Part II Wellhead Protection Plan Amendment

Potential Contaminant Inventory, Goals and Management Strategy

Worthington, Minnesota

Public Water Supplier No. 1530011
SEH No. WORTC 126958 4.00

December 7, 2017

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Glossary of Terms

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

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

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

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

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

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

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

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

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

Acronyms

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

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Prepared for Worthington, Minnesota

1.0 Introduction

1.1 Background

The wellhead protection (WHP) plan for the City of Worthington was prepared in cooperation with the Minnesota Department of Health (MDH) and the Minnesota Rural Water Association. It contains specific actions that the city will take to fulfill WHP requirements that are specified under Minnesota Rules, part 4720.5100 to 4720.5590. Also, the support that Minnesota state agencies, federal agencies, and Nobles County will provide is presented to identify their roles in protecting the city's drinking water supply. The plan is effective for 10 years after the approval date specified by MDH and the city is responsible for implementing its WHP plan of action. Furthermore, the city will evaluate the status of plan implementation at least every two and one half years to identify whether its WHP plan is being implemented on schedule.

1.2 Report Contents

This report is Part II of a Wellhead Protection Plan for the City of Worthington, and 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 detailed discussion of the potential contaminant source management strategies and corresponding goals, objectives, and action plans.
- A review of the wellhead/source water protection evaluation program
- An alternative water supply contingency strategy.

Note that information presented in figures within the report are "tiled" figures (e.g., Figures 1-1, 1-2 and 1-3) because the city well fields occur in multiple areas. In Figures 1 through Figure 9, information pertaining to Malcolm and Okabena well fields are included in the first figure tile and information pertaining to the Lake Bella well fields is included on the second figure tile. Figures 10 through 12 contain a figure tile for each well field.

1.3 Appendices Content

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

Appendix A contains the Scoping Decision Notice No. 2 along with the assessment of data elements (and supporting data) used to prepare this plan.

Appendix B contains Part I of the plan was completed in 2016 and is summarized in Section 2. In Part I of the plan, the Wellhead Protection Area (WHPA) and Drinking Water Supply Management Area (DWSMA) were delineated, and vulnerability assessments of the wells and corresponding DWSMAs were amended based on updated data available on the source water aquifer used by the municipal wells.

Appendix C contains the inventory of potential contamination sources that may present a risk to the city's drinking water. This part of the plan is discussed in Section 3 in terms of assigning risk to the city's water supply and is discussed as issues, problems or opportunities summarized in Section 6.

Appendix D contains the water supply plan approval letter. This plan is provides an alternate water supply if there is a disruption caused by contamination or mechanical failure.

1.4 General Information

The municipal water supply wells included in the WHP Plan are listed in Table 1. These wells for which the municipality of Worthington receives its water are divided, spatially, into three well fields. These are the Okebena, Malcom and Lake Bella Wellfields which also correspond to the Drinking Water Supply Management Areas discussed in section 3.1 of this report.

Table 1
Water Supply Well Wells Included in WHP

Well No.	Unique Well No.	Date Constructed/ Reconstructed	Aquifer	Total Depth (ft)	Casing Depth (ft)	Casing Diameter (in)	Capacity (gpm)	Vulnerability
19	223617	1957	Buried Sand and Gravel	63	58	24-12	116	Not Vulnerable
20	633531	2000	Water Table	44	28	20	103	Vulnerable
22	169892	1980	Buried Sand and Gravel	64	45	8	125	Vulnerable
24	197476	1984	Water Table	76	56	12	385	Vulnerable
25	195163	1984	Water Table	80	65	12	499	Vulnerable
26	654756	2001	Water Table	85	62	12/20	480	Vulnerable
27	240094	1963	Water Table	62	52	12	421	Vulnerable
28	455791	1989	Water Table	75	50	12	456	Vulnerable
29	455790	1988	Water Table	102	77	12	487	Vulnerable
31	760572	2009	Water Table	90	66	16	635	Vulnerable

Note: All wells are Primary status

1.5 Wellhead Protection Team

Manager: Eric Roos, Worthington Public Utilities

Team Members:

- Aaron Meyer, MRWA
- John Shea, Nobles Soil and Water Conservation District
- Laura DeBeer, Pipestone County Soil and Water Conservation District

2.0 Identification and Assessment of the Data Elements Used to Prepare the Plan

The data elements that are included in this plan document the need for the WHP measures that will be implemented to help protect the city's water supply from potential sources of contamination. The city met with representatives from MDH on two occasions to discuss the data elements that are specified in Minnesota Rules, part 4720.5400, for preparing a WHP plan.

The first scoping meeting that was held on September 16, 2013 addressed the data elements that were needed to support the delineation of the WHPA, the DWSMA, and the well and DWSMA vulnerability assessments. The second scoping meeting that was held on May 23, 2016 discussed the data elements required to 1) identify potential risks to the public water supply and 2) develop effective management strategies to protect the public water supply in relation to the well and DWSMA vulnerability. The results of each meeting were communicated to the city by MDH through a formal scoping decision notice. This information is found in Appendix B.

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

The availability of the information relating to each data element that is used in this plan was evaluated by staff from the MDH, the City of Worthington and MRWA. During the evaluation process, the City of Worthington, MRWA, and MDH determined if the data element was considered an issue, concern or opportunity that the City of Worthington must address in this plan. If this is found to be the case during data evaluation and assessment, the information is provided in Appendix C. Actions that are needed to address deficiencies found during the data element assessment process in either the quality or the amount of data are included in the plan of action.

2.1 Required Data Elements

2.1.1 Physical Environment

2.1.1.1 Precipitation

Precipitation is a required data element and was described in the Part I WHPP. A map of gauging stations can be seen by visiting the University of Minnesota Climatology page. Detailed precipitation information from this dataset for years 2011-2017 is included in the table below (recorded in inches) with an average annual precipitation of 27.56 inches. The table can indicate times of the year of greatest precipitation which may correlate with increased likelihood of infiltration or surface runoff of contaminants from the land surface. These information could also suggest when water quality monitoring would provide the most meaningful results. (http://climate.umn.edu/hidenannual/)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011	1.24	1.8	1.1	3.52	5.39	4.76	8.75	0.99	0.39	0.55	0.08	0.71
2012	0.94	2.57	1.49	3.34	8.77	0.38	0.59	2.77	0.39	0.67	0.85	0.82
2013	0.73	0.6	1.69	3.88	4.14	5.42	0.42	2.27	1.07	3.61	0.28	0.97
2014	0.29	0.64	0.45	1.21	1.12	10.03	0.94	3.02	0.88	1.01	0.43	0.83
2015	0.42	0.46	0.17	1.95	4.37	3.27	3.01	6.67	2.46	2.58	3.75	1.67
2016	0.21	1.18	0.75	5.25	7.41	5.69	3.31	2.17	7.82	2.7	1.35	1.64
2017	0.56	0.28	0.79	2.22	5	5.72	0.87					

2.1.1.2 Geology

Geology is a required data element and was described in the Part I WHPP. Detailed geologic information is included in the Part 1 WHPP (Appendix B).

2.1.1.2.1 *Regional and Local Geology*

Glacial ice advanced into and receded from southwestern Minnesota many times and from a similar source area during the last two million years. The resulting glacial sediments and deposits are typically 400 to 450 feet thick in the Worthington area and are the difficult to distinguish. In the vicinity of the Worthington public water supply wells there are four types of glacial deposits near the land surface. Regionally, the Quaternary glacial deposits consist of supraglacial hummocky till comprised of discontinuous lenses of clay, silt, sand, and gravel. Within this till mass and in the vicinity of most of the Worthington public water supply wells are stream sediments of sand, gravel, and silt, organic deposits of peat, marshes, and shallow lakes, and till with stream-modified surfaces where thin sand and gravel deposits overlie clayey till. Two locally prominent, north to south channels of these deposits extend from the southwestern and southeastern corners of Okabena Lake in southwestern Worthington to Lake Bella.

Depth to bedrock in the Worthington area is estimated to be 400 to 450 feet below the land surface (elevation of approximately 1,200 feet above mean sea level [MSL]). The uppermost bedrock is Cretaceous rock comprised primarily of shale and siltstone with some fine-grained, quartzose sandstone. The total thickness of the formation is likely 300 to 350 feet, and the beds of sandstone within it range in thickness from 0 to 100 feet and are most common near the base of the formation. The Sioux Quartzite underlies the Cretaceous rocks. It is interbedded with hard red claystone (“pipestone”). The upper 200 to 300 feet of the quartzite may contain sand zones, joints, and fractures. The maximum thickness of the Sioux Quartzite is more than 1,000 feet and it is underlain by undifferentiated crystalline rock.

2.1.1.3 Soils

Soils surrounding the Drinking Water Supply Management area are classified by the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) (http://datagateway.nrcs.usda.gov/). Soil information can be used to prioritize areas for land management based on soil permeability. When there is a surface water contribution area, an area of high erosion can result in contaminants moving into areas of recharge. Detailed information including eroding lands can be found in appendix C and depicted in Figures 4-1 and 4-2 as part of this plan. According to the NRCS Web Soil Survey, shallow soils in the project area consist primarily of clay loams.

2.1.1.4 Water Resources

Water Resources can be regulated under several different government rules and programs and these datasets are provided by the DNR and can be accessed through the Minnesota Geospatial Commons (https://gisdata.mn.gov/). The classifications based upon state regulations and programs can be viewed in Figures 7-1 and 7-2. These regulations can be useful to management of the surface waters within the DWSMA and can overlap surface water protection or monitoring activities useful to wellhead protection. The DWSMA boundaries for the City of Worthington intersect three watershed boundaries. These are the Des Moines, Missouri Little Sioux and Rock River watersheds. Water Resources information for Watershed boundaries, public watersheds, public ditch, public watercourses, City of Worthington designated floodplains, wetlands and public water basins are depicted in Figures 7-1 and 7-2.

2.1.2 Land Use

Land use including parcels and other governmental boundaries were used during the Part I WHPP to delineate the DWSMA. Information about land use is important for the Part II WHPP because it provides the jurisdictional entity in addressing any future or known issues within the DWSMA. Furthermore, land use surrounding the source water to the aquifer may directly impact water quality and quantity especially in areas of higher vulnerability. The City of Worthington is a municipality located at the south-southeastern boundary of Nobles County. The Worthington DWSMA is comprised of three Drinking Water Supply Management Areas (DWSMAs) intersecting the Lake Okabena (City of Worthington), Lake Malcom, and Lake Bella well fields. The WHPAs and DWSMAs for each of these DWSMAs are located within Nobles County; however, the Lake Bella DWSMA protrudes across the Minnesota State boundary into Iowa. In general, Lake Okabena DWSMA is occupied by residential, commercial and industrial activity common of a municipality while the Lake Bella and Malcom DWSMAs are comprised primarily of agricultural and conservational lands.

2.1.2.1 Parcels & Boundaries

Figures 3-1 and 3-2 shows the boundaries of parcels, municipalities, and public land surveys within the DWSMA and the municipal boundary for the City of Worthington. Detailed parcel information can be accessed through the County Website. Lake Okabena and the Malcom Lake DWSMAs are located entirely in Minnesota while the Lake Bella DWSMA extends across the Minnesota State line into Iowa. These DWSMAs are located in Nobles County and intersect Bigelow, Worthington, and Indian Lake Townships. The DWSMAs includes a small portion of the incorporated area of the City of Worthington and is located in Minnesota Township 102 and 101 North, Range 40 West and includes parts of Sections 21 through 35 (Figures 3-1 and 3-2). A detailed breakdown land use within the DWSMA is included in Chapter 4.2 Table 4.

2.1.2.2 Potential Contaminant Sources

Mapping and an inventory of the current and historical agricultural, residential, commercial, industrial, recreational, and institutional land uses and potential contaminant sources have been completed and are discussed in section 4 and listed in Appendix C, depicted on Figures 10-1/10-2/10-3, 11-1/11-2/11-3, and 12-1/12-2/12-3 and described in detail in Chapter 4. The inventory, mapping and management of land uses and potential sources of contamination for the DWSMA reflect what is known about these data elements, as follows:

High and Very Vulnerability

1. All potential contaminant sources as listed on High and Very High Vulnerability PCSI Requirements

2. Land use/land cover map and table
3. Inventory of the IWMZ

Moderate Vulnerability

4. All potential contaminant sources as listed on Moderate Vulnerability PCSI Requirements
5. Land use/land cover map and table
6. Inventory of the IWMZ

Low Vulnerability

1. All potential contaminant sources as listed on Low Vulnerability PCSI Requirements
2. A land use/land cover map and table; and
3. Inventory of the IWMZ

2.1.2.3 Land Cover, Zoning and Land Use

Zoning for the drinking water supply management area is under the ordinances, planning, and jurisdiction of both the City of Worthington and Nobles County. The City of Worthington Zoning, public land managed for wildlife and recreation, and public lands purchased by the DNR, Pheasants Forever, Worthington Public Utilities, and Watershed District is depicted in Figures 6-1 and 6-2. The future Land use plan for City of Worthington is included as Figure 9. The Nobles County Zoning maps are currently under construction and are not included as part of this plan. The 2011 land use map from the National Land Use Database was analyzed to determine local land uses and is depicted in Figures 5-1 and 5-2.

Figures 5-1 and 5-2 National Land Cover Dataset

- Woody Wetlands
- Developed, Open Space
- Deciduous Forest
- Cultivated Crops
- Herbaceous
- Hay/Pasture
- Evergreen Forest
- Emergent Herbaceous Wetlands
- Developed, Low Intensity
- Open Water
- Barren Land
- Developed, High Intensity
- Developed, Medium Intensity
- Shrub/Scrub

2.1.2.4 Public Utility Services

Public Utility Services may act as potential contaminant sources or corridors to contaminant sources and therefore included as data elements for this plans reference.

- Transportation routes or corridors. Transportation Routes are depicted in Figures 1-1 and 1-2.

- Utilities provided by the City of Worthington are depicted in Figures 8-1 and 8-2. Additional Storm water information is available at the city office.
- Gas and oil pipelines – No liquid gas or oil pipelines are depicted on The National Pipeline Mapping System (NPMS) Public Viewer within DWSMA. One natural gas pipeline is depicted on the eastern boundary of Worthington. Natural gas was determined to not be a potential contaminant source for the source water aquifer and thus not included as part of the PCSI.
- Public drainage systems. Public Drainage systems are depicted in Figures 7-1 and 7-2 and a Public Drainage ditch/storm water basin is depicted in Figure 11-2.

2.1.3 Water Quantity

2.1.3.1 Surface Water Quantity

Three lakes and several small streams and ditches are present within this area. The three lakes are Okabena Lake in the southern part of the city, Ocheda Lake located 2.5 miles south of the city, and Lake Bella, approximately 6.5 miles south of the city. Lake Bella was recently created by restricting the flow of the Ocheyedan River that flows south from Ocheda Lake. High are low water levels for the following lakes were obtained from the Minnesota DNR. The following Surface water Quantity Data is presented in the following order: Highest recorded water level (famsl), Lowest recorded water level (famsl), and ordinary high water level (famsl). Lake Bella: 1557.32, 1547.64, NA, Lake Ocheda: 1563.1, 1557.52, 1561, and Lake Okabena: 1577.93, 1573.95, 1577.8 (MnDNR, 2017). Most of the streams, creeks, and ditches in the area are intermittent and seasonal. No major rivers are present locally, and the area is divided between the Little Sioux River, the West Fork of the Des Moines River and the Rock River major watersheds. The Little Rock River is located approximately 7 miles southwest of Worthington. There are no known water-use conflicts pertaining to the surface water quantity of these features. Surface water quantity is a required data element and was also described in Part I WHPP (Appendix B).

2.1.3.2 Groundwater Quantity

The City of Worthington presently meets the water demand of the distribution area and groundwater levels are adequate and is within the permitted appropriations that is administered by the Minnesota Department of Natural Resources. To the City's knowledge there are no other high capacity wells or water quantity conflicts within the DWSMA. Additional wells are registered with the Minnesota Well Index and are discussed in section 4.2.3 of this plan. The City of Worthington has begun planning for additional water quantity requests that may come from future residential and industrial demands.

2.1.4 Water Quality

2.1.4.1 Surface Water Quality

Watershed districts are depicted in Figures 7-1 and 7-2. Surface water Quality can be accessed through the MnDNR's "Lake Finder" and "Watershed Health Assessment" tools and also the Minnesota Pollution Control Agency's "Special Waters Search". Lake Okabena and the Ocheda water basin are both registered by the MPCA has having an EPA "approved" impairment for Nutrient/Eutrophication Biological Indicators and Turbidity. From the MPCA's assessment, these impairments are considered to be construction related parameters and require updated best management strategies. The MnDNR "Watershed Health Assessment" tool lists the surrounding watersheds as having a moderate Water Quality Mean score with a moderate to high non-point source risk reflecting geography, climate, and land use practices.

2.1.4.2 Groundwater Quality

A detailed summary of water quality data is included in chapter 4.1 derived from the City of Worthington's Consumer Confidence Report. The City of Worthington provides its drinking water from 10 municipal wells from depths 44 to 102 feet below surface. The water is presently treated for groundwater conditions and any changes in general chemistry may indicate the well water is being recharged from non-groundwater sources such as improperly sealed wells or surface water.

2.2 Assessment of Data Elements

The types of potential contamination sources that may exist within the DWSMA were derived from the information collected to satisfy the data element requirements. The results of the assessment of DWSMA and well vulnerability and the presence or absence of human-caused contaminants in the source water were used to guide the risk assessment to potential sources of contamination.

Generally, the quality of the source water aquifers utilized for the Worthington public water supply is good; the water supply is free of harmful contaminants and pollutants. The public water supply system has always remained in full compliance with all state and federal drinking water regulations.

3.0 Delineation of the Wellhead Protection Area, Drinking Water Supply Management Area and Vulnerability Assessments

3.1 WHPA and DWSMA Delineation

The boundaries of the WHPA and DWSMA and the DWSMA vulnerability are shown in Figure 1-1 (Okabena and Malcolm Wellfields) and Figure 1-2 (Lake Bella Wellfield) and well vulnerability is listed above in Table 1. A detailed description of the process used for 1) delineating the WHPA and the DWSMA, and 2) preparing the vulnerability assessments of the city water supply well(s) and DWSMA is presented in the Part I report found in Appendix B.

The WHPAs are defined by a 10-year time of travel for the Okabena Wellfield and a combination of 10-year travel times and SWCAs for the Malcolm and Lake Bella Wellfields. Figures 1-1/1-2 and Figures 2-1/2-2 also show the emergency response areas (ERAs), which are defined by a 1-year time of travel. The Inner Wellhead Protection Management Zone (IWMZ) is the area within a 200-foot radius around each well. Definitions of rule-specific terms that are used are provided in the "Glossary of Terms."

The Malcolm Wellfield DWSMA, as amended, is smaller than the previous DWSMA, primarily due to the abandonment of Wells 16B and 17. The Lake Okabena Wellfield DWSMA is also smaller in area and does not extend into the lake. The DWSMA for the Lake Bella Wellfield, as amended, is largely the same as the original DWSMA, with the exception of a few parcels that have been removed from the DWSMA.

3.2 DWSMA Vulnerability Assessment

The significance of this assessment relative to the likelihood that a contaminant may move from a potential source to the source water aquifer is summarized below in terms of a travel time. Generally, the higher the vulnerability rating, the greater the risk that a released contaminant may result in contaminated drinking water. These ratings are shown in Figure 1-

1 (Okabena and Malcolm Wellfields) and Figure 1-2 (Lake Bella Wellfield) and were determined using geologic, soils, and groundwater chemistry information.

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

The Lake Okabena DWSMA (Wells 19 and 22) is classified as moderately vulnerable. The Malcolm and Lake Bella DWSMAs are classified as having high vulnerability.

4.0 Assigning Risk to Potential Contamination Sources

The types of potential contamination sources that may exist within the DWSMA were derived from the information collected to satisfy the data element requirements (Chapter 2). The 1) results of the assessment of DWSMA and well vulnerability and 2) the presence or absence of human-caused contaminants in the source water were used to guide the risk assessment to potential sources of contamination. Table 2 indicates the risk that the City of Worthington has assigned to potential point sources of contamination that are located within the IWMZ. This assessment also reflects the risk assessment that MDH has assigned to them in the sanitary survey report. Table 3 indicates the risk that the City of Worthington has assigned to potential point sources of contamination that are located in the remainder of the DWSMA beyond the IWMZ whereas, Table 4 indicates this risk attributed potential non-point sources of contamination.

4.1 Contaminants of Concern

Generally, the quality of the source water aquifers utilized for the Worthington public water supply is good and free of harmful contaminants and pollutants. The public water supply system has always remained in full compliance with all state and federal drinking water regulations.

Samples from the Worthington public water supply system are routinely collected and analyzed by the MDH as required under the Minnesota Public Water Supply Program and the federal *Safe Drinking Water Act*. The samples are tested for microorganisms, inorganic compounds, organic chemicals, pesticides and herbicides, and radioactive contaminants. No contaminants were detected at levels that violated federal drinking water standards; however copper was in exceedance of the federal action level. Some constituents were detected in trace amounts that were below legal limits such as arsenic, barium, fluoride, TTHM and HAA5 (byproducts of drinking water disinfection), chlorine, and lead. On March 9, 2016 one of the City of Worthington wells tested positive for E.coli. Confirmation samples were taken and no detections of E.coli were recorded. The well was taken offline on March 10, 2016. The 2016 Worthington Drinking Water Consumer Confidence Report is available on the Worthington Public Utilities website. There are currently no issues related to the quality of the water obtained by the public water supply wells.

The Worthington public water supply is treated for aesthetic problems through the addition of chlorine and potassium permanganate. Fluoride is also added to the water as mandated by the State of Minnesota, and a phosphate product is added to inhibit corrosion. Groundwater quality studies completed by the Minnesota Pollution Control Agency (MPCA), the USGS, the MGS, and the MNDNR have been reviewed, and the information from these studies used, in delineating the WHPAs and performing the vulnerability assessments.

4.2 Inventory Results and Risk Assessment

A map and description of the locations of potential contamination sources are presented in Appendix C and attached figures, along with a discussion of required data elements and their consideration in management of the DWSMA.

An overview of required data elements are discussed in Chapter 2, Identification and Assessment of the Data Elements. Local, State, and Federal databases were assessed in determining potential contaminant sources to satisfy required data elements. From these requirements, the following sources were identified for the DWSMA.

4.2.1 The Aquifer

The source water aquifers were found in the part 1 WHPP to have moderate to Very High vulnerabilities and may be affected by current land use activities and Potential Contaminant Sources identified as part of this plan.

4.2.2 Land Use

Zoning for the drinking water supply management area is under the ordinances, planning, and jurisdiction of both the Nobles County and the City of Worthington. Improper management of land use within the DWSMAs can act as potential contaminant sources to the source water aquifers. Identified land use potential contaminant sources are detailed in appendix C and depicted on Figures 10-1/10-2 and 11-1/11-2. These sites include feedlots, land application sites, roadways over water, and storm water basins. Worthington Public Utilities Commission is unaware of any proposed large-scale land use changes within the DWSMA that could potentially negatively impact the municipal wells or source water aquifers. Changes in land use have the potential to introduce pathways or sources of contamination to the source water aquifers. National Land Cover Dataset Land Use and County Zoning within the DWSMA is depicted on Figures 5-1/5-2 and 6-1/6-2.

4.2.3 Well Water

The Minnesota Department of Health provided a database with indexed wells within the DWSMA to be included as part of this PCSI. Wells within the DWSMA may extend into the source water aquifer and if improperly constructed or maintained could transmit pollutants into the aquifer. Wells inventoried from the MDH are included in Appendix C and depicted on Figures 12-1, 12-2, and 12-3. Wells with poor location accuracy are also presented on Figures 12-1/12-2/12-3 and detailed in Appendix C.

4.2.4 Minnesota Pollution Control Agency Potential Contaminant Source Inventory

The Minnesota Pollution Control Agency (MPCA) provides multiple state wide databases inventorying potential contaminant sources as part of their GIS ready “What’s in my Neighborhood” database and Spills database and relevant listing types are included below. The MPCA Spills database provides an address that was used to geocode registered Spills within the City of Worthington. MPCA “What’s in My Neighborhood” database is provided in GIS form and mapped using the following methodology for locating. There are a variety of

methods that the MPCA employs to located sites. Those used for sites within the search area for this report include; Address Matching House Number, Digitized-DRG, Digitized - Map Tool, Zip Code Centroid, Interpolation Unknown, and GPS – Other. These location methods are considered reliable aside from Zip Code Centroid and Interpolation Unknown. Nearly all of these sites which were poorly located by the MPCA were relocated or determined to be outside the DWSMA boundaries by The City of Worthington and Short Elliott Hendrickson, Inc. based on address mapping or field knowledge.

4.2.4.1 MPCA Spill Listings

In the State of Minnesota, spills that may cause pollution, such as spills of toxic, flammable, corrosive and dangerous industrial chemicals, are required to be reported. Spills of any quantity are required to be reported, with the exception of petroleum that has a reporting threshold of greater than five-gallons. A concern expressed by the Worthington Public Utilities Commission is emergency response, coordination, and documentation of any such spill that may occur within the DWSMA. Spills are depicted in Figures 11-1, 11-2 and 11-3 and detailed in Appendix C.

4.2.4.2 Tank Sites

Underground and above ground storage tanks used to store large quantities of liquid chemicals and potentially hazardous substances are considered high risks for groundwater contamination. If Leaking or ruptured, these tanks could release large quantities of chemicals into the subsurface, which could eventually enter the source water aquifers and public water supply wells. Tank sites are depicted in Figures 11-1, 11-2 and 11-3 and detailed in Appendix C.

4.2.4.3 Leak Sites

Leaking storage tank sites also pose a high risk for groundwater contamination. As discussed in the previous section, these sites have had a storage tank release its contents into or onto the ground. Although many have been “cleaned” and “closed” by the MPCA, some of these sites may still have remaining soil and/or groundwater contamination. Leak sites are depicted in Figures 11-1, 11-2, and 11-3 and detailed in Appendix C.

4.2.4.4 State Assessment Site

Superfund projects occur where known or suspected environmental contamination threatens public health, welfare or the environment. The Superfund Program identifies, investigates and determines appropriate cleanup plans for these sites. Superfund projects often occur at abandoned or uncontrolled sites, for instance, where the business that polluted a site no longer exists. Federal Superfund sites are on the U.S. Environmental Protection Agency’s National Priority List (NPL), while State Superfund sites are on Minnesota’s Permanent List of Priorities (PLP). MPCA staff may work with Environmental Protection Agency (EPA) staff or other state agencies to investigate and clean up these sites. State Assessment Sites are depicted in Figures 11-1, 11-2 and 11-3 and detailed in Appendix C.

4.2.4.5 Unpermitted Dump

Unpermitted dump sites are landfills that never held a valid permit from the MPCA. Generally, these dumps existed prior to the permitting program established with the creation of the MPCA in 1967. These dumps are not restricted to any type of waste, but were often old farm or municipal disposal sites that accepted household waste. State assessment staff have investigated many of these dump sites. Dump sites are depicted in Figures 11-1, 11-2 and 11-3 and detailed in Appendix C.

4.2.4.6 Petroleum Brownfield

Petroleum Brownfield sites are places that may have been contaminated with petroleum due to a past or current leak. Petroleum Brownfields program staff assesses the risk associated with petroleum contamination at these sites and then provide technical assistance to help get the site cleaned up, developed, and/or transferred to a new owner. Petroleum Brownfields are depicted in Figures 11-1, 11-2, and 11-3 and detailed in Appendix C.

4.3 Inventory Results and Risk Assessment

A map and description of the locations of potential contamination sources are presented in Appendix C and Figures 10-1/10-2/10-3, 11-1/11-2/11-3, and 12-1/12-2/12-3. Also, the risk assessment includes 1) a summary of the results for the IWMZ is listed in Table 2, and 2) for the remainder of the DWSMA in Table 3.

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

A high (H) risk potential implies that the potential source type has the greatest likelihood to negatively impact the City water supply and should receive highest priority for management.

A moderate (M) risk potential implies that the potential source type may have an impact on the City water supply and should receive an intermediate priority for management.

A low (L) risk potential implies that a potential source type may have a marginal or negligible impact on the City water supply and should receive a low priority for management.

4.3.1 Data Accuracy and Limitations

For this plan, the Worthington Public Utilities has attempted to identify and specifically locate as many potential contaminant sources as possible and feasible given the current level of information and available resources. However, some potential contaminant sources may exist within the DWSMA that have not yet been identified or accurately located.

Table 2
Potential Contamination Sources and Assigned Risk for the IWMZ

Source Type	Total	Level of Risk
Okabena Well Field		
Electrical transformer storage area, oil-filled (Well 19)	1	Low
Portable (privy) or toilet (Well 22)	1	Moderate
Unused, unsealed well or boring (Well 22)	1	High
Ordinary high water level of a stream, river, pond, lake, reservoir, or drainage ditch (Well 22)	1	Low
Malcolm Well Field		
No potential contaminant sources reported within IWMZ		
Lake Bella Well Field		
Operating well (Well 24, Well 27)	2	High
Gravel pocket or French drain for clear water drainage only (Well 29, Well 30)	2	High

Potential Point Contamination Source Type and Assigned Risk

Potential Contaminant Source Type	Number Within DWSMA and Level of Risk	Status of Potential Contaminant Source	Level of Risk
Okabena Well Field			
Wells	20	12 are Active*	Moderate
Aboveground Tank	1	Inactive	Moderate
Underground Tanks	4	Inactive	Moderate
Brownfield	5	1 is Active*	High
Leak	8	1 is Active*	Low
Site Assessment	1	Inactive	Low
Spill	6	Inactive	Moderate
Storage Tanks	We are assuming each home/farm site may have a storage tank for fuel.		
Chemical Storage	We are assuming each home/farm site may have chemicals used for ag./turf applications.		
Malcolm Well Field			
Wells	19	1 is Active*	High
Land Application Site	4	Active	High
Stormwater Basin	1	Active	Moderate
Storage Tanks	We are assuming each home/farm site may have a storage tank for fuel.		
Presumed Land Application Site	We are assuming each home/farm without an application or permit may be a potential land application site.		
Presumed Subsurface Sewage Treatment	We are assuming each home/farm may have subsurface sewage treatment systems.		
Chemical Storage	We are assuming each home/farm site may have chemicals used for ag./turf applications.		
Lake Bella Well Field			
Wells	27	18 are Active*	Moderate
Feedlots	8	Active	High
Land Application Site	16	Active	High
State Assessment Site	1	Inactive	Low
Road Crossing over Water	2	Active	Low
Unpermitted Dump	1	Unknown	Moderate
Storage Tanks	We are assuming each home/farm site may have a storage tank for fuel.		
Presumed Land Application Site	We are assuming each home/farm without an application or permit may be a potential land application site.		
Presumed Subsurface Sewage Treatment	We are assuming each home/farm may have subsurface sewage treatment systems.		
Chemical Storage	We are assuming each home/farm site may have chemicals used for ag./turf applications.		

*Please note: The status of potential contaminant sources only detail number of active sites. Additional statuses may have been inventoried and are listed in detail with Appendix C.

Table 3
Nonpoint Sources of Potential Contamination and Assigned Risk
(Based on DWSMA Vulnerability)

Land Use Category **Agricultural, Commercial, Industrial, Residential, Open Space**	**DWSMA**	**ERA** (1 year time of travel)	
	Acres	**Acres**	**Level of Risk**
Okabena Well Field			
Developed, Low Intensity	26.14	16.7	Moderate
Developed, Medium Intensity	31.91	26.0	Moderate
Developed, High Intensity	17.01	5.3	Moderate
Deciduous Forest	2.03	-	Low
Developed, Open Space	24.59	11.9	Low
Emergent Herbaceous Wetlands	11.88	2.02	Low
Grassland/Herbaceous	29.62	21.53	Moderate
Row/Agriculture/Pasture/Hay	176.67	26.37	High
Malcolm Well Field			
Barren Land	1.1	-	Low
Developed, Low Intensity	26.9	2.13	Moderate
Developed, Medium Intensity	5.1	-	Moderate
Developed, High Intensity	-	-	Moderate
Developed, Open Space	83.7	0.038	Low
Deciduous Forest	14.52	-	Low
Mixed Forest	15.32	-	Low
Shrub/Shrub	1.36	-	Low
Emergent Herbaceous Wetlands	13.48	0.97	Low
Grassland/Herbaceous	51.9	2.29	Low
Open Water	7.79	0.0001	Low
Row/Agriculture/Pasture/Hay	1511.94	6.04	High
Lake Bella Well Field			
Barren Land	1.07	-	Low
Developed, Low Intensity	19.4	2.44	Moderate
Developed, Medium Intensity	4.09	-	Moderate
Developed, High Intensity	1.17	-	Moderate
Deciduous Forest	12.91	-	Low
Developed, Open Space	409.45	12.68	Low
Emergent Herbaceous Wetlands	308.77	10.2	Low
Mixed Forest	52.44	-	Low
Shrub/Shrub	9.74	-	Low
Woody Wetland	2.61	-	Low
Grassland/Herbaceous	623.7	28.8	Low
Open Water	236.31	23.48	Low
Row/Agriculture/Pasture/Hay	5979.34	80.8	High

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

The city estimates that the following changes to the physical environment, land use, surface water, and groundwater-may occur over the ten-year period that the WHP plan is in effect. This is needed to determine whether new potential sources of contamination may be introduced in the future and to identify future actions for addressing these anticipated sources. Land and water use changes may introduce new contamination sources or result in changes to groundwater use and quality. The anticipated changes may occur within the jurisdictional authority of the City, although some may not due to part of the DWSMA being outside of the City boundaries.

Table 5 describes the anticipated changes to the physical environment, land use, and surface water or groundwater in relationship to 1) the influence that existing governmental land and water programs and regulations may have on the anticipated change, and 2) the administrative, technical, and financial considerations of the City of Worthington and property owners within the DWSMA.

Table 4
Expected Land and Water Use Changes

Expected Change (Physical Environment, Land Use, Surface Water, Ground Water)	Impact of the Expected Change On the Source Water Aquifer	Influence of Existing Government Programs and Regulations on the Expected Change	Administrative, Technical, and Financial, Considerations due to the Expected Change
The City of Worthington has purchased and plans to purchase land within the DWSMA to transition it into inactive or conservational lands.	As land is retired to conservation, source water to the aquifer is less likely to be impacted from potential contaminant sources.	No changes, therefore, existing programs or regulations are adequate.	Working with land owners to purchase and retire land into conservation within the DWSMA. Financial cost associated with purchasing land and administrative consideration while working with conservation partners.
No changes to the physical makeup of the aquifer are expected.	No changes, therefore, no impact.	No changes, therefore, existing programs or regulations are adequate.	Because there are no expected changes to the physical makeup of the aquifer no additional administrative, technical or financial considerations required.
Relocating wells – Well 27, 24, 28 – too close to lake, coliform issues. Drilling within new acquisition of land, probably won't change DWSMA delineation due to already having large SWCA	Additional filtering of surface water will improve source water aquifer.	Existing regulations will dictate setbacks for wells to be relocated. MDH well code and safe drinking water act regulations will determine the location of the wells.	Because there are no expected changes to the physical makeup of the aquifer no additional administrative, technical or financial considerations required.
In the future, more of Worthington's water will come from Lewis and Clark	Use of alternative water source will reduce burden on present source water aquifer.	No anticipated influence from government programs or regulations	With future delineations, if pumping of present source water aquifer decreases, DWSMA areas may shrink.
No changes are expected in the land uses within the DWMSA for Okabena or Lake Bella.	No changes, therefore, no impact.	Existing County regulations are in place and adequate.	Because there are no expected changes no additional administrative, technical or financial considerations required.
Within Malcolm DWSMA there may be some residential or light commercial development	Development is not expect to impact the source water aquifer	Existing zoning requirements will dictate development and land use.	Zoning regulations are in place and will address development; therefore no administrative, technical or financial considerations are anticipated.

6.0 Issues, Problems and Opportunities

6.1 Identification of Issues, Problems and Opportunities

The City of Worthington has identified water and land use issues, problems and opportunities related to 1) the aquifer used by the city water supply wells, 2) the quality of the well water, or 3) land or water use within the DWSMA. The city assessed 1) input from public meetings and written comments that it received, 2) the data elements identified by MDH during the scoping meetings, and 3) and the status and adequacy of the city's official controls and plans on land use and water uses, as well as those of local, state, and federal government programs. The results of this effort are presented in Table 6 which defines the nature and magnitude of contaminant source management issues in the city's DWSMA.

Identifying the issues, problems and opportunities as well as resource needs enables the city to: 1) take advantage of opportunities that may be available to make effective use of existing resources, 2) set meaningful priorities for source management and 3) solicit support for implementing specific source management strategies.

6.2 Comments Received

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

Table 5
Issues, Problems and Opportunities

Issue Identified	Impacted Feature	Problem Associated with the Identified Issue	Opportunity Associated with the Identified Issue	Adequacy of Existing Controls to Address the Issue
The Quaternary Water Table Aquifer (QWTA) provides the majority of Worthington's water and is directly connected hydrologically to lakes and streams in the area. However, whether the QWTA wells are hydrologically connected to surface water is not understood.	Aquifer, Well Water Quality, DWSMA	The hydrologic connection between QWTA wells and surface water, if it exists, is not understood.	The City, working in cooperation with MDH, needs to conduct further monitoring to determine the existence and degree of hydrologic connection.	Not applicable.
Lake Bella DWSMA wells 24, 27 and 28 tested positive for coliform bacteria in spring 2016, with Well 27 showing the presence of E. coli. However, there were no detections of coliform bacteria or E.coli in the Worthington distribution system.	Well Water Quality	Water quality concern.	WPU will continue to work with MDH, with relocation of some wells anticipated.	Controls are adequate.
In the previous WHP Plan, the Lake Okabena DWSMA was considered low vulnerability because both Wells 19 and 22 showed no tritium. However, updated sampling showed tritium at 3.1 TU in Well 22 in 2003.	Aquifer, Well Water Quality, DWSMA	The cause of the increased tritium level in Well 22 is not known and needs to be investigated.	WPU will conduct in situ inspection of Well 22 to assess integrity of the well casing.	Not applicable.
It is always difficult to foresee or plan for every threat or potential contaminant source which may affect Worthington in the future.	Aquifer, DWSMA, Well Water Quality	The City may not be prepared technically or financially to address potential threats unknown to them at this time.	If a critical issue or potential contaminant threat becomes an issue in the future for the City, the city can ask for assistance from the various state agencies and MRWA to promptly take action to prevent this contaminant source from contaminating their drinking water supply. Grants dollars may also be available to help cover various cost and equipment.	Not applicable at this time.
The City of Worthington has limited resources and funds to implement the wellhead protection plan.	Aquifer DWSMA Well Water Quality	With limited resources implementing the WHP plan will be a challenge for the City of Worthington.	Form partnerships with the Township, County and State agencies who have controls in the DWSMA so they can help with implementation.	Not applicable

Issue Identified	Impacted Feature	Problem Associated with the Identified Issue	Opportunity Associated with the Identified Issue	Adequacy of Existing Controls to Address the Issue
The Lake Bella DWSMA is entirely outside the city limits.	Aquifer, DWSMA, Well Water Quality	Water is recharging the city's aquifer from lands outside the city limits. The city has no land use controls or authority over these areas.	The city will need to work cooperatively with Nobles County and surrounding townships to ensure smart land use decisions are made within the City's DWSMA.	Nobles County has zoning authority over this area and can provide valuable assistance in land use issues.
Spill response equipment/expertise are not readily available.	Aquifer, Well Water Quality	The city and first responders are not prepared to adequately respond to a spill within their DWSMA.	The city and first responders can work cooperatively with local and state government to develop and implement a spill response plan to handle issues which may arise within the DWMSA.	Adequate controls exist at the state level however greater awareness and tools are necessary at the City of Worthington.
Intensive row crop production and other agricultural land use previously dominated the wellhead protection areas	Aquifer, Well Water Quality	Row crop production and agriculture may add nitrates or bacteria to the subsurface.	WPU will continue to work cooperatively with outside organizations (such as Pheasants Forever) to place additional land in conservancy.	Not applicable.
In the future, WPU will obtain more water from Lewis and Clark	Aquifer	Not applicable.	Use of alternative water source will reduce burden on present source water aquifer.	Not applicable
The City has old municipal wells which have not been properly sealed.	Aquifer, Water Quality	Wells which have not been sealed according to MDH standards may provide a pathway for pollutants to enter into the aquifer.	With the assistance of MDH the city can locate, assess and seal the wells if they pose a threat to the city's drinking water supply.	MDH Well Management has the ability to require the city to properly address unused improperly sealed wells. The city can utilize the MDH WHP grant program to seal the wells.

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

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

7.1 Existing Controls and Programs of the City of Worthington

The city has identified the legal controls and/or programs provided in Table 7 that it has in-place that can be used to support the management of potential contamination sources within the DWSMA.

Table 6
Controls and Programs of the City of Worthington

Type of Control	Program Description
Zoning Ordinance and Conditional Use Permits	Sets standards and orderly growth of various land uses within the City limits and allows the City to apply permit conditions to land uses they deem necessary.
Connection to City Services (Sewer)	City requires residents are required to connect to city sewer when feasible; private sewage systems are not allowed with the City.
Cross Connection Control (under State Plumbing Code)	Prevents the cross connection between the City's distribution system and private water sources.
Water Conservation	Worthington has a 3-stage system

7.2 Local Government Controls and Programs

Table 8 summarizes the departments or programs within Nobles County may be able to assist the city with issues relating to potential contamination sources that 1) have been inventoried or 2) may result from changes in land and water use within the DWSMA.

Table 7
Local Agency Controls and Programs

Government Unit	Name of Control/Program	Program Description
Nobles County Environmental Services Department	Zoning and Conditional Use Permits	Sets standards and orderly growth of various land uses within the County and allows the County to apply permit conditions to land uses they deem necessary.
	Household Hazardous Waste Collection.	Provides education to landowners and a collection program for disposing of household hazardous waste.
	Water Planning	Establishes countywide goals and priorities towards protecting water resources.
	Feedlot Ordinance	Sets minimum standards and management requirements for feedlots less than 1000 animal units in size.
	Subsurface Sewage Treatment System (SSTS) Ordinance	Sets minimum standards for permitting design and construction of SSTSs.
Okabena-Ocheda Watershed District	The Watershed District has rules in place and regulates via permits land use practices and other activities which may potentially negatively impact waters within the watershed.	The Watershed District reviews applications and issues permits on various practices which may impact water quality within the watershed some of the practices include; tile line placement (new installation and maintenance), stormwater outfall locations and quality, above ground storage tanks etc…
Nobles County Emergency Management Dept.	Transportation accidents causing contaminant spills	1) Directs the response and the extent of initial clean-up of fuel, chemical, or other hazardous substances that are released due to transportation accidents.
Nobles County Soil and Water Conservation District	1) Agricultural BMPs 2) Storm water management 3) Wetland management 4) Feedlots 5) Residential BMPs	The Nobles SWCD promotes the protection of water and soil resources in the county through educational programs, cost-sharing and collaboration with other local, state and federal agencies.

7.3 State Agency and Federal Agency Support

MDH will serve as the contact for enlisting the support of other state agencies on a case-by-case basis regarding technical or regulatory support that may be applied to the management of potential contamination sources. Participation by other state agencies and the federal

government is based on legal authority granted to them and resource availability. Furthermore, MDH 1) administers state regulations that affect specific potential sources of contamination and 2) can provide technical assistance for property owners to comply with these regulations.

Table 9 identifies specific regulatory programs or technical assistance that state and federal agencies may provide to the City of Worthington to support implementation of its WHP plan. It is likely that other opportunities for assistance may be available over the ten-year period that the plan is in effect due to changes in legal authority or increases in funding granted to state and federal agencies. Therefore, the table references opportunities available when the city's WHP plan was first approved by MDH.

Table 8
State and Federal Agency Controls and Programs

Government Unit	Type of Program	Program Description
MN Dept. of Health	State Well Code (MR Chapter 4725)	MDH has authority over the construction of new wells and sealing of wells. MDH staff in the Well Management Program offers technical assistance for enforcing well construction, maintaining setback distances for certain contamination sources, and well sealing.
MN. Dept. of Health	Wellhead Protection	MDH can provide technical and financial assistance to the city for whp activities and can help identify technical and financial support that other governmental agencies can provide to assist with managing potential contamination sources.
MN Dept. of Natural Resources	Water Appropriation Permitting (MR Chapter 6115) Shoreland	DNR can require that anyone requesting an increase in existing permitted appropriations or to pump groundwater must address concerns of the impacts to drinking water if these concerns are include in a WHP plan. Establishes special requirements for landuse and soil disturbances within shoreland areas along protected waters.
MN Pollution Control Agency (MPCA)	Feedlot Rules Registered Storage Tank Program Stormwater Program	Establishes minimum state-wide standards for feedlot regulations and regulates feedlots >1000 animal units. MPCA administers the programs dealing with storage tank regulations and stormwater management.
MN Dept. of Agriculture (MDA)	Nutrient and Chemical Programs	MDA administers the programs which regulate the storage and application of nutrients and chemicals (pesticides and herbicides) and provide in field technical advice to farmers located within the DWSMAs.
U.S. Dept. of Agriculture (USDA)	Farm Bill Programs	The local USDA Service Center can provide technical and financial support for individuals and farmers through the Farm Bill.
Environment Protection Agency (EPA)	Shallow Disposal Well Program	EPA has the regulatory authority over Class V Injections Well or also known as Shallow Disposal Wells.

7.4 Support Provided by Nonprofit Organizations

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

8.0 Goals

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

- The overall GOAL of the City of Worthington is to promote public health, economic development and community infrastructure by maintaining a potable drinking water supply for all residents of the community, both now and into the future.

9.0 Objectives and Plan of Action

Objectives provide the focus for ensuring that the goals of the WHP plan are met and that priority is given to specific actions that support multiple outcomes of plan implementation.

Both the objectives and the wellhead protection measures (actions) that support them are based on assessing 1) the data elements (Chapter 2, and Appendix I), 2) the potential contaminant source inventory (Chapter 4), 3) the impacts that changes in land and water use present (Chapter 5), and 4) issues, problems, and opportunities related to administrative, financial, and technical considerations (Chapter 5).

9.1 Objectives

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

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

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

C. Gather additional information within the DWSMA in order to better understand the size and vulnerability of the DWSMA.

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

E. Manage the Inner Wellhead Management Zone to prevent contamination of the aquifer near the public supply wells.

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

G. Develop local land use controls and partner with local units of government to better protect the aquifer used by the City of Worthington.

9.2 WHP Measures and Action Plan

Based upon the factors, the WHP team has identified WHP measures that will be implemented by the city over the 10-year period that its WHP plan is in effect. The objective that each measure supports is noted, as well as 1) the lead party and any cooperators, 2) the

anticipated cost for implementing the measure, and 3) the year or years in which it will be implemented.

The following categories are used to further clarify the focus that each WHP measure provides as well as help to organize the measures listed in the action plan:

- Data Collection
- IWMZ Management
- Land Use Management
- Potential Contamination Source Management
- Public Education and Outreach
- Reporting and Evaluation
- Water Use and Contingency Strategy

9.3 Establishing Priorities

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

- Contamination of the public water supply wells by substances that exceed federal drinking water standards
- Quantifiable levels of contamination resulting from human activity
- The location of potential contaminant sources relative to the wells.
- The number of each potential contaminant source identified and the nature of the potential contaminant associated with each source
- The capability of the geologic material to absorb a contaminant
- The effectiveness of existing controls
- The time required to get cooperation from other agencies and cooperators
- The resources needed: staff, money, time, legal, and technical

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

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

Measure	Priority	Public Education and Outreach	Objective Addressed	City Measure Unless Cooperator is Noted	Cost	Implementation time frame									
						2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
1	High	The City of Worthington will include in the City Newsletter notification to the residents and businesses in Worthington that the City has an approved wellhead protection plan and share with them the general themes discussed in the plan.	A	MDH, MRWA	$500	•									
2	High	The City of Worthington will send a onetime mailing to all land owners within the DWSMA informing them that the City Website has information on general themes and practices discussed in the wellhead protection plan.	A		Staff Time	•									
3	High	The City of Worthington will provide WHP educational materials onto the City's website. Education materials, discussed in management strategies below, may utilize applicable resources through the Minnesota Rural Association, Minnesota Department of Health, Minnesota Department of Agriculture and Minnesota Pollution Control Agency. Topics Covered will include: 1. Proper management of wells (active, abandoned or unused). 2. Education material about basic UST requirements by hyperlinking the MPCA Fact Sheets, "Underground Storage Tanks: Are you doing the Big Five?" and "What Tank Owners Need to Know About the Underground Storage Tank Rules" 3. Promote best management practices related to lawn care management. 4 Information about the county household hazardous waste collection services. 5. Information to property owners about the proper operation, maintenance, and management of Subsurface Sewage Treatment Systems (SSTS). 6 Information for agricultural chemical users about proper handling, disposal, and storage of agricultural chemical. 7. Provide information regarding Storm Water runoff provided by the requirements specified in the city's MS4 storm water permit.	A	MDH, MRWA. MPCA, MDA	Staff Time	•									

Measure	Priority	Potential Contaminant Source Management and Land Use Management	Objective Addressed	City Measure Unless Cooperator is Noted	Cost	Implementation time frame									
						2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
4	High	The City will solicit external funding and support for placing addition land within the DWSMAs into conservancy	B	Various Cooperators	Varies	As Needed									
5	High	The city will explore the option of working together with neighboring public water suppliers to help fund a position to implement wellhead protection plans. The city would help fund a position if they are successful in securing grant funds via a MDH implementation grant.	B	MDH	$10,000	As Needed									
6	Medium	Evaluate risk associated to the drinking water supply by any potential inactive municipal or city test wells. City will work cooperatively with MDH to evaluate old municipal wells within the DWSMA.	B	MDH	Staff Time					•					
7	Medium	If any wells within the DWSMA are identified as needing to be sealed apply for an MDH grant or inquire with various cooperators to assist with sealing of wells.	B	MDH Nobles Co. 1W1P	$5,000	As Needed									
8	High	Mail the County Highway Department, MnDOT and Township a map of the DWSMA and ask that they take into consideration this area when they are conducting road construction or maintenance projects (i.e. storm water or diversions, fuel and construction equipment management and maintenance, chemical use, etc.).	B	Nobles County HWY, MN DOT, Twp.	Staff Time			•							
9	High	The City will request from the County the formal opportunity to provide comments on application of manure from feedlots or changes within the DWSMA.	B	Nobles County	Staff Time	•									
10	High	If any issues are determined to be caused from urban and agricultural runoff the city can partner with local units of government or apply for grants to address any such issues.	B	Nobles Co, SWCD, MDA, MDH, MRWA 1W1P	Staff Time		•								

Measure	Priority	Potential Contaminant Source Management and Land Use Management	Objective Addressed	City Measure Unless Cooperator is Noted	Cost	Implementation time frame									
						2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
11	High	The City will work coordinately with 1W1P.The City can apply for grants to provide financial support for any issues that may affect the source water or aquifer.	B	1W1P	Staff Time	As Needed									
12	High	The City will work with local government to address and water quality issues. City can apply for grants if issues are identified.	B	SWCD, MDH, 1W1P, County	Staff Time	As Needed									
13	Medium	The City will solicit information or attend relevant meetings where watershed protection and drinking water protection efforts are being discussed. If any issues are identified the city can apply for grants to provide financial support etc…	B	SWCD, MDH,1W1P ,etc	Staff Time	As Needed									
14	Medium	If any new contaminant sources are identified to the City of Worthington update the Potential Contaminant Source list. Such actions may include hiring a consultant to update the PCSI or contacting the MPCA for updates on any new listings within the DWSMA.	B	MPCA, Consultant	~ 5,000					•					
15	High	It is always difficult to foresee or plan for the future. The City will use its planning and management capabilities within this plan to help respond to new/unknown source water protection issues that may impact the quality or quantity of its drinking water in the future.	B		Staff Time	As Needed									

Measure	Priority	IWMZ Management	Objective Addressed	City Measure Unless Cooperator is Noted	Cost	Implementation time frame									
						2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
16	High	Implement the WHP Measures Findings in the IWMZ Inventories.	B, E	MDH, MRWA	Staff Time					•					•
17	High	Work with MDH to ensure that setback distances for new potential contamination sources are met.	B, E	MDH	Staff Time	On-going									
18	High	Assist MDH staff in completing future Inner Wellhead Management Zone Inventories for the public water supply wells.	B, E		Staff Time				•					•	
19	High	Continue to routinely record the static and pumping groundwater levels in all wells.	D, E		Staff	On-going									
20	Medium	Work with local and state agencies in future and ongoing efforts to compile regional geologic and hydrogeologic information through investigation and studies (See Scoping 2 Notice)	D, E		Staff Time										
21	High	City would request MDH generate a plan and work cooperatively on a water monitoring plan to address deficiencies in the understanding of surface water and groundwater interaction in the Lake Okabena Wellfield. If hydrologic connection is found, inventory and manage stormwater outfalls/basins (See Scoping 2 Notice)	D	MDH	Staff Time	•									
22	Medium	City would work cooperatively to conduct monitoring of the Lake Bella Wellfield, contingent upon availability of funding. (See Scoping 2 Notice)	D	MDH	Staff Time					•					

Measure	Priority	Land Use Management	Objective Addressed	City Measure Unless Cooperator is Noted	Cost	Implementation time frame									
						2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
23	High	The City will request that Nobles Co. review their existing land use ordinances to determine if appropriate measures are in place to protect the City's drinking water source.	G, C	Nobles County, MDH	Staff Time	•									
24	Medium	Include the WHPA and DWSMA maps in the city Comprehensive Land Use Plan.	G, C		Staff Time	•									
25	Medium	Ask County to update or include the WHPA and DWSMA maps in the County Comprehensive Land Use Plan.	G, C		Staff Time	•									
26	High	The City of Worthington will continually monitor or sample Lake Bella DWSMA wells 24, 27 and 28 for issues associated with a close proximity to Lake Bella (i.e. coliform detections)	G, C		Staff Time	•	•								
27	High	If The City of Worthington concludes Lake Bella Wells 24, 27, and 28 have issues associated with proximity to Lake Bella apply for grant from MDH to help seal problematic wells.	G, C	MDH	Staff Time		•	•							
28	High	If The City of Worthington concludes Lake Bella Wells 24, 27, and 28 have issues associated with proximity to Lake Bella apply for grants from listed contributors to help financially with siting and construction of new well(s).	G, C	MDH, 1W1P, Nobles Co MRWA, MnDNR	Staff Time		•	•							
29	High	Send a letter to Nobles Co. requesting the formal opportunity to provide comments on pending landuse changes within the DWSMA and a one mile radius around the DWSMA.	G, C	Nobles Co., MDH	Staff Time	•					•				

Measure	Priority	Emergency Contingency Planning	Objective Addressed	City Measure Unless Cooperator is Noted	Cost	Implementation time frame									
						2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
30	High	Send a DWSMA map to applicable emergency responders with the City of Worthington and Nobles County. Ask for any reported spill incidents to include Wellhead Protection Manager.	F	Nobles County	Staff Time	•									
31	Medium	Reach out to first responders to identify any needs for spill response that agencies may need. May be contingent on grant funding.	F	MPCA, Nobles County	Staff Time	As Needed									
32	Medium	Update the Emergency Response Plan	F		Staff Time		•		•		•		•		•
33	Medium	Mail a letter and DWMSA map to the county and ask that they include the DWSMA map in the county dispatch manual.	F	Nobles County	Staff Time	•									
34	High	<u>Implementation, Tracking and Reporting Activities</u> Maintain a "WHP folder" that contains documentation of WHP activities you have completed.	D	MDH, MRWA	Staff Time	•	•	•	•	•	•	•	•	•	•
35	High	<u>WHP Program Evaluation Plan Reporting:</u> Complete an Evaluation Report every 2.5 years that evaluates the "progress of plan of action and the impact of a (any) contaminant release on the aquifer supplying the public water supply well" MN WHP Rule 4720.5270. This evaluation will be mailed to the MDH Planner upon completion. This evaluation is available on the MRWA website.	D	MDH, MRWA	Staff Time			•			•			•	

10.0 Evaluation Program

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

1. Worthington Public Utilities will continue to cooperate with the Minnesota Department of Health in the annual monitoring of the water supply to determine whether the management strategies are having a positive effect and to identify water quality problems that may arise that must be addressed.
2. WHP plan manager will drive through the drinking water supply management area on a regular basis to identify any changes in land use or potential contaminant source management practices which may adversely impact the public water supply.
3. The wellhead protection team will meet on an as-needed basis to review the results of each strategy implemented during the previous plan year and identify, and discuss whether modifications are needed for those strategies, and additional strategies for the coming plan year. Each of the goals addressed in chapter 9.1 will be measured for performance based on reports, programs, and other related activities.
4. The wellhead protection plan manager will make a written report every 2.5 (or as needed) years to the City of Worthington regarding progress in implementing the wellhead protection management objectives, and the measure of success in meeting each goal stated in Chapter 9.1 of this plan. The annual reports will be compiled and used to review the overall progress in implementing source management strategies when the City of Worthington Public Utilities wellhead protection plan is updated in 10 years. A copy of the report will be sent to the Minnesota Department of Health Source Water Protection Unit in St. Paul, MN and another copy will be placed in the City of Worthington Public Utilities Wellhead Protection file.
5. As needed, briefings to the Worthington City Council or Worthington Public Utilities, in order to provide the basis for documenting whether each action step for that year was implemented, not feasible, or needs further assistance.
6. The City will assess the results of each action item that has been taken annually to determine whether the action item has accomplished its purpose or whether modification is needed. Assessment results will be presented in an annual report to the Worthington Public Utilities.
7. At year 8 the City will prepare a written report that documents how it has assessed plan implementation and the action items that were carried out. The report will be presented to MDH at the first scoping meeting that it will hold with the City to begin amending the WHP plan.

11.0 Contingency Strategy

The WHP plan must include an approved water supply plan that addresses disruption of the water supply that is caused either by contamination or mechanical failure. The city has prepared this strategy using a template that is provided by MRWA and has the approval letter presented in Appendix D of this plan.

12.0 References

Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. Photogrammetric Engineering and Remote Sensing, v. 81, no. 5, p. 345-354

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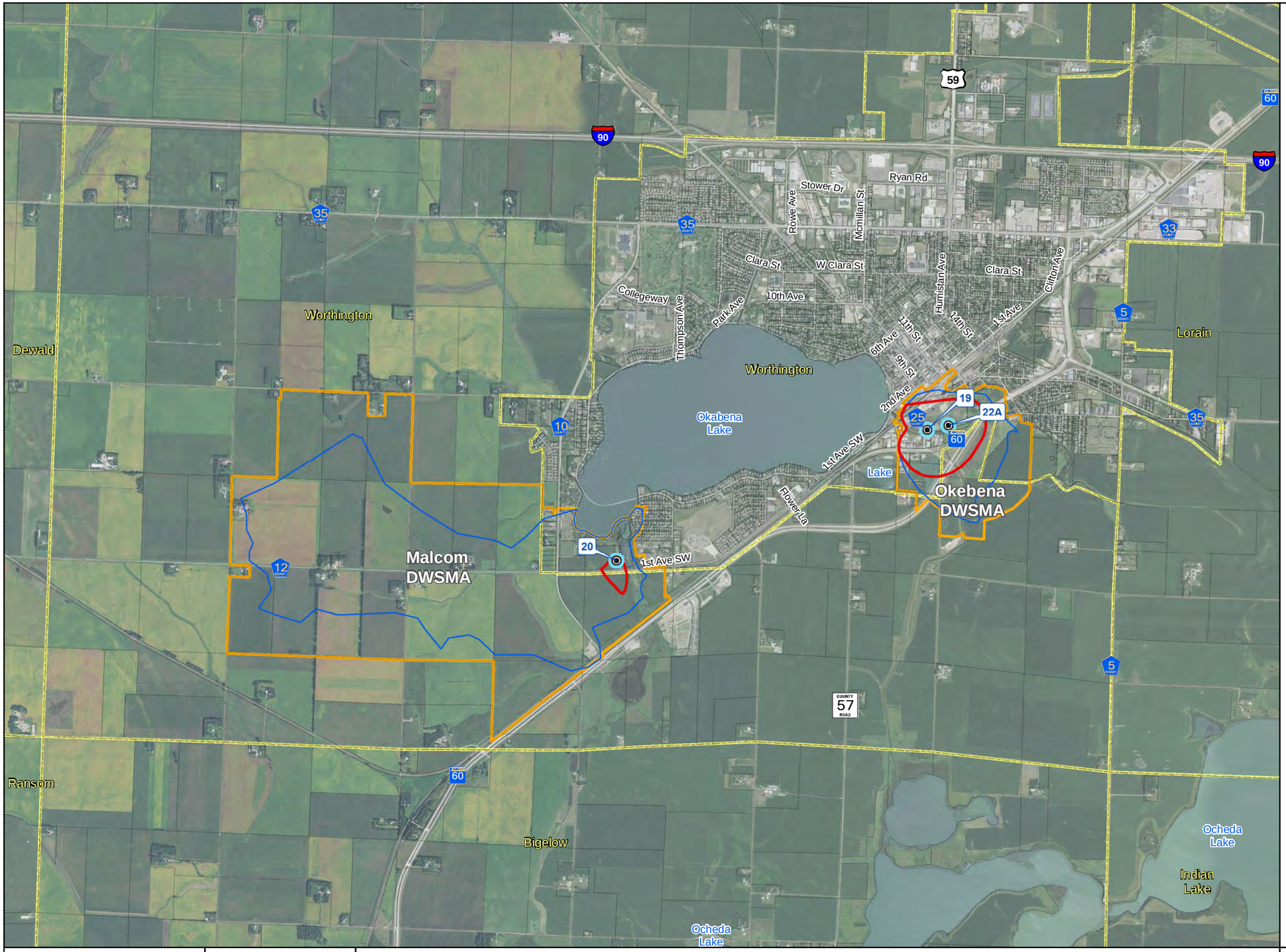
List of Figures



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Project: Wortc 12695
Print Date: 8/7/2017

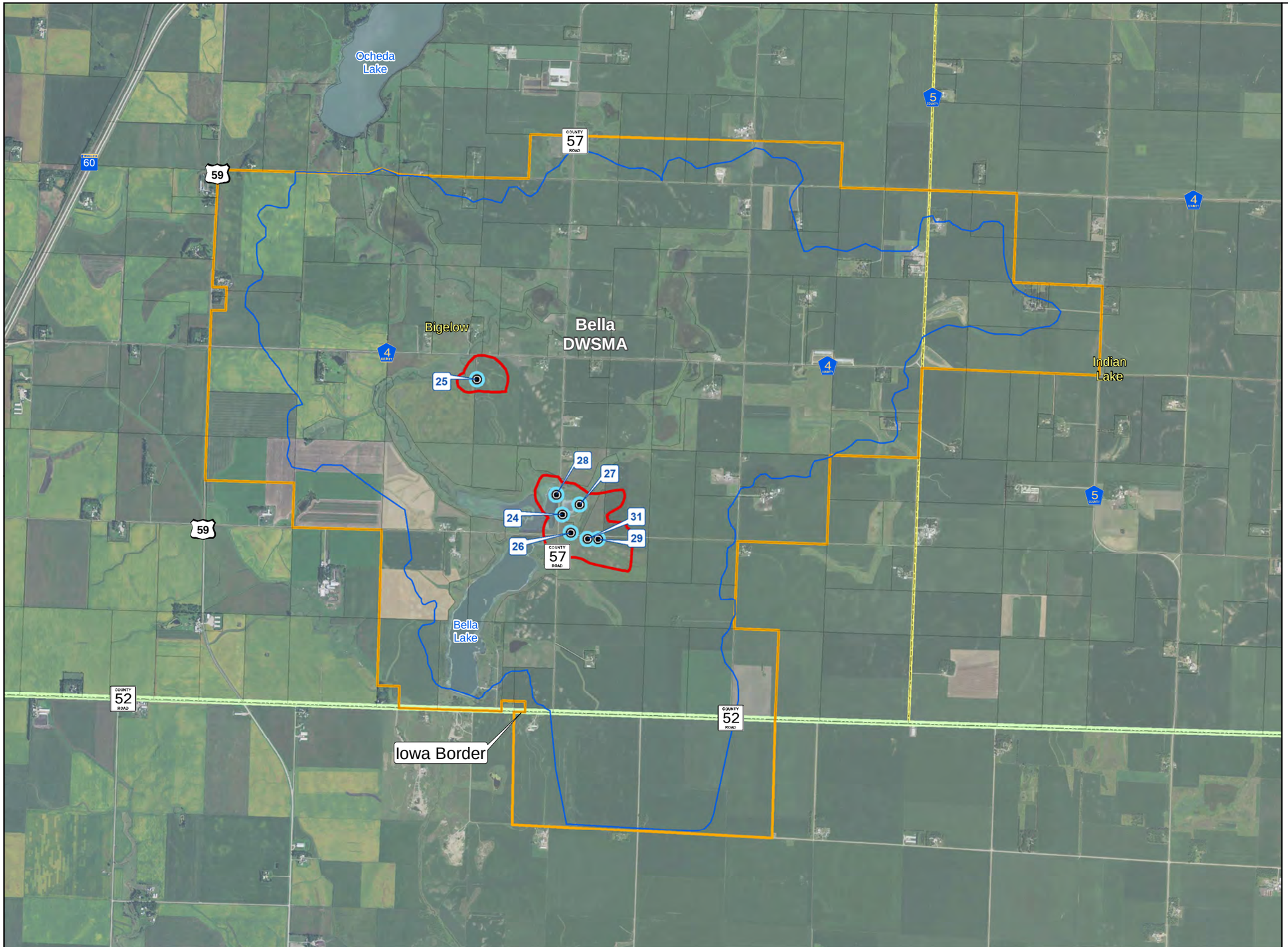
Map by: msherrill
Projection: UTM Zone 15N
Source: ESRI, MDH, MPCA, MnDOT MnDNR, SeH, MnGeo WMS Service

WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

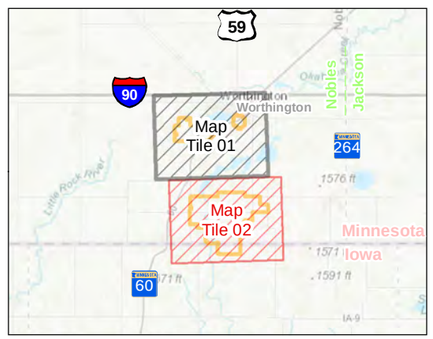
WHPA and DWSMA

Figure 1-1



Legend

- Public Water Supply Well
- Inner Wellhead Management Zone
- Emergency Response Area
- Wellhead Protection Area (WHPA)
- Drinking Water Supply Management Area
- Municipalities
- County Boundary
- Parcel Boundaries



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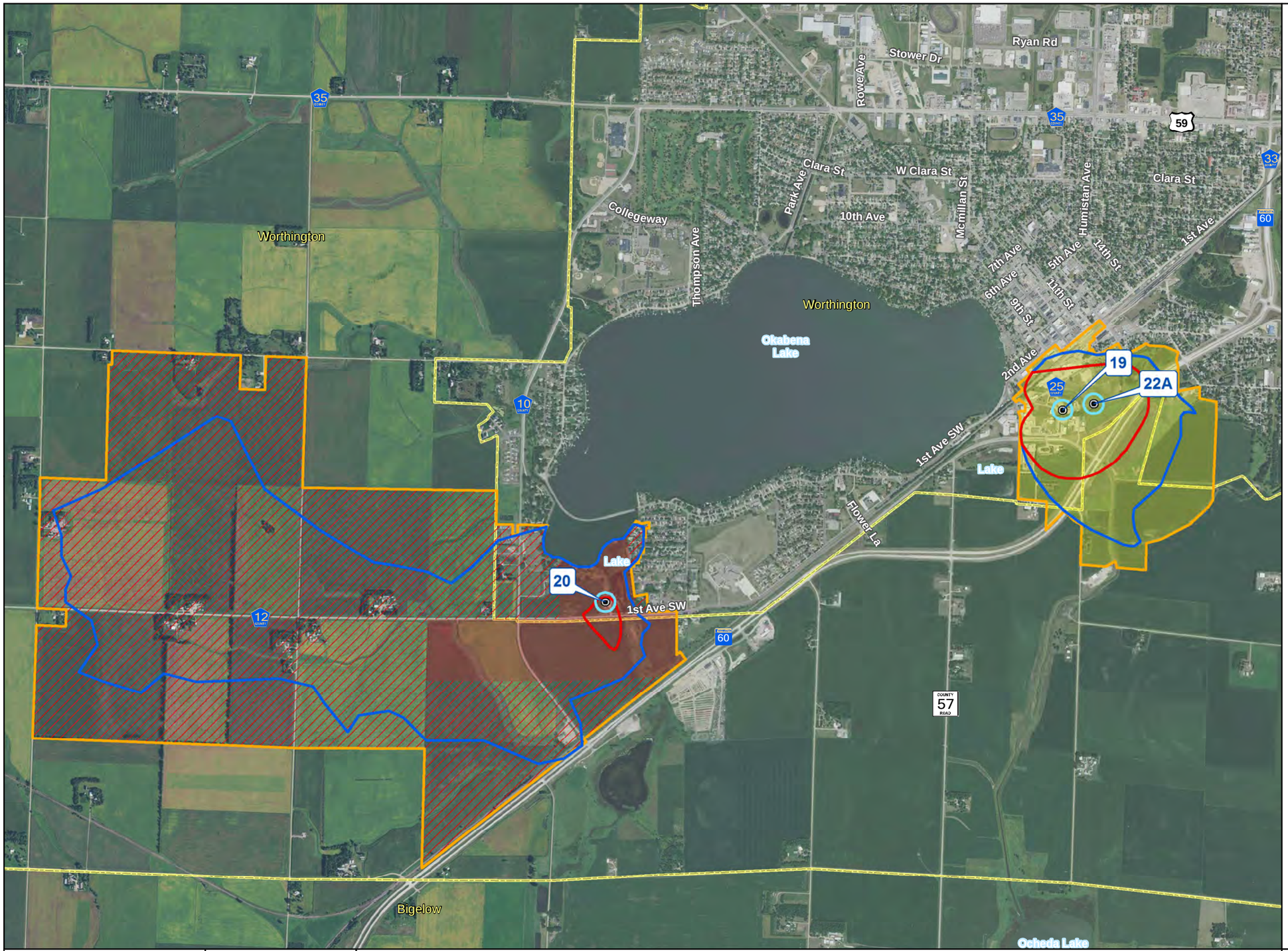
WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

WHPA and DWSMA

Figure 1-2



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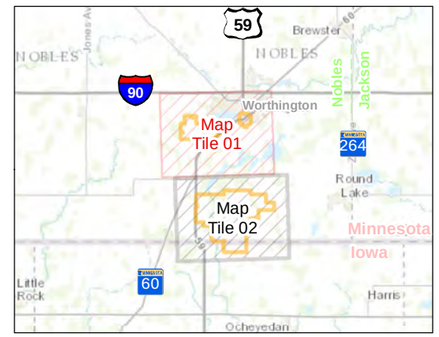
DWSMA Vulnerability

- Very High Vulnerability Groundwater
- High Vulnerability Surfacewater
- High Vulnerability Groundwater
- Moderate Vulnerability Groundwater



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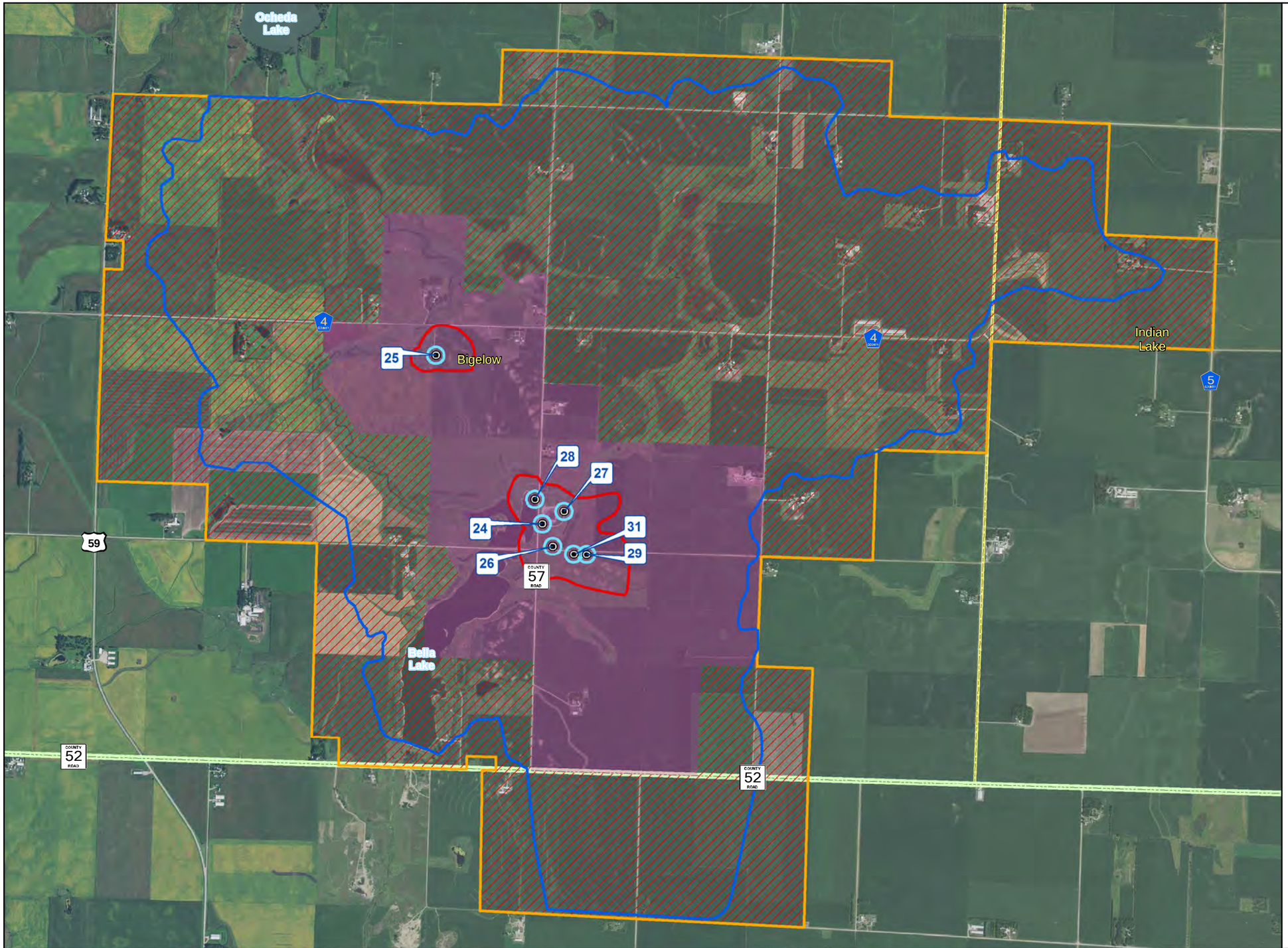
WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

DWSMA Vulnerability

Figure 2-1



Legend

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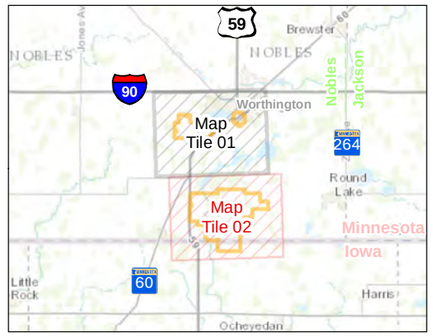

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WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

DWSMA Vulnerability

Figure 2-2

Legend

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- Parcel Boundaries
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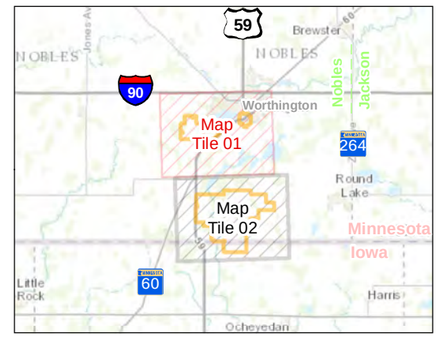

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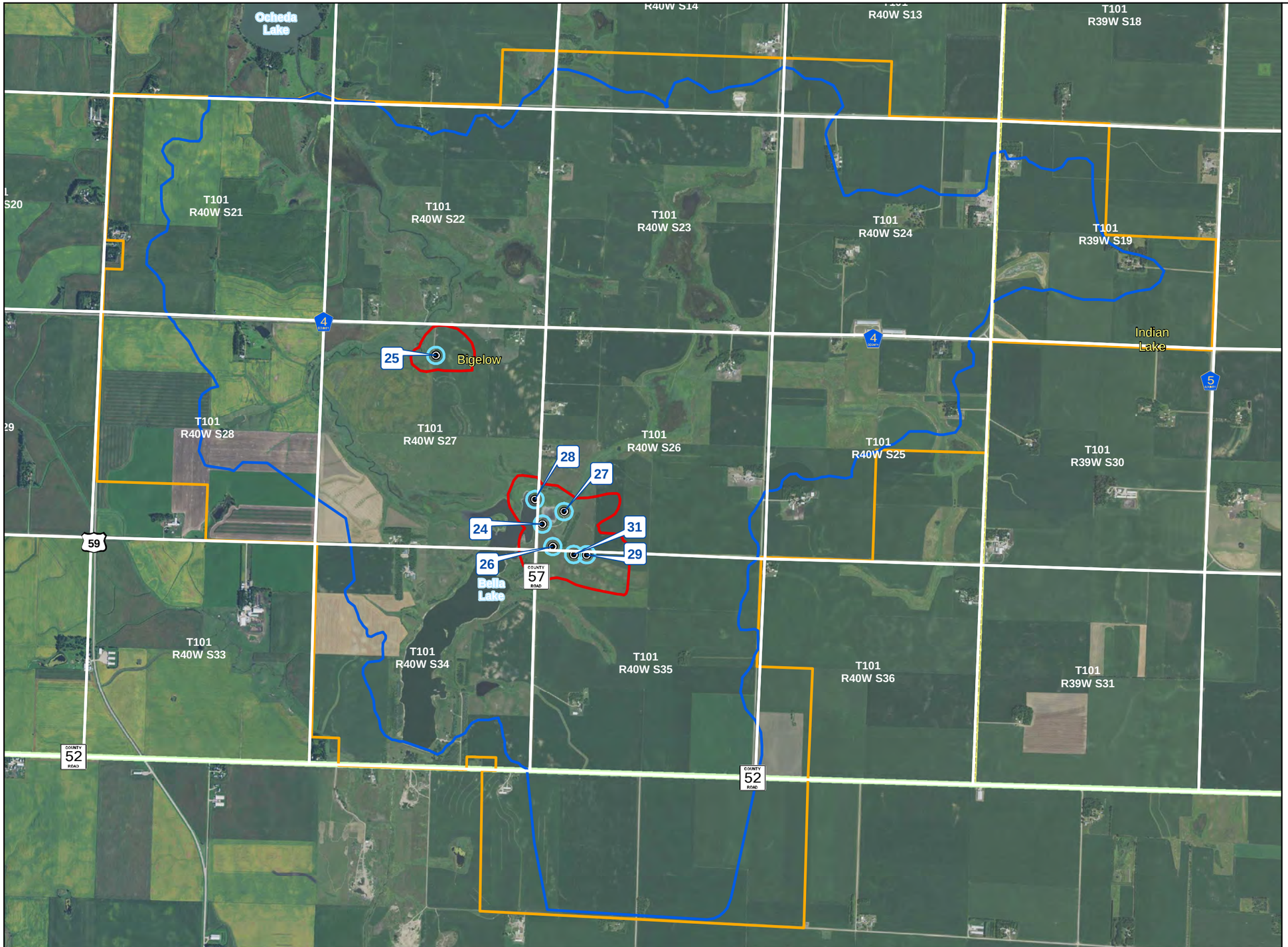
WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

Political Boundaries

Figure 3-1



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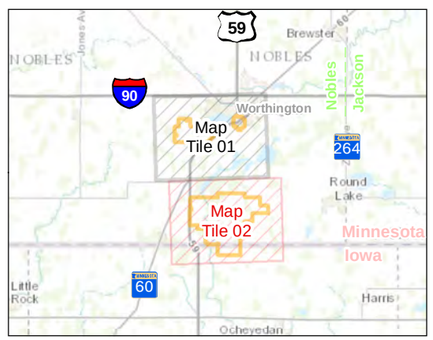

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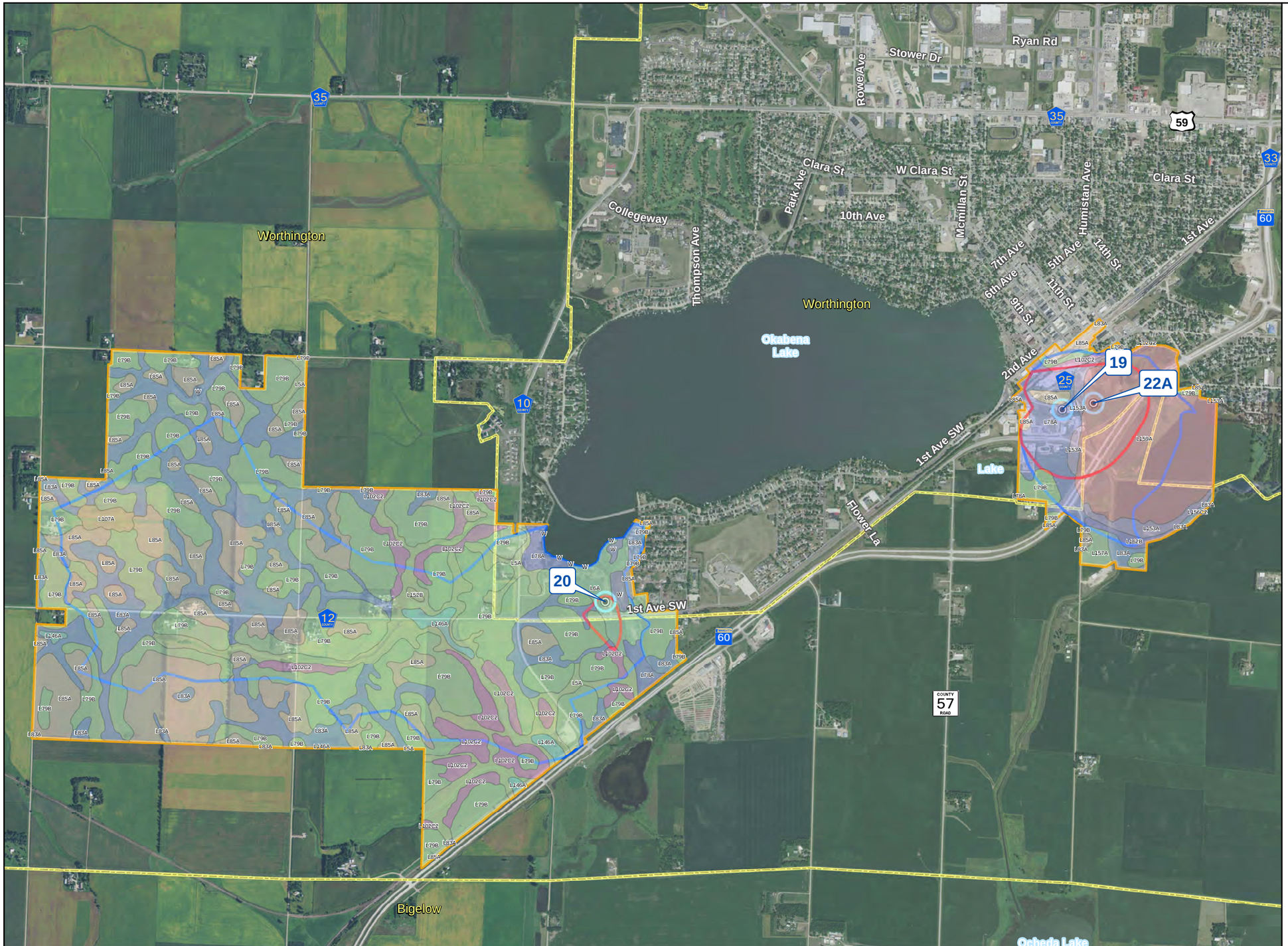
WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

Political Boundaries

Figure 3-2



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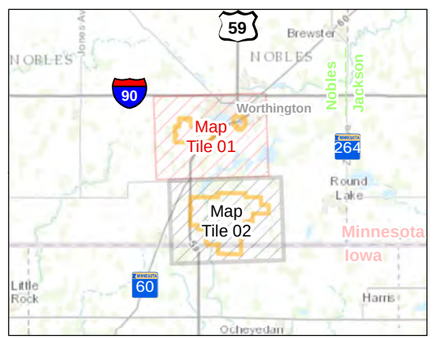
Detailed Soil Information can be found in Appendix C



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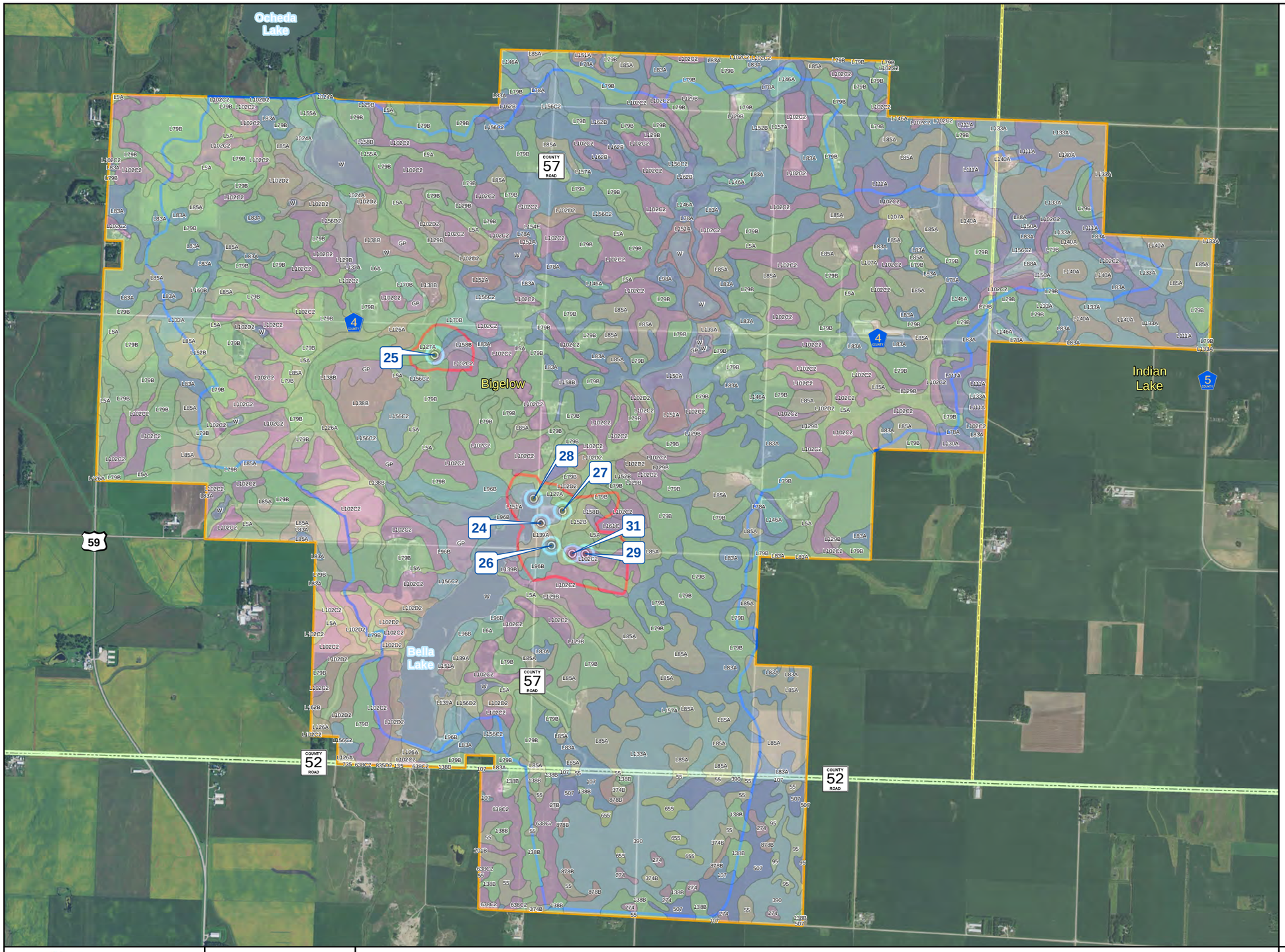
Projection: UTM Zone 15N
Source: ESRI, MDH, MPCA, MnDOT MnDNR, SeH, MnGeo WMS Service NRCS Soil Survey

WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

NRCS Soil Survey

Figure 4-1



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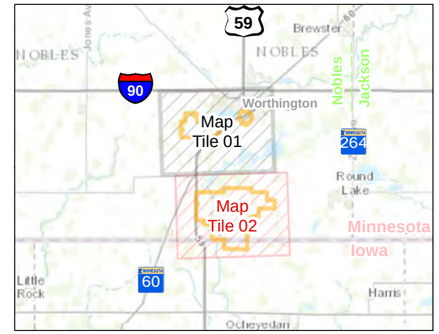

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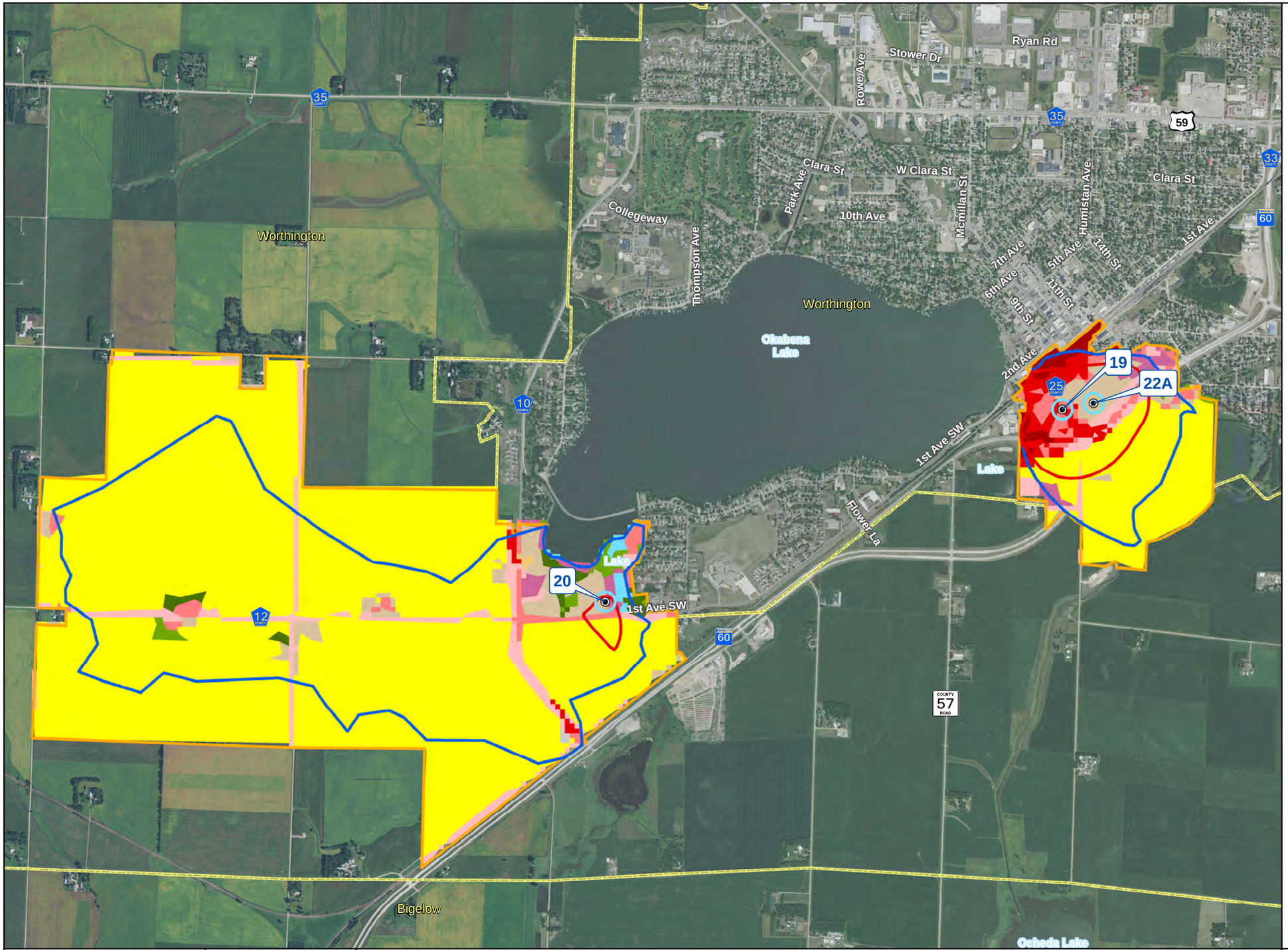
WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

NRCS Soil Survey

Figure 4-2

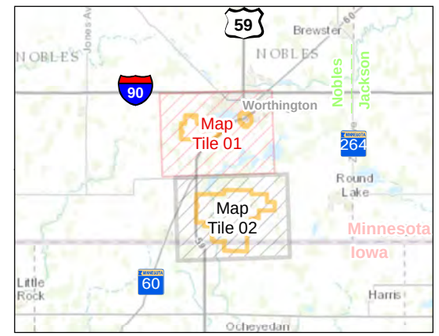


Legend

- Public Water Supply Well
- Inner Wellhead Management Zone
- Emergency Response Area
- Wellhead Protection Area (WHPA)
- Drinking Water Supply Management Area
- Municipalities
- County Boundary
- Parcel Boundaries

NLCD 2011 - Land Cover

- Developed, High Intensity
- Developed, Medium Intensity
- Developed, Open Space
- Developed, Low Intensity
- Barren Land
- Deciduous Forest
- Mixed Forest
- Open Water
- Pasture/Hay
- Shrub/Scrub
- Grassland/Herbaceous
- Woody Wetlands
- Emergent Herbaceous Wetlands



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Project: Wortc 12695
Print Date: 6/16/2017

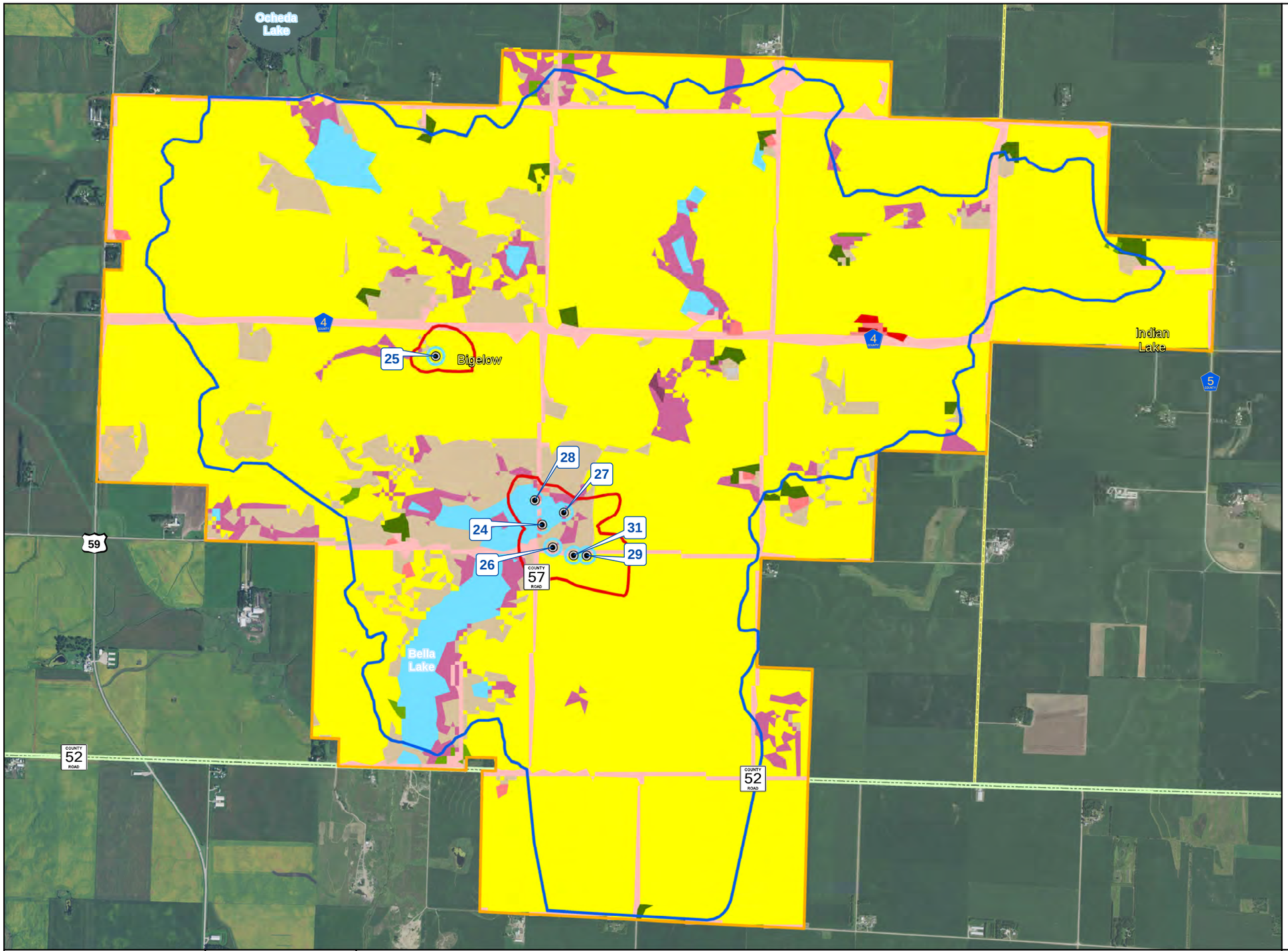
Map by: msherrill
Projection: UTM Zone 15N
Source: ESRI, MDH, MPCA, MnDOT MnDNR, SeH, MnGeo WMS Service 2011 NLCD Landuse

WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

2011 NLCD Landuse

Figure 5-1



Legend

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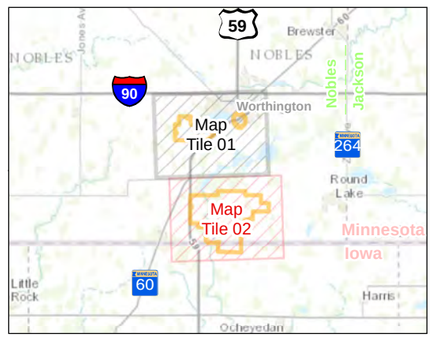

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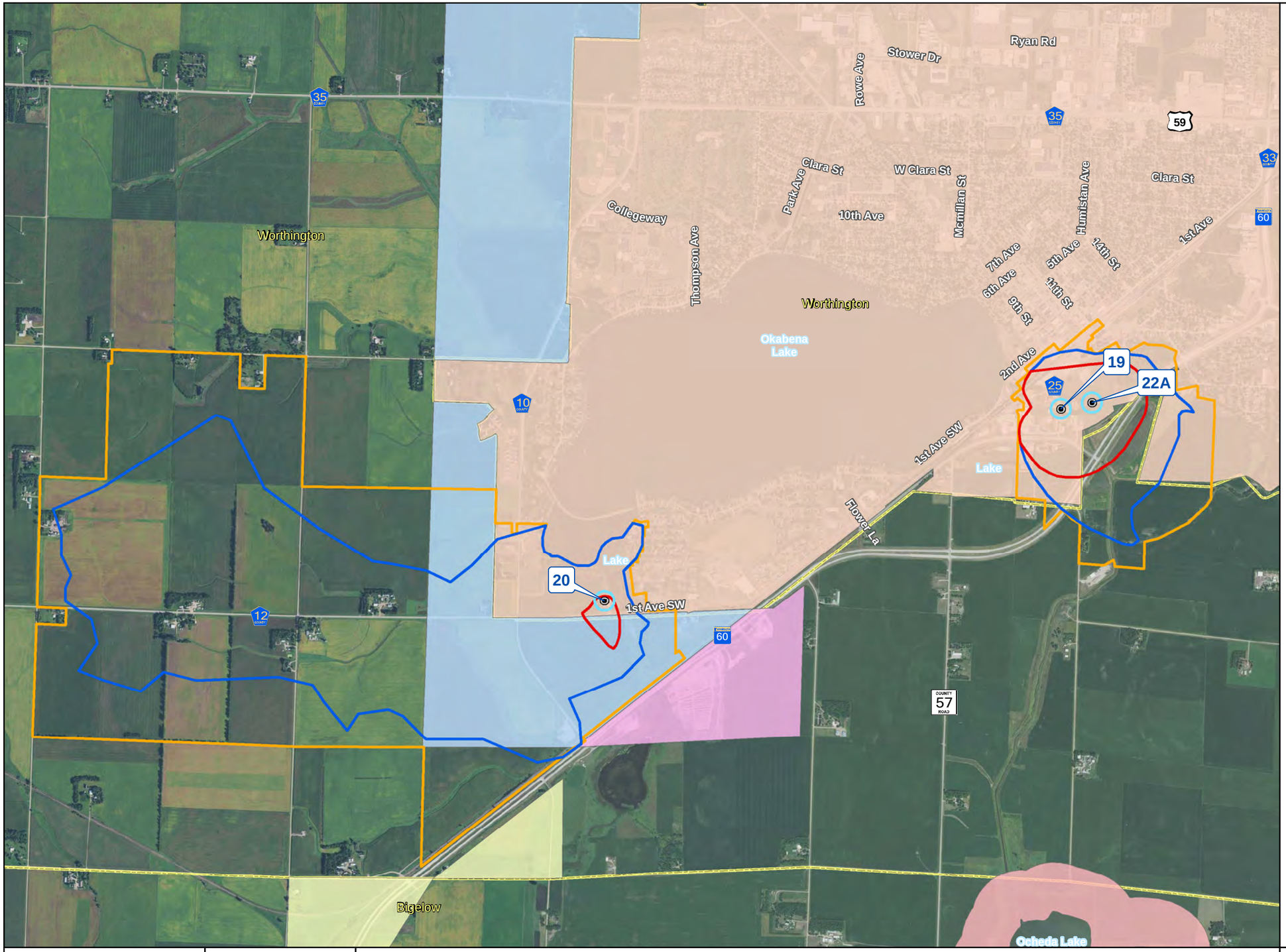
WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

2011 NLCD Landuse

Figure 5-2



Legend

- Public Water Supply Well
- Inner Wellhead Management Zone
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- Wellhead Protection Area (WHPA)
- Drinking Water Supply Management Area
- Municipalities
- County Boundary
- Parcel Boundaries

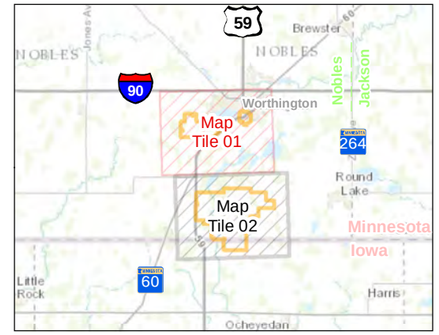
County Zoning

- B-1 - Highway Business
- I - General Industry
- Municipality
- R-1 - Urban Residential
- R-2 - Rural Residential
- RDS - Residential Recreational Shoreland
- SP - Special Protection Shoreland

Uncolored area is agricultural land.

Management Areas

- Public Land Purchased by DNR, Pheasants Forever, Worthington Public Utilities and Watershed District Partnership
- Other Public Land Managed for Wildlife and Recreation



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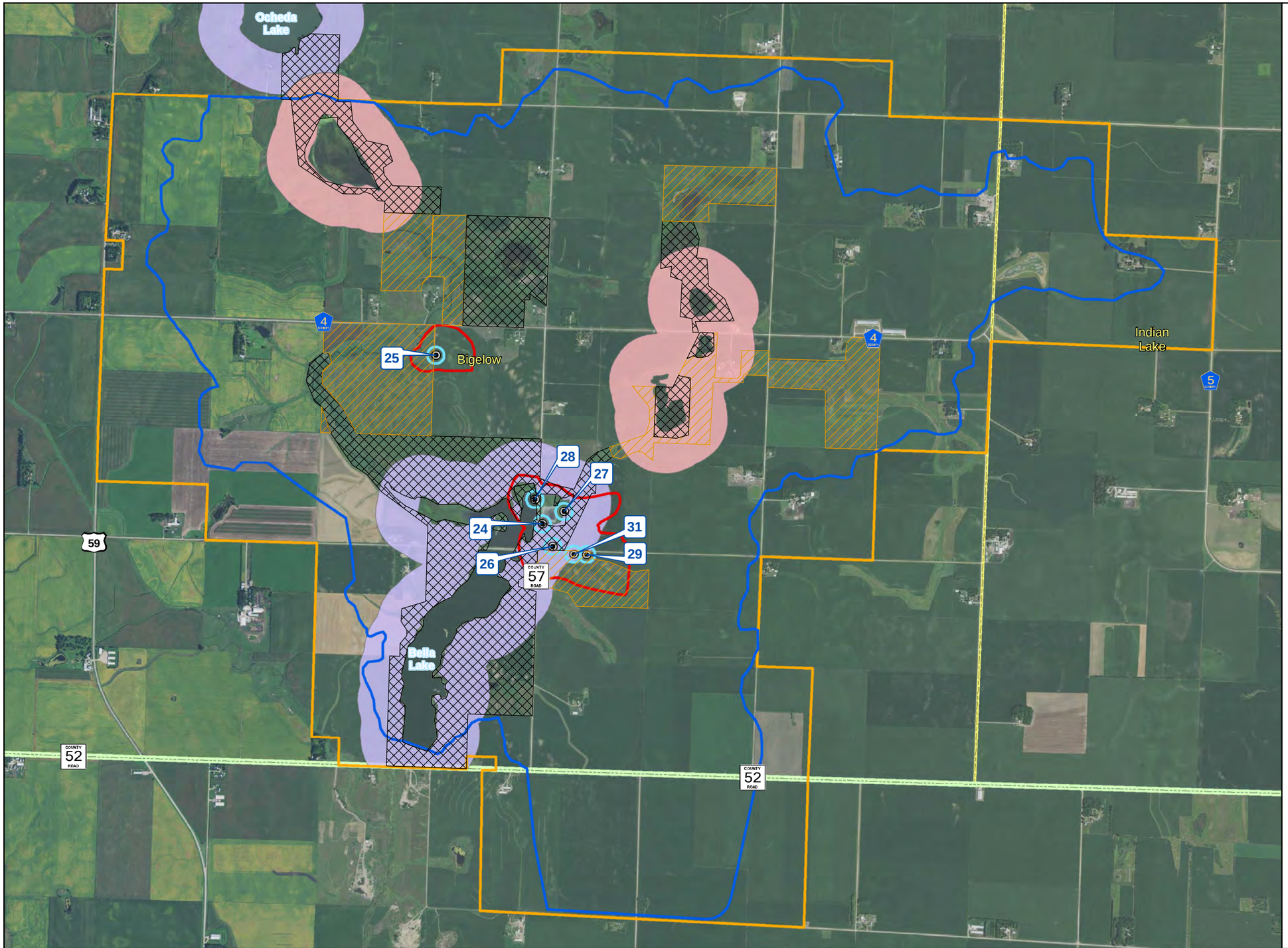
Map by: msherrill
Projection: UTM Zone 15N
Source: ESRI, MDH, MPCA, MnDOT MnDNR, SeH, MnGeo WMS Service Nobles County Zoning

WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

Zoning

Figure 6-1



Legend

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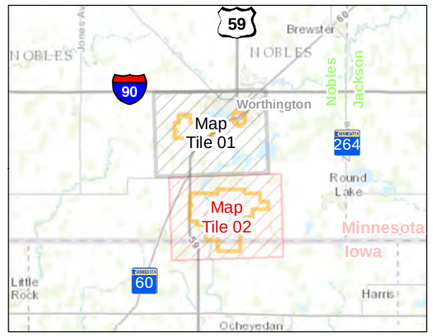

0 1,200 2,400 4,800 Feet

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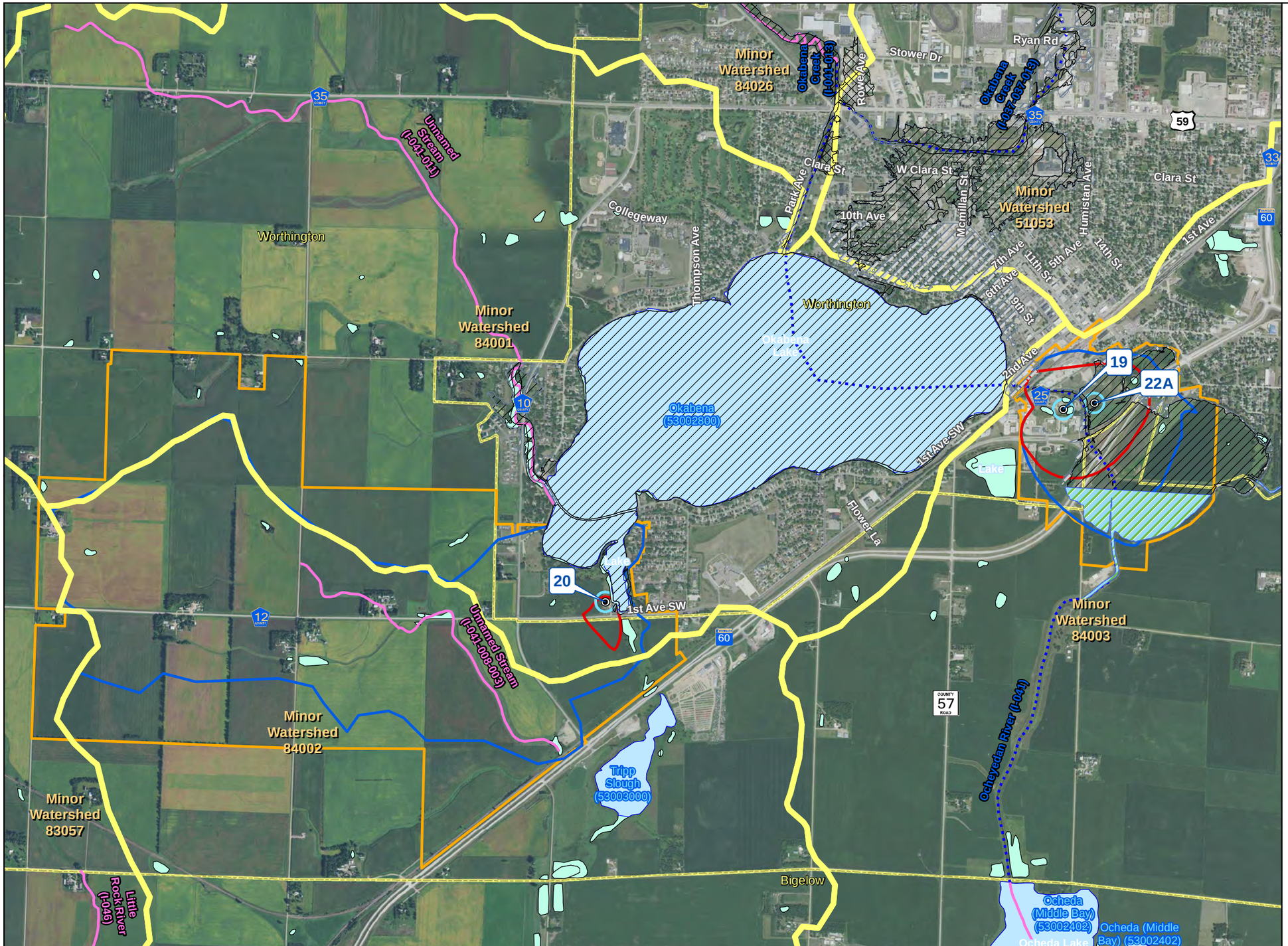
WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

Zoning

Figure 6-2



Legend

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- Parcel Boundaries

Worthington Flood Ordinances

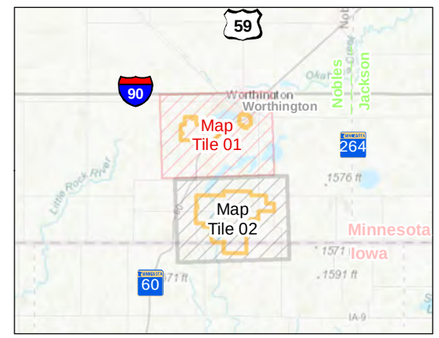
- .2% annual chance of floodingD HAZARD
- A - 1% annual chance of flooding
- AE - Base Floodplain
- AO - River or Stream Flood Hazard

National Wetlands Inventory (4713, 4614, and 4714: DNR)

- Wetlands

Minnesota Land Management

- Watershed Boundary
- Public Water Watercourse
- Public Ditch/Altered Natural Watercourse
- Public Waters Basins



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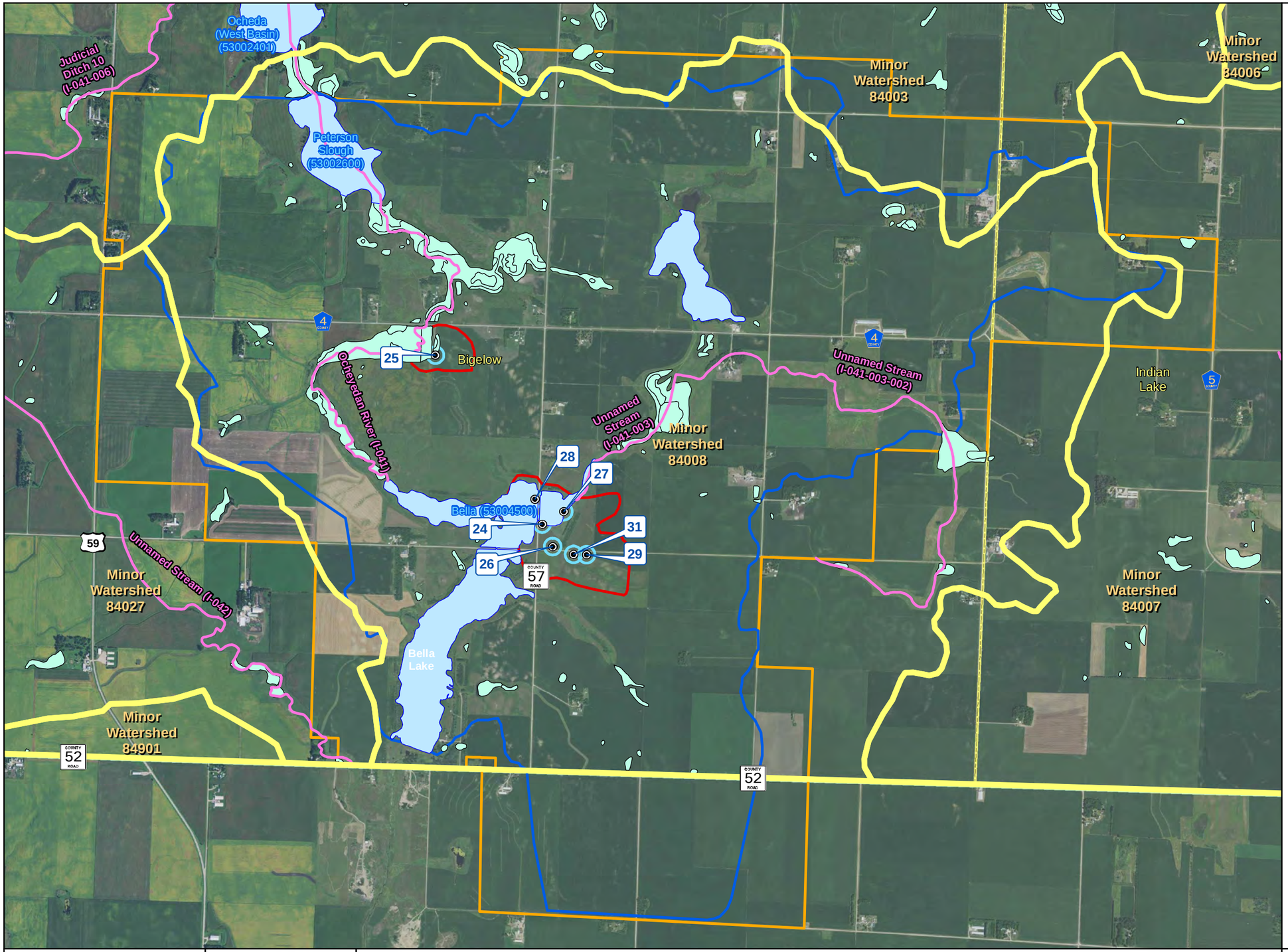
Map by: msherrill
Projection: UTM Zone 15N
Source: ESRI, MDH, MPCA, MnDOT MnDNR, SeH, MnGeo WMS Service City Floodplain Ordinances NWI_4713B,4614&4714

WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

Water Resources

Figure 7-1



Legend

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- Wetlands

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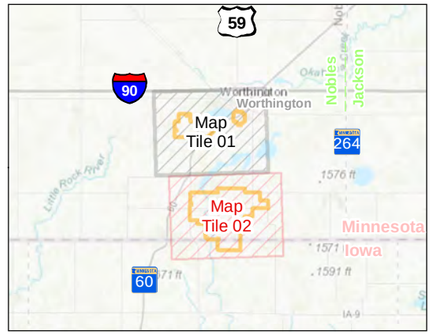
- Public Water Watercourse
- Public Ditch/Altered Natural Watercourse
- Public Waters Basins



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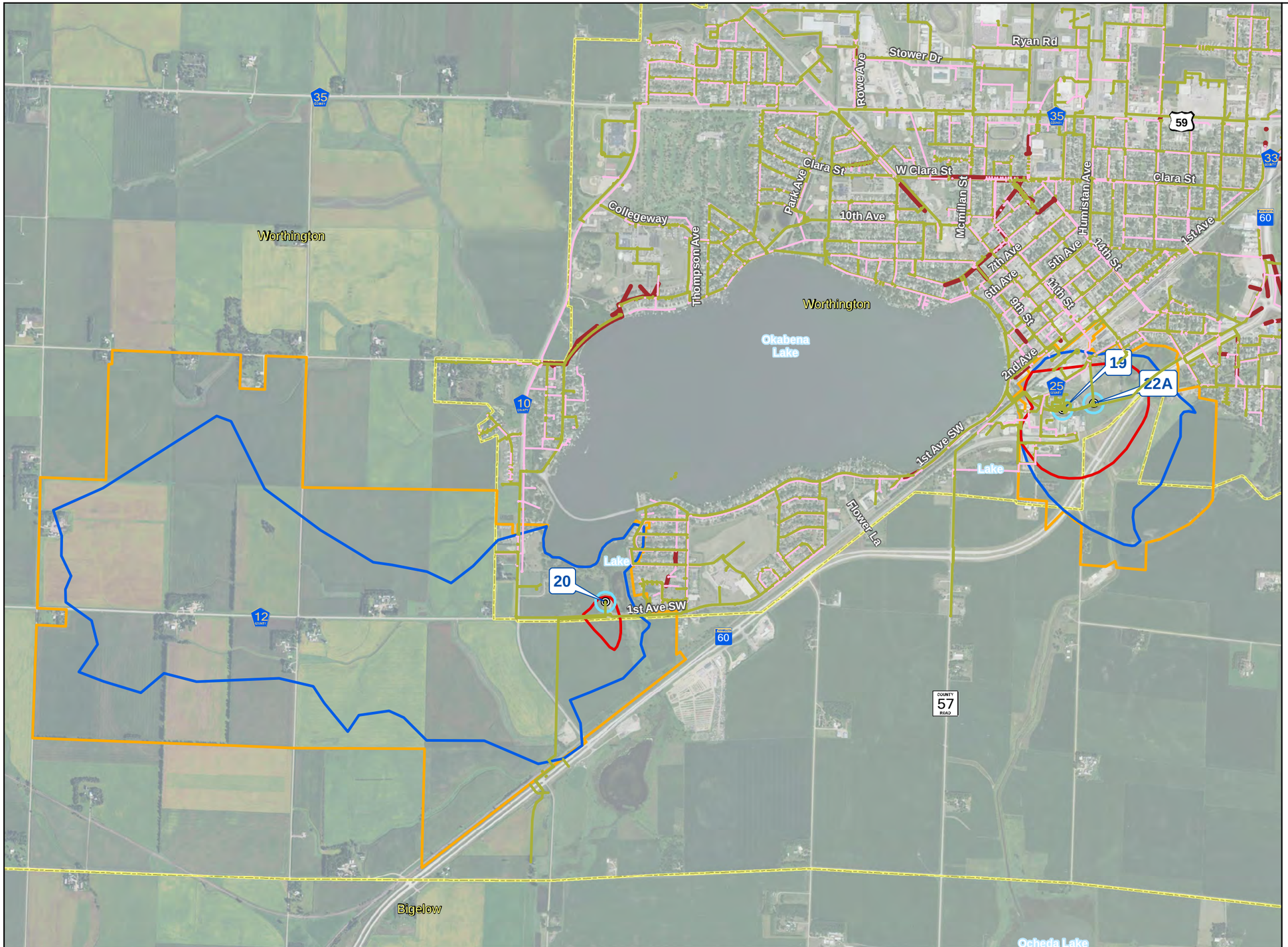
WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

Water Resources

Figure 7-2



Legend

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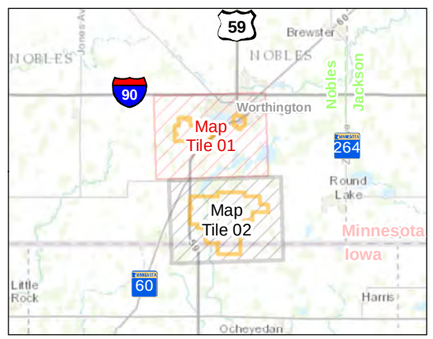
- County Boundary
- Parcel Boundaries

Worthington Utilities

- Sanitary
- Water
- Abandoned



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WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

Worthington Utilities

Figure 8-1

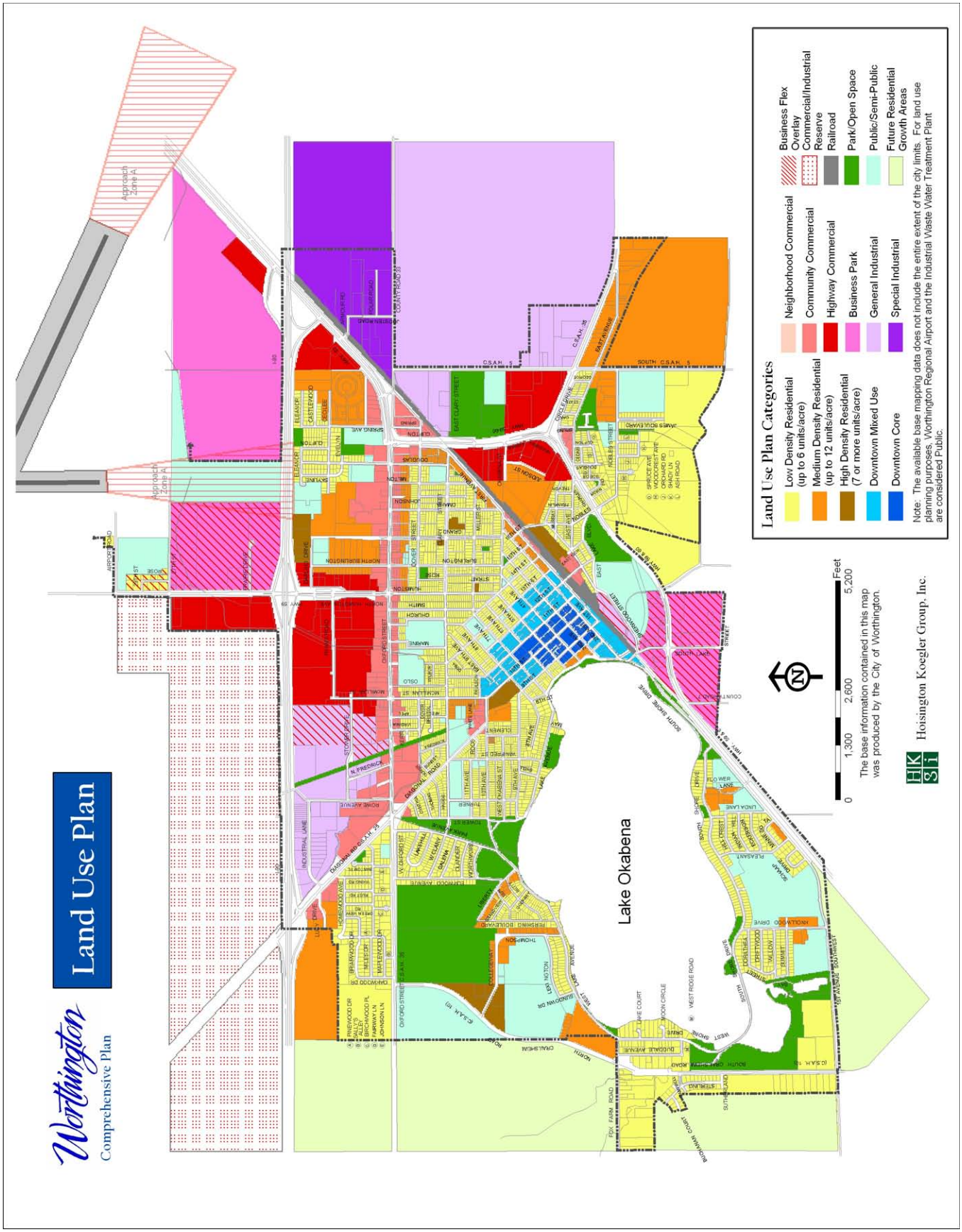

Figure 2-4
Land Use Plan

Figure 9 - Land Use Plan
Worthington Comprehensive Plan

Legend

- Public Water Supply Well
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- Parcel Boundaries

DWSMA Vulnerability

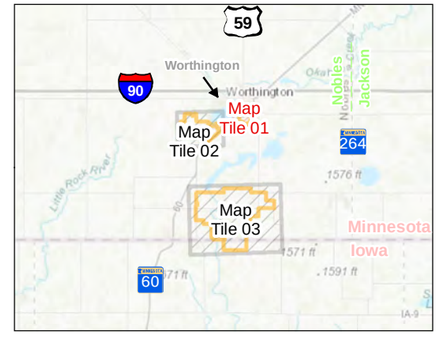
- Very High Vulnerability Groundwater
- High Vulnerability Surfacewater
- High Vulnerability Groundwater
- Moderate Vulnerability Groundwater

Minnesota Pollution Control Agency

- Feedlot

Owner

- County Registered Land Application Site
- Presumed Land Application Site



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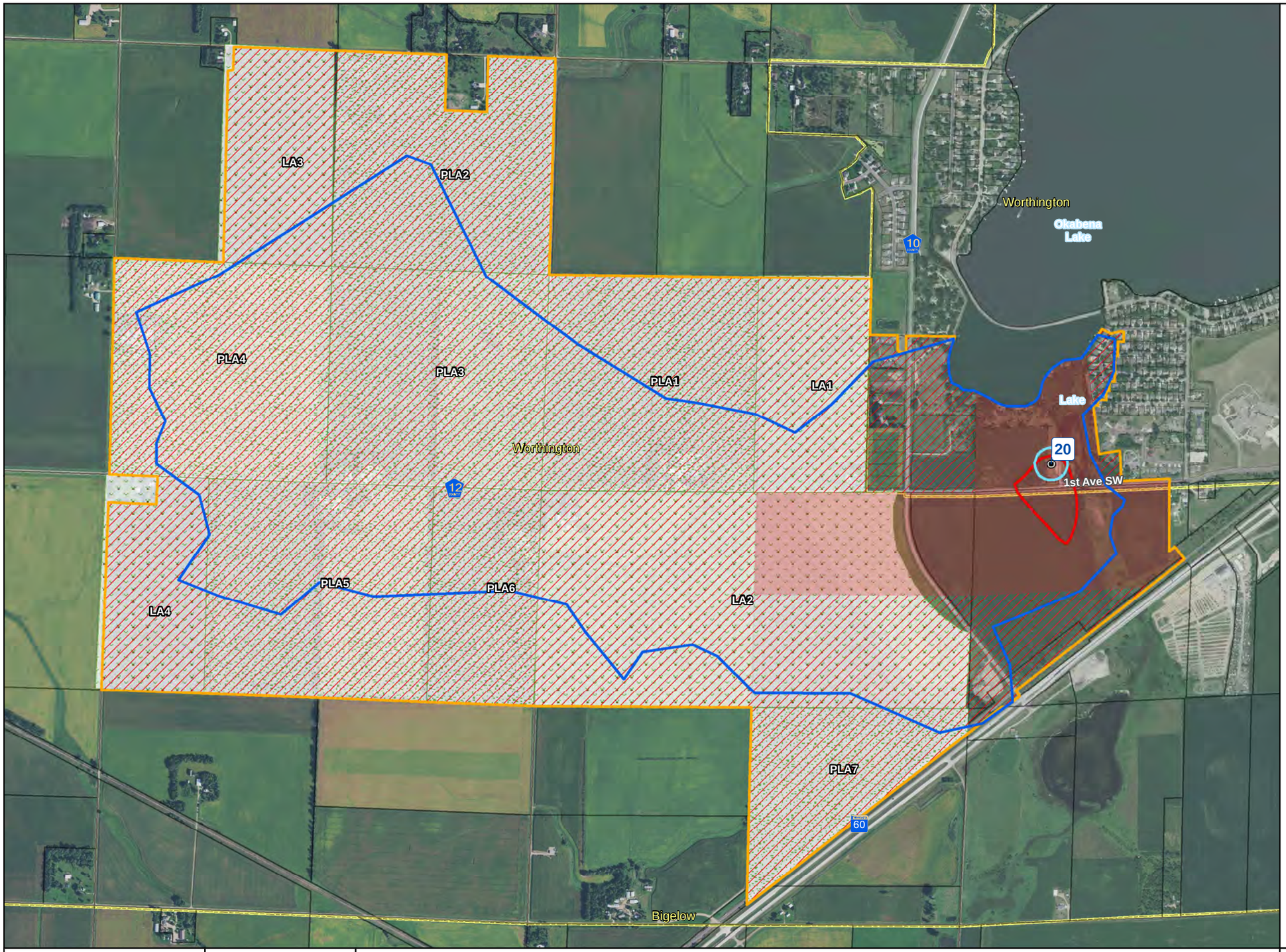
WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

PCSI Land Application and Feedlots

Figure 10-1



Legend

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DWSMA Vulnerability

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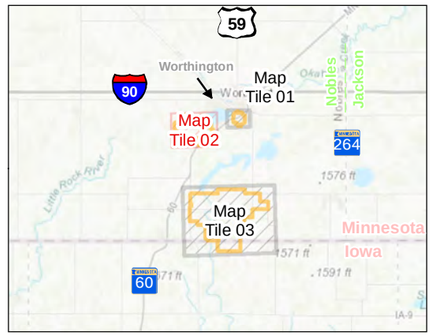
- High Vulnerability Groundwater
- Moderate Vulnerability Groundwater

Minnesota Pollution Control Agency

- Feedlot

Owner

- County Registered Land Application Site
- Presumed Land Application Site



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WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

PCSI Land Application and Feedlots

Figure 10-2

Ocheda Lake

LA7 LA8 PLA10 WM9 PLA13 LA11 LA12 WM10 WM11 PAL14 PLA9 PLA11 LA9 PLA8 COUNTY 57 ROAD PLA16 LA10 PLA17 PLA18 PLA19 PLA20 PLA21 PLA15 WM14 WM13 WM12 LA13 PLA24 PLA28 PLA29 PLA22 PLA23 PLA26 LA19 PLA27 PLA25 PLA30 LA18 PLA33 WM17 WM16 LA16 PLA34 LA17 PLA31 PLA35 PLA36 PLA37 PLA38 PLA39 PLA41 LA20 PLA42 PLA40 PLA43

25 Bigelow

28 27 24 26 29 31

Bella Lake

Indian Lake

59 COUNTY 52 ROAD COUNTY 57 ROAD

Legend

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Minnesota Pollution Control Agency

- Feedlot

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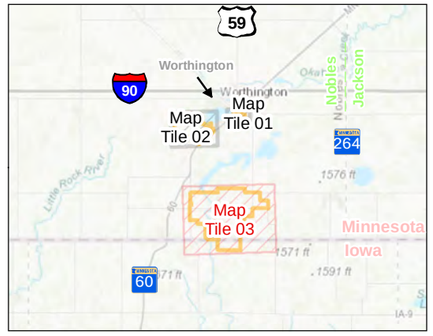

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WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

PCSI Land Application and Feedlots

Figure 10-3

Legend

- Public Water Supply Well
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- Parcel Boundaries

DWSMA Vulnerability

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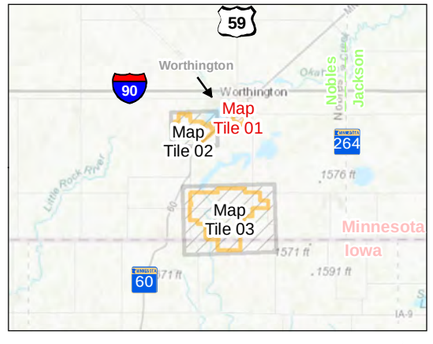
- High Vulnerability Surfacewater
- High Vulnerability Groundwater
- Moderate Vulnerability Groundwater

Potential Contaminant Source

- Subsurface Sewage Treatment System
- Road Crossing Over Water
- Stormwater Basin

Minnesota Pollution Control Agency

- State Assessment Site
- Unpermitted Dump Preferred ID
- Brownfield; Brownfields
- Leak Site
- Aboveground Tanks Preferred ID
- Underground Tanks Preferred ID
- MPCA Spill



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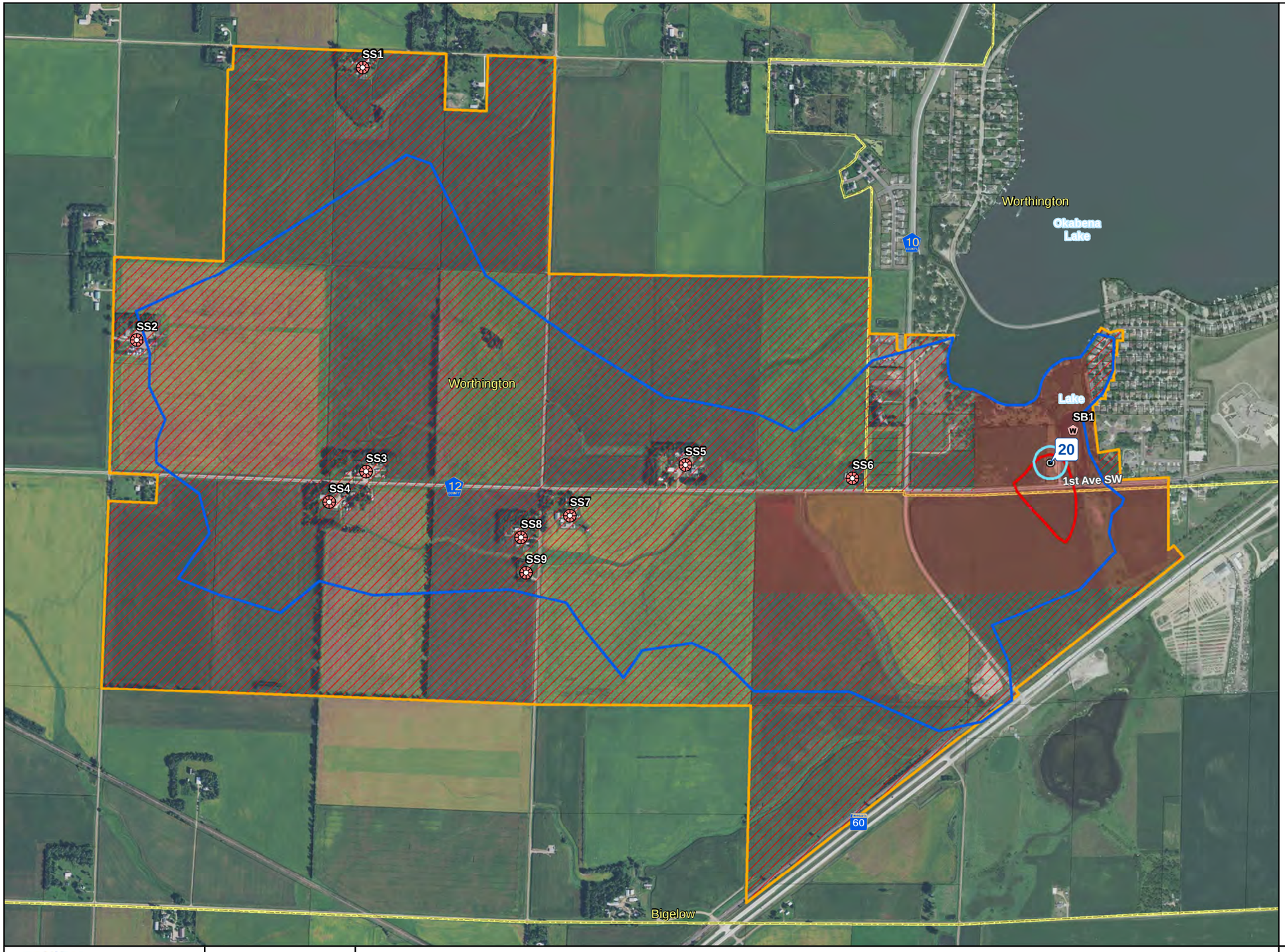
Map by: msherrill
Projection: UTM Zone 15N
Source: ESRI, MDH, MPCA, MnDOT MnDNR, SeH, MnGeo WMS Service

WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

MPCA and Other Potential Contaminant Sources

Figure 11-1



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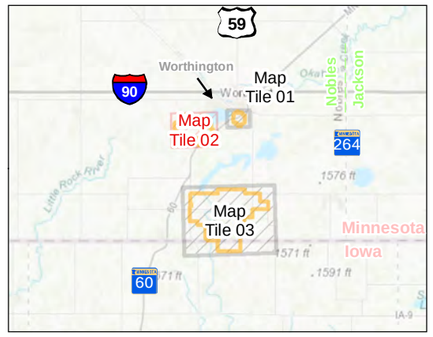
- Leak Site
- Aboveground Tanks Preferred ID
- Underground Tanks Preferred ID
- MPCA Spill



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ST. PAUL, MN 55110
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FAX: (651) 490-2150
WATTS: 800-325-2055
www.sehinc.com

Project: Wortc 12695
Print Date: 12/15/2017

Map by: msherrill
Projection: UTM Zone 15N
Source: ESRI, MDH, MPCA, MnDOT MnDNR, SeH, MnGeo WMS Service

WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

MPCA and Other Potential Contaminant Sources

Figure 11-2

Ocheda Lake

SS28
SS13
SS29
SS30
SS35
SS16
SS34
SS10
SS31
SS36
SS12
SS14
SS17
R2
SS15
SS18
SS11
SS32
SS27
SS19
SS33
Indian Lake
SS20
Bigelow
SS26
SS25
WM15
SS37
R1
SS21
Bella Lake
SS22
SS24
SS23

25
27
24
26
29
31

59
COUNTY 57 ROAD
COUNTY 52 ROAD
COUNTY 52 ROAD

Legend

- Public Water Supply Well
- Inner Wellhead Management Zone
- Emergency Response Area
- Wellhead Protection Area (WHPA)
- Drinking Water Supply Management Area
- Municipalities
- County Boundary
- Parcel Boundaries

DWSMA Vulnerability

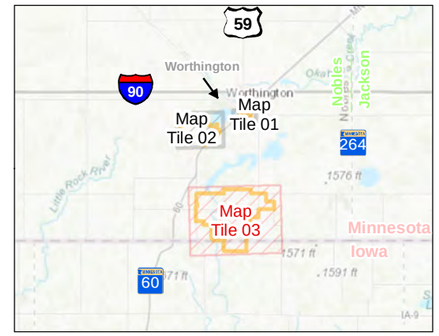
- Very High Vulnerability Groundwater
- High Vulnerability Surfacewater
- High Vulnerability Groundwater
- Moderate Vulnerability Groundwater

Potential Contaminant Source

- Subsurface Sewage Treatment System
- Road Crossing Over Water
- Stormwater Basin

Minnesota Pollution Control Agency

- State Assessment Site
- Unpermitted Dump Preferred ID
- Brownfield; Brownfields
- Leak Site
- Aboveground Tanks Preferred ID
- Underground Tanks Preferred ID
- MPCA Spill



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WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

MPCA and Other Potential Contaminant Sources

Figure 11-3

Legend

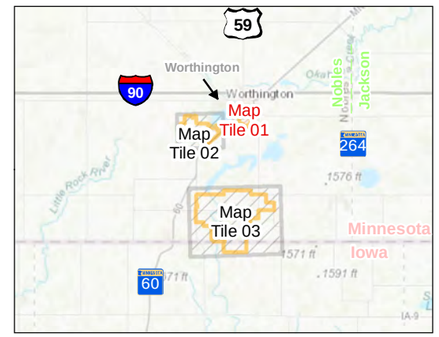
- Public Water Supply Well
- Inner Wellhead Management Zone
- Emergency Response Area
- Wellhead Protection Area (WHPA)
- Drinking Water Supply Management Area
- Municipalities
- County Boundary
- Parcel Boundaries

DWSMA Vulnerability

- Very High Vulnerability Groundwater
- High Vulnerability Surfacewater
- High Vulnerability Groundwater
- Moderate Vulnerability Groundwater

Minnesota Department of Health

- Minnesota Well Index
- Unlocated Well



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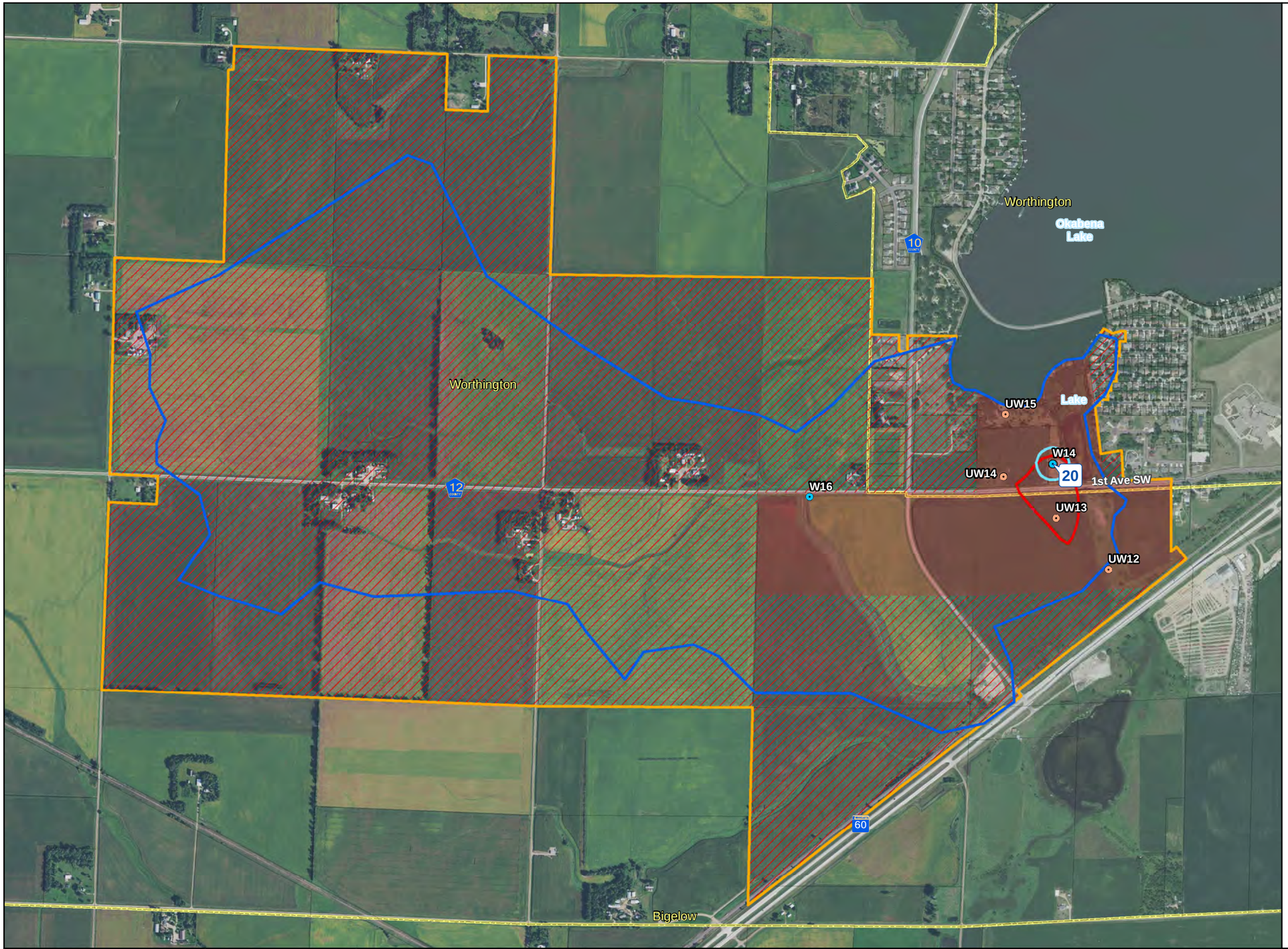
WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

PCSI Minnesota Well Index

Figure 12-1



Legend

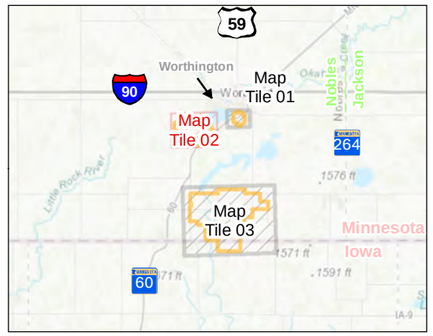
- Public Water Supply Well
- Inner Wellhead Management Zone
- Emergency Response Area
- Wellhead Protection Area (WHPA)
- Drinking Water Supply Management Area
- Municipalities
- County Boundary
- Parcel Boundaries

DWSMA Vulnerability

- Very High Vulnerability Groundwater
- High Vulnerability Surfacewater
- High Vulnerability Groundwater
- Moderate Vulnerability Groundwater

Minnesota Department of Health

- Minnesota Well Index
- Unlocated Well



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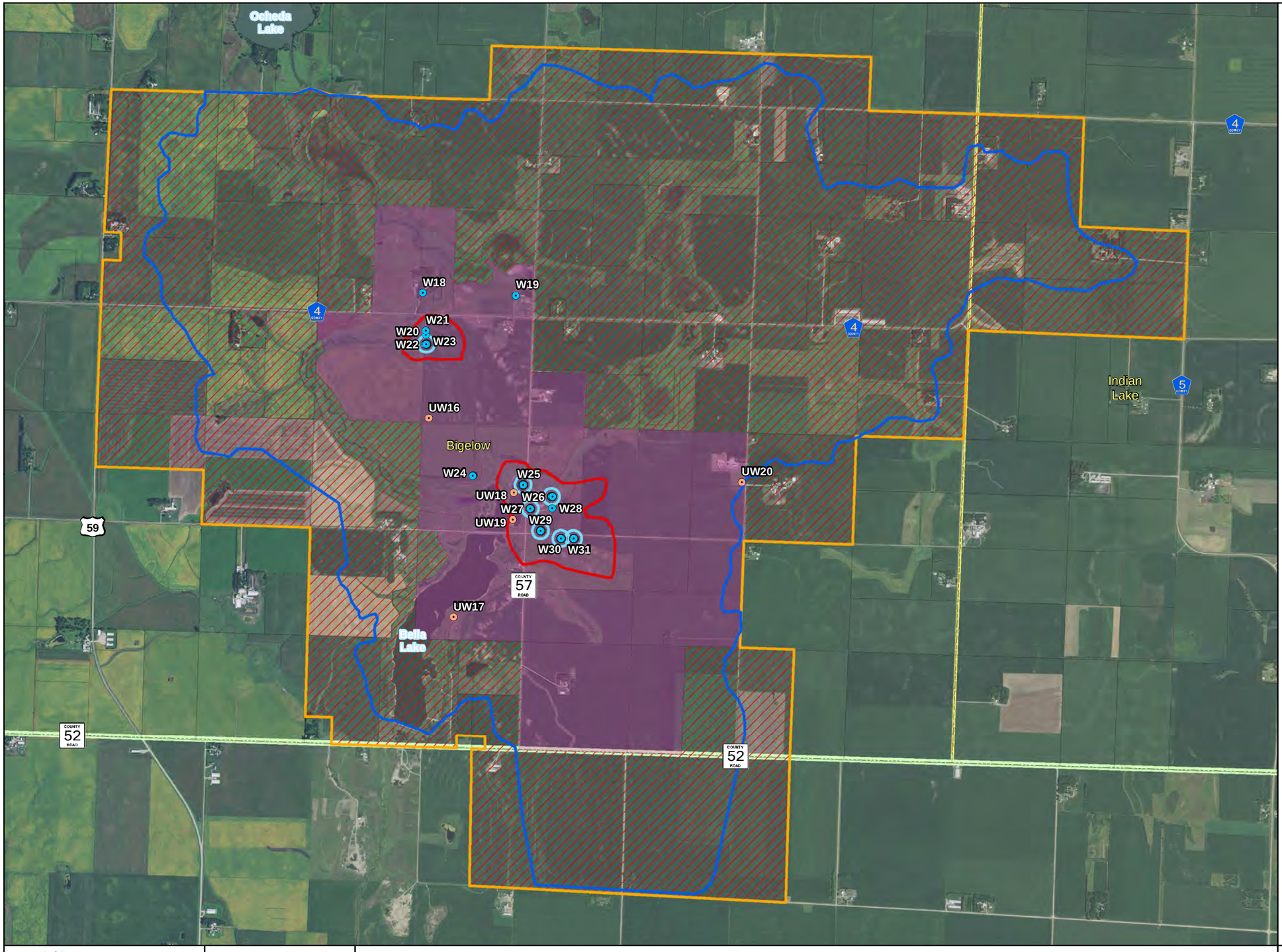
WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

PCSI Minnesota Well Index

Figure 12-2



Legend

- Public Water Supply Well
- Inner Wellhead Management Zone
- Emergency Response Area
- Wellhead Protection Area (WHPA)
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DWSMA Vulnerability

- Very High Vulnerability Groundwater
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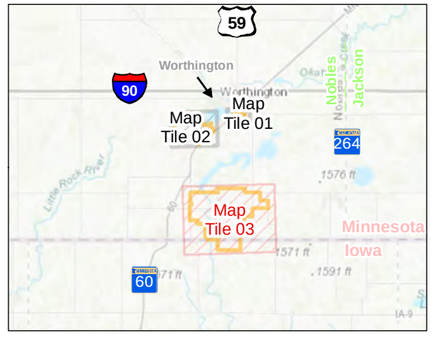
Minnesota Department of Health

- Minnesota Well Index
- Unlocated Well



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WELLHEAD PROTECTION PLAN PART II

Worthington, Minnesota

PCSI Minnesota Well Index

Figure 12-3

Appendix A

Scoping Decision Notice

June 2, 2016

Protecting, maintaining and improving the health of all Minnesotans

Mr. Eric Roos, Water Superintendent
Worthington Public Utilities
P.O. Box 458
Worthington, Minnesota 56187-0458

Dear Mr. Roos:

Subject: Scoping 2 Decision Notice and Meeting Summary – Worthington Public Utilities – PWSID 1530011

This letter provides notice of the results of the second scoping meeting held with you (Worthington Public Utilities), Susan Wojtkiewicz, (SEH Inc.), Aaron Meyer and Scott Hanson (Minnesota Rural Water Association), Laura DeBeer (Pipestone County Soil and Water Conservation District), John Shea (Nobles County Soil and Water Conservation District) and me (Minnesota Department of Health) on May 23, 2016, at Worthington Public Utilities Office regarding Part II of your wellhead protection (WHP) plan. During the meeting, we discussed 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. The data elements must be compiled and assessed in terms of their present and 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 drinking water supply management areas. We also discussed a summary of planning issues identified during the Part I WHP Plan development process which should be considered for inclusion in your Part II WHP Plan.

Worthington Public Utilities 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. Worthington Public Utilities will have until June 15, 2016, to complete its WHP plán.

If a data element is marked on the enclosed notice as a data element that must be used and it does not exist, it is helpful if your plan notes this. MDH understands SEH 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 II of your plan. If you have any questions regarding the enclosed notice, contact me by email at Amanda.Strommer@state.mn.us or by phone at (507) 476-4241.

Sincerely,

Amanda Strommer

Amanda Strommer, Planner
Environmental Health Division
1400 East Lyon Street
Marshall, Minnesota 56258-2529

AS:ds-b
Enclosures
cc: Aaron Meyer, Minnesota Rural Water Association
Susan Wojtkiewicz, SEH, Inc.
John Bloome, MDH Engineer, Marshall District Office
Steve Robinson, City Administrator, City of Worthington
Ron Struss, Minnesota Department of Agriculture

SCOPING 2 DECISION NOTICE
Variable Vulnerable DWSMA and SWCA

Remainder of the Wellhead Protection Plan

Name of Public Water Supply: **Worthington Public Utilities PWSID: 1530011**		**Date:** June 2, 2016
Name of the Wellhead Protection Manager: Mr. Eric Roos, Water Superintendent		
Address: P.O. Box 458	**City:** Worthington	**Zip:** 56187-0458
Unique Well Numbers: 223617 (Well 19); 633531 (Well 20); 169892 (Well 22); 197476 (Well 24); 195163 (Well 25); 654756 (Well 26); 240094 (Well 27); 455791 (Well 28); 455790 (Well 29); 760572 (Well 31)		**Phone:** (507) 372-8680

Instructions for Completing the Scoping 2 Form

N	R	S	
X			**N = Not required.** If this box is checked, this data element is **NOT** necessary for your wellhead protection plan because it is not needed or it has been included in the first scoping decision notice. **Please go to the next data element.**

N	R	S	
	X		**R = Required for the remainder of the plan.** If this box is checked, this data **MUST** be used for the "**remainder of the plan.**"

N	R	S	
		X	**S = Submit to MDH.** If this box is checked, this data element **MUST** be included in your **wellhead protection plan and submitted to MDH.** If there is **NO** check mark in the **"S"** box but there is an **"X"** in the **"R"** box, this data element **MUST** be included in your plan, but should **NOT be submitted to MDH.** This box will only be checked if MDH does not have access to this data element. This will help to reduce the cost by reducing the amount of paper and time to reproduce the data element.

Note: Any data elements required in the first scoping decision notice must also be used to complete the remainder of the wellhead protection plan.

DATA ELEMENTS ABOUT THE PHYSICAL ENVIRONMENT

PRECIPITATION			
N	R	S	An existing map or list of local precipitation gauging stations. – **Exclude Okabena DWSMA (#223617 and #169892)**
	X	X	
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing table showing the average monthly and annual precipitation in inches for the preceding five years. – **Exclude Okabena DWSMA (#223617 and #169892)**
	X	X	
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
GEOLOGY			
N	R	S	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.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			
N	R	S	Existing records of the geologic materials penetrated by wells, borings, exploration test holes, or excavations, including those submitted to the department.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			
N	R	S	Existing borehole geophysical records from wells, borings, and exploration test holes.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect the geology of the areas.			
N	R	S	Existing surface geophysical studies.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect the geology of the areas.			
SOILS			
N	R	S	Existing maps of the soils and a description of soil infiltration characteristics. – **Exclude Okabena DWSMA (#223617 and #169892)**
	X	X	
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	A description or an existing map of known eroding lands that are causing sedimentation problems. – **Exclude Okabena DWSMA (#223617 and #169892)**
	X	X	
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

WATER RESOURCES			
N	R	S	An existing map of the boundaries and flow directions of major watershed units and minor watershed units. **– Exclude Okabena DWSMA (#223617 and #169892)**
	X		
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing map and a list of public waters as defined in Minnesota Statutes, section 103G.005, subdivision 15, and public drainage ditches. **– Exclude Okabena DWSMA (#223617 and #169892)**
	X		
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	The shoreland classifications of the public waters listed under subitem (2), pursuant to part 6120.3000 and Minnesota Statutes, sections 103F.201 to 103F.221. **– Exclude Okabena DWSMA (#223617 and #169892)**
	X		
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing map of wetlands regulated under Chapter 8420 and Minnesota Statutes, section 103G.221 to 103G.2373. **– Exclude Okabena DWSMA (#223617 and #169892)**
	X		
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing map showing those areas delineated as floodplain by existing local ordinances. **– Exclude Okabena DWSMA (#223617 and #169892)**
	X		
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

DATA ELEMENTS ABOUT THE LAND USE

LAND USE			
N	R	S	An existing map of parcel boundaries.
	X	X	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing map of political boundaries.
	X	X	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing map of public land surveys including township, range, and section.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

Land Use: Ground Water and Surface Water Contribution Vulnerability

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

Technical Assistance Comments: The inventory, mapping, and management of land uses and potential sources of contamination for all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements, as follows:

Groundwater and Surface Water Contribution Vulnerability

1) All potential contaminant sources as listed below. Two DWSMA Vulnerability Figures for the Worthington Public Utility are attached for reference to identify the different areas of vulnerability and the Surface Water Contribution Area.
2) A land use/land cover map and table.
3) An inventory of the Inner Wellhead Management Zone(s) (IWMZ).

Areas with Moderate Vulnerability Groundwater **for Okabena DWSMA Only**
All potential contaminant sources as listed on the attachment: Potential Contaminant Source Inventory Requirements for Moderately Vulnerable DWSMA.

Areas with High Vulnerability Groundwater **for Malcolm and Lake Bella DWSMAs Only**
All potential contaminant sources as listed on the attachment: Potential Contaminant Source Inventory Requirements for Highly and Very Highly Vulnerable DWSMA.

Highly Vulnerable SWCA Area Only (no groundwater infiltration/vulnerability concerns) **for Malcolm and Lake Bella DWSMAs Only**
All potential contaminant sources as listed on the attachment: Potential Contaminant Source Inventory Requirements for Highly Vulnerable Surface Water Contribution DWSMA.

As a starting point, MDH will provide a land cover map and table from federal data bases. This data set must be used unless an alternative electronic data set that is more current and detailed is available. Management strategies must be developed for all land uses and potential sources of contamination.

N	R	S	
	X	X	An existing comprehensive land-use map.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X	X	Existing zoning map.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

PUBLIC UTILITY SERVICES			
N	R	S	An existing map of transportation routes or corridors.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

N	R	S	An existing map of storm sewers, sanitary sewers, and public water supply systems.
	X	X	
Technical Assistance Comments: It is not necessary to include a map of your public water supply system in your plan if you feel it would pose a threat to the security of your system. An existing map of the storm sewers and sanitary sewers in the Drinking Water Supply Management Area(s) must be included in the wellhead protection plan and must also be submitted to MDH as part of the approval.			

N	R	S	An existing map of the gas and oil pipelines used by gas and oil suppliers.
	X	X	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

N	R	S	An existing map or list of public drainage systems. – **Exclude Okabena DWSMA (#223617 and #169892)**
	X	X	
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

N	R	S	An existing record of construction, maintenance, and use of the public water supply well and other wells within the drinking water supply management area.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			

DATA ELEMENTS ABOUT WATER QUANTITY

SURFACE WATER QUANTITY			
N	R	S	An existing description of high, mean, and low flows on streams. – **Exclude Okabena DWSMA (#223617 and #169892)**
	X		
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

N	R	S	An existing list of lakes where the state has established ordinary high water marks. – **Exclude Okabena DWSMA (#223617 and #169892)**
	X		
Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			

N	R	S	
	X		An existing list of permitted withdrawals from lakes and streams, including source, use, and amounts withdrawn. – **Exclude Okabena DWSMA (#223617 and #169892)**

Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X		An existing list of lakes and streams for which state protected levels or flows have been established. – **Exclude Okabena DWSMA (#223617 and #169892)**

Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X	X	An existing description of known water-use conflicts, including those caused by groundwater pumping. – **Exclude Okabena DWSMA (#223617 and #169892)**

Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

GROUNDWATER QUANTITY

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

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X	X	An existing description of known well interference problems and water-use conflicts.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X		An existing list of state environmental bore holes, including unique well number, aquifer measured, years of record, and average monthly levels.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

DATA ELEMENTS ABOUT WATER QUALITY

SURFACE WATER QUALITY

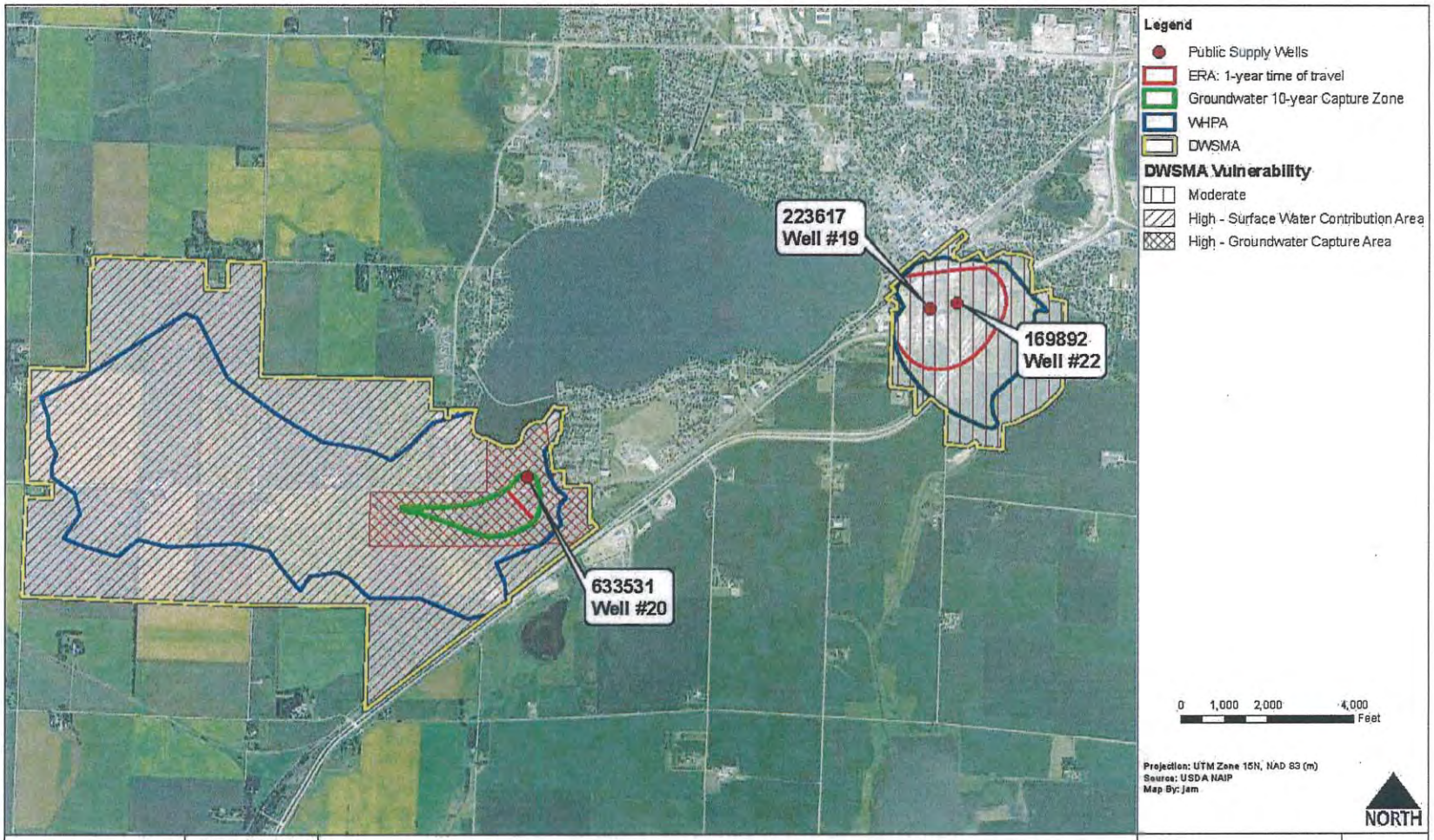
N	R	S	
	X		An existing map or list of the state water quality management classification for each stream and lake. – **Exclude Okabena DWSMA (#223617 and #169892)**

Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

N	R	S	
	X		An existing summary of lake and stream water quality monitoring data, including: 1. bacteriological contamination indicators; 2. inorganic chemicals; 3. organic chemicals; 4. sedimentation; 5. dissolved oxygen; and 6. excessive growth or deficiency of aquatic plants. – **Exclude Okabena DWSMA (#223617 and #169892)**

Technical Assistance Comments: The management of the vulnerable parts of the Drinking Water Supply Management Area(s) must reflect what is known about this data element.

GROUNDWATER QUALITY			
N	R	S	An existing summary of water quality data, including: 1. bacteriological contamination indicators; 2. inorganic chemicals; and 3. organic chemicals.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing list of water chemistry and isotopic data from wells, springs, or other groundwater sampling points.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing report of groundwater tracer studies.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing site study and well water analysis of known areas of groundwater contamination.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about these data elements.			
N	R	S	An existing property audit identifying contamination.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			
N	R	S	An existing report to the Minnesota Department of Agriculture and the Minnesota Pollution Control Agency of contaminant spills and releases.
	X		
Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect what is known about this data element.			



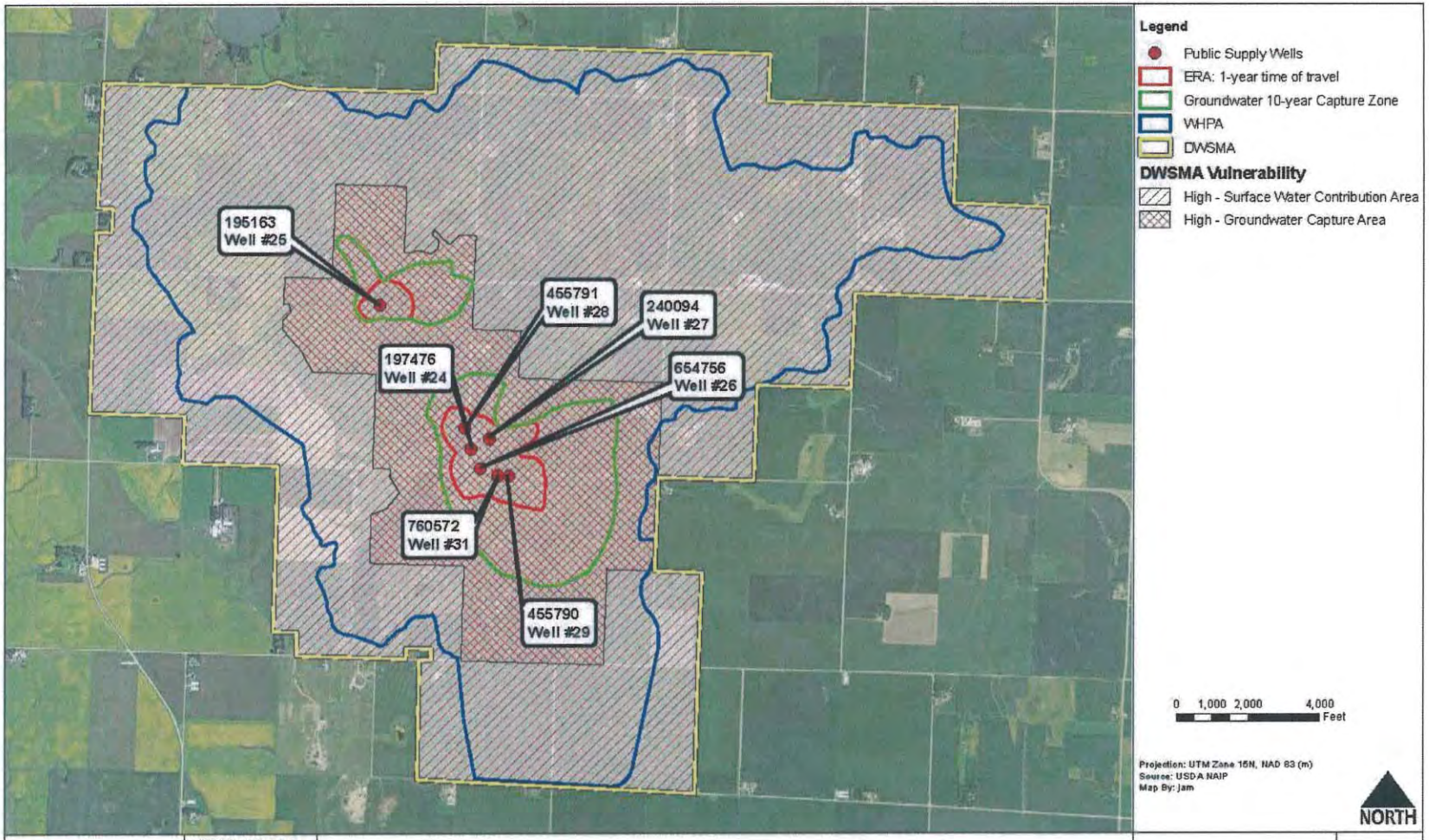
SEH

Project Number
WORTC 126958

WELLHEAD PROTECTION PLAN
Worthington, Minnesota

DWSMA Vulnerability
Okabena and
Malcolm Wellfields

Figure
9



SEH	Project Number WORTC 126958	**WELLHEAD PROTECTION PLAN** **Worthington, Minnesota**	**DWSMA Vulnerability** **Lake Bella Wellfield** — Figure 10

Scoping 2 Meeting - Wellhead Protection (WHP) Planning Issues Summary
Prepared for Worthington Public Utilities (WPU)
Okabena, Malcolm, and Lake Bella DWSMAs

Drinking Water Protection Issues Identified to Date:

- WPU source aquifers are in the unconfined sand and gravel aquifer and the semi-confined or confined drift. The Quaternary Water Table Aquifer (QWTA) is the primary source aquifer utilized by WPU and eighty percent of its public water supply wells are completed in it. The Quaternary Semi-confined/confined Aquifer (QBAA) supplies water to only twenty percent of WPU public water supply wells.
- According to research, the QWTA is directly connected hydrologically to lakes and streams in the area. In addition, this aquifer lies within 50 feet of the land surface and is within proximity to a subdued surface topography. It is within loam to clayey loam till which does not act as a confining layer for the aquifer.
- Tritium results for Malcolm DWSMA Well 20 was 6.4 TU.
- Tritium results for Lake Bella DWSMA Well 25 was 4.6 TU, Well 27 was 8.6 TU, and Well 29 was 6.3 TU.
- In the previous WHP Plan, the Lake Okabena Wellfield DWSMA was considered low vulnerability because both Wells 19 and 22 showed no traces of tritium. However, updated tritium sampling conducted by MDH in 2013 shows that Well 22 has a tritium level of 3.1 TU.
- In the Lake Okabena DWSMA further monitoring needs to be completed to determine whether or not the public water supply wells are connected hydrologically to the lake.

Water Quality Detections and Implications:

Lake Bella DWSMA Wells 28, 24 and 27 were positive for coliform bacteria Spring 2016 with Well 28 having E.coli present. WPU is addressing the positive samples and working with MDH District Engineer.

Old Municipal Well Information:

The Minnesota Department of Health has compiled historical information for use in the planning process. See the PWS remarks in MDH unverified wells report and old municipal well report for more information.

Sanborn Maps:

☒ Sanborn Maps are available for this area

☐ Sanborn Maps are not available for this area.

Recommended WHP Measures for all Wellfields:

1. Continue to routinely record the static and pumping groundwater levels in the public water supply wells. Data collected can be used to provide valuable information about the system water sources.
2. Work with county and state government agencies in future and ongoing efforts to compile regional geologic and hydrogeologic information through investigations and studies.

Lake Okabena Wellfield:

3. In order to address deficiencies in the understanding of surface water and groundwater interaction in the Lake Okabena Wellfield, the system should develop a water monitoring plan in year two of the plan implementation. The system can contact their SWP area hydrologist if any help is needed with this. The monitoring plan should

include monitoring for the standard MDH Surface Water Suite parameters (chloride, bromide, nitrate, ammonia, water stable isotopes, alkalinity, TOC, special metal scan, field measurement, total coliform/coli and tritium. Monitoring frequency should be quarterly for at least a year (length determined by MDH). The system will be responsible for the logistics for the monitoring, and MDH will be responsible for covering the analyses cost. If MDH is not able to cover the cost then WPU will not be required to conduct this monitoring effort. Information collected will be used to inform the next amendment about the delineation method that should be used to delineate the WHPA in Lake Okabena Wellfield.

4. In year five (after monitoring is complete), if it is determined that Lake Okabena is connected to the public supply wells, then WPU will need to inventory and manage stormwater outfalls/basins.

Lake Bella Wellfield:

5. In year five of plan implementation, monitoring of the Lake Bella Wellfield should be conducted, contingent upon the availability of funding. Sampling of all primary and seasonal public water supply wells for the standard MDH Vulnerability Suite parameters should be conducted for the spring, summer and fall period. Please contact your SWP area hydrologist for assistance. This will help to inform the next amendment.

Other:

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.*

Scoping 2 Decision Notice Attachment
Potential Contaminant Source Inventory Requirements

Moderately Vulnerable DWSMA

The following current and historical potential contaminant sources and related codes, materials and related codes, and activity status and related codes are required to be included in the potential contaminant source inventory. In cases where a materials identification is required, a materials designation and code must be assigned. All potential contaminant sources must be assigned an activity status and related code using state program descriptors or local knowledge.

Potential Contaminant Sources (PCS) Material	PCS Codes Material Codes
Above-Ground Storage Tank - Greater than 1100 gallons	AST
Chemicals	C000
Fertilizers	A050
Fuels, gases, and oils	F000
Hazardous substances	C001
Solvents and coatings	S000
Waste	W000
Agricultural Drainage Well (potential Class V)	ADW
Disposal Well (potential Class V)	DISWLL
Industrial Drainage Well (potential Class V)	INDW
Large Capacity Cesspool (potential Class V)	CVLCC
Large Capacity Waste Water Disposal Site (potential Class V)	CVWWD
Leaking Underground Storage Tank	LUST
Misc. Injection Well (potential Class V)	INJWLL
Motor Vehicle Waste Disposal Well (potential Class V)	CVMVW
Pipeline Facility	PLFAC
Potential Contamination Site[1]	PCS
Recharge Well (potential Class V)	RWLL
Reinjection Well (potential Class V)	RIWLL
Solid Waste Management Site	SWMS
Special Drainage Well (potential Class V)	SPDW
Spills	SPL
Storage or Preparation Area	STOR
Chemicals (include RMP facilities here)	C000
Fertilizers	A050
Fuels, gases, and oils	F000
Hazardous substances (include TRIS facilities here)	C001
Solvents and coatings	S000
Waste	W000

Potential Contaminant Sources (PCS) **Material**	**PCS Codes** **Material Codes**
Stormwater Injection Well (potential Class V)	SWI
Suspected Contaminant of Concern	SCC
Chemical	C000
Food, agricultural, and consumer products	A000
Fuels, gases, and oils	F000
Materials and minerals	M000
Pathogens	P000
Solvents and coatings	S000
Waste	W000
Underground Storage Tank	UST
Chemicals	C000
Fertilizers	A050
Fuels, gases, and oils	F000
Hazardous substances	C001
Solvents and coatings	S000
Waste	W000
Wells	WEL

Footnotes:

[1]Potential Contamination Sites (PCS) include the following:

Brownfields (BMS)
Delisted State Superfund Sites (DPLP)
Federal Superfund Sites (NPL)
Hazardous Waste Investigative/cleanup (HWIC)
No Further Remedial Action Planned (NFRAP)
State Superfund Sites (PLP)
Suspected Hazardous Waste Site (CERCL)
Voluntary Investigative Cleanup (VIC)

Activity Status; Codes; and Descriptions

Status	Code	Description
Active	A	PCS is operative or in use. Examples: Animal feedlot is active. Well is in use or has maintenance permit.
Closed	C	PCS is inactive and is not open from a regulatory viewpoint. Example: Leaking storage tank site or landfill is closed.
Inactive	I	PCS is present but not currently active. Examples: Gravel pit is inactive. Well is un-used.
Removed	R	PCS has been removed. Example: Underground storage tank has been removed.
Unknown	U	Activity status of the PCS is not known definitely or has not been evaluated. Examples: Class V site status unknown. Well is thought to be sealed, but no official sealing record has been identified.

Scoping 2 Decision Notice Attachment
Potential Contaminant Source Inventory Requirements

Highly and Very Highly Vulnerable DWSMA

The following current and historical potential contaminant sources and related codes, materials and related codes, and activity status and related codes are required to be included in the potential contaminant source inventory. In cases where a materials identification is required, a materials designation and code must be assigned. All potential contaminant sources must be assigned an activity status and related code using state program descriptors or local knowledge.

Potential Contaminant Sources (PCS) Material	PCS Codes Material Codes
Above-Ground Storage Tank	AST
Chemicals	C000
Fertilizers	A050
Fuels, gases, and oils	F000
Hazardous substances	C001
Solvents and coatings	S000
Waste	W000
Agricultural Drainage Well (potential Class V)	ADW
Animal Burial Site	ABS
Animal Feedlot	AFL
Ash Disposal Site	ASHD
Disposal Well (potential Class V)	DISWLL
Drainage Ditch (non-public, non-roadway)	DITCH
Dump (unpermitted)	DMP
Grave(s)	GRV
Hazardous Waste Generator	HWG
Hazardous Waste Handler	HWH
Industrial Drainage Well (potential Class V)	INDW
Land Application	LAPP
Agricultural chemicals	C010
Chemicals (unspecified)	C000
Fertilizers	A050
Minerals and metals (unspecified)	M000
Waste (used unless one of the materials listed below apply)	W000
Solid waste	W100
Animal manure	W520
Biolsolids	W200
Septage	W720
Industrial	W740

Large Capacity Cesspool (potential Class V)	CVLCC
Large Capacity Waste Water Disposal Site (potential Class V)	CVWWD
Leaking Underground Storage Tank	LUST
Misc. Injection Well (potential Class V)	INJWLL
Motor Vehicle Waste Disposal Well (potential Class V)	CVMVW
Nuclear Reactor	NR
Pipeline Crossing Over Water	PIPEX
Pipeline Facility	PLFAC
Pit (aggregate)	PIT
Potential Contamination Site[1]	PCS
Rail Crossing Over Water	RAILX
Recharge Well (potential Class V)	RWLL
Reinjection Well (potential Class V)	RIWLL
Road Crossing Over Water	ROADX
Sinkhole	SINK
Sludge Disposal Site	SLDG
Solid Waste Management Site	SWMS
Special Drainage Well (potential Class V)	SPDW
Spills	SPL
Storage or Preparation Area	STOR
Agricultural chemicals	C010
Chemicals (include RMP facilities here)	C000
Fertilizers	A050
Fuels, gases, and oils	F000
Hazardous substances (include TRIS facilities here)	C001
Road salt	C020
Solvents and coatings	S000
Pressure-treated wood	C220
Waste (used unless one of the materials listed below apply)	W000
Solid waste	W100
Animal manure	W520
Waste oils	W700
Motor vehicle waste	W710
Tires	W120
Stormwater Basin	SWB
Stormwater Injection Well (potential Class V)	SWI
Stormwater Outlet	SROUT
Subsurface Sewage Treatment System	SSTS
Suspected Contaminant of Concern	SCC
Chemical	C000
Food, agricultural, and consumer products	A000
Fuels, gases, and oils	F000

Materials and minerals	M000
Pathogens	P000
Solvents and coatings	S000
Waste	W000
Underground Storage Tank	UST
Chemicals	C000
Fertilizers	A050
Fuels, gases, and oils	F000
Hazardous substances	C001
Solvents and coatings	S000
Waste	W000
Waste - Metro Area	IWS
Wastewater Disposal Site[2]	WWDS
Wastewater Stabilization Pond	WSP
Wastewater Treatment Pond	WWTD
Wells	WEL

Footnotes:

[1]Potential Contamination Sites (PCS) include the following:

Brownfields (BMS)
Delisted State Superfund Sites (DPLP)
Federal Superfund Sites (NPL)
Hazardous Waste Investigative/cleanup (HWIC)
No Further Remedial Action Planned (NFRAP)
State Superfund Sites (PLP)
Suspected Hazardous Waste Site (CERCL)
Voluntary Investigative Cleanup (VIC)
State Assessment Site (SAS)

[2]Wastewater Disposal Sites (WWDS) include the following:

National Pollutant Discharge Elimination System (NDPES)
State Disposal System Permit (SDS)

Activity Status; Codes; and Descriptions

Status	Code	Description
Active	A	PCS is operative or in use. Examples: Animal feedlot is active. Well is in use or has maintenance permit.
Closed	C	PCS is inactive and is not open from a regulatory viewpoint. Example: Leaking storage tank site or landfill is closed.
Inactive	I	PCS is present but not currently active. Examples: Gravel pit is inactive. Well is un-used.
Removed	R	PCS has been removed. Example: Underground storage tank has been removed.
Unknown	U	Activity status of the PCS is not known definitely or has not been evaluated. Examples: Class V site status unknown. Well is thought to be sealed, but no official sealing record has been identified.

Scoping 2 Decision Notice Attachment

Potential Contaminant Source Inventory Requirements

Highly Vulnerable Surface Water Contribution Area

The following current and historical potential contaminant sources and related codes, materials and related codes, and activity status and related codes are required to be included in the potential contaminant source inventory. In cases where a materials identification is required, a materials designation and code must be assigned. All potential contaminant sources must be assigned an activity status and related code using state program descriptors or local knowledge.

Potential Contaminant Sources (PCS) Material	PCS Codes	Material Codes	Comments / Caveats
Above-Ground Storage Tank	AST		Outdoor, spills and runoff; note presence or absence of containment
Chemicals		C000	
Fertilizers		A050	
Fuels, gases, and oils		F000	
Hazardous substances		C001	
Solvents and coatings		S000	
Waste		W000	
Animal Feedlot	AFL		Aboveground storage and runoff ; note if it is an open lot
Ash Disposal Site	ASHD		Runoff and flooding potential
Drainage Ditch (non-public, non-roadway)	DITCH		Runoff movement through any public or other drainage ditch system toward lake or streams

Potential Contaminant Sources (PCS) Material	PCS Codes	Material Codes	Comments / Caveats
Hazardous Waste Generator with Outside Storage	HWG		For aboveground outside storage
Hazardous Waste Handler	HWH		Aboveground storage and runoff, spills

Potential Contaminant Sources (PCS)	PCS Codes	Material Codes	Comments / Caveats
Material			
Land Application	LAPP		Runoff and flooding potential
Agricultural chemicals		C010	
Chemicals (unspecified)		C000	
Fertilizers		A050	
Minerals and metals (unspecified)		M000	
Waste (used unless one of the materials listed below apply)		W000	
Solid waste		W100	
Animal manure		W520	
Biosolids		W200	
Septage		W720	
Industrial		W740	
Large Capacity Cesspool (potential Class V)	CVLCC		Runoff and flooding potential
Large Capacity Waste Water Disposal Site (potential Class V)	CVWWD		Runoff and flooding potential
Pipeline Crossing Over Water	PIPEX		
Pit (aggregate)	PIT		Runoff and flooding potential
Potential Contamination Site[1]	PCS		Likely to be highly plume- and site-dependent, driven by how much of a surface water issue the contaminant is

Potential Contaminant Sources (PCS) Material	PCS Codes	Material Codes	Comments / Caveats
Rail Crossing Over Water	RAILX		
Road Crossing Over Water	ROADX		
Sludge Disposal Site	SLDG		
Solid Waste Management Site	SWMS		Aboveground storage runoff issues
Spills	SPL		Aboveground, runoff and ponding at surface
Storage or Preparation Area	STOR		Aboveground, runoff potential; note if site is subject to an industrial stormwater permit
Agricultural chemicals		C010	
Chemicals (include Risk Management Plan facilities here)		C000	
Fertilizers		A050	
Fuels, gases, and oils		F000	
Hazardous substances (include Toxic Release Inventory Site facilities here)		C001	
Road salt		C020	
Solvents and coatings		S000	
Pressure-treated wood		C220	

Potential Contaminant Sources (PCS)	PCS Codes	Material Codes	Comments / Caveats
Material			
Waste (used unless one of the materials listed below apply)		W000	
Solid waste		W100	
Animal manure		W520	
Waste oils		W700	
Motor vehicle waste		W710	
Tires		W120	
Stormwater Basin	SWB		Runoff out of basins during storm events could reach lakes. Also could be area of focused recharge to aquifer.
Stormwater Outlet	SROUT		
Subsurface Sewage Treatment Center	SSTS		
Suspected Contaminant of Concern	SCC		These would be inventoried in a groundwater high or moderate vulnerability area, but should be inventoried anywhere there's a potential for travel via runoff events. To be used when no other potential contaminant source is appropriate.
Chemical		C000	
Food, agricultural, and consumer products		A000	
Fuels, gases, and oils		F000	
Materials and minerals		M000	

Potential Contaminant Sources (PCS)	PCS Codes	Material Codes	Comments / Caveats
Material			
Pathogens		P000	
Solvents and coatings		S000	
Waste		W000	
Wastewater Disposal Site[2]	WWDS		If site discharge would likely interact with stormwater runoff; one example could be industrial wastewater from a food processing facility. Include wastewater discharges to streams or lakes that contribute to the source aquifer.
Wastewater Stabilization Pond	WSP		Flooding risk
Wastewater Treatment Pond	WWTD		

Footnotes:

[1]Potential Contamination Sites (PCS) include the following:

Brownfields (BMS)
Delisted State Superfund Sites (DPLP)
Federal Superfund Sites (NPL)
Hazardous Waste Investigative/cleanup (HWIC)
No Further Remedial Action Planned (NFRAP)
State Superfund Sites (PLP)
Suspected Hazardous Waste Site (CERCL)
Voluntary Investigative Cleanup (VIC)
State Assessment Site (SAS)

[2]Wastewater Disposal Sites (WWDS) include the following:

National Pollutant Discharge Elimination System (NDPES)
State Disposal System Permit (SDS)

Activity Status; Codes; and Descriptions

Status	Code	Description
Active	A	PCS is operative or in use. Examples: Animal feedlot is active. Well is in use or has maintenance permit.
Closed	C	PCS is inactive and is not open from a regulatory viewpoint. Example: Leaking storage tank site or landfill is closed.

Inactive	I	PCS is present but not currently active. Examples: Gravel pit is inactive. Well is un-used.
Removed	R	PCS has been removed. Example: Underground storage tank has been removed.
Unknown	U	Activity status of the PCS is not known definitely or has not been evaluated. Examples: Class V site status unknown. Well is thought to be sealed, but no official sealing record has been identified.

Appendix B

Part I Wellhead Protection Plan

(Included on CD)

Appendix C

Potential Contaminant Source Inventory

Appendix C
Potential Contaminant Source Index
Part II Wellhead Protection Plan
Worthington, Minnesota

Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
PCSI Land Application and Feedlots															
Figure 10-2															
PLA7	1	Multiple in Comment	Presumed Land Application Site	NA		Worthington	56187	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 20-0220-000
PLA1	2	Multiple in Comment	Presumed Land Application Site	NA		Worthington	56187	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 20-0184-500, 20-0184-000
PLA3	3	Multiple in Comment	Presumed Land Application Site	NA		Worthington	56187	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 20-0192-000, 20-0192-500
PLA2	4	Multiple in Comment	Presumed Land Application Site	NA		Worthington	56187	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 20-0188-000, 20-0189-000
PLA4	5	Multiple in Comment	Presumed Land Application Site	NA		Worthington	56187	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 20-0191-000
PLA5	6	Multiple in Comment	Presumed Land Application Site	NA		Worthington	56187	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 20-0207-000
PLA6	7	Multiple in Comment	Presumed Land Application Site	NA		Worthington	56187	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 20-0209-000, 20-0208-000
LA4	8	20-0205-000	Sonstegard	NA		Worthington	56187	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
LA3	9	20-0186-000	Adam Blume	NA		Worthington	56187	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
LA2	10	20-0213-000	Doug Fransen	NA		Worthington	56187	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
LA1	11	20-0183-000	Adam Blume	NA		Worthington	56187	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site

Appendix C
Potential Contaminant Source Index
Part II Wellhead Protection Plan
Worthington, Minnesota

Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
Figure 10-3															
WM9	12	01-0099-000	Aaron Nystrom Farm	105-92936	30679 Quine Ave	Worthington	56187	Feedlots Preferred ID	AFL	A	W000	1		High	Not on state database, reported by county, 212 AU
WM10	13	08-0103-000	Delbert Wickstrom Farm - Sec 19	105-92616	Address Unknown	Worthington	56187	Feedlots Preferred ID	AFL	A	W000	1		High	<10 AU
WM11	14	01-0167-000	Marlyn Nystrom Farm - Sec 24 NE	105-92953	31463 Read Ave	Worthington	56187	Feedlots Preferred ID	AFL	A	W000	1		High	15 AU Chickens
WM13	15	01-0187-300	John Donkersloot Farm Sec 26	105-94143	32831 320th St	Worthington	56187	Feedlots Preferred ID	AFL	A	W000	1		High	147 AU
WM14	16	01-0185-500	Gordon Wiertzema Farm - Sec 26	105-92605	Address Unknown	Worthington	56187	Feedlots Preferred ID	AFL	A	W000	1		High	<10 AU GOATS AND SHEEP
WM12	17	01-0175-000	Jim Spangler Farm - Sec 24	105-92944	33314 320th St	Worthington	56187	Feedlots Preferred ID	AFL	A	W000	1		High	225 AU CHICKENS
WM17	18	01-0188-000	Jess Donkersloot Farm - Sec 26	105-94151	32637 Quine Ave	Worthington	56187	Feedlots Preferred ID	AFL	A	W000	1	Very High		200 AU

Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
Figure 10-3 Continued															
WM16	19	01-0182-500	Dean Christopherson Farm - Sec 25	105-94144	32732 Quine Ave	Worthington	56187	Feedlots Preferred ID	AFL	A	W000	1		High	212 All Dairy
PLA8	20	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0140-000
PLA9	21	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0141-000, 01-0142-000, 01-0146-000, 01-0145-500
PLA11	22	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0150-250, 01-0149-000, 01-0145-250, 01-0147-000, 01-0145-000
PLA10	23	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0102-500
PLA13	24	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0155-000
PAL14	25	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 08-0103-000, 08-0102-000
PLA15	26	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0144-250
PLA16	27	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0151-000, 01-0143-000
PLA17	28	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0161-000, 01-0160-000, 01-0159-000
PLA18	29	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0158-000, 01-0157-000
PLA19	30	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0174-000, 01-0173-500, 01-0173-000, 01-0172-000, 01-0163-00001-0174-000, 01-0173-500, 01-0173-000, 01-0172-000, 01-0163-000
PLA20	31	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0171-000
PLA22	32	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0200-000, 01-0199-000, 01-0199-500, 01-0201-000

Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
Figure 10-3 Continued															
PLA23	33	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1	Very High		Presumed Land Application Site on parcels 01-0193-000
PLA24	34	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0185-500, 01-0185-000
PLA25	35	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1	Very High		Presumed Land Application Site on parcels 01-0184-000
PLA26	36	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0185-500, 01-0183-000, 01-0187-500
PLA27	37	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0187-300
PLA28	38	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0175-000
PLA29	39	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0176-000, 01-0176-500
PLA30	40	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0177-000, 01-0178-000
PLA31	41	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1	Very High	High	Presumed Land Application Site on parcels 01-0192-000, 01-0196-000, 01-0194-000
PLA33	42	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1	Very High		Presumed Land Application Site on parcels 01-0191-000, 01-0191-700
PLA34	43	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1	Very High		Presumed Land Application Site on parcels 01-0186-000
LA20	44	01-0243-500	D&S Dairy	NA		Bigelow	56117	Land Application Site	LAPP	A	C010	1	Very High		County Registered Land Application Site
PLA35	45	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1	Very High	High	Presumed Land Application Site on parcels 01-0233-000, 01-0232-500, 01-0232-000
LA19	46	01-0187-000	Donkersloot	NA		Bigelow	56117	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
PLA36	47	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1	Very High		Presumed Land Application Site on parcels 01-0239-000
LA18	48	01-0202-000	D&S Dairy	NA		Bigelow	56117	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
PLA37	49	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1	Very High		Presumed Land Application Site on parcels 01-0240-000, 01-0241-000

Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
Figure 10-3 Continued															
LA17	50	01-0190-000	Donkersloot	NA		Bigelow	56117	Land Application Site	LAPP	A	C010	1	Very High		County Registered Land Application Site
PLA38	51	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1	Very High		Presumed Land Application Site on parcels 01-0239-500, 01-0242-000
LA16	52	01-0182-000	Dean Chistopheson	NA		Bigelow	56117	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
PLA39	53	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0237-000
PLA40	54	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0236-500, 01-0236-000
PLA41	55	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1	Very High		Presumed Land Application Site on parcels 01-0244-500, 01-0244-000
LA13	56	01-0171-000	Jim Spangler	NA		Bigelow	56117	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
PLA42	57	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 01-0252-000
LA12	58	01-0167-000	Marlyn Nystron	NA		Bigelow	56117	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
PLA43	59	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site located in Iowa
LA11	60	01-0163-500	Dean Christoheson	NA		Bigelow	56117	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
LA10	61	01-0162-000	Mike Sampson	NA		Bigelow	56117	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
LA9	62	01-0153-500	D&S Dairy	NA		Bigelow	56117	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
LA8	63	01-0094-000	Aaron Nystrom	NA		Bigelow	56117	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
LA7	64	01-0101-000	Dean Christopheson	NA		Bigelow	56117	Land Application Site	LAPP	A	C010	1		High	County Registered Land Application Site
PLA21	65	Multiple in Comment	Presumed Land Application Site	NA		Bigelow	56117	Land Application Site	LAPP	U	C010	1		High	Presumed Land Application Site on parcels 08-0111-000, 08-0113-500, 08-0113-000, 08-0112-000

Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
MPCA and Other Potential Contaminant Sources															
Figure 11-1															
SP1	66	31-3937-000	UNION PACIFIC RR	184963	1034 1st Ave	Worthington	56187	MPCA Spill	SPL	C	F000	1	Moderate		A BOLT THAT HOLDS THE FILTER CANNISTER BROKE & CAUSED SPILL. SPIL TO RR BALLAST. BAYWEST HIRED.
SP1	67	RR-RAIL-006	Worthington Yard	166753	1034 1st Ave	Worthington	56187	MPCA Spill	SPL	C	F000	1	Moderate		**No file** Material sloshed out while moving in the yard. This is a courtesy call it is not believed that any material reached the ground. Caller has been in contact with the RP and they are sending someone to check for bad gaskets or a loose manhole.
SP1	68	RR-RAIL-006	fuel leak from RR refer car at Depot	63887579	1034 1st Avenue	Worthington	56187	MPCA Spill	SPL	C	F000	1	Moderate		Discovered a leak from a refrigerated rail car power unit, currently parked in the yard. Crew enroute to repair and clean up. UPRR case # 2012-08-03-095AAA
SP1	69	RR-RAIL-006	Locomotive engine oil release at Depot	68344269	1034 1st Avenue	Worthington	56187	MPCA Spill	SPL	C	F000	1	Moderate		A locomotive released engine oil, releasing over the past week, discovered at 2:18 central time. There was a leak under the engine, the leak has stopped. The Hazardous Manager looking into cause, Matt Thompson, 414-517-3061. DO forgot to ask amount of spi
SP1	70	RR-RAIL-006	Union Pacific Railroad derail in Worthington Yard	72995066	1034 1st Avenue	Worthington	56187	MPCA Spill	SPL	C	F000	1	Moderate		Caller reporting a derailment of 2 locomotives, no release. Cause unknown.
SP1	71	31-0001-000	Union Pacific Railroad diesel at Worthington Depot	73370570	1034 1st Avenue	Worthington	56187	MPCA Spill	SPL	C	F000	1	Moderate		RP was doing a diesel test on a locomotive and while hooking a bottle onto a suction device, 3 drops from a previous sample spilled onto the ballast, the ballast rock was picked up. Report # 2015-03-22-043BAV
WM2	72	31-0001-000	Standard Oil (former Campbell Soup Site)	VP10240	115 9th St	Worthington	56187	Former Brownfields VIC Preferred ID	BMS	I	F000	1	Moderate		VP10243 IS Active as of 06/06/2017
WM2	73	31-0001-000	Awra Doro	VP10241	115 9th St	Worthington	56187	Former Brownfields VIC Preferred ID	BMS	I	F000	1	Moderate		VP10243 IS Active as of 06/06/2017
WM2	74	31-0001-000	Standard Oil #3 (former Campbell Soup)	VP10242	115 9th St	Worthington	56187	Former Brownfields VIC Preferred ID	BMS	I	F000	1	Moderate		VP10243 IS Active as of 06/06/2017
WM2	75	31-0001-000	Standard Oil #4 (former Campbell Soup Site)	VP10243	115 9th St	Worthington	56187	Brownfields VIC Preferred ID	BMS	A	F000	1	Moderate		VP10243 IS Active as of 06/06/2017

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Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
Figure 11-1 continued															
WM3	76	31-3931-000	GCC Ready Mix - Worthington	LS0020190	1000 Sherwood St	Worthington	56187	Leak Site Preferred ID	LUST	A	F000	1	Moderate		Active as of 06/06/2017
WM3	77	31-3931-000	Worthington Ready Mix Inc	TS0008537	1000 Sherwood St	Worthington	56187	Underground Tanks Preferred ID	UST	I	F000	1	Moderate		4 tanks removed
WM4	78	31-0001-000	Campbell Soup Co (spill)	3758	115 9th St	Worthington	56187	Former Leak Site Preferred ID	LUST	I	F000	1	Moderate		Site Closure 2013
WM4	79	31-0001-000	Campbell Soup Plant Service Station	9996	115 9th St	Worthington	56187	Former Leak Site Preferred ID	LUST	I	F000	1	Moderate		Site Closure 2013
WM4	80	31-0001-000	Campbell Soup Co	TS0008574	115 9th St	Worthington	56187	Underground Tanks Preferred ID	UST	I	F000	1	Moderate		2 removed UST
WM4	81	31-0001-000	Former Campbells Soup Co Redevelopment	3669	115 9th St	Worthington	56187	Former Brownfields PBP Preferred ID	BMS	I	F000	1	Moderate		Site Closed 2013
WM4	82	31-0001-000	Former Campbells Soup Co Redevelopment	PB3669	115 9th St	Worthington	56187	Brownfields Preferred ID	BMS	I	F000	1	Moderate		Site Closed 2013
WM4	83	31-0001-000	Campbell Soup Co	12779	115 9th St	Worthington	56187	Former Leak Site Preferred ID	LUST	I	F000	1	Moderate		Site Closure 2013
WM4	84	31-0001-000	Campbell Soup Co	TS0008574	115 9th St	Worthington	56187	Aboveground Tanks Preferred ID	AST	I	F000	1	Moderate		2 removed AST
WM4	85	31-0001-000	Former Campbells Soup Co Property	18558	115 9th St	Worthington	56187	Former Leak Site Preferred ID	LUST	I	F000	1	Moderate		Site Closed 2013

Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
Figure 11-1 continued															
WM4	86	31-0001-000	Campbell Soup	3742	115 9th St	Worthington	56187	Former Leak Site Preferred ID	LUST	I	F000	1	Moderate		Site Closure 2013
WM5	87	31-0006-000	Worthington Tire	TS0018213	709 2nd Ave	Worthington	56187	Underground Tanks Preferred ID	UST	I	F000	1	Moderate		2 removed tanks
WM6	88	31-0965-000	Gateway 76	398	525 Highway 59	Worthington	56187	Former Leak Site Preferred ID	LUST	I	F000	1	Moderate		Site Closed 1998
WM6	89	31-0965-000	Former Gateway 76	17504	525 Highway 59	Worthington	56187	Former Leak Site Preferred ID	LUST	I	F000	1	Moderate		Site Closed 2014
WM6	90	31-0965-000	Gateway Service	TS0008563	525 Highway 59	Worthington	56187	Underground Tanks Preferred ID	UST	I	F000	1	Moderate		Non-Active: 3 removed - 3 temp closed
WM7	91	31-0975-000	Shine Brothers Corp of MN	SA0003263	520 Gateway Dr	Worthington	56187	Site Assessment Preferred ID	PLP	I	F000	1	Moderate		Inactive as of 06/06/2017
Figure 11-2															
SS6	92	20-0183-000	Presumed Subsurface Sewage Treatment System	na		Worthington	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS5	93	20-0184-000	Presumed Subsurface Sewage Treatment System	na		Worthington	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS7	94	20-0213-000	Presumed Subsurface Sewage Treatment System	na		Worthington	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS8	95	20-0209-000	Presumed Subsurface Sewage Treatment System	na		Worthington	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS9	96	20-0208-000	Presumed Subsurface Sewage Treatment System	na		Worthington	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS3	97	20-0192-750	Presumed Subsurface Sewage Treatment System	na		Worthington	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS4	98	20-0207-000	Presumed Subsurface Sewage Treatment System	na		Worthington	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS2	99	20-0190-000	Presumed Subsurface Sewage Treatment System	na		Worthington	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS1	100	20-0188-000	Presumed Subsurface Sewage Treatment System	na		Worthington	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SB1	101	ROW	City of Worthington	NA		Worthington	56187	Stormwater Basin	SWB	A	W000	1	High		City Stormwater Basin near sunset bay

Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
Figure 11-3															
SS23	102		Presumed Subsurface Sewage Treatment System	na		Bigelow		Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS24	103	01-0252-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS22	104	01-0244-500	Presumed Subsurface Sewage Treatment System	na		Bigelow	56117	Subsurface Sewage Treatment System	SSTS	U	W000	1	Very High		Presumed Subsurface Sewage Treatment system on Farmstead
SS21	105	01-0234-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56117	Subsurface Sewage Treatment System	SSTS	U	W000	1	Very High		Presumed Subsurface Sewage Treatment system on Farmstead
SS37	106	01-0232-500	Presumed Subsurface Sewage Treatment System	na		Bigelow	56117	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS20	107	01-0191-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56117	Subsurface Sewage Treatment System	SSTS	U	W000	1	Very High		Presumed Subsurface Sewage Treatment system on Farmstead
SS26	108	01-0188-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1	Very High		Presumed Subsurface Sewage Treatment system on Farmstead
SS25	109	01-0182-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS33	110	01-0178-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS32	111	01-0176-500	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS31	112	01-0174-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS27	113	01-0187-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS34	114	01-0168-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead

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Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
SS35	115	08-0103-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56117	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS36	116	08-0113-500	Presumed Subsurface Sewage Treatment System	na		Bigelow	56117	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS30	117	01-0165-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead

Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
Figure 11-3 continued															
SS29	118	01-0155-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS28	119	01-0099-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS16	120	01-0149-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS18	121	01-0185-500	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS17	122	01-0162-500	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS19	123	01-0184-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1	Very High		Presumed Subsurface Sewage Treatment system on Farmstead
SS15	124	01-0193-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1	Very High		Presumed Subsurface Sewage Treatment system on Farmstead
SS14	125	01-0152-250	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1	Very High		Presumed Subsurface Sewage Treatment system on Farmstead
SS12	126	01-0151-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS11	127	01-0200-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS10	128	01-0140-000	Presumed Subsurface Sewage Treatment System	na		Bigelow	56117	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
SS13	129	01-0145-250	Presumed Subsurface Sewage Treatment System	na		Bigelow	56187	Subsurface Sewage Treatment System	SSTS	U	W000	1		High	Presumed Subsurface Sewage Treatment system on Farmstead
R1	130	01-0196-500	Road Crossing Over Water - 330th over Bella Lake	NA	330th street	Bigelow	56117	Road Crossing Over Water	ROADX	A	W000	1	Very High		Bridge for 330th over Lake Bella

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Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
R2	131	01-0152-250	Road Crossing Over Water - 320th over Ocheyedon River	NA	320th street	Bigelow	56187	Road Crossing Over Water	ROADX	A	W000	1	Very High		Road Crossing Over Water - 320th over Ocheyedon River
WM15	132	01-0182-000	Bigelow Township Dump	SA0008184	See location description	Bigelow Township	56187	Site Assessment Preferred ID	PLP	I	F000	1		High	Inactive as of 06/06/2017
WM15	133	01-0182-000	Bigelow Township Dump	REM03625	See location description	Bigelow Township	56187	Unpermitted Dump Preferred ID	DMP	U	W100	1		High	Listed as Inactive

Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
PCSI Minnesota Well Index															
Figure 12-1															
W6	134	31-0957-500	WORHTINGTON 22A	00169892		Worthington	56187	Located Well	WEL	A	-	1	Moderate		Minnesota Well Index Located Well
W7	135	31-0957-500	WORTHINGTON NO.22	00223612		Worthington	56187	Located Well	WEL	I	-	1	Moderate		Minnesota Well Index Located Well
W5	136	31-0957-500	WORTHINGTON 19	00223617		Worthington	56187	Located Well	WEL	I	-	1	Moderate		Minnesota Well Index Located Well
W10	137	31-0964-000	B4	00276393		Worthington	56187	Located Well	WEL	A	-	1	Moderate		Minnesota Well Index Located Well
W8	138	31-1859-500		00276397		Worthington	56187	Located Well	WEL	U	-	1	Moderate		Minnesota Well Index Located Well
W12	139	31-0964-000		00276396		Worthington	56187	Located Well	WEL	U	-	1	Moderate		Minnesota Well Index Located Well
W11	140	31-0964-000	MW-7 (2013)	00276394		Worthington	56187	Located Well	WEL	A	-	1	Moderate		Minnesota Well Index Located Well
W13	141	31-0964-000	MW-8 (2013)	00276395		Worthington	56187	Located Well	WEL	A	-	1	Moderate		Minnesota Well Index Located Well
W9	142	31-0964-000	B3	00276392		Worthington	56187	Located Well	WEL	A	-	1	Moderate		Minnesota Well Index Located Well
UW1	143	31-3931-000	MW-1	00552503		Worthington	56187	Unlocated Well	WEL	A	-	1	Moderate		Unlocated Well file - Relocated to DWSMA
UW1	144	31-3931-000	MW-2	00552504		Worthington	56187	Unlocated Well	WEL	A	-	1	Moderate		Unlocated Well file - Relocated to DWSMA
UW1	145	31-3931-000	MW-3	00552505		Worthington	56187	Unlocated Well	WEL	A	-	1	Moderate		Unlocated Well file - Relocated to DWSMA
UW1	146	31-3931-000	MW-4	00552506		Worthington	56187	Unlocated Well	WEL	A	-	1	Moderate		Unlocated Well file - Relocated to DWSMA
UW6	147	31-1859-500	MW-7	00552268		Worthington	56187	Unlocated Well	WEL	A	-	1	Moderate		Unlocated Well file - Relocated to DWSMA
UW5	148	WORTHINGTON	WORTHINGTON 57-4	00250574		Worthington	56187	Unlocated Well	WEL	U	-	1	Moderate		Unlocated Well file - Relocated to DWSMA
UW8	149	31-0971-000	WORTHINGTON 56-1	00250575		Worthington	56187	Unlocated Well	WEL	U	-	1	Moderate		Unlocated Well file - Relocated to DWSMA
UW8	150	31-0971-000	WORTHINGTON W-56-1	00244233		Worthington	56187	Unlocated Well	WEL	U	-	1	Moderate		Unlocated Well file - Relocated to DWSMA
UW9	151	31-0978-000	MW-2	00512555		Worthington	56187	Unlocated Well	WEL	A	-	1	Moderate		Unlocated Well file - Relocated to DWSMA
UW3	152	WORTHINGTON	WORTHINGTON 57-3	00250572		Worthington	56187	Unlocated Well	WEL	U	-	1	Moderate		Unlocated Well file - Relocated to DWSMA
UW4	153	31-0957-500	WORHTINGTON 57-5	00250573		Worthington	56187	Unlocated Well	WEL	U	-	1	Moderate		Unlocated Well file - Relocated to DWSMA
UW11	154	20-0262-000	ST. JOHN, C.	00237063		Worthington	56187	Unlocated Well	WEL	A	-	1	Moderate		Unlocated Well file - Relocated to DWSMA

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Figure 12-2															
W14	155	31-3978-250	WORTHINGTON 20	00633531		Worthington	56187	Located Well	WEL	A	-	1	High		Minnesota Well Index Located Well
W16	156	20-0215-000	WORTHINGTON 10A	00223597		Worthington	56187	Located Well	WEL	U	-	1	High		Minnesota Well Index Located Well
UW15	157	31-3978-750	WORTHINGTON 56-3	00250578		Worthington	56187	Unlocated Well	WEL	U	-	1	High		Unlocated Well file - Relocated to DWSMA
UW14	158	31-3979-000	WORTHINGTON 56-2	00250579		Worthington	56187	Unlocated Well	WEL	U	-	1	High		Unlocated Well file - Relocated to DWSMA
UW14	159	31-3979-000	WORTHINGTON 56-6	00250580		Worthington	56187	Unlocated Well	WEL	U	-	1	High		Unlocated Well file - Relocated to DWSMA
UW14	160	31-3979-000	PETERS 1	00250581		Worthington	56187	Unlocated Well	WEL	U	-	1	High		Unlocated Well file - Relocated to DWSMA
UW12	161	20-0232-500	WORTHINGTON 57-9	00250582		Worthington	56187	Unlocated Well	WEL	U	-	1	High		Unlocated Well file - Relocated to DWSMA
UW13	162	20-0232-500	WORTHINGTON 57-7	00250583		Worthington	56187	Unlocated Well	WEL	U	-	1	High		Unlocated Well file - Relocated to DWSMA
UW14	163	31-3979-000	WORTHINGTON W-56-2	00244234		Worthington	56187	Unlocated Well	WEL	U	-	1	High		Unlocated Well file - Relocated to DWSMA
UW14	164	31-3979-000	PETER'S NO. 1	00244235		Worthington	56187	Unlocated Well	WEL	U	-	1	High		Unlocated Well file - Relocated to DWSMA

Appendix C
Potential Contaminant Source Index
Part II Wellhead Protection Plan
Worthington, Minnesota

Map ID	PCSI ID	PIN	Facility Name	Program ID	Address	City	Zip Code	ID Type	PCSI Code	Status	Material	Total	Groundwater Vunerability	Surface Water Vulnerability	Comment
Figure 12-3															
W18	165	01-0152-250	NELSON, ELMER	00604803		Bigelow	56187	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W19	166	01-0150-000	BUYSMAN, LESTER	00189511		Bigelow	56187	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W21	167	01-0193-000	WORTHINGTON TW-1A-89	00268080		Bigelow	56187	Located Well	WEL	U	-	1	Very High		Minnesota Well Index Located Well
W20	168	01-0193-000	WORTHINGTON OBS-1A-89	00268081		Bigelow	56187	Located Well	WEL	U	-	1	Very High		Minnesota Well Index Located Well
W23	169	01-0193-000	WORTHINGTON 25	00195163		Bigelow	56187	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W22	170	01-0193-000	WORTHINGTON TW-25	00187836		Bigelow	56187	Located Well	WEL	U	-	1	Very High		Minnesota Well Index Located Well
W24	171	01-0194-000	WORTHINGTON 22A	00223622		Bigelow	56117	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W24	172	01-0194-000	WORTHINGTON 23	00223621		Bigelow	56117	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W24	173	01-0194-000	WORTHINGTON 22B	00223623		Bigelow	56117	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W24	174	01-0194-000	WORTHINGTON 24	00223624		Bigelow	56117	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W24	175	01-0194-000	WORTHINGTON 25	00223625		Bigelow	56117	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W25	176	01-0196-500	WORTHINGTON 28	00455791		Bigelow	56117	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W26	177	01-0191-500	WORTHINGTON 27	00240094		Bigelow	56117	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W26	178	01-0191-500	WORTHINGTON 27A	00654757		Bigelow	56117	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W28	179	01-0191-500	PERMANENT OBSERVATION PIEZOMETER	00268051		Bigelow	56117	Located Well	WEL	U	-	1	Very High		Minnesota Well Index Located Well
W27	180	01-0191-500	WORTHINGTON 24	00197476		Bigelow	56117	Located Well	WEL	U	-	1	Very High		Minnesota Well Index Located Well
W29	181	01-0191-700	WORTHINGTON 26	00654756		Bigelow	56117	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W30	182	01-0239-000	WORTHINGTON 31	00760572		Bigelow	56117	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
W31	183	01-0239-000	WORTHINGTON 29	00455790		Bigelow	56117	Located Well	WEL	A	-	1	Very High		Minnesota Well Index Located Well
UW16	184	01-0193-000	MW	00514033		Bigelow	56117	Unlocated Well	WEL	A	-	1	Very High		Unlocated Well file - Relocated to DWSMA
UW19	185	01-0196-500	WORTHINGTON	00244230		Bigelow	56117	Unlocated Well	WEL	A	-	1	Very High		Unlocated Well file - Relocated to DWSMA
UW18	186	01-0196-500	WORTHINGTON 22B	00250550		Bigelow	56117	Unlocated Well	WEL	U	-	1	Very High		Unlocated Well file - Relocated to DWSMA
UW19	187	01-0196-500	WORTHINGTON 22A	00250551		Bigelow	56117	Unlocated Well	WEL	U	-	1	Very High		Unlocated Well file - Relocated to DWSMA
UW20	188	01-0182-000	CHRISTOPHERSON, BURTON	00611422		Bigelow	56117	Unlocated Well	WEL	A	-	1	Very High		Unlocated Well file - Relocated to DWSMA
UW17	189	01-0233-500	LAKE BELLA PARK	00171920		Bigelow	56117	Unlocated Well	WEL	A	-	1	Very High		Unlocated Well file - Relocated to DWSMA

Appendix D

Water Supply Plan Approval

MINNESOTA DEPARTMENT OF NATURAL RESOURCES
REGIONAL OFFICE
201371 State Highway 15
New Ulm, MN 56073
507-359-6000

MNDNR

12/16/2016

ERCI ROOS
WORTHINGTON WATER SUPERINTENDENT
318 NINTH STREE
PO BOX 458
WORTHINGTON, MN 56187

RE: Water Supply Plan Approval, City of Worthington, Nobles County

Eric,

Our office has completed the review of your Water Supply Plan for public water supply authorized under DNR Water Appropriation Permit #1963-1128. I am pleased to advise you that in accordance with Minnesota Statutes, Section 103G.291, Subdivision 3, and on behalf of the Commissioner of the Department of Natural Resources, I hereby **approve your Water Supply Plan**. We encourage cities to complete the attached "Certification of Adoption" form. Please upload the form to MPARS-Water Supply Plan tab as soon as the city officially adopts the Plan.

The DNR, Minnesota Rural Water Association, and The Metropolitan Council encourage the city to educate its customers on how they can reduce household water use. As mentioned at the Water Supply Planning Workshops, the DNR will be contacting you periodically about progress the city has made on their water conservation goals. We encourage you to keep records of your success.

Thank you for your efforts in planning for the future of the City of Worthington water supply and for conserving the water resources of the State of Minnesota. If you have any questions or need additional assistance with the city's water appropriation permit, please contact Area Hydrologist Brian Nyborg at 507-831-2900 ext. 224.

Sincerely,

Robert Collett
EWR Southern Regional Manager

Ec: Carmelita Nelson, DNR
Brian Nyborg DNR Area Hydrologist
Minnesota Permitting and Reporting System (MPARS)