT, Highway Department | 651-234-7500 | 1500 West CO RD B-2 Roseville, MN 55113 | |
| City of Chisago City, Neighboring Water System | (651) 257-4162 | City Hall 10625 Railroad Avenue PO Box 611 Chisago City, MN 55013 | |
| City of Center City, Neighboring Water System | 651-257-5284 | City Hall 300 N. Center Avenue PO Box 245. Center City, MN 55012 | info@centercitymn.us |
| Sharon Kroening, MPCA Groundwater | 651.757.2507 | 520 Lafayette Rd, St Paul, MN 55155 | sharon.kroening@state.mn.us |
| MRWA Technical Services | (218) 685-5197 | 217 12th Ave SE, Elbow Lake, MN 56531 | mrwa@mrwa.com |
| John Frietag, MDH Contact | (651) 201-5000 | 625 Robert St N, St Paul, MN 55164 | john.freitag@state.mn.us |

B. Incident Assessment Team

| Contact | Phone | Address |
|---|---|---|
| Matt Fraley, Director of Public Works | (651) 325-1769 | 13292 Sylvan Avenue, Lindstrom, MN 55045 |
| John Olinger, City Administrator | (651) 257-0625 | 13292 Sylvan Avenue, Lindstrom, MN 55045 |
| Jon Herdegen, City Engineer | W: 612-548-3124<br>C: 651-233-8286 | 60 Plato Blvd East, Suite 140<br>St Paul, MN 55107 |
| Kevin Stenson, Mayor | C: (651) 318-8854 | 30256 Broadway Street<br>Lindstrom, MN 55045 |
| Bill Schlumbohm, Council Member | C: (651) 338-7300 | 28432 Lakeside Trail<br>Lindstrom, MN 55045 |
| Laurie Burington, Council Member | C: (651) 307-0135 | 29335 Moringside Ct.<br>Lindstrom, MN 55045 |
| David Waldoch, Council Member | C: (612) 308-7669 | PO Box 95<br>Lindstrom, MN 55045 |
| AnnMarie Brink, Council Member | C: (651) 304-7027 | PO Box 602<br>Lindstrom, MN 55045 |
| Matt Fraley, Director of Public Works | (651) 325-1769 | 13292 Sylvan Avenue,<br>Lindstrom, MN 55045 |
| State Incident Duty Officer | 651-649-5451<br>1-800-422-0798 | NA |
| Justin Wood, Deputy Director of Emergency Management | W: 651-213-6300 | Chisago County<br>313 N Main St., Rm 131<br>Center City, MN 55012 |
| Scott Sellman, Director Emergency Management | 651-213-6313 | Chisago County<br>313 N Main St., Rm 131<br>Center City, MN 55012 |
| Jeanna Hayes, Region 6 (METRO) Program Coordinator | (320) 428-3184 | 313 N Main St, Sheriff's Office, Rm 100<br>Center City, MN 55012 |
| Chief Sellman, Assistant Fire Chief | Non- Emergency<br>(651) 257-0628 | 12955 Lake Boulevard<br>Lindstrom, MN 55045 |

B. Public Information Plan

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

Media Contacts

| Media | Name | Telephone | Address |
|---|---|---|---|
| **Newspaper** | Chisago County Press | 651-257-5115 | P.O. Box 748<br>12631 Lake Blvd.<br>Lindstrom, MN 55045 |
| **Newspaper** | Star Tribune | 612-673-4000 | 650 3rd Ave. South, Ste 1300,<br>Minneapolis, MN 55488 |
| **Newspaper** | St Paul Pioneer Press | 651-222-1111 | 10 River Park Plaza #700,<br>St. Paul, MN 55107 |
| **Television** | KSTP- 5 ABC | 651-646-5555 | 3415 University Ave<br>St. Paul MN |
| **Television** | WCC0 – 4 CBS | (612) 339-4444 | WCCO-TV<br>90 S. 11th Street<br>Minneapolis, MN 55403 |
| **Television** | KARE- 11 - NBC | 763-593-1111 | 8811 Olson Memorial Hwy.<br>Minneapolis, MN 55427 |
| **Radio** | Minnesota Public Radio | 651-290-1500 | 480 Cedar Street, Saint Paul, MN 55101 |
| **Radio** | WCCO Radio 830 Am | 651-439-5006 | 625 2nd Ave S Ste 200<br>Minneapolis, MN 55402 |

## VI. Mitigation and Conservation Plan

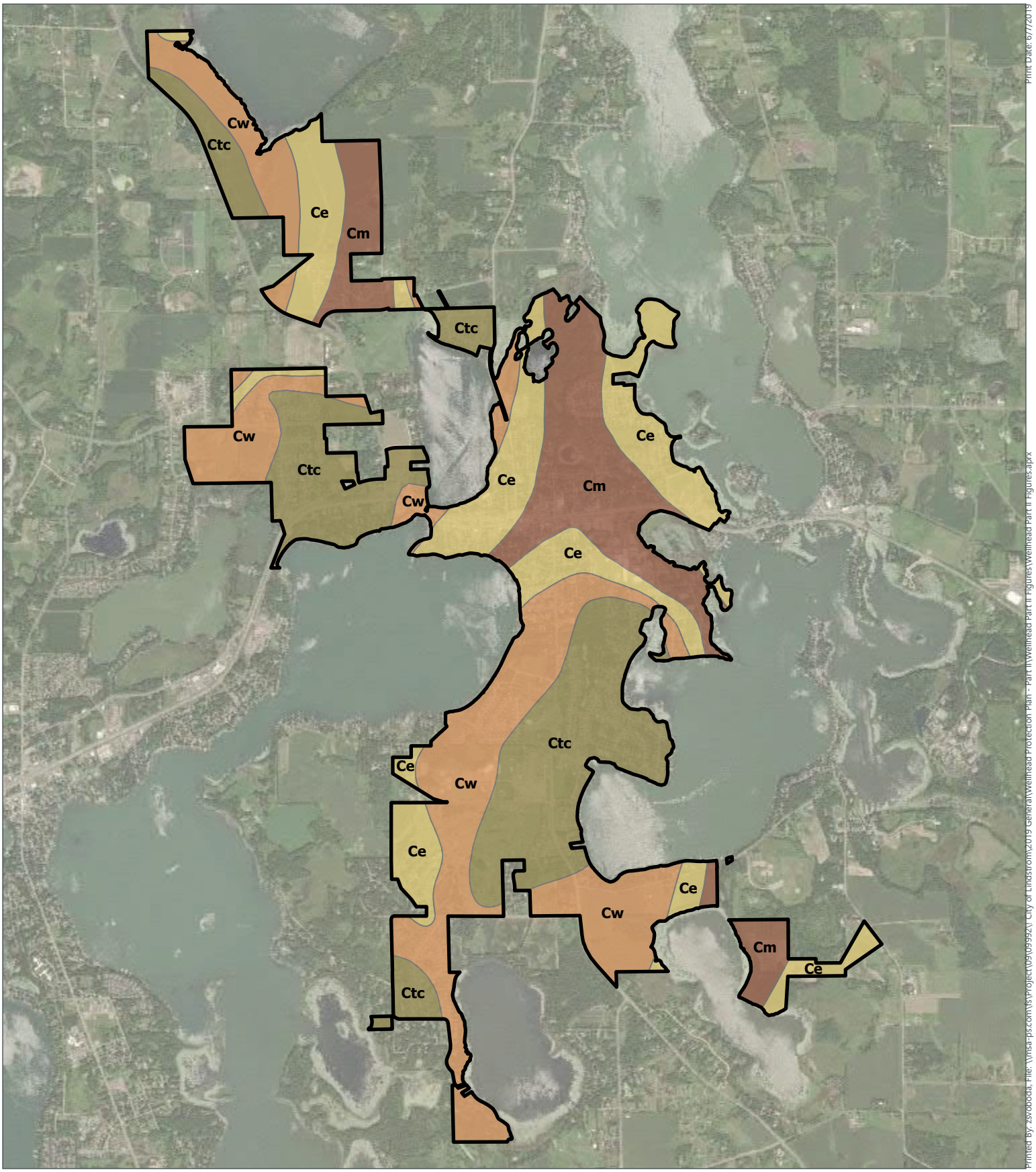
A. Information identifying ways to reduce the vulnerability of the water supply system to disruption and improve the response capabilities – The City has prepared a document – the Wellhead Protection Plan Part II which identifies the strategies for decreasing the vulnerability of the Cities wells and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

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

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

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

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




MSA

*Data Sources:*

# FIGURE 1

## BEDROCK GEOLOGY

CITY OF LINDSTROM,
CHISAGO COUNTY, MINNESOTA

N 0 1,500 3,000 Feet

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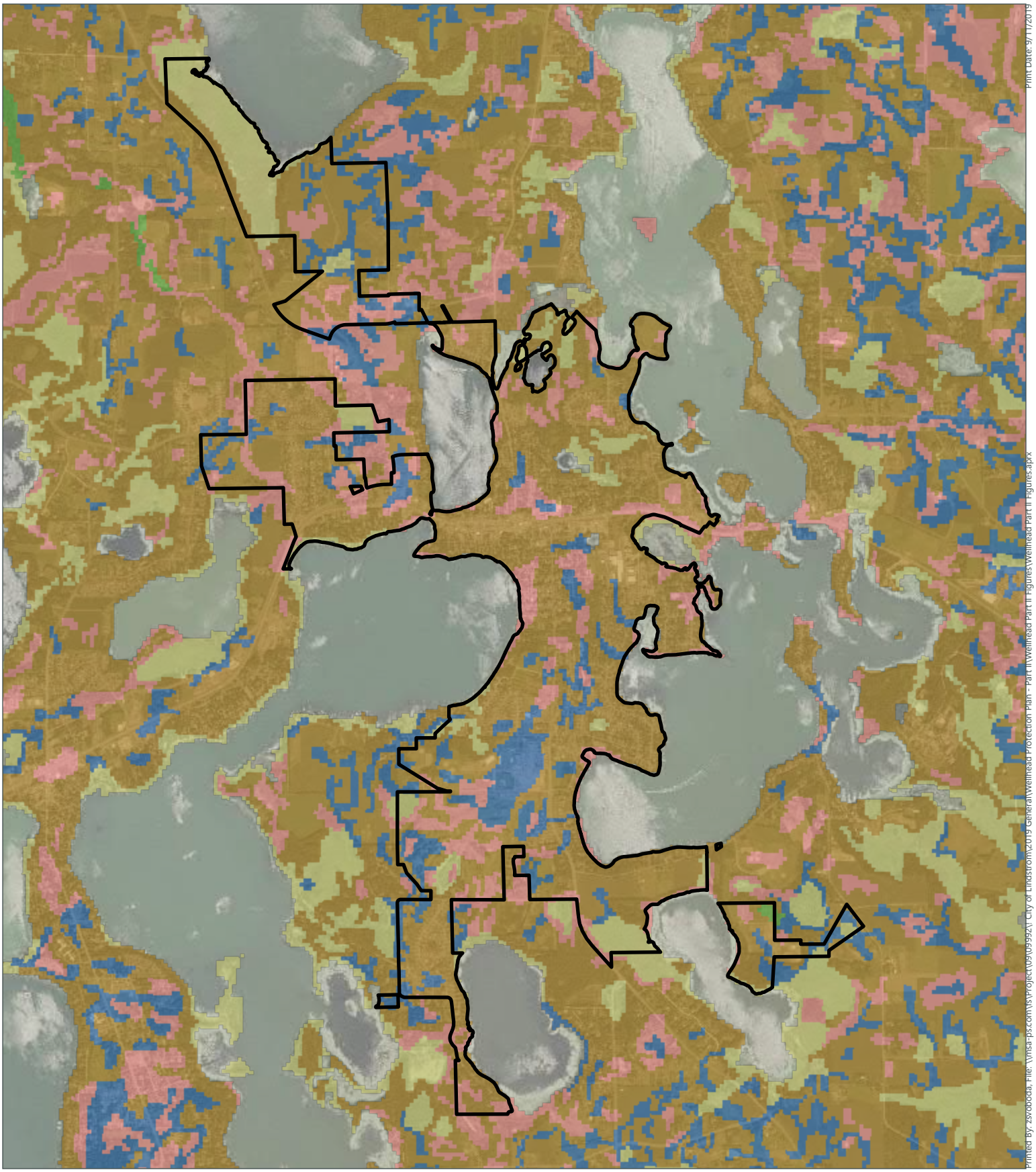


# FIGURE 2

## HYDROLOGIC SOIL GROUP

CITY OF LINDSTROM,
CHISAGO COUNTY, MINNESOTA

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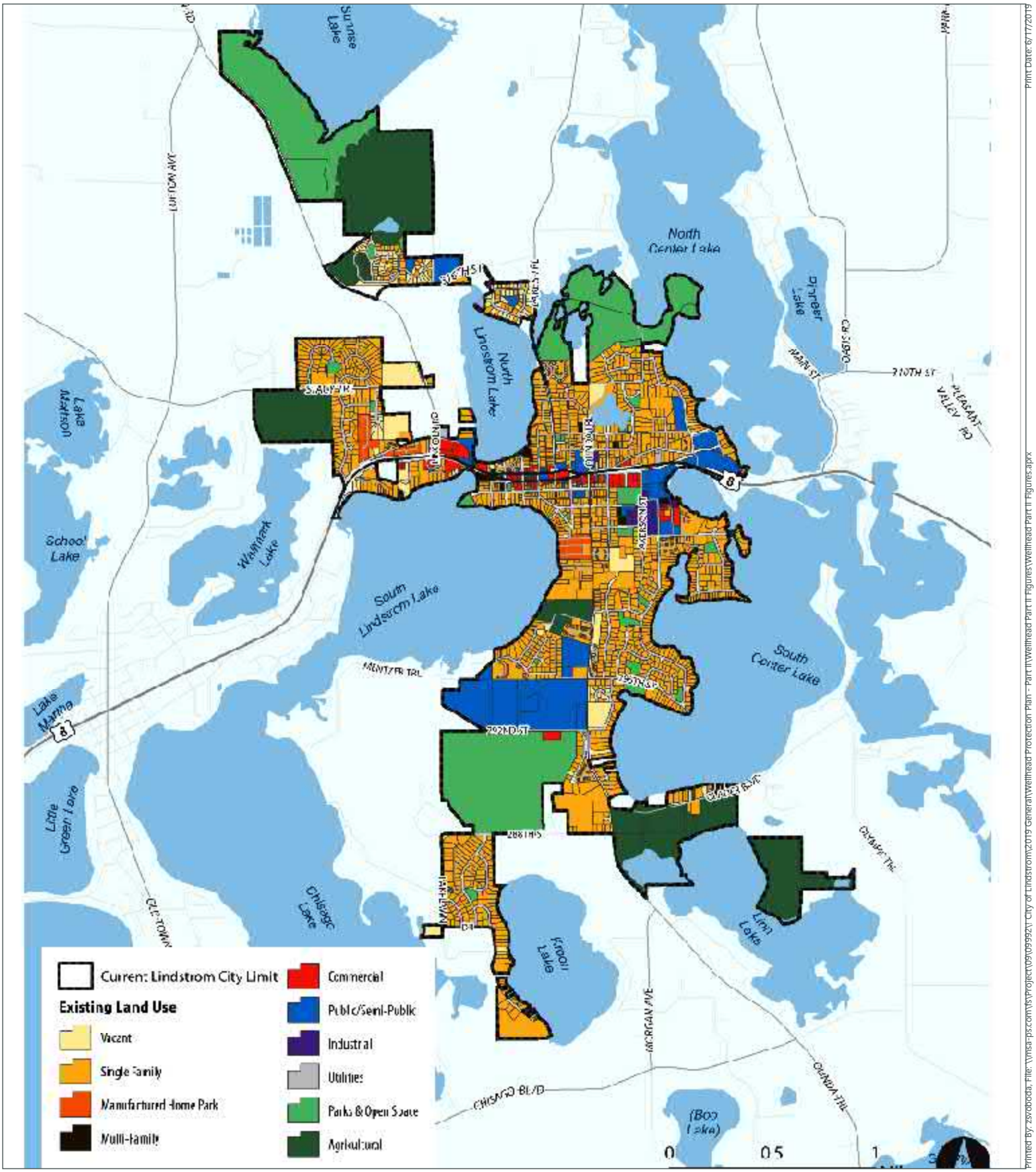


Printed By: zsvoboda, File: \\msa-ps.com\vs\Project\05\09992\1 City of Lindstrom\2019 General\Wellhead Protection Plan - Part II\Wellhead Part II Figures\Wellhead Part II Figures.aprx
Print Date: 6/17/2019

MSA

*Data Sources:*

# FIGURE 3

## LAND USE MAP

CITY OF LINDSTROM,
CHISAGO COUNTY, MINNESOTA

N 0 350 700 Feet

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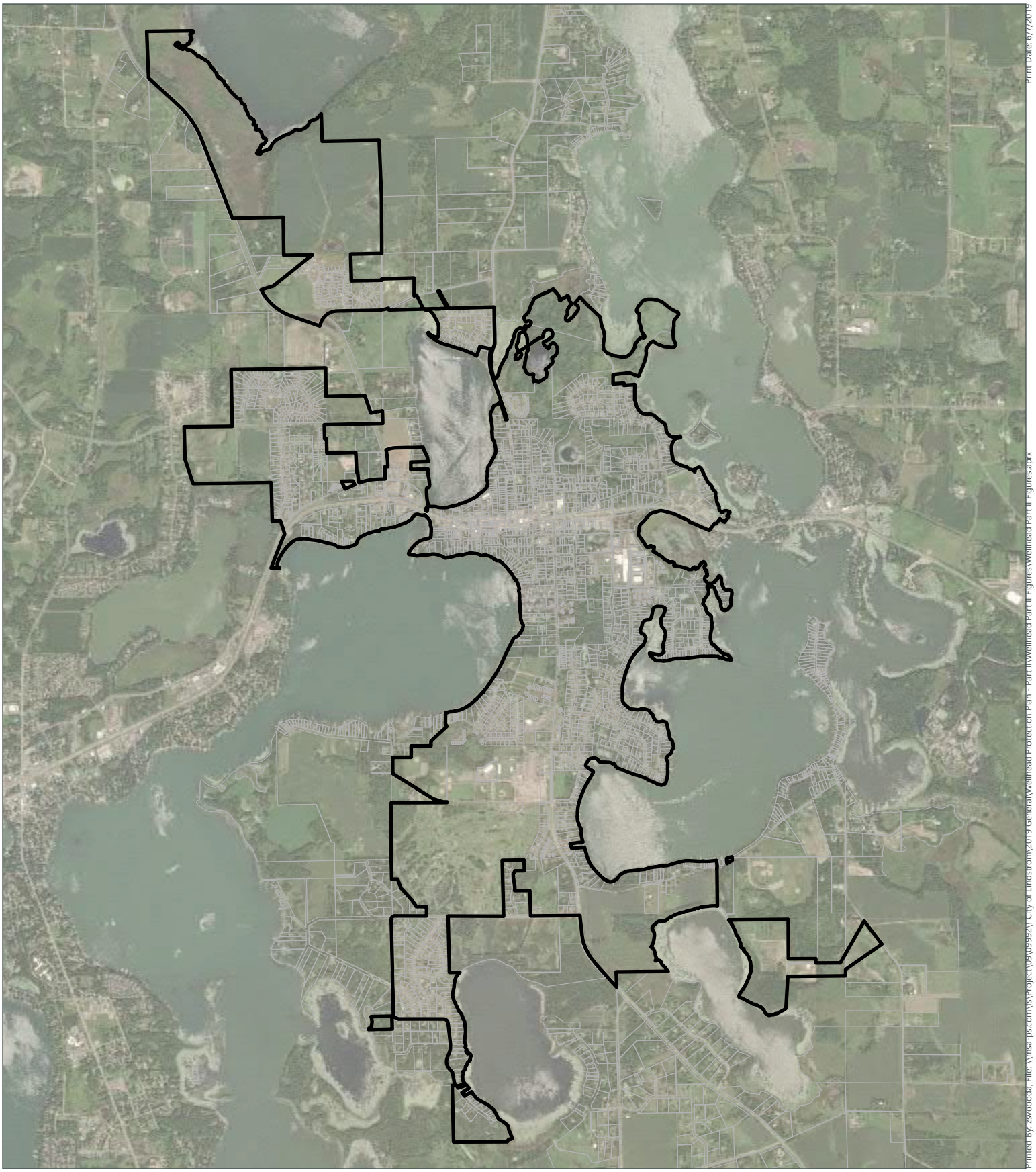


MSA

*Data Sources:*

Lindstrom City Boundary

Parcels

0 1,500 3,000 Feet

# FIGURE 4

## PARCEL BOUNDARIES

CITY OF LINDSTROM,
CHISAGO COUNTY, MINNESOTA

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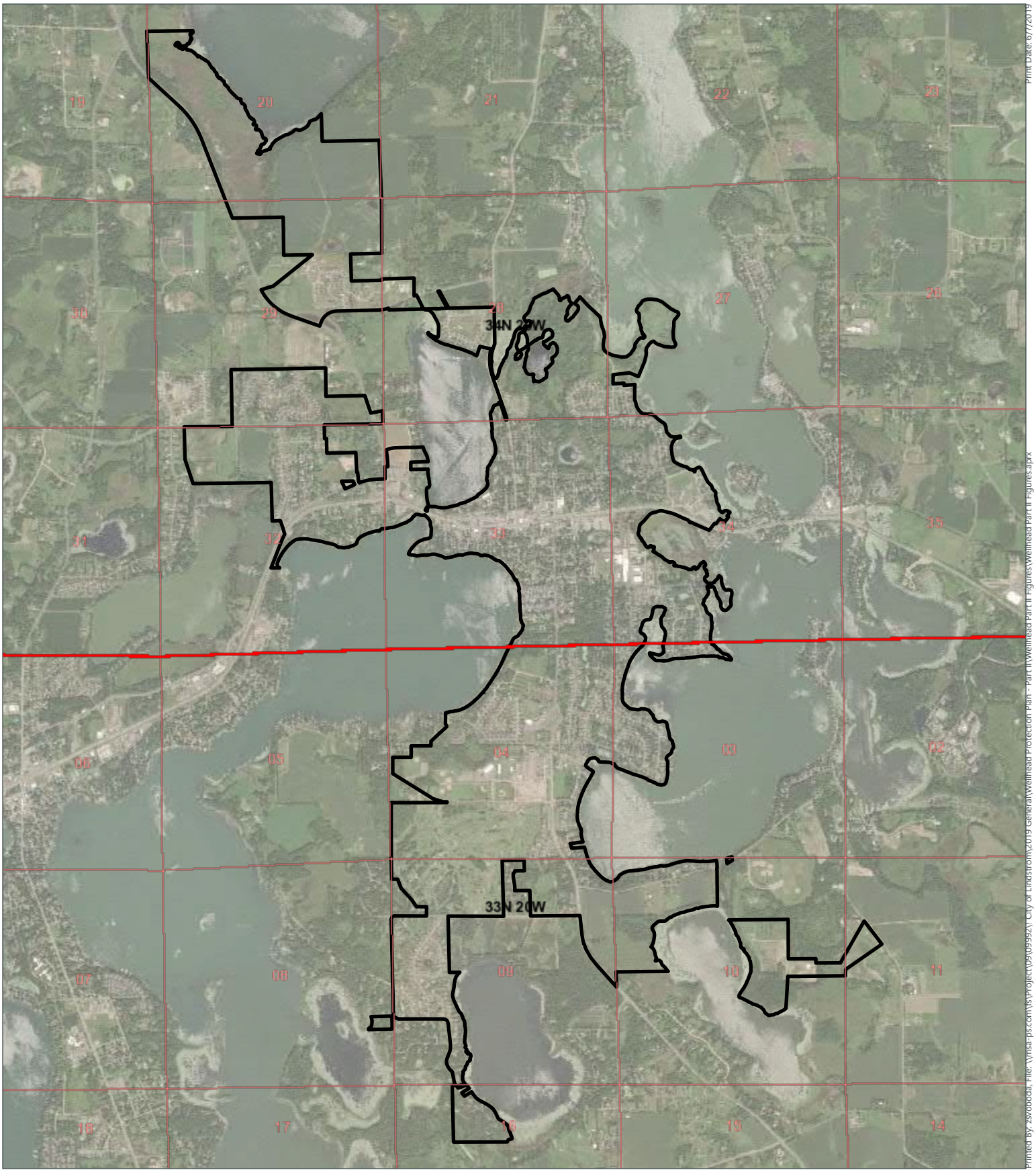


MSA

*Data Sources:*

PLSS Township

PLSS Section

Lindstrom City Boundary

0 1,500 3,000 Feet

# FIGURE 5

## TOWNSHIP, RANGE AND SECTION

CITY OF LINDSTROM,
CHISAGO COUNTY, MINNESOTA

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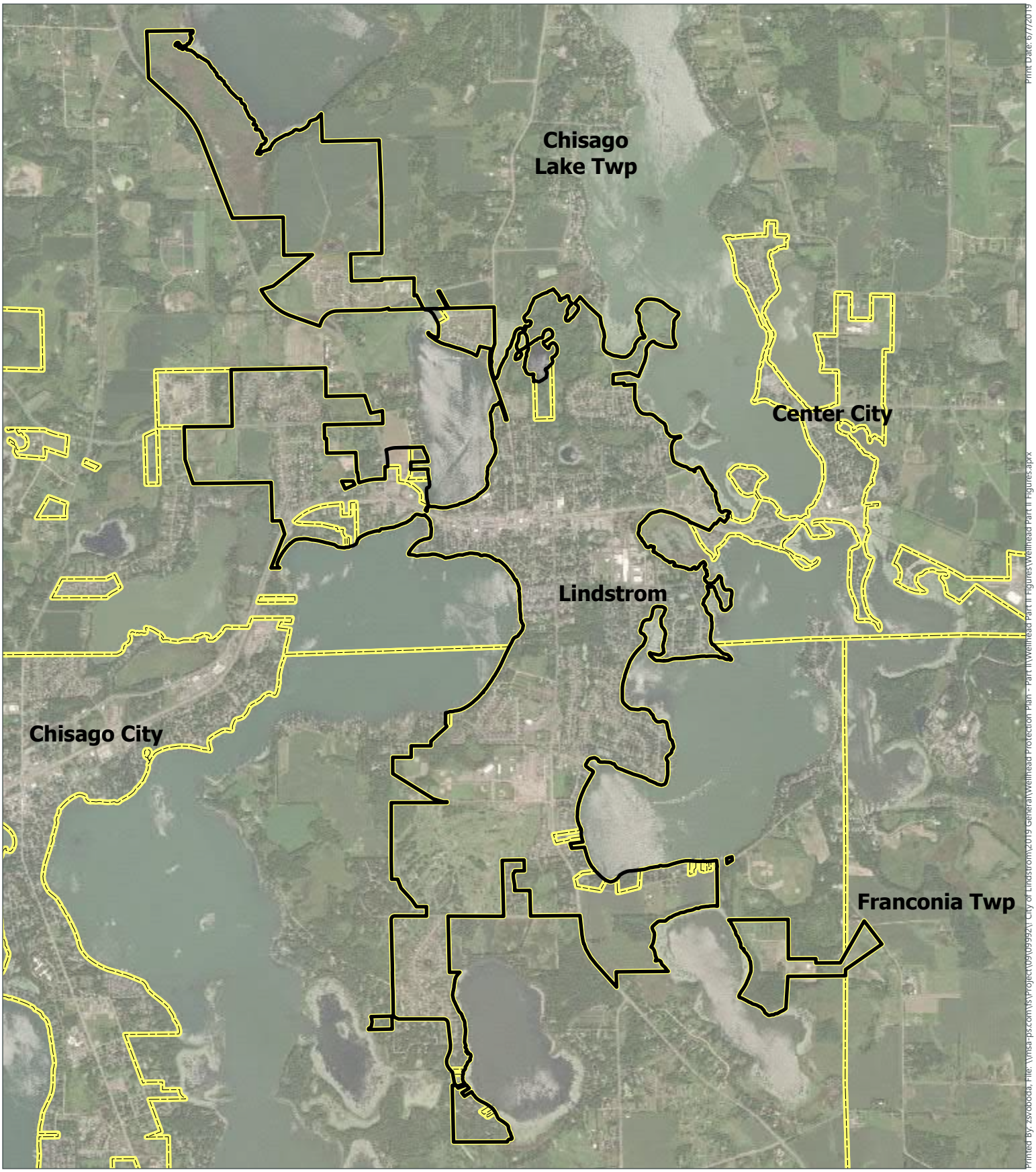


MSA

Data Sources:

Lindstrom City Boundary

City/Township Boundary

0 1,500 3,000 Feet

# FIGURE 6

## POLITICAL BOUNDARIES MAP

CITY OF LINDSTROM,
CHISAGO COUNTY, MINNESOTA

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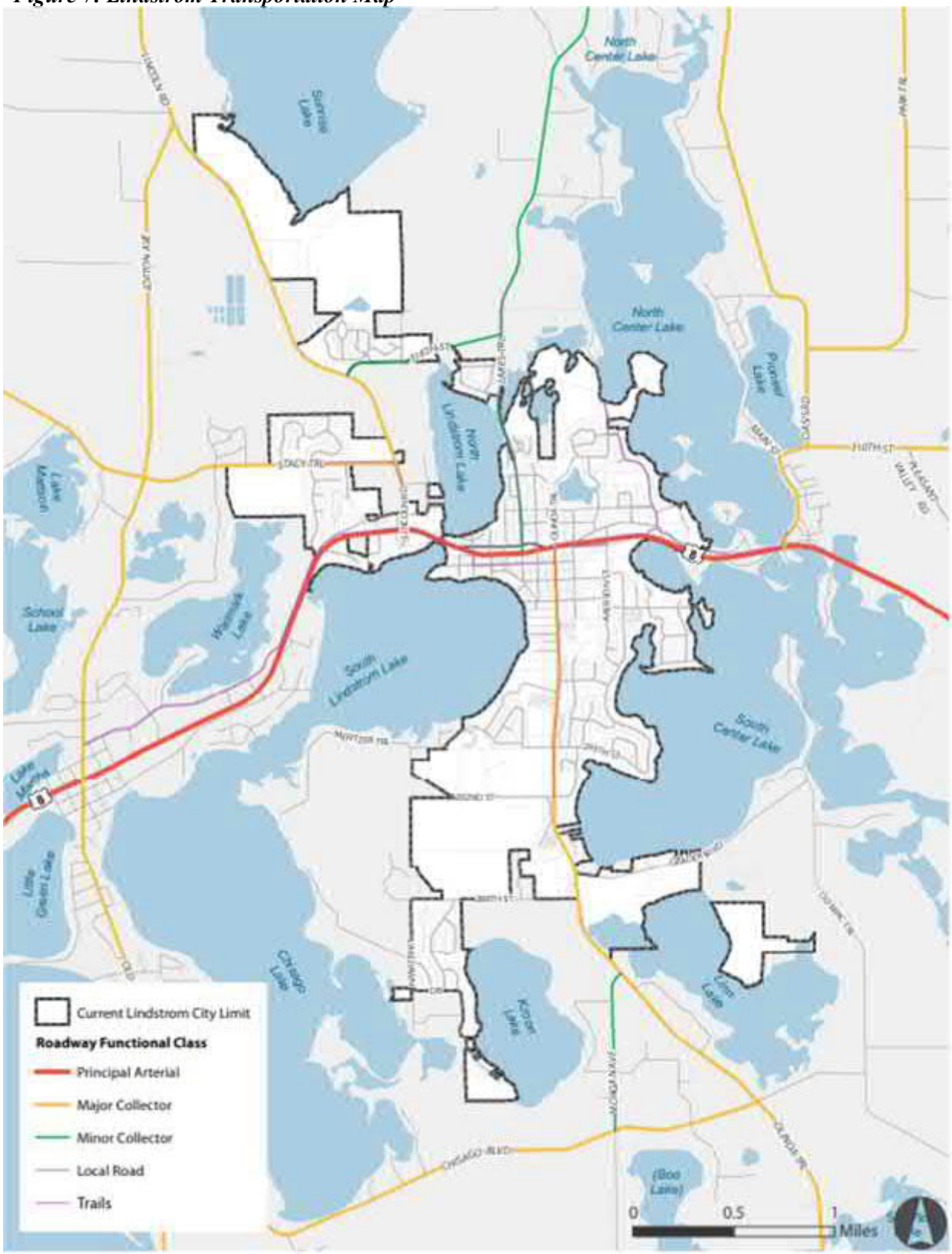
*Figure 7: Lindstrom Transportation Map*



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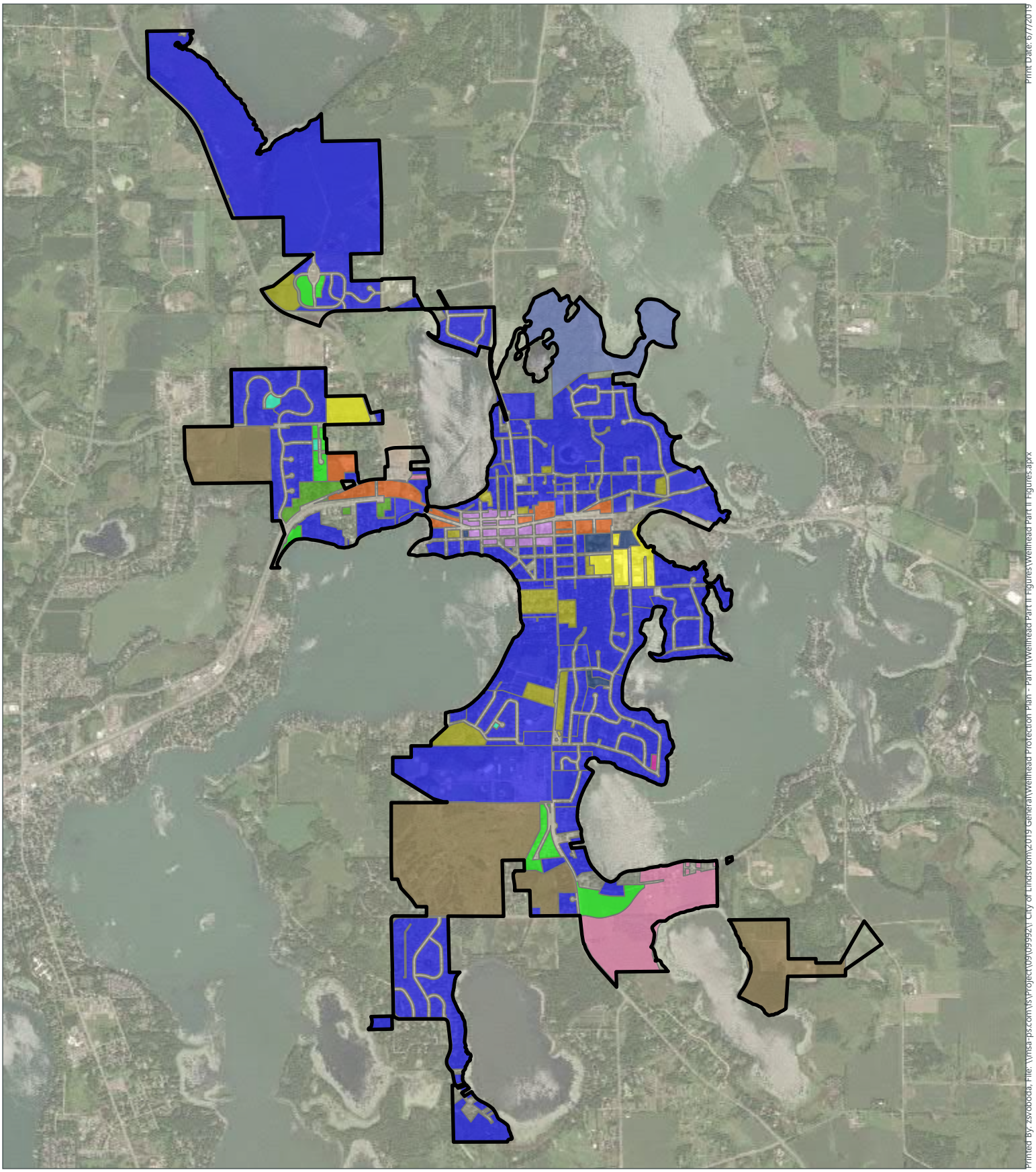


MSA

# FIGURE 8

## ZONING MAP

CITY OF LINDSTROM,
CHISAGO COUNTY, MINNESOTA

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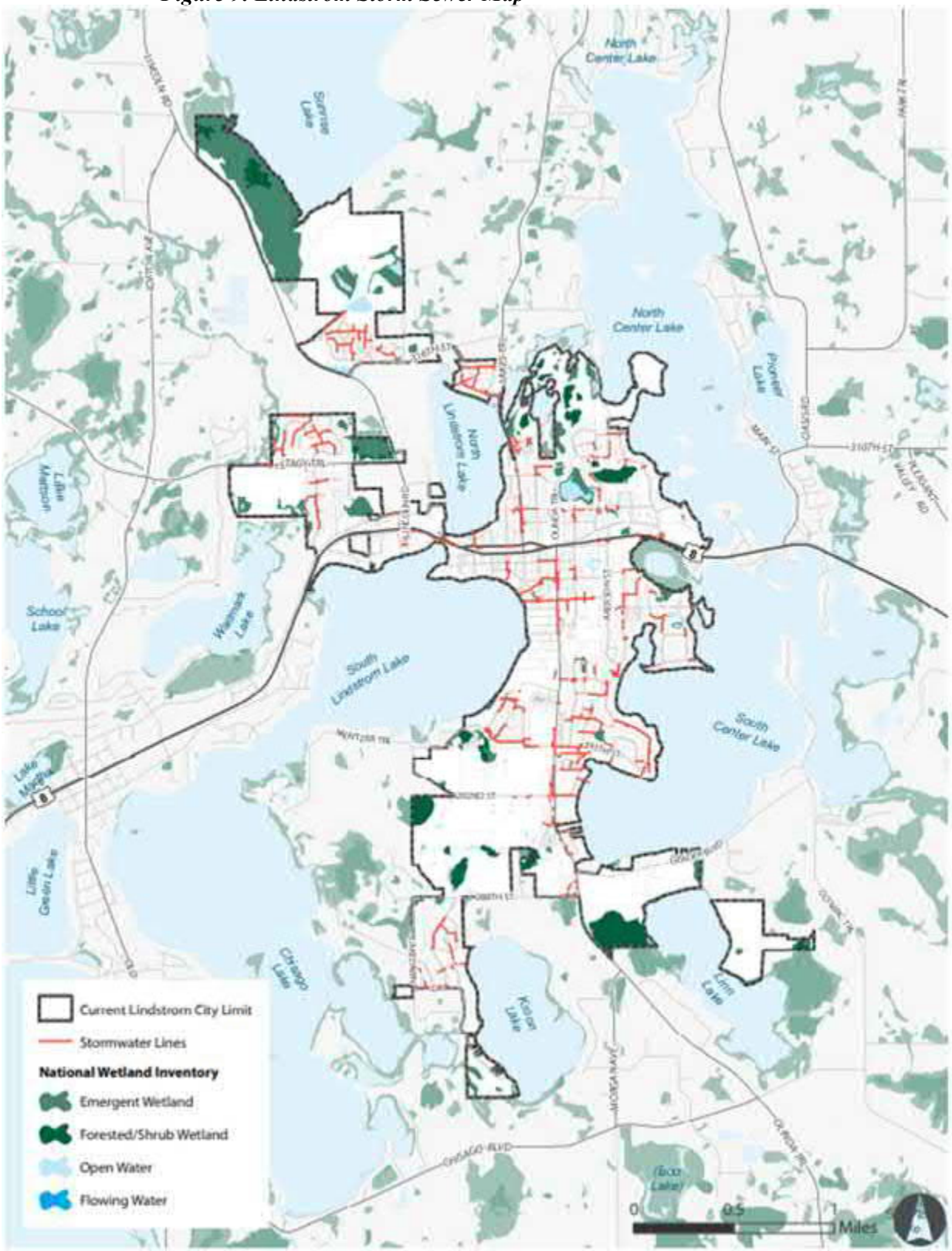
***Figure 9: Lindstrom Storm Sewer Map***




Included with Permission from Hoisington Koegler Group Inc.

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***Figure 10: IWMZs for the City of Lindstrom***

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** | 1130007 **COMMUNITY** |
| **NAME** | Lindstrom |
| **ADDRESS** | Lindstrom Water Superintendent, 13292 Sylvan Avenue, P.O. Box 703, Lindstrom, MN 55045 |

## FACILITY (WELL) INFORMATION

| | |
|---|---|
| **NAME** | Well #3 |
| **FACILITY ID** | S02 |
| **UNIQUE WELL NO.** | 217913 |
| **COUNTY** | Chisago |

**IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?**

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

| **PWS ID / FACILITY ID** | 1130007 S02 | **UNIQUE WELL NO.** | 217913 |
|---|---|---|---|

| 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 | | Y | 15 | 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 / FACILITY ID | 1130007 S02 | UNIQUE WELL NO. | 217913 |
|---|---|---|---|

| PCSI CODE | ACTUAL OR POTENTIAL CONTAMINATION SOURCE | ISOLATION DISTANCES (FEET) | | | | LOCATION | |
|---|---|---|---|---|---|---|---|
| | | Minimum Distances | | Sensitive Well[1] | Within 200 Ft. Y / N / U | Dist. from Well | Est. (?) |
| | | Community | Non-community | | | | |
| *GW1 | Gray-water dispersal area | 50 | 50 | 100 | N | | |
| LC1 | Large capacity cesspools (Class V well - illegal)[2] | 75 | 75 | 150 | N | | |
| MVW | Motor vehicle waste disposal (Class V well - illegal)[2] | illegal | illegal | | N | | |
| PR1 | Privy, nonportable | 50 | 50 | 100 | N | | |
| PR2 | Portable (privy) or toilet | 50 | 20 | | N | | |
| *SF1 | Watertight sand filter; peat filter; or constructed wetland | 50 | 50 | | N | | |
| SET | Septic tank | 50 | 50 | | N | | |
| HTK | Sewage holding tank, watertight | 50 | 50 | | N | | |
| SS1 | Sewage sump capacity 100 gal. or more | 50 | 50 | | N | | |
| SS2 | Sewage sump capacity less than 100 gal., tested, conforming to rule | 50 | 20 | | N | | |
| *ST1 | Sewage treatment device, watertight | 50 | 50 | | N | | |
| SB1 | Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences | 50 | 20 | | N | | |
| SB2 | Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials | 50 | 50 | | Y | 100 | N |
| SB2 | Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials | 50 | 50 | | Y | 125 | N |
| *WB1 | Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection | 50 | 50 | | N | | |
| *WB2 | Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection | 20 | 20 | | N | | |
| **Land Application** | | | | | | | |
| SPT | Land spreading area for sewage, septage, or sludge | 50 | 50 | 100 | N | | |
| **Solid Waste Related** | | | | | | | |
| COS | Commercial compost site | 50 | 50 | | N | | |
| CD1 | Construction or demolition debris disposal area | 50 | 50 | 100 | N | | |
| *HW1 | Household solid waste disposal area, single residence | 50 | 50 | 100 | N | | |
| LF1 | Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons | 300 | 300 | 600 | N | | |
| SVY | Scrap yard | 50 | 50 | | N | | |
| SWT | Solid waste transfer station | 50 | 50 | | N | | |
| **Storm Water Related** | | | | | | | |
| SD1 | Storm water drain pipe, 8 inches or greater in diameter | 50 | 20 | | N | | |
| SWI | Storm water drainage well[2] (Class V well - illegal[3]) | 50 | 50 | | N | | |
| SM1 | Storm water pond greater than 5000 gal. | 50 | 35 | | N | | |
| **Wells and Borings** | | | | | | | |
| *EB1 | Elevator boring, not conforming to rule | 50 | 50 | | N | | |
| *EB2 | Elevator boring, conforming to rule | 20 | 20 | | N | | |
| MON | Monitoring well | record dist. | record dist. | | N | | |
| WEL | Operating well | record dist. | record dist. | | N | | |
| UUW | Unused, unsealed well or boring | 50 | 50 | | N | | |
| **General** | | | | | | | |
| *CR1 | Cistern or reservoir, buried, nonpressurized water supply | 20 | 20 | | N | | |
| PLM | Contaminant plume | 50 | 50 | | N | | |
| *CW1 | Cooling water pond, industrial | 50 | 50 | 100 | N | | |
| DC1 | Deicing chemicals, bulk road | 50 | 50 | 100 | N | | |
| *ET1 | Electrical transformer storage area, oil-filled | 50 | 50 | | N | | |
| GRV | Grave or mausoleum | 50 | 50 | | N | | |
| GP1 | Gravel pocket or French drain for clear water drainage only | 20 | 20 | | N | | |
| *HS1 | Hazardous substance buried piping | 50 | 50 | | N | | |
| HS2 | Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight, without safeguards | 150 | 150 | | N | | |
| HS3 | Hazardous substance tank or container, above ground or underground, 56 gal. or more, or 100 lbs. or more dry weight with safeguards | 100 | 100 | | N | | |
| HS4 | Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding | 50 | 50 | | N | | |
| HWF | Highest water or flood level | 50 | N/A | | N | | |
| *HG1 | Horizontal ground source closed loop heat exchanger buried piping | 50 | 50 | | N | | |

| PWS ID / FACILITY ID | 1130007 S02 | UNIQUE WELL NO. | 217913 |
|---|---|---|---|

| 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).** | | | | | | | |
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| | | | | | | | |
| **Potential Contamination Sources and Codes Based on Previous Versions of this Form** | | | | | | | |
| | none found within 200' of this well. | | | | | | |

* New potential contaminant source.

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

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

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

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

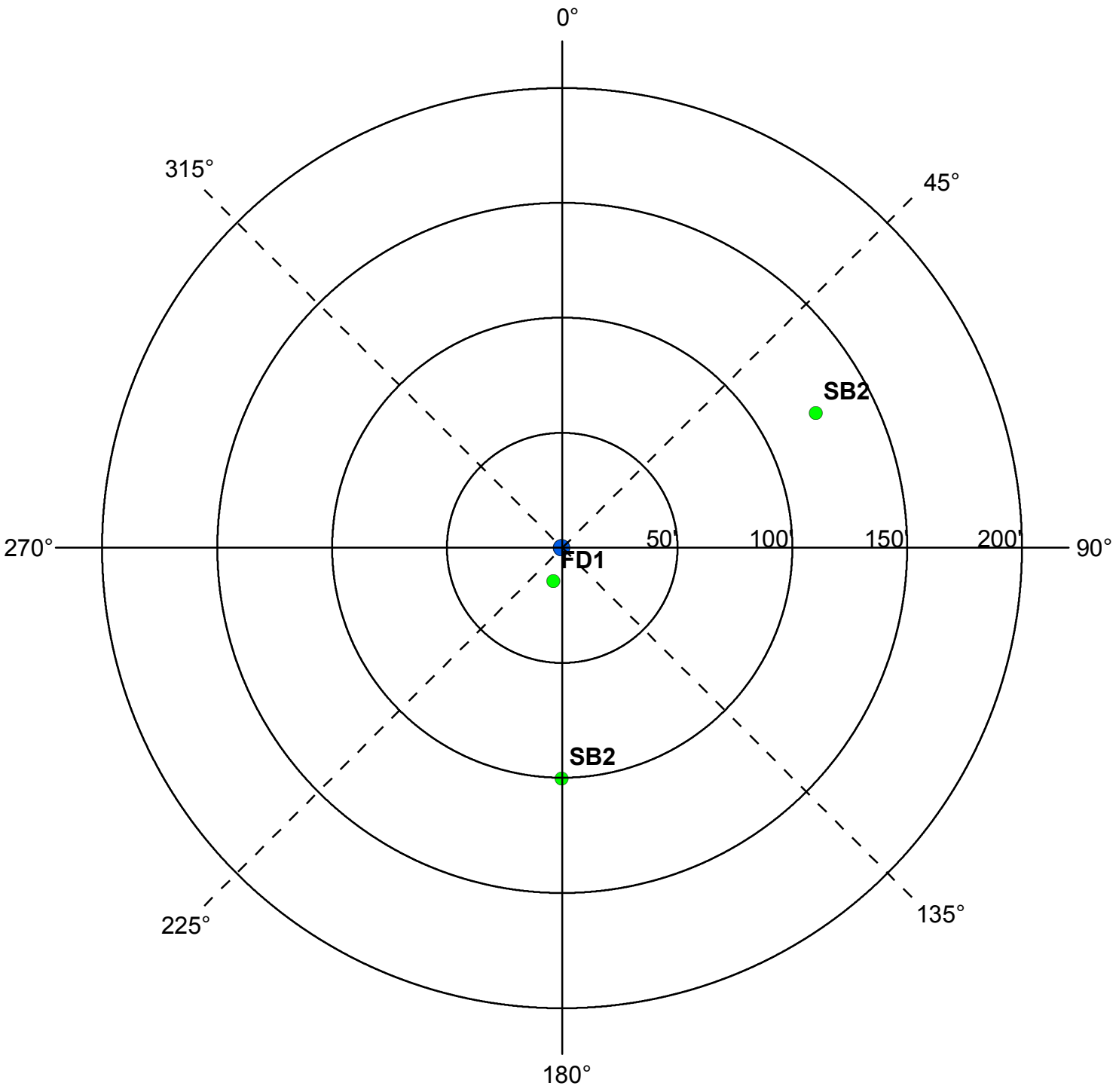
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls;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

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

| PWS ID / FACILITY ID | 1130007 S02 | UNIQUE WELL NO. | 217913 |
|---|---|---|---|

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

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




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

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

| INSPECTOR | Freitag, John | DATE | 9 - 10 - 2019 |
|---|---|---|---|

| PWS ID / FACILITY ID | 1130007 S02 | UNIQUE WELL NO. | 217913 |
|---|---|---|---|

| RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES | WHP MEASURE IMPLEMENTED? Y or N | DATE VERIFIED |
|---|---|---|
| Any sewer lines that are observed to be leaking, cracked, or deteriorated, should be replaced. | | |
| Best management practices should be employed for outdoor chemical use, to prevent stormwater from moving chemical contaminants to surface waters or where wells could be impacted. | | |
| Floor drains, such as in pumphouses, that discharge to a gravel pocket or seepage pit should have a "No Dumping" sign posted. | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**COMMENTS**

To the best knowledge of city staff, clear water drainage from floor drain in the well house is thought to drain to the sanitary sewer line in the street.

**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** | 1130007 | **COMMUNITY** |
| **NAME** | Lindstrom | |
| **ADDRESS** | Lindstrom Water Superintendent, 13292 Sylvan Avenue, P.O. Box 703, Lindstrom, MN 55045 | |

## FACILITY (WELL) INFORMATION

| | |
|---|---|
| **NAME** | Well #4 |
| **FACILITY ID** | S04 |
| **UNIQUE WELL NO.** | 659877 |
| **COUNTY** | Chisago |

**IS THERE A WELL LOG OR ADDITIONAL CONSTRUCTION INFORMATION AVAILABLE?**

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

| **PWS ID / FACILITY ID** | 1130007 S04 | **UNIQUE WELL NO.** | 659877 |
|---|---|---|---|

| 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 / FACILITY ID | 1130007 S04 | UNIQUE WELL NO. | 659877 |
|---|---|---|---|

| PCSI CODE | ACTUAL OR POTENTIAL CONTAMINATION SOURCE | ISOLATION DISTANCES (FEET) | | | | LOCATION | |
|---|---|---|---|---|---|---|---|
| | | Minimum Distances | | Sensitive Well[1] | Within 200 Ft. Y / N / U | Dist. from Well | Est. (?) |
| | | Community | Non-community | | | | |
| *GW1 | Gray-water dispersal area | 50 | 50 | 100 | N | | |
| LC1 | Large capacity cesspools (Class V well - illegal)[2] | 75 | 75 | 150 | N | | |
| MVW | Motor vehicle waste disposal (Class V well - illegal)[2] | illegal | illegal | | N | | |
| PR1 | Privy, nonportable | 50 | 50 | 100 | N | | |
| PR2 | Portable (privy) or toilet | 50 | 20 | | N | | |
| *SF1 | Watertight sand filter; peat filter; or constructed wetland | 50 | 50 | | N | | |
| SET | Septic tank | 50 | 50 | | N | | |
| HTK | Sewage holding tank, watertight | 50 | 50 | | N | | |
| SS1 | Sewage sump capacity 100 gal. or more | 50 | 50 | | N | | |
| SS2 | Sewage sump capacity less than 100 gal., tested, conforming to rule | 50 | 20 | | N | | |
| *ST1 | Sewage treatment device, watertight | 50 | 50 | | N | | |
| SB1 | Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences | 50 | 20 | | Y | 150 | N |
| SB1 | Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences | 50 | 20 | | Y | 120 | N |
| SB1 | Sewer, buried, approved materials, tested, serving one building, or two or less single-family residences | 50 | 20 | | Y | 100 | N |
| SB2 | Sewer, buried, collector, municipal, serving a facility handling infectious or pathological wastes, open-jointed or unapproved materials | 50 | 50 | | Y | 80 | N |
| *WB1 | Water treatment backwash holding basin, reclaim basin, or surge tank with a direct sewer connection | 50 | 50 | | N | | |
| *WB2 | Water treatment backwash holding basin, reclaim basin, or surge tank with a backflow protected sewer connection | 20 | 20 | | N | | |
| **Land Application** | | | | | | | |
| SPT | Land spreading area for sewage, septage, or sludge | 50 | 50 | 100 | N | | |
| **Solid Waste Related** | | | | | | | |
| COS | Commercial compost site | 50 | 50 | | N | | |
| CD1 | Construction or demolition debris disposal area | 50 | 50 | 100 | N | | |
| *HW1 | Household solid waste disposal area, single residence | 50 | 50 | 100 | N | | |
| LF1 | Landfill, permitted demolition debris, dump, or mixed municipal solid waste from multiple persons | 300 | 300 | 600 | N | | |
| SVY | Scrap yard | 50 | 50 | | N | | |
| SWT | Solid waste transfer station | 50 | 50 | | N | | |
| **Storm Water Related** | | | | | | | |
| SD1 | Storm water drain pipe, 8 inches or greater in diameter | 50 | 20 | | Y | 100 | N |
| SD1 | Storm water drain pipe, 8 inches or greater in diameter | 50 | 20 | | Y | 70 | N |
| SWI | Storm water drainage well[2] (Class V well - illegal[3]) | 50 | 50 | | N | | |
| SM1 | Storm water pond greater than 5000 gal. | 50 | 35 | | N | | |
| **Wells and Borings** | | | | | | | |
| *EB1 | Elevator boring, not conforming to rule | 50 | 50 | | N | | |
| *EB2 | Elevator boring, conforming to rule | 20 | 20 | | N | | |
| MON | Monitoring well | record dist. | record dist. | | N | | |
| WEL | Operating well | record dist. | record dist. | | N | | |
| UUW | Unused, unsealed well or boring | 50 | 50 | | N | | |
| **General** | | | | | | | |
| *CR1 | Cistern or reservoir, buried, nonpressurized water supply | 20 | 20 | | N | | |
| PLM | Contaminant plume | 50 | 50 | | N | | |
| *CW1 | Cooling water pond, industrial | 50 | 50 | 100 | N | | |
| DC1 | Deicing chemicals, bulk road | 50 | 50 | 100 | N | | |
| *ET1 | Electrical transformer storage area, oil-filled | 50 | 50 | | N | | |
| GRV | Grave or mausoleum | 50 | 50 | | N | | |
| GP1 | Gravel pocket or French drain for clear water drainage only | 20 | 20 | | Y | 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 | | |

| PWS ID / FACILITY ID | 1130007 S04 | UNIQUE WELL NO. | 659877 |
|---|---|---|---|

| 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 | | | | |
| HS4 | Hazardous substance multiple storage tanks or containers for residential retail sale or use, no single tank or container exceeding 56 gal. or 100 lbs., but aggregate volume exceeding | 50 | 50 | | N | | |
| HWF | Highest water or flood level | 50 | N/A | | N | | |
| *HG1 | Horizontal ground source closed loop heat exchanger buried piping | 50 | 50 | | N | | |
| *HG2 | Horizontal ground source closed loop heat exchanger buried piping and horizontal piping, approved materials and heat transfer fluid | 50 | 10 | | N | | |
| IWD | Industrial waste disposal well (Class V well)[2] | illegal[3] | illegal[3] | | N | | |
| IWS | Interceptor, including a flammable waste or sediment | 50 | 50 | | N | | |
| OH1 | Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (holds water six months or more) | 50 | 35 | | N | | |
| *PP1 | Petroleum buried piping | 50 | 50 | | N | | |
| *PP2 | Petroleum or crude oil pipeline to a refinery or distribution center | 100 | 100 | | N | | |
| 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).** | | | | | | | |
| | | | | | | | |
| | | | | | | | |
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| | | | | | | | |
| | | | | | | | |
| **Potential Contamination Sources and Codes Based on Previous Versions of this Form** | | | | | | | |
| | none found within 200' of this well. | | | | | | |

| PWS ID / FACILITY ID | 1130007 S04 | UNIQUE WELL NO. | 659877 |
|---|---|---|---|

| 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 | | | | |

* New potential contaminant source.

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

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

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

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

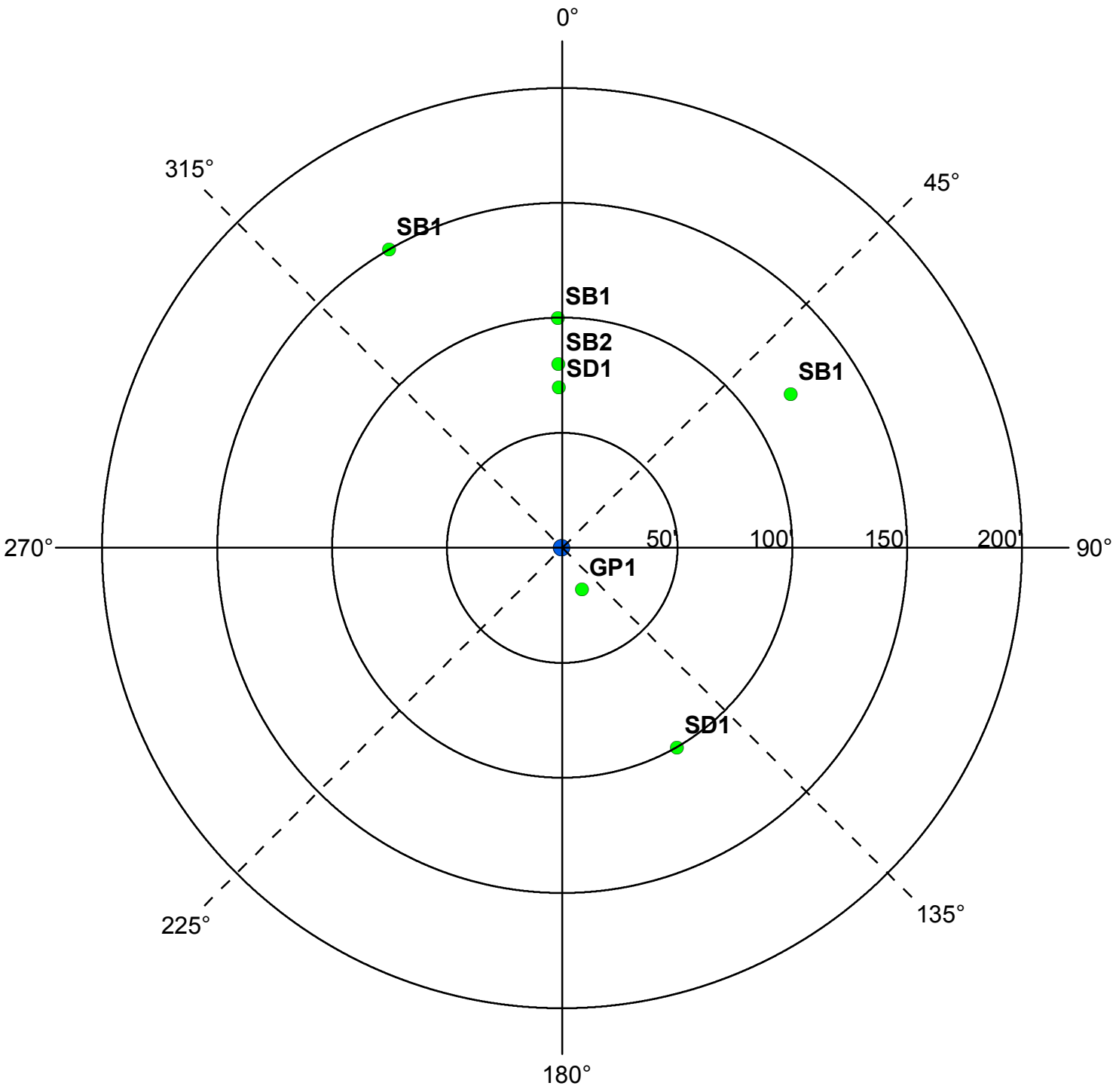
[5] A community public water-supply well must be a minimum of 50 feet from a petroleum tank or container, unless the tank or container is used for emergency pumping and is located in a room or building separate from the community well; and is of double-wall construction with leak detection between walls;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

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

| PWS ID / FACILITY ID | 1130007 S04 | UNIQUE WELL NO. | 659877 |
|---|---|---|---|

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

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




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

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

| INSPECTOR | Freitag, John | DATE | 9 - 10 - 2019 |
|---|---|---|---|

| PWS ID / FACILITY ID | 1130007 S04 | UNIQUE WELL NO. | 659877 |
|---|---|---|---|

| RECOMMENDED WELLHEAD PROTECTION (WHP) MEASURES | WHP MEASURE IMPLEMENTED? Y or N | DATE VERIFIED |
|---|---|---|
| Any sewer lines that are observed to be leaking, cracked, or deteriorated, should be replaced. | | |
| Best management practices should be employed for outdoor chemical use, to prevent stormwater from moving chemical contaminants to surface waters or where wells could be impacted. | | |
| Floor drains, such as in pumphouses, that discharge to a gravel pocket or seepage pit should have a "No Dumping" sign posted. | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**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**

***Figure 11: Note on Public Drainage Systems***

Note: The National Hydraulic Dataset (NHD) data was examined for the City of Lindstrom DWSMA and no ditches were located within the DWSMA area.

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# Appendix A
# City of Lindstrom Wellhead Protection Plan, Part 1
Delineation of the Wellhead Protection Area (WHPA) Drinking Water Supply Management Area (DWSMA and Assessments of Well and DWSMA Vulnerability)

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# Amendment to the Wellhead Protection Plan

# Part I

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

**Prepared for**

**City of Lindstrom**

**December 2017**

**Amal Djerrari, P.E., Hydrologist**
**Source Water Protection Unit**

DEPARTMENT OF HEALTH

CLEAN WATER LAND & LEGACY AMENDMENT

# Table of Contents

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## Table of Contents - Continued

### List of Tables



### List of Figures



### Appendices



---

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

Signature: _____ Date: _____

Printed Name: Amal Djerrari License Number: 20369

---

# Glossary of Terms

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

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

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

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

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

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

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

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

# Acronyms

**CWI** - County Well Index

**DNR** - Minnesota Department of Natural Resources

**EPA** - United States Environmental Protection Agency

**FSA** - Farm Security Administration

**MDA** - Minnesota Department of Agriculture

**MDH** - Minnesota Department of Health

**MGS** - Minnesota Geological Survey

**MnDOT** - Minnesota Department of Transportation

**MnGEO** - Minnesota Geospatial Information Office

**MODFLOW** - Three-Dimensional Finite-Difference Groundwater Model

**MPCA** - Minnesota Pollution Control Agency

**NRCS** - Natural Resource Conservation Service

**SWCD** - Soil and Water Conservation District

**UMN** - University of Minnesota

**USDA** - United States Department of Agriculture

**USGS** - United States Geological Survey

# 1. Summary

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

**Geology and Groundwater Flow** – The city of Lindstrom has two primary wells completed in the Mt. Simon Sandstone Aquifer. The Mt. Simon is confined by the overlying Eau Claire Formation, or buried beneath a layer of clay-rich sediment, within the bedrock valleys. The wells are approximately 460 to 620 feet deep (Table 1). Groundwater flow in the Mt. Simon is generally to the east-southeast and discharges to the St. Croix River. Locally, a groundwater mound creates a southwestern component of flow near the city of Lindstrom wells.

**Table 1 - Water Supply Well Information**

| Local Well ID | Unique Number | Use / Status | Case Diameter (inches) | Case Depth (feet) | Well Depth (feet) | Date Constructed / Reconstructed | Aquifer | Well Vulnerability |
|---|---|---|---|---|---|---|---|---|
| Well #3 | 217913 | Primary | 24 x 16 | 505 | 615 | 1972 | CMTS - Mt. Simon | Not Vulnerable |
| Well #4 | 659877 | Primary | 30 x 24 x 18 | 459 | 595 | 2001 | CMTS - Mt. Simon | Not Vulnerable |

**Well Vulnerability** - The vulnerability of each well has been assessed based on 1) well construction details, especially conformance with standards required by the state well code, 2) the geologic sensitivity of the aquifer, and 3) past monitoring results. Well #3 does not meet construction standards as grouting information is unknown. If the well was not grouted, it has the potential for acting as a conduit for flow of surface water and contaminants into the buried aquifer. The wells draw from an aquifer that is geologically protected. Water samples from both wells lacked detectable tritium (detection indicates the presence of young water), so they are not considered vulnerable at this time (Table 2). This is reinforced by the low chloride/bromide ratio presented below, which is reflective of water that has not been impacted by human-caused chloride contamination such as road deicing (Mullaney et al., 2009).

**Table 2 - Isotope and Water Quality Results**

| Sampling Point | Tritium (TU) | Nitrate + Nitrite (mg/L) | Ammonia Nitrogen (mg/L) | Chloride (mg/L) | Bromide (mg/L) | Cl/Br | Sulfate (mg/L) |
|---|---|---|---|---|---|---|---|
| Well #3<br>217913 | *< 0.8*<br>*1/24/17* | *< 0.05*<br>*1/24/17* | 0.16<br>*1/24/17* | 0.688<br>*1/24/17* | 0.0083<br>*1/24/17* | 83<br>*1/24/17* | <0.5<br>*1/24/17* |
| Well #4<br>659877 | *< 0.8*<br>*1/24/17* | *< 0.05*<br>*1/24/17* | 0.15<br>*1/24/17* | 0.843<br>*1/24/17* | 0.0088<br>*1/24/17* | 96<br>*1/24/17* | <0.5<br>*1/24/17* |

**DWSMA vulnerability** -The vulnerability of the city's aquifer throughout the DWSMA is based on the geologic sensitivity ratings of wells and their monitoring data. Based on this information MDH has assigned a low vulnerability to the DWSMA. This suggests that the clay-rich sediments and/or the Eau Claire Formation that overlie the city's aquifer prevents water and contaminants from moving quickly from the land surface into the city's aquifer and implies a time of travel of decades or longer. The principal threats to this aquifer are unsealed abandoned wells that penetrate through this clay layer. Such wells are 450 feet or greater in depth in the Lindstrom area.

**Water Quality Concerns** - At present, none of the human-caused contaminants for which the Safe Drinking Water Act has established health-based standards has been found above maximum allowable levels in the city's water supply.

**Recommendations** - Recommendations have been generated to improve future delineations and vulnerability assessments and should be considered for inclusion as management strategies in the city's wellhead protection plan. These activities include water quality monitoring. Further details can be found in Section 8 of this report.

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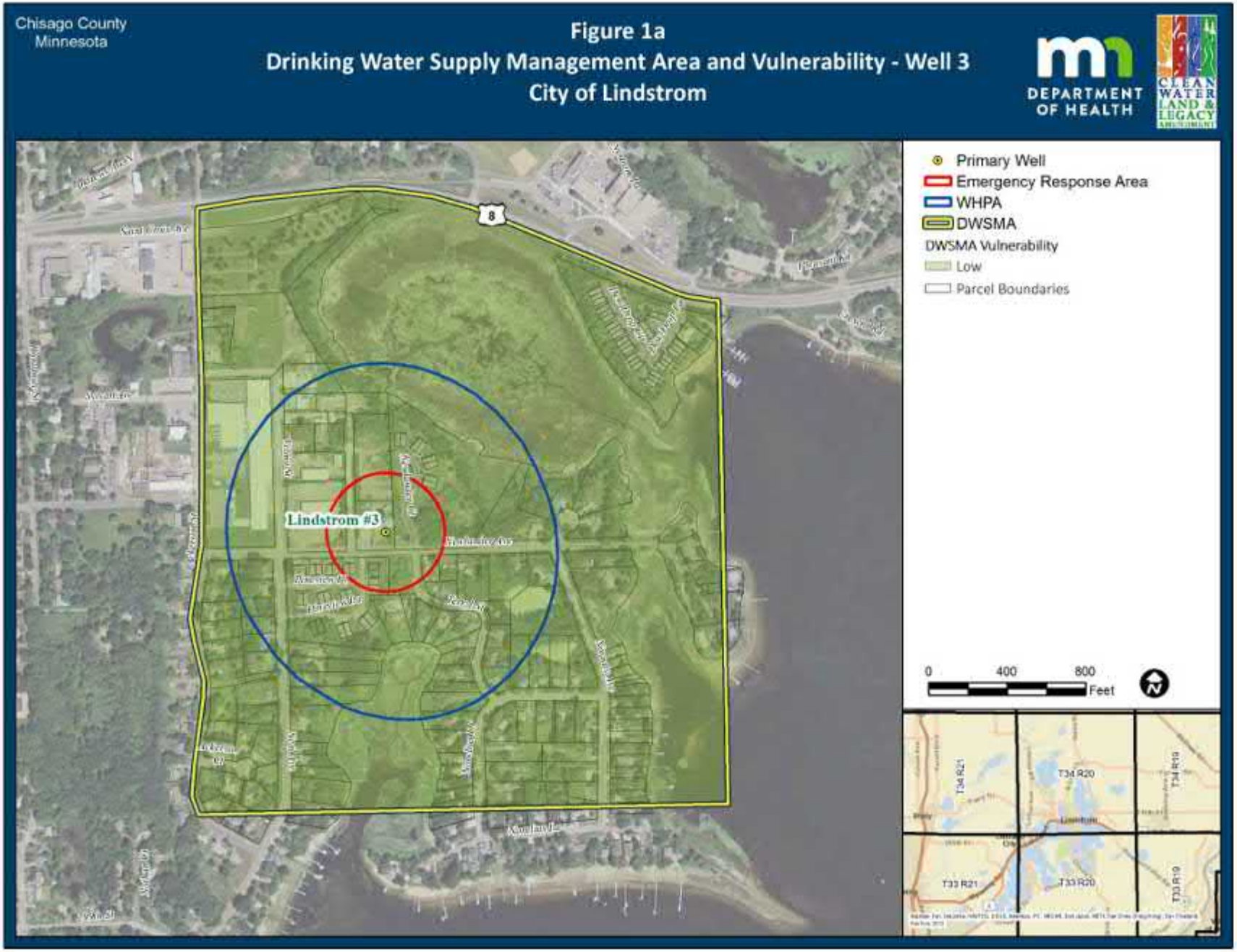
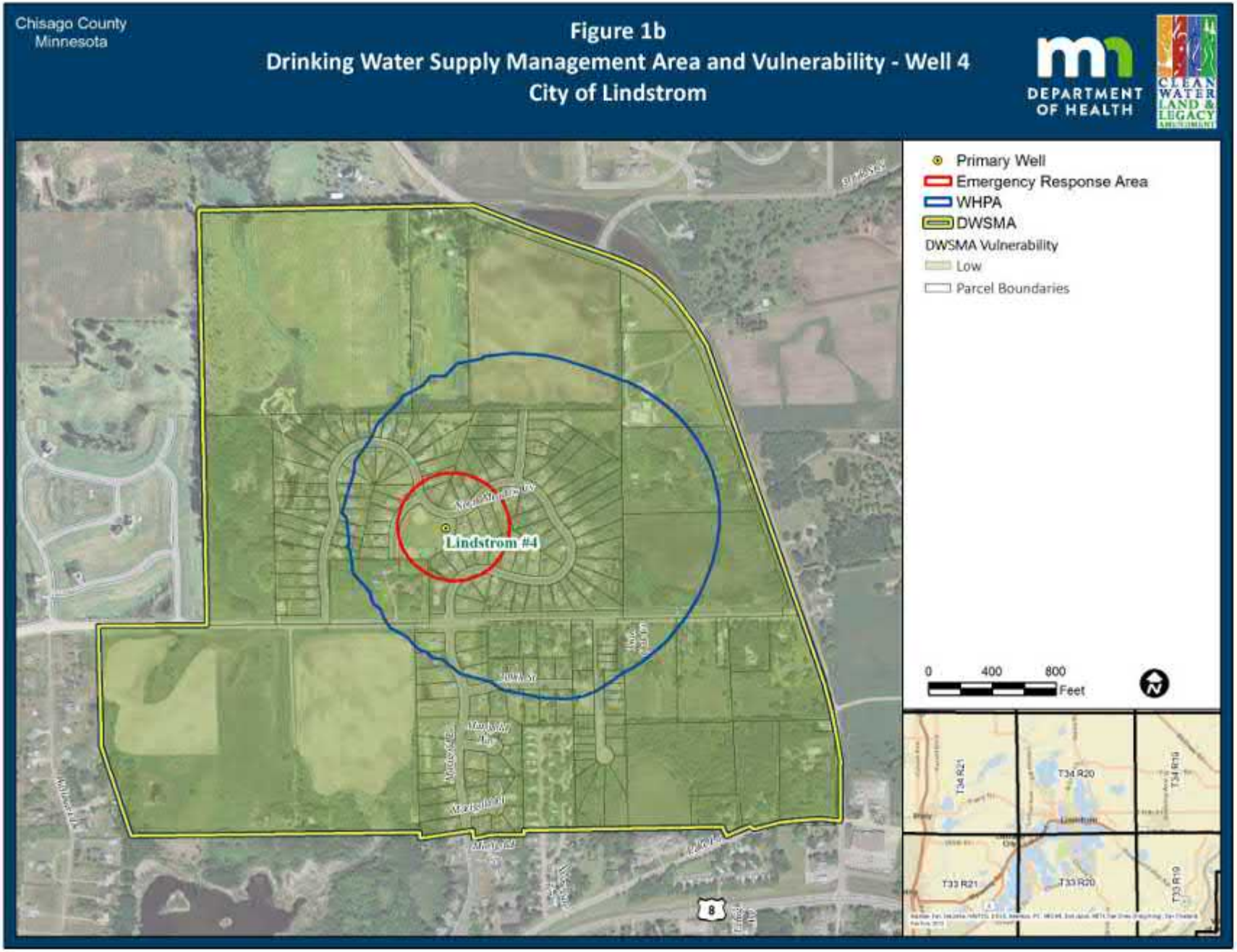

Chisago County
Minnesota
Figure 1a
Drinking Water Supply Management Area and Vulnerability - Well 3
City of Lindstrom
DEPARTMENT OF HEALTH
CLEAN WATER LAND & LEGACY
Primary Well
Emergency Response Area
WHPA
DWSMA
DWSMA Vulnerability
Low
Parcel Boundaries
Lindstrom #3
8
0
400
800
Feet
T34 R21
T34 R20
T34 R19
T33 R21
T33 R20
T33 R19


Chisago County
Minnesota
Figure 1b
Drinking Water Supply Management Area and Vulnerability - Well 4
City of Lindstrom
DEPARTMENT OF HEALTH
CLEAN WATER LAND & LEGACY
Primary Well
Emergency Response Area
WHPA
DWSMA
DWSMA Vulnerability
Low
Parcel Boundaries
Lindstrom #4
0
400
800
Feet
T34 R21
T34 R20
T34 R19
T33 R21
T33 R20
T33 R19
8

## 2. Introduction

The Minnesota Department of Health (MDH) developed Part I of the wellhead protection (WHP) plan at the request of the city of Lindstrom (PWSID 1130007). The work was performed in accordance with the Minnesota Wellhead Protection Rule, parts 4720.5100 to 4720.5590.

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

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

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

## 3. Assessment of the Data Elements

MDH staff met with representatives of the public water supplier on March 14, 2017, for a scoping meeting that identified the data elements required to prepare Part I of the WHP plan. Table 3 presents the assessment of these data elements relative to the present and future implications of planning items specified in Minnesota Rules, part 4720.5210.

## Table 3 - Assessment of Data Elements

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

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

**Definitions Used for Assessing Data Elements:**

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

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

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

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

# 4. General Descriptions

## 4.1 Description of the Water Supply System

The city of Lindstrom obtains its drinking water supply from two primary wells completed in the Mt. Simon Sandstone Aquifer. Table 1 summarizes general construction information and vulnerability status.

## 4.2 Description of the Hydrogeologic Setting

The hydrologic setting for the Mt. Simon Aquifer is described in the 2007 WHPA Part 1 report (Djerrari, 2007). Unconsolidated deposits more than 300 feet thick are present above bedrock in the city of Lindstrom area. Variations in the thickness occur primarily due to relief on the bedrock surface, but are also due to topography. The principal subsurface feature that affects the thickness of these materials is a bedrock valley that likely had been incised into the bedrock surface prior to the last glaciation. Figure 3 in Appendix A shows the trend of this valley in the Lindstrom-Center City area. The valley is largely filled with fine-grained glacial deposits, although a few horizons of sand are present locally (Meyer and others, 2010).

The rocks comprising the uppermost bedrock surface near the city of Lindstrom are the Tunnel City and the Wonewoc Sandstones. Below the Wonewoc, and separating it from the Mt. Simon, is the Eau Claire Formation, which grades from a glauconitic fine-grained sandstone to siltstone to shale. The Eau Claire is typically 100 to 125 feet thick. However, in the Lindstrom area, the Eau Claire has been eroded, and is even absent in the deepest portion of the bedrock valley.

The Mt. Simon Sandstone is the lowermost Paleozoic formation. Lindstrom Wells 3 and 4 draw water from the Mt. Simon Aquifer.

The distribution of the aquifer and its stratigraphic relationships with adjacent geologic materials are shown in the geologic cross-sections developed in the original Part 1 plan (Djerrari, 2007), and included in Appendix A. They were prepared using well record data contained in the County Well Index (CWI) database. The geological maps and studies used to further define local hydrogeologic conditions are provided in the "Selected References" section of this report. A description of the hydrogeologic setting for the aquifers used to supply drinking water is presented in Table 4.

**Table 4 - Description of the Hydrogeologic Setting at the City Wells**

**(Mt. Simon Aquifer)**

| Aquifer | Attribute | Descriptor | Data Source |
|---|---|---|---|
| Mt. Simon Aquifer | Aquifer Material | Sandstone | City well logs. |
| | Primary Porosity | 0.2 | Typical of aquifer material. |
| | Aquifer Thickness | 126 - 139 ft | City well logs. |
| | Stratigraphic Top Elevation | 442 – 472 feet AMSL | City well logs. |
| | Stratigraphic Bottom Elevation | 317 - 332 feet AMSL | City well logs. |
| | Hydraulic Confinement | Confined | Interpreted from well records found in the CWI database. |
| | Transmissivity | Reference Value/Range<br>2,780 $ft^2$/day<br>(1,790 – 4,820 $ft^2$/day) | The reference value and the range for the transmissivity were obtained by multiplying the hydraulic conductivity by the aquifer thickness. |
| | Hydraulic Conductivity (K) | Reference Value/Range :<br>22.1 ft/day<br>(14.2 – 34.7 ft/day) | The reference value and the range for the hydraulic conductivity were obtained from specific capacity tests conducted in Mt. Simon wells in the area. |
| | Groundwater Flow Field | Flow to the west/southwest at Well #4; Hydraulic Gradient: $2 \times 10^{-3}$<br>Well #3 is located on a groundwater mound (created by the presence of a bedrock valley incised in the Mt. Simon). Hydraulic Gradient is flat ($5 \times 10^{-5}$) | Groundwater Model Results (Figure 2). |

# 5. Delineation of the Wellhead Protection Area

## 5.1 Delineation Criteria

The boundaries of the WHPA for the city of Lindstrom are shown in Figures 1a and 1b. Table 5 describes how the delineation criteria specified under Minnesota Rules, part 4720.5510, were addressed.

Information provided by the city of Lindstrom was used to identify the maximum volume of water pumped annually by each well over the previous five-year period, as shown in Table 6. Previous pumping values have been reported to the DNR, as required by Groundwater Appropriations Permit 1980-3020. The city does not anticipate any increase in the annual pumping volume in the next five years. Therefore, the pumping rate used in the model for each Lindstrom well for the WHPA delineation was the historical maximum for the period 2012-2016. The maximum daily volume of discharge, used as an input parameter in the groundwater model, was calculated by dividing the greatest annual pumping volume by 365 days.

**Table 5 - Description of WHPA Delineation Criteria**

| Criterion | Descriptor | How the Criterion was Addressed |
|---|---|---|
| Flow Boundary | Mississippi, Rum, and St. Croix Rivers | The rivers provided boundary conditions to the regional model that extended to these natural boundaries. The head specified boundary for the local model were set at the head computed by the regional groundwater model. |
| Flow Boundary | Other High-Capacity Wells (Table 7) | The pumping amounts were determined based on the averaged 2011 - 2015 pumping volumes. The pumping amounts of these high-capacity wells were included in the methods used for the delineation. In addition, other high capacity wells located beyond the two-mile radius were included in the model. |
| Daily Volume of Water Pumped | See Table 6 | Pumping information was obtained from the DNR Groundwater Appropriations Permit 1980-3020 and from the public water supply system. The annual pumped volumes were converted to a daily volume pumped by the well. |
| Groundwater Flow Field | See Figure 2 | The model calibration process addressed the relationship between the calculated versus observed groundwater flow field. |
| Aquifer Transmissivity | Reference Value:<br><br>2,780 $ft^2$/day for the Mt. Simon at Well #1 | See Table 4. |
| Time of Travel | 10 years | The public water supplier selected a 10-year time of travel. |

## Table 6 - Annual Volume of Water Discharged from Water Supply Wells

| Well Name | Unique Number | Type | Total Annual Withdrawal (gal/year) | | | | | Maximum Withdrawal 2012 - 2016 (gallons/year) | Projected 2021 Withdrawal (gallons/year) | WHPA Withdrawal Instantaneous Pumping Rate ($m^3$/day)[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2012 | 2013 | 2014 | 2015 | 2016 | | | |
| Well #3 | 217913 | Primary | 38,713,000 | 55,297,000 | 53,435,000 | 53,908,000 | **56,017,000** | 56,017,000 | No Change | 580.9 |
| Well #4 | 659877 | Primary | **74,009,000** | 53,459,000 | 49,578,000 | 41,796,000 | 42,769,000 | 74,009,000 | | 767.5 |
| | | | | | | | | | | |
| **Totals** | | | 112,722,000 | 108,756,000 | 103,013,000 | 95,704,000 | 98,786,000 | 130,026,000 | | 1348.4 |

[1] = Withdrawals used in the WHPA delineation

Source: The DNR State Water Use Database System (SWUDS), Permit Number 1980-3020.

## Table 7 - Other Permitted High-Capacity Wells within Two Miles

| Unique Number | Well Name | DNR Permit Number | Aquifer | Use | Annual Volume of Water Pumped[1, 2] | Daily Volume (cubic meters) | 5-Year Average Annual Volume of Water Pumped[1] ▲ | 10-Year Average Annual Volume of Water Pumped[1] |
|---|---|---|---|---|---|---|---|---|
| 516063 | Chisago City, City of | 1979-3273 | CFRNCECR | Municipal/Public Water Supply | 33.431 | 347.000 | 36.311 | 34.221 |
| 217914 | Center City, City Of | 1965-1023 | CFRNCMTS | Municipal/Public Water Supply | 14.136 | 147.000 | 17.186 | 18.132 |
| 217896 | Chisago Lakes Golf Estates | 1986-3208 | CECRCMTS | Golf Course Irrigation | 11.826 | 123.000 | 15.211 | 16.323 |
| 706812 | Hazelden Foundation | 1977-3092 | CFIG | Private Water Supply; Commercial/Institutional Water Supply | 10.610 | 110.000 | 10.418 | 16.200 |
| 217895 | Hazelden Foundation | 1977-3092 | CIGL | Private Water Supply; Commercial/Institutional Water Supply | 5.678 | 59.000 | 6.381 | 3.521 |
| 228343 | Hazelden Foundation | 1977-3092 | CFRNCIGL | Private Water Supply; Commercial/Institutional Water Supply | 4.518 | 47.000 | 6.275 | 3.383 |
| 107129 | Hazelden Foundation | 1977-3092 | CFRNCIGL | Private Water Supply; Commercial/Institutional Water Supply | 9.703 | 101.000 | 4.216 | 2.108 |
| 564717 | Blue Waters Leisure Park | 2011-0335 | QBAA | Private Water Supply | 2.587 | 27.000 | 2.003 | 1.002 |
| 462966 | Center City, City Of | 1965-1023 | CIGLCMTS | Municipal/Public Water Supply | 0.001 | 0.000 | 1.644 | 0.822 |
| 217912 | Stonegate Properties | 1992-3195 | CFRNCMTS | Private Water Supply | 2.129 | 22.000 | 1.348 | 1.960 |
| 177939 | Blue Waters Leisure Park | 2011-0335 | QBAA | Private Water Supply | 0.000 | 0.000 | 0.393 | 0.197 |

[1] = Expressed as millions of gallons.
[2] = Source year = 2015
Source: MN Dep't. of Natural Resources Division of Waters - MNDNR Permitting and Reporting System (MPARS)
GIS Data Source: swp.mpars_ii_2015_table

## 5.2 Method Used to Delineate the Wellhead Protection Area

The WHPAs shown in Figures 1a and 1b are composites of all the areas identified using methods described in this report that potentially contribute recharge to the aquifers used by the city wells within a 10-year time of travel. Figures 1a and 1b show the WHPAs delineated for the city wells using the results of the porous media modeling delineations. These delineations were completed using an existing regional MODFLOW Model, MetroModel 3.0, provided by the Metropolitan Council (Met Council, 2009). MODFLOW is a 3D, cell-centered, finite difference, saturated flow model developed by the USGS (Harbaugh et al., 2005).

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

A local-scale model centered on Lindstrom was extracted from the regional seven-county model. The local model and all of the modeling for this amendment was completed using GMS (Aquaveo, 2015), a pre- and post- processor for MODFLOW. The local model was created using the technique of local grid refinement where a smaller, more refined grid is used within the regional model. The heads computed from the regional model then provide some of the boundary conditions for the local model as specified heads. The size of the domain and the general flow-field characteristics of the model were based on the MetroModel and the results of the original delineation.

The local model domain was divided into a three-dimensional, non-uniform grid. The model has 219 rows, 222 columns, and nine layers. The details of the MetroModel were then translated to the local-scale model using GMS. Finer grid spacing (~1m in the area of the city wells) was applied in the local model with telescopic mesh refinement used in the area of the site where the city wells are located. This refinement was required for an accurate computation of the particle flow paths for determining the WHPA delineation.

Prior to its use in the delineations, the following modifications were incorporated in the refined model:

- Local areas of modified horizontal conductivity were included in the model to reflect the Mt. Simon Aquifer property in the Lindstrom area.
- The pumping rates from Table 6 were assigned to the Lindstrom wells.
- The pumping rates from Table 7 were assigned to the permitted high-capacity wells located within two-miles of the city wells.

The delineation was performed by backtracking particles from the wells to a 10-year time of travel using the particle tracking MODPATH Code (Pollock, 1994). A series of 50 particles were launched at the wells. A porosity of 0.20 was used for the Mt. Simon Aquifer.

## 5.3 Results of Model Calibration and Sensitivity Analysis

Model quality is commonly evaluated by three different measures: calibration, sensitivity, and uncertainty analyses. Model calibration is a procedure that compares the results of a model based on estimated input values to measured or "known" values. This procedure is used to define model validity over a range of input values. The result of calibration is an assessment of the general quality of the model and the confidence that may be placed in the model results. As a matter of practice, groundwater flow models usually are calibrated using groundwater elevation and flow (if available). Sensitivity analysis quantifies the differences in model results produced by the natural variability of a particular parameter. Uncertainty analysis addresses the effects of poor data quality (lack of local detailed information or deficiencies in the data) on the model results. Together, sensitivity and uncertainty analyses are commonly used to evaluate the effects that natural variability and uncertainties in the hydrogeologic data have on the size and shape of the capture zones. In regards to the WHPA delineation, these analyses are used to document that the delineation is optimal, conservative, and protective of public health based on existing information.

### 5.3.1. Calibration

MetroModel 3.0 was calibrated to static and transient water level targets from DNR, MPCA, MDH, MGS, and USGS databases, base flows values from USGS and Met Council flow data, and aquifer transmissivity values determined from large-scale pumping tests, and compiled by MGS. The MODFLOW model was calibrated through a series of automated inverse optimization procedures using the model-independent parameter estimating software BEOPEST.

The local refined model was verified for selected observation wells completed in the Tunnel City, Wonewoc, and Mt. Simon Aquifers (Appendix B). The standard deviation of the model prediction errors represented less than 7.5 percent of the total change in the measured heads across the model domain, which is within an acceptable range for a calibrated model.

### 5.3.2. Sensitivity Analysis

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

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

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

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

**Results** - The ambient groundwater flow field that is defined in Figure 2 provide the basis for determining the extent to which each model run reflects the conceptual understanding of the orientation of the capture area for a well. The regional model has been calibrated to hydraulic heads, and the local refined model calibration was verified for heads measured in observation wells completed in the Tunnel City, Wonewoc, and Mt. Simon. The sensitivity of the WHPA

to the direction of groundwater flow should not be significant, given the current knowledge of hydraulic head distribution in the aquifer.

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

**Results** - The regional model has been calibrated to hydraulic heads. The local refined model calibration was verified in the aquifer of interest. The sensitivity of the WHPA to the direction of groundwater flow should not be significant, given the current knowledge of hydraulic head distribution in the aquifer.

The **horizontal hydraulic conductivity** influences the size and shape of the capture zone. In the base-case scenario, the hydraulic conductivity of the Mt. Simon Aquifer was estimated from specific capacity tests conducted at Mt. Simon wells in the area during construction. However, no pump test was conducted at the city wells. Therefore, there is uncertainty on the actual hydraulic conductivity of these two formations.

To account for this uncertainty, a range of hydraulic conductivity was determined from area wells specific capacity tests, as specified in Table 4.

**Results** – An increase/decrease in hydraulic conductivity had a slight impact on Well #4 capture zone shape. It has a minimal impact on the size or shape of the capture zone at Well #3 (Figure 3).

The **vertical hydraulic conductivity within the bedrock valley** influences the size and shape of the capture zone by changing the amount of leakage recharging the wells. In the base-case scenario, the vertical hydraulic conductivities of the material filling the eroded portion of the Eau Claire Formation within the bedrock (Layer 8) were kept at the values calibrated in MetroModel 3.0. To account for an uncertainty if the conductive property of this material, the vertical hydraulic conductivity was reduced to a value of $10^{-6}$ cm/s.

**Results** – The decrease in hydraulic conductivity increased the size of the capture zone at Well #3, while slightly shifting that at Well #4 to the west (Figure 3).

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

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

The wellhead protection areas for the Lindstrom wells in Figures 1a and 1b consists of a composite of the porous media aquifer delineations for the different input parameters used in the sensitivity analysis. The input files for all models are available upon request at MDH.

## 5.4 Addressing Model Uncertainty

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

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

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

The WHPA for Lindstrom wells consists of a composite of the porous media aquifer delineations. This provides a conservative approach to addressing model uncertainty and produces a WHPA that is expected to protect public health.

# 6. Delineation of the Drinking Water Supply Management Area

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

- Center-lines of highways, streets, roads, or railroad rights-of-ways.
- Public Land Survey coordinates.
- Property or fence lines.

# 7. Vulnerability Assessments

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

## 7.1 Assessment of Well Vulnerability

MDH has developed a database of community and non-community, non-transient public water supply wells in Minnesota that stores information pertinent to well vulnerability and rates the vulnerability of individual wells. A score is calculated for each well based on factors such as well construction, geology at the well site, and chemical data. A higher score correlates to a greater perceived vulnerability. A numeric cutoff is used to identify vulnerable from non-vulnerable wells (MDH, 1997). Vulnerable wells are also identified based on the presence of contamination, such as nitrate-nitrogen in excess of 10 mg/l, or young (post-1953) water, as indicated by the presence of 1 tritium unit or greater in the well water. The results of this assessment for city wells are described below.

The vulnerability assessment for each well used by the city of Lindstrom is listed in Table 1. All Lindstrom wells are non-vulnerable. This assessment is based upon the following conditions:

1) Well construction for Lindstrom Well #4 (659877) meets current State Minnesota Water Well Construction Code specifications (Minnesota Rules, part 4725). Therefore, the well does not provide a pathway for contaminants to enter the aquifer used by the public water supplier. Lindstrom Well #3 (217913) does not meets construction standards as grouting information is unknown. If the well was not grouted, it has the potential for acting as a conduit for flow of surface water and contaminants into the buried aquifer. The wells draw from an aquifer that is geologically protected.

2) The geologic conditions at the wells include a cover of clay-rich geologic materials over the aquifer that is sufficient to retard the vertical movement of contaminants at the well location.

3) Water samples were collected in January 2017 from both Lindstrom wells and were analyzed for tritium, nitrate, chloride and bromide (Table 2). No tritium or nitrate was detected in the samples, confirming the non-vulnerable nature of the well (Alexander and Alexander, 1989). In addition, the chloride and bromide results confirm that the well has not been impacted by land-use activities (Mullaney, et. al, 2009).

### 7.2 Assessment of the Drinking Water Supply Management Area Vulnerability

The DWSMA vulnerability is low near Wells 3 and 4 (Figures 6), based upon the following information:

1) Review of the geologic logs contained in the CWI database, geological maps, and reports indicates low geologic sensitivity exists throughout the DWSMA. The L-scores at the deep wells within Lindstrom Well #4 DWSMA range from 2 to 23. Although quaternary geology is missing from Well #3 log, wells within and near Well 3 DWSMA have L-score ranging from 2 to 26.

2) Isotopic and water chemistry data from the city of Lindstrom Well #3 (217913) and Well #4 (659877) indicates the aquifer contains water that has no detectable levels of tritium or human-caused contamination.

## 8. Recommendations

MDH provides the following recommendations which may support better understanding the hydrogeologic conditions of the source aquifers during future refinements of the WHPA:

- Collect groundwater samples from Well #3 (217913) and Well #4 (659877) for analysis of chloride, bromide, sulfate, nitrate + nitrite as N, ammonia, and tritium. Timeframe: at year six. Responsibilities: the city of Lindstrom staff to schedule with MDH; sample collection and analysis done by MDH; contingent upon funding from MHD.

- Continue collecting groundwater samples for analysis of regulated contaminants and provide the data to MDH. Responsibilities: MDH staff to schedule with the city of Lindstrom staff; sample collection and analysis done by MDH; contingent upon funding from MHD.

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

Pollock, D.W. (1994), *User's guide for MODPATH/MODPATH-PLOT, Version 3; a particle tracking post-processing package for MODFLOW, the U.S. Geological Survey finite-difference ground-water flow model,* Open-File Report, 94-464, U.S. Geological Survey, 248 p.

# Figures

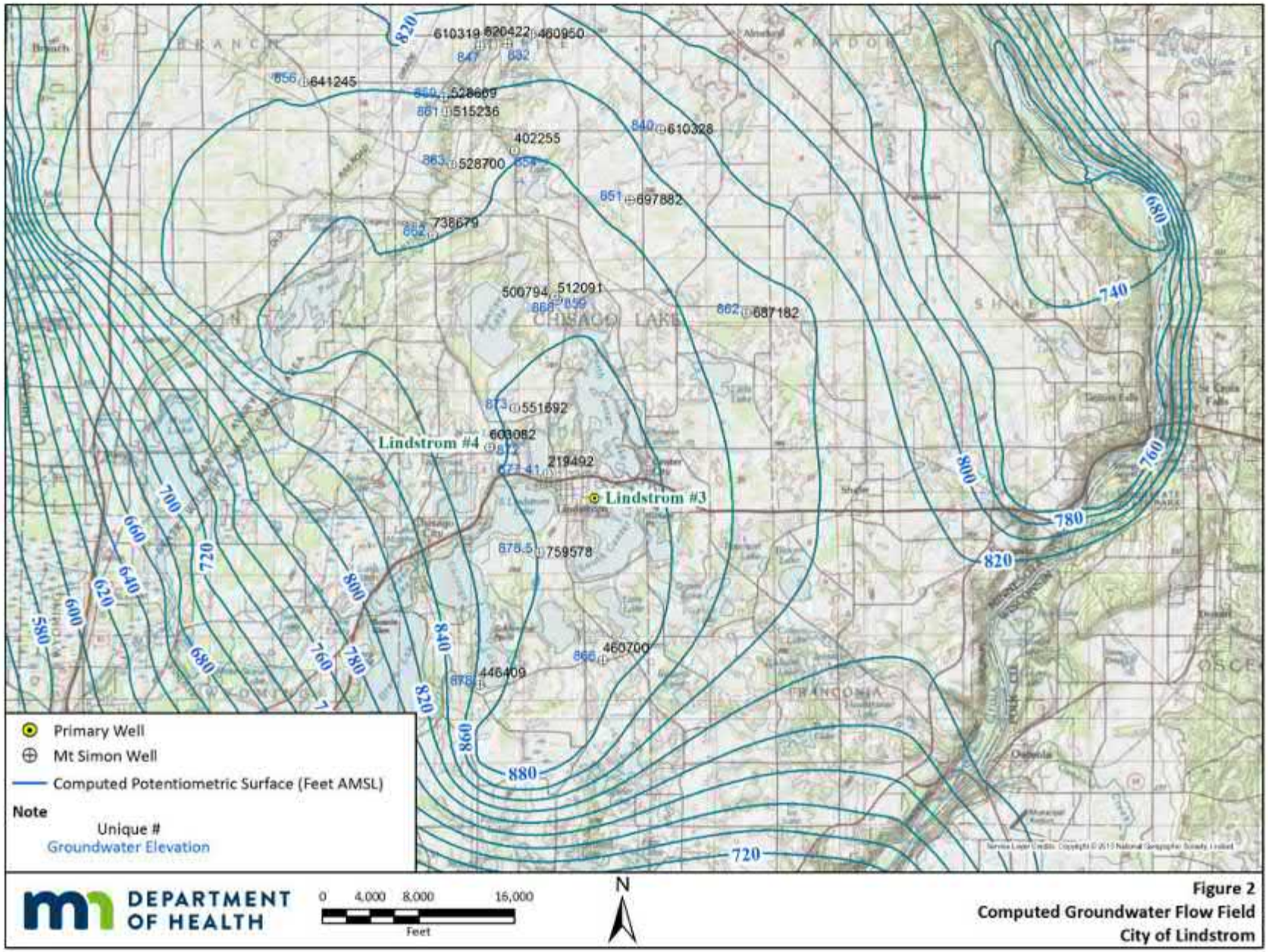


**Figure 2**
**Computed Groundwater Flow Field**
**City of Lindstrom**

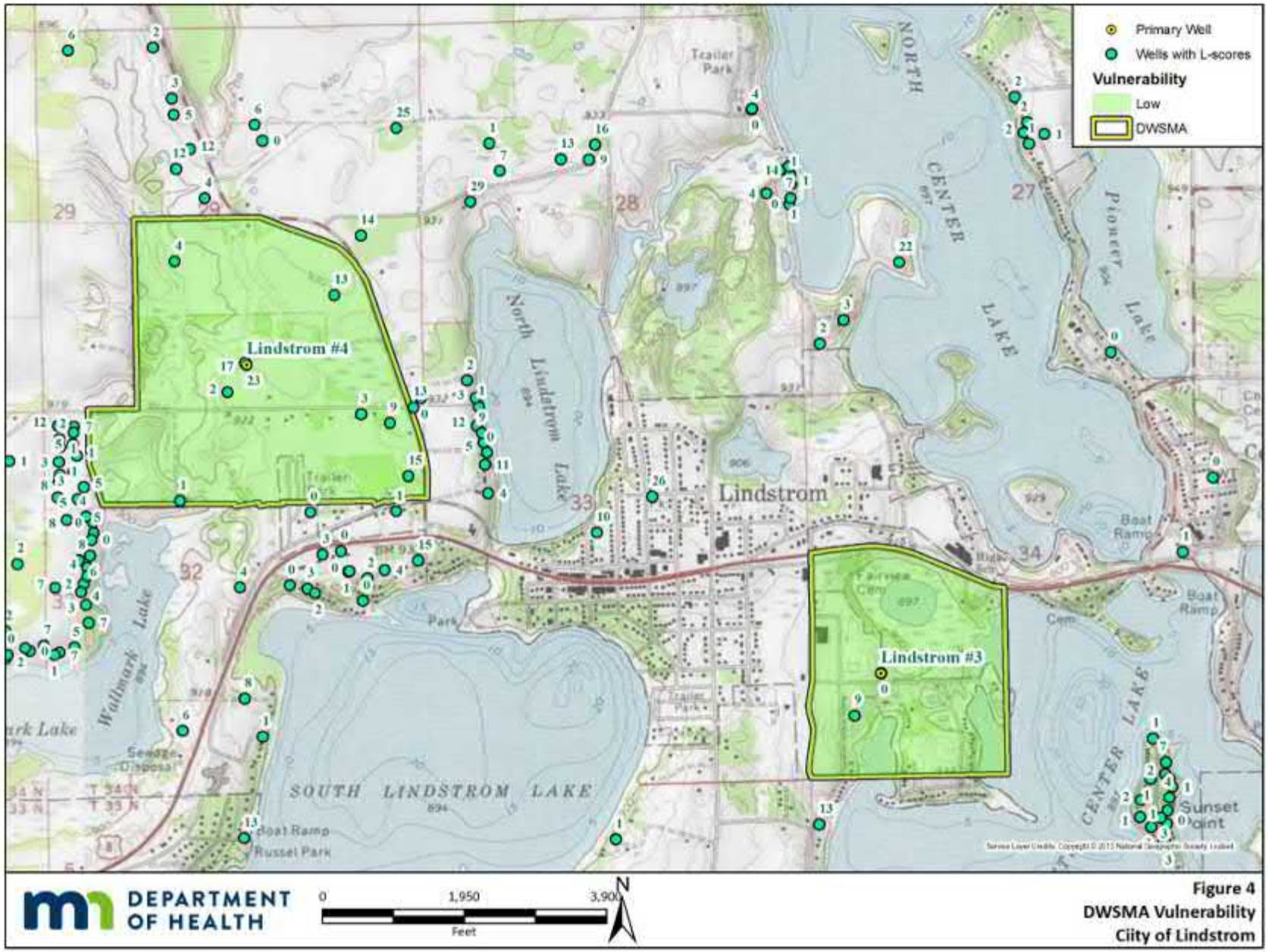


**Figure 4**
**DWSMA Vulnerability**
**Ciity of Lindstrom**

# Appendix A

# Bedrock Geology near Wells 3 and 4

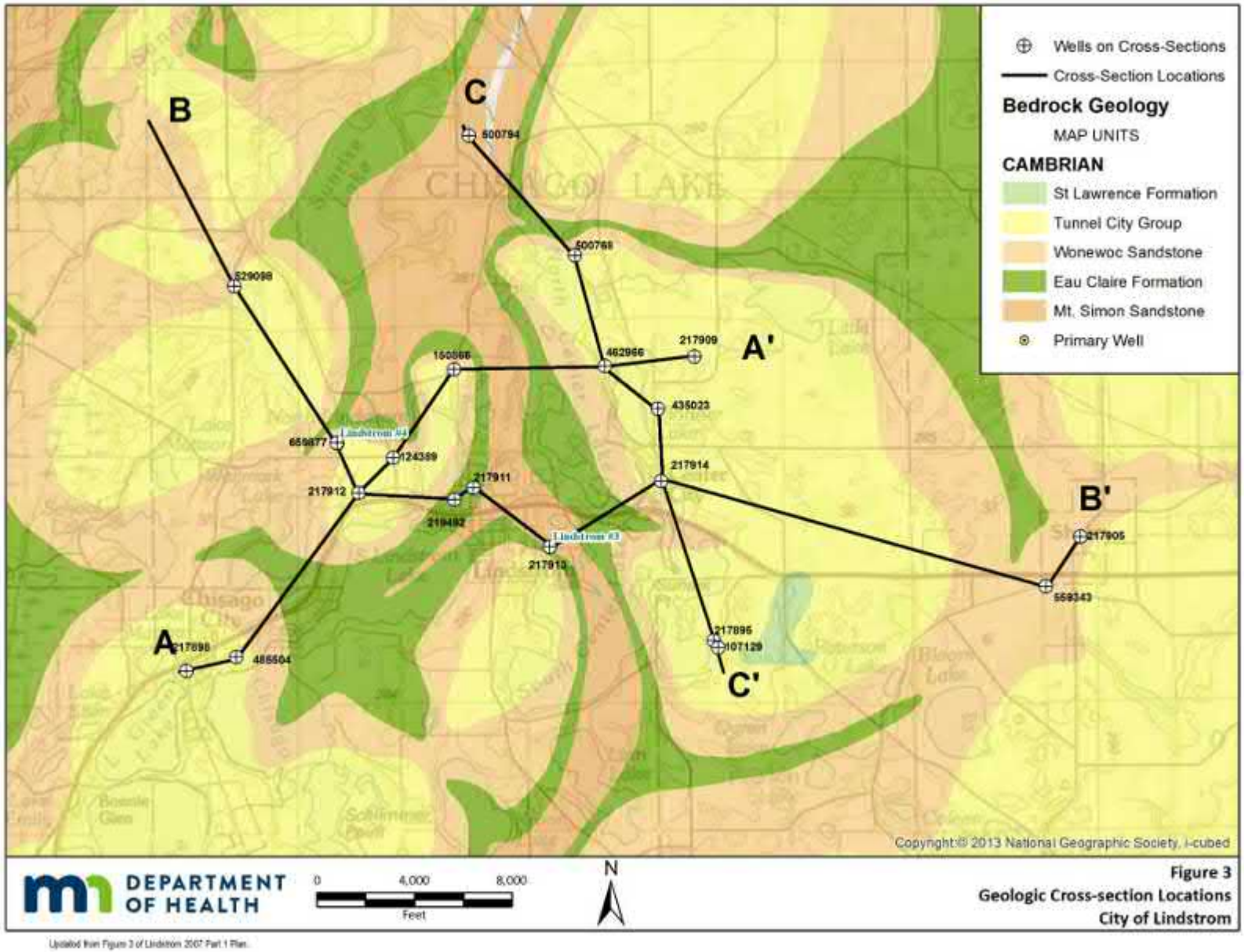
Wells on Cross-Sections
Cross-Section Locations
Bedrock Geology
MAP UNITS
CAMBRIAN
St Lawrence Formation
Tunnel City Group
Wonewoc Sandstone
Eau Claire Formation
Mt. Simon Sandstone
Primary Well
A
A'
B
B'
C
C'
500794
500769
529098
462966
217909
150566
435023
659877
124389
217914
217911
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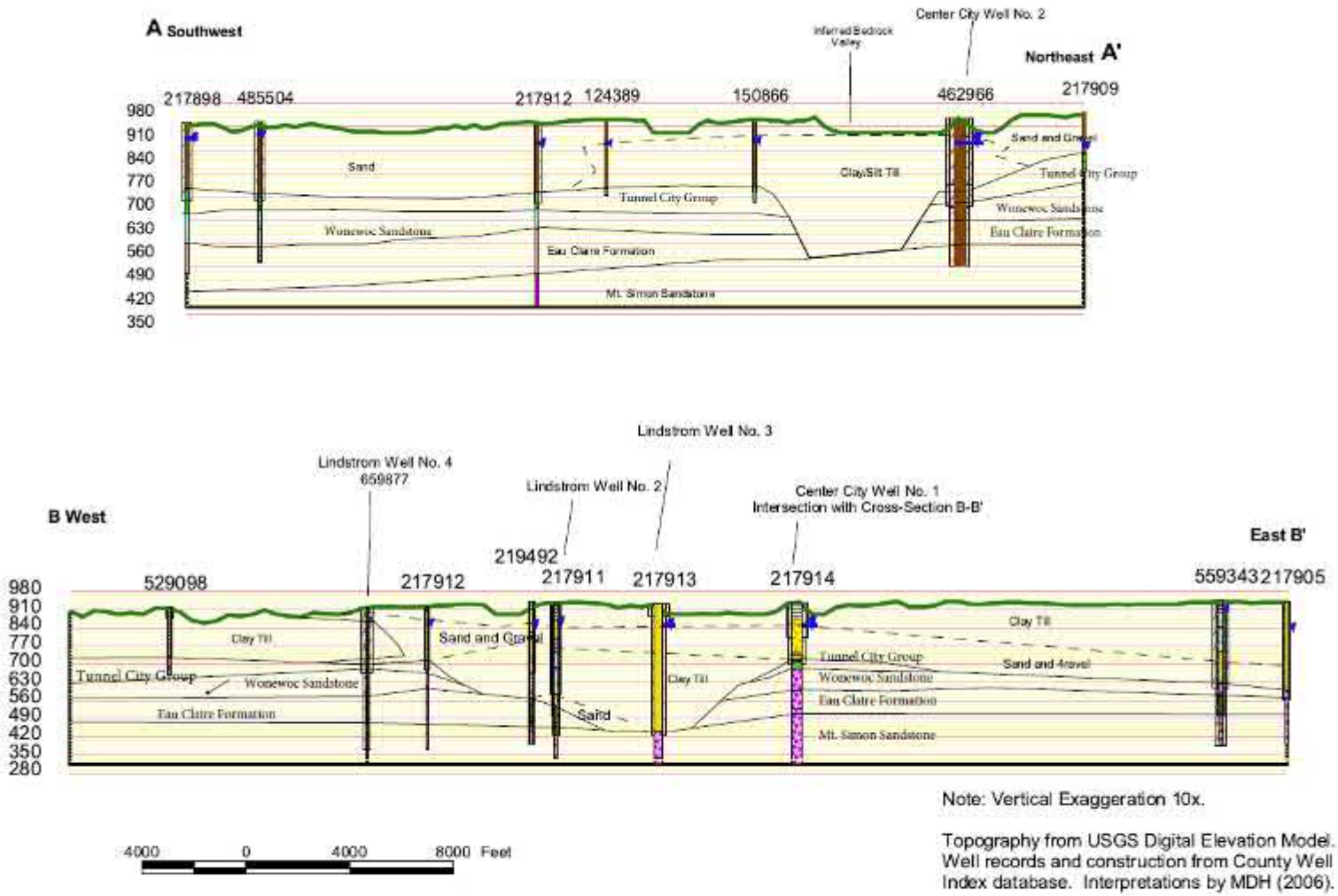
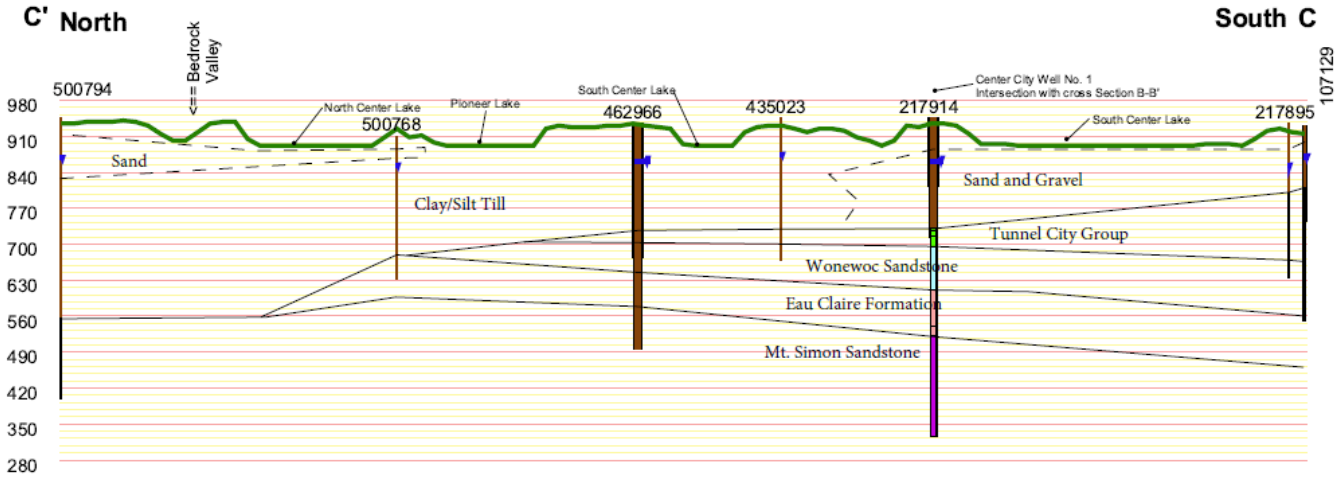
Figure 3
Geologic Cross-section Locations
City of Lindstrom
Updated from Figure 3 of Lindstrom 2007 Part 1 Plan.




Note: Vertical Exaggeration 10x.

Topography from USGS Digital Elevation Model. Well records and construction from County Well Index database. Interpretations by MDH (2006).

Figure 4A
GEOLOGIC CROSS-SECTIONS AA' AND BB'
(City of Lindstrom)




Note: Vertical Exaggeration 10x.

Topography from USGS Digital Elevation Model.
Well records and construction from County Well Index database. Interpretations by MDH (2006).

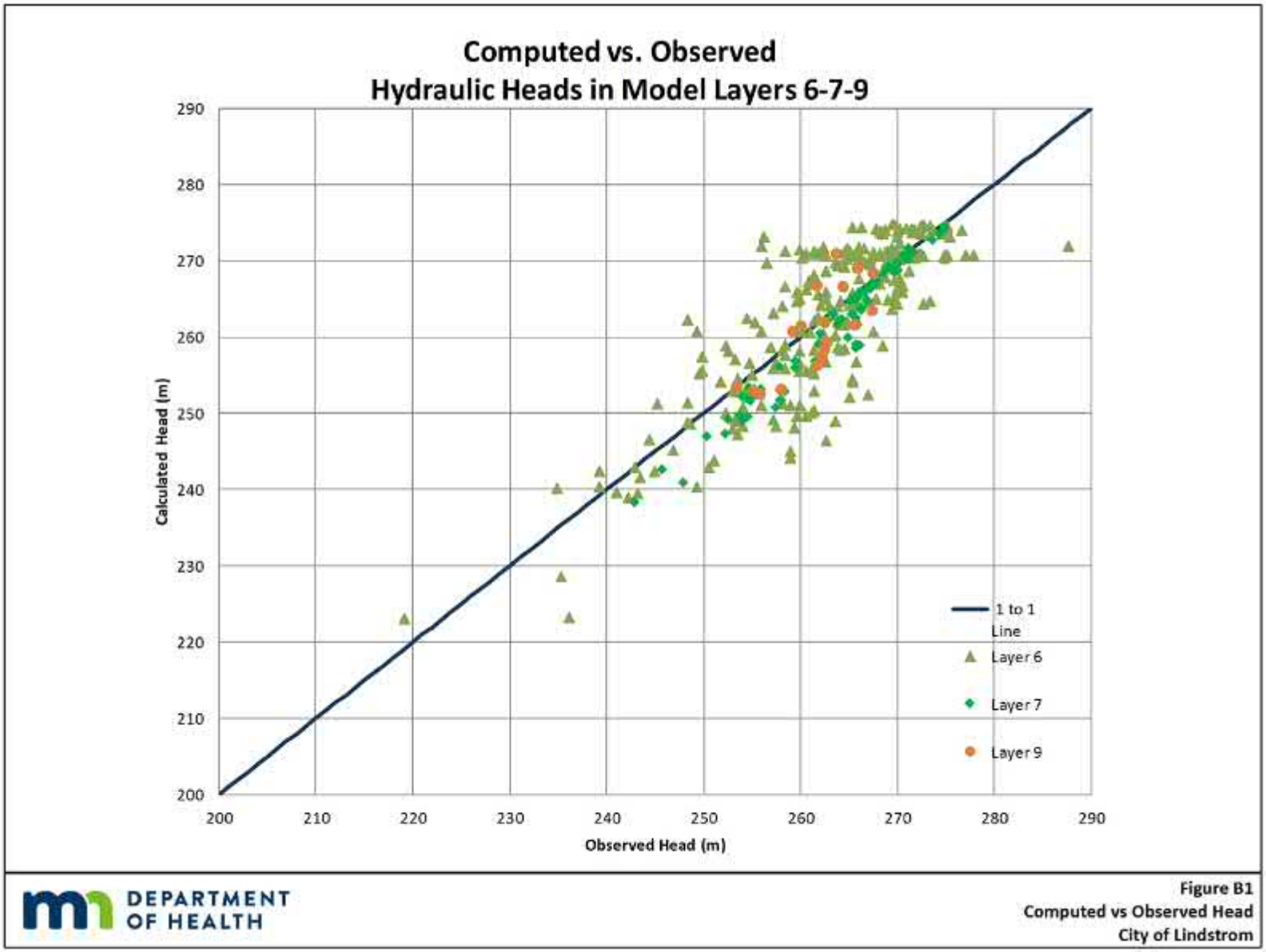
2000 0 2000 4000 Feet

MINNESOTA MDH DEPARTMENT OF HEALTH

Figure 4B
GEOLOGIC CROSS-SECTION CC'
(City of Lindstrom)

# Appendix B

# Calibrated Model Results




DEPARTMENT OF HEALTH

**Figure B1**
**Computed vs Observed Head**
**City of Lindstrom**

DEPARTMENT OF HEALTH

January 31, 2019

Mr. John Olinger, City Administrator
City of Lindstrom
13292 Sylvan Avenue
Lindstrom, Minnesota 55045

Subject: Scoping 2 Decision Notice and Meeting Summary – City of Lindstrom – PWSID 1130007

Dear Mr. Olinger,

This letter provides notice of the results of a scoping meeting held with you, Council Member Bill Schlumbom, and Jon Herdegen, City Engineer of MSA Professional Services (city of Lindstrom), and me on January 15, 2019, at Lindstrom City Hall regarding wellhead protection (WHP) planning. During the meeting, we discussed the data elements that must be compiled and assessed to prepare the part of the WHP plan related to the management of potential contaminants in the approved drinking water supply management area. The enclosed Scoping 2 Decision Notice lists the data elements discussed at the meeting. We also discussed a summary of planning issues and recommendations that were identified during the Part 1 WHP Plan development process which should be considered for inclusion in your Part 2 WHP Plan.

The city of Lindstrom has met the requirements to distribute copies of the first part of the WHP plan to local units of government and hold an informational meeting for the public. The city of Lindstrom will have until December 12, 2019, to complete its WHP plan.

MDH understands MSA Professional Services Inc. will be working with you to develop a draft of the remainder of the WHP plan. I will be contacting you to review the progress of the development of Part 2 of your plan. Upon request, the Technical Assistance Planner can provide a glossary of terminology, identification of information sources for the required Data Elements, and other technical assistance documents. If you have any questions regarding the enclosed notice, contact me by email at John.freitag@state.mn.us or by phone at 651-201-4669.

Sincerely,

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

JF:ds-b
Enclosures: Scoping 2 Decision Notice, PCSI Requirements, WHP Planning Summary
cc: Lucas Martin, MDH Engineer, Metro Office
Jon Herdegen, City Engineer, MSA Professional Services

Date: January 31, 2019

Name of Public Water Supply: City of Lindstrom

PWSID: 1130007

Name of the Wellhead Protection Manager: Mr. John Olinger, City Administrator

Address: 13292 Sylvan Avenue

City: Lindstrom

Zip: 55045

Phone: 651-257-0625

Primary Unique Well Numbers: 217913 (Well #3), 659877 (Well #4)

DWSMA Vulnerability: ☒ Low

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

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

## Scoping 2 Data Elements Needed for the Part 2

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

# Submit –

The following information MUST be submitted in the Part 2 by including it in the plan narrative and/or appendix. An asterisk* with red text indicates information that MUST be contained in the Part 2.

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

## DATA ELEMENTS ABOUT THE LAND USE –

Land Use

*An existing map of political boundaries.

*An existing map of public land surveys including township, range, and section.

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

- A map and an inventory of the current and historical agricultural, residential, commercial, industrial, recreational, and institutional land uses and potential contaminant sources.

  *The Potential Contaminant Source Inventory (PCSI) data in both a table and map format must be created and included in the Part 2. Include potential contaminant sources as listed on the PCSI attachment provided for each existing vulnerability within the DWSMA.

  - Inventory wells greater than 450 feet in depth. Also inventory wells of undocumented or unknown depths.
  - The inventory should include your community wells but not include any wells that are known to have been sealed according to the Minnesota Well Code (MN Rules 4725).

  *A land use/land cover map and table. SWP Planner can provide a land cover map and data/table from federal sources. This data set should be used unless an alternative electronic data set that is more current and detailed is available. Assess and discuss changes in land use that could impact management of the DWSMA.

  *An inventory of the Inner Wellhead Management Zone (IWMZ). A recent IWMZ inventory (within six years) for each primary well with management recommendations on the MDH form, or a table that summarizes the number and type of contaminant sources with the management recommendations must be included. Incorporate or

reference the recommendation(s) from the IWMZ into the Part 2. IWMZ will be completed by the SWP Planner with assistance from the PWS staff. A copy will be provided to the PWS.

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

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

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

# Required to be discussed in plan -

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

## DATA ELEMENTS ABOUT THE PHYSICAL ENVIRONMENT –

Water Resources

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

Technical Assistance Comments: Assess and describe any issues and management needed due to proximity to floodplain. Public water supply wells located in the floodplain should be evaluated to determine if they are meeting the flood protection requirements of the MN Well Code 4725.5850. Consider utilizing the sanitary survey report to identify potential issues with public water supply wells in floodplains.

## DATA ELEMENTS ABOUT THE LAND USE –

Land Use

- An existing map of parcel boundaries.

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

# Part 1 -

The following information was reviewed and assessed in Part 1. The Part 1 should be used as a data source for the Part 2. The technical assistance comments provide the requirements for how this information must be discussed and/or included in the Part 2. Include relevant excerpts or summaries from the Part 1 where indicated. Or if the Part 1 is included in the appendix that can be referenced.

## DATA ELEMENTS ABOUT THE PHYSICAL ENVIRONMENT –

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

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

## DATA ELEMENTS ABOUT THE LAND USE –

<u>Public Utility Services</u>

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

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

## DATA ELEMENTS ABOUT WATER QUANTITY –

Groundwater Quantity

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

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

## DATA ELEMENTS ABOUT WATER QUALITY –

Groundwater Quality

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

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

Revision Date: 04/01/2018

City of Lindstrom Scoping 2 Meeting

Wellhead Protection (WHP) Planning Issues Summary

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

Drinking Water Protection Issues Identified to Date:

None

Water Quality Detections and Implications:

At present, none of the human-caused contaminants for which the Safe Drinking Water Act has established health-based standards has been found above maximum allowable levels in the city's water supply.

Old Municipal Well Information:

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

Sanborn Maps:

☒ Sanborn Maps are not available for this area.

Recommended WHP Measures:

Collect groundwater samples from Well #3 (217913) and Well #4 (659877) for analysis of chloride, bromide, sulfate, nitrate + nitrite as N, ammonia, and tritium. Timeframe: at year six. Responsibilities: The city of Lindstrom staff to schedule with MDH; sample collection and analysis done by MDH; contingent upon funding from MDH.

Continue collecting groundwater samples for analysis of regulated contaminants and provide the data to MDH. Responsibilities: MDH staff to schedule with the city of Lindstrom staff; sample collection and analysis done by MDH; contingent upon funding from MHD.

Other:

# Appendix B
# City of Lindstrom Consumer Confidence Report

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# Lindstrom

## 2018 DRINKING WATER REPORT

## Making Safe Drinking Water

Your drinking water comes from a groundwater source: two wells ranging from 595 to 615 feet deep, that draw water from the Mt. Simon aquifer.

Lindstrom 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 Matt Fraley, Public Works Director, at (651) 325-1769 or mfraley@cityoflindstrom.us if you have questions about Lindstrom'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.

## Lindstrom Monitoring Results

This report contains our monitoring results from January 1 to December 31, 2018.

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 or 1-800-818-9318 between 8:00 a.m. and 4:30 p.m., Monday through Friday.

## 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.
- Level 1 Assessment: A Level 1 assessment is a study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system.
- Level 2 Assessment: A Level 2 assessment is a very detailed study of the water system to identify potential problems and determine (if possible) why an E. coli MCL violation has occurred and/or why total coliform bacteria have been found in our water system on multiple occasions.
- 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.
- NA (Not applicable): Does not apply.
- NTU (Nephelometric Turbidity Units): A measure of the cloudiness of the water (turbidity).
- 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.
- TT (Treatment Technique): A required process intended to reduce the level of a contaminant in drinking water.
- 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 Action Level | EPA's Ideal Goal (MCLG) | 90% of Results Were Less Than | Number of Homes with High Levels | Violation | Typical Sources |
|---|---|---|---|---|---|---|
| Copper (07/21/17) | 90% of homes less than 1.3 ppm | 0 ppm | 0.11 ppm | 0 out of 20 | NO | Corrosion of household plumbing. |
| Lead (07/21/17) | 90% of homes less than 15 ppb | 0 ppb | 1.4 ppb | 0 out of 20 | NO | Corrosion of household plumbing. |

**INORGANIC & ORGANIC CONTAMINANTS – Tested in drinking water.**

| Contaminant (Date, if sampled in previous year) | EPA's Limit (MCL) | EPA's Ideal Goal (MCLG) | Highest Average or Highest Single Test Result | Range of Detected Test Results | Violation | Typical Sources |
|---|---|---|---|---|---|---|
| Combined Radium (2015) | 5.4 pCi/l | 0 pCi/l | 2 pCi/l | N/A | NO | Erosion of natural deposits. |

| OTHER SUBSTANCES – Tested in drinking water. | | | | | | |
|---|---|---|---|---|---|---|
| Substance (Date, if sampled in previous year) | EPA's Limit (MCL) | EPA's Ideal Goal (MCLG) | Highest Average or Highest Single Test Result | Range of Detected Test Results | Violation | Typical Sources |
| Fluoride | 4.0 ppm | 4.0 ppm | 0.87 ppm | 0.85 - 0.91 ppm | NO | Erosion of natural deposits; Water additive to promote strong teeth. |

## Potential Health Effects and Corrective Actions (If Applicable)

Copper: During the year, we failed to provide lead results to persons served at the sites that were tested as required by the Lead and Copper Rule during the timeframe allowed

Lead: During the year, we failed to provide lead results to persons served at the sites that were tested as required by the Lead and Copper Rule during the timeframe allowed

## Some People Are More Vulnerable to Contaminants in Drinking Water

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. The developing fetus and therefore pregnant women may also be more vulnerable to contaminants in drinking water. These people or their caregivers should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline at 1-800-426-4791.

# Learn More about Your Drinking Water

## Drinking Water Sources

Minnesota's primary drinking water sources are groundwater and surface water. Groundwater is the water found in aquifers beneath the surface of the land. Groundwater supplies 75 percent of Minnesota's

drinking water. Surface water is the water in lakes, rivers, and streams above the surface of the land. Surface water supplies 25 percent of Minnesota's drinking water.

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

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

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

- How Lindstrom 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 or 1-800-818-9318 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. Lindstrom provides 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 Lead Poisoning Prevention: Common Sources (https://www.health.state.mn.us/communities/environment/lead/sources.html).

# Help Protect Our Most Precious Resource – Water

## The Value of Water

Drinking water is a precious resource, yet we often take it for granted.

Throughout history, civilizations have risen and fallen based on access to a plentiful, safe water supply. That's still the case today. Water is key to healthy people and healthy communities.

Water is also vital to our economy. We need water for manufacturing, agriculture, energy production, and more. One-fifth of the U.S. economy would come to a stop without a reliable and clean source of water.

Systems are in place to provide you with safe drinking water. The state of Minnesota and local water systems work to protect drinking water sources. For example, we might work to seal an unused well to prevent contamination of the groundwater. We treat water to remove harmful contaminants. And we do extensive testing to ensure the safety of drinking water.

If we detect a problem, we take corrective action and notify the public. Water from a public water system like yours is tested more thoroughly and regulated more closely than water from any other source, including bottled water.

## Conservation

Conservation is essential, even in the land of 10,000 lakes. For example, in parts of the metropolitan area, groundwater is being used faster than it can be replaced. Some agricultural regions in Minnesota are vulnerable to drought, which can affect crop yields and municipal water supplies.

We must use our water wisely. Below are some tips to help you and your family conserve – and save money in the process.

- Fix running toilets—they can waste hundreds of gallons of water.
- Turn off the tap while shaving or brushing your teeth.
- Shower instead of bathe. Bathing uses more water than showering, on average.
- Only run full loads of laundry, and set the washing machine to the correct water level.
- Only run the dishwasher when it's full.
- Use water-efficient appliances (look for the WaterSense label).
- Use water-friendly landscaping, such as native plants.
- When you do water your yard, water slowly, deeply, and less frequently. Water early in the morning and close to the ground.
- Learn more
  - Minnesota Pollution Control Agency's Conserving Water webpage (https://www.pca.state.mn.us/living-green/conserving-water)
  - U.S. Environmental Protection Agency's WaterSense webpage (https://www.epa.gov/watersense)