AUSTIN UTILITIES

WELLHEAD PROTECTION PLAN

July 2019

Forward

The following are excerpts from the Austin Utilities website that provide a brief overview of this public water supply system:

> *"Austin Utilities is a community-owned, not-for-profit electric, water, and natural gas utility, serving more than 12,000 customers within a community of over 23,000 people. Austin is located in Southeastern Minnesota approximately 12 miles north of the Iowa border and approximately 100 miles south of the Twin Cities metro area. Our mission is to offer utility products and services in a safe, reliable and responsible manner in order to enhance the quality of life in our community."*

This document presents a comprehensive wellhead protection plan for AU that will help provide for an adequate and safe drinking water supply for community residents.

Eight wells in the Austin area contribute source water to the AU system. The wells have undergone a separate, extensive groundwater modeling process as part of wellhead protection planning. The modeling results are presented in a 'part one' report located in Appendix B which contain 1) the delineation of the wellhead protection area, 2) the delineation of the drinking water supply management area (DWSMA), and 3) the assessments of well and drinking water supply management area vulnerability. The part one report was approved by the Minnesota Department of Health (MDH) before the second part of the plan was prepared.

The remainder of the wellhead protection plan is referred to as 'part two' and contains procedures for conducting a potential contaminant source inventory (PCSI) and the development of goals, objectives and measures that AU will take to offset the risk that potential contamination sources present to the public water supply system.

As per MDH wellhead protection rules, a review and assessment of various data elements, determined by DWSMA vulnerability, must be completed for the DWSMA. This process must address existing and historical aspects of 1) the physical environment, 2) land uses, 3) water quantity, and 4) water quality. The data assessment process conducted by the AU wellhead protection team supports both the delineation and vulnerability report (part one) and assists in both the identification of potential impacts the data elements may have on the source water and how the water supplier can address these potential impacts (part two). Appendix A contains detailed assessments of all applicable data elements for the DWSMA.

The identification of potential contaminant sources within the DWSMA is a fundamental element of wellhead protection. A PCSI is needed to assign meaningful priorities to management measures and to monitor the effectiveness of implementation of the WHP plan. This is an ongoing process that entails inventorying present and past land uses and periodically updating the PCSI as land uses change within the DWSMA. The extent of potential contaminant inventory conducted within the DWSMA is determined by the vulnerability of both the public water supply wells and the DWSMA. The AU wellhead protection team has conducted a thorough inventory of potential contaminant sources within the DWSMA which are shown on maps and tables in Appendix C.

The wellhead protection team discussed and listed any expected changes to the physical environment, land use, and surface and groundwater that may impact the aquifer serving the public water supply wells in the DWSMA. Chapter 5 discusses this subject in greater detail to clarify expected changes and how those changes may impact the source water used by AU.

A WHP plan must identify water and land use issues, problems, and opportunities related to the aquifer serving the public water supply wells, the well water, and the DWSMA. The wellhead protection team needs this process to define the nature and magnitude of contaminant source management issues within the DWSMA. The identification of issues, problems, and opportunities that may exist in the DWSMA enables AU to 1) take advantage of opportunities that may be available to make effective use of existing resources, 2) set priorities for management of contaminants listed, and 3) request support for implementing specific management strategies. Chapter 6 provides further discussion and tables of issues, problems and opportunities identified by the AU wellhead protection team.

Finally, the core of a WHP plan is the identification and implementation of effective management strategies that will protect the public water supply wells from contamination. These management strategies, or measures, may range from nonregulatory activities such as public education, to regulatory activities such as adoption by federal, state or local units of government to control specific types of contaminant sources. The AU wellhead protection team has selected and prioritized measures that should effectively address local land and water uses, as well as resource needs.

Factors the team considered include:

- contamination of a public water supply well;
- quantities of potential contaminant sources and their proximity to a public water supply well;
- capability of the geologic material to absorb a contaminant;
- existence and effectiveness of current official controls;
- time required to obtain cooperation; and
- administrative, legal, technical, and financial resources needed.

The long range goals, objectives, and measures assigned to the DWSMA by the AU wellhead team is discussed and itemized in Chapters 8 and 9 and Appendix D.

Once both parts of the plan are approved by the MDH, the Public Water Supplier has met all requirements for preparing a wellhead protection plan that are contained in Minnesota Rules Chapter 4720, parts 4720.5100 to 4720.5590.

Wellhead Protection Plan Manager

Todd Jorgenson – Austin Utilities

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Glossary of Terms

Drinking Water Supply Management Area (DWSMA) means the surface and subsurface areas surrounding a public water supply well, including the WHP area, that must be managed by the entity identified in the WHP plan. (MR4720.5 100, subpart 13). This area is delineated using identifiable landmarks that reflect the scientifically calculated WHPA boundaries as closely as possible.

Emergency Response Area (ERA) means the part of the WHP area that is defined by a one- year time of travel within the aquifer that is used by the public water supply well (MR4720.5250, Subpart 3). It is used to set priorities for managing potential contamination sources within the DWSMA.

Ground Water Capture Area (GWCA) is an area that is approximately the same size and shape as the WHPA (see definition below) but is displayed on potential contaminant source and land cover maps with 'squared – off' boundaries using public land survey or public road right of ways for the purpose of identifying and managing potential contaminant sources. A GWCA only applies to highly vulnerable DWSMA. The GWCA also includes the ERA of each DWSMA.

Inner Wellhead Management Zone (IWMZ) means the land that is within 200 feet of a public water supply well (MR4720.5 100, subpart 19). The public water supplier must manage the IWMZ to help protect it from sources of pathogen sources or chemical contamination that may cause an acute health effect.

Non-point Source Contamination refers to contamination of the drinking water aquifer that is caused by polluted runoff or pollution sources that cannot be attributed to a well-defined origin, e.g., runoff from agricultural fields, feedlots or urban areas.

Point Source Contamination refers to contamination of the drinking water aquifer that is attributed to pollution from a well-defined origin, such as discharge from a leaking fuel tank, a solid waste disposal site, or an improperly constructed or unused abandoned well.

Primary Water Supply Well means a well that is regularly pumped by a public water supply system to provide drinking water.

Surface Hydrologic Feature means the portion of the landscape that may 1) contribute recharge to the aquifer over the time of travel value used to define the WHPA or 2) affect the orientation of the groundwater flow field toward the public water supply well. A surface hydrologic feature includes naturally occurring or human-made features where water collects at the land surface and may provide recharge to the groundwater. Examples are ditches, lakes, mine pits, ponds, rivers, reservoirs, storm sewer outfalls, storm water collection basins, streams, and wetlands.

Surface Water Contribution Area (SWCA) means **i**n 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. A SWCA only applies to highly vulnerable DWSMA.

Vulnerability refers to the likelihood that one or more contaminants of human origin may enter either 1) a water supply well that is used by the public water supplier or 2) an aquifer that is a source of public drinking water. Very high or high vulnerability indicates that vertical recharge to the source water aquifer occurs over a time period of weeks to years. Low vulnerability indicates that vertical recharge to the source water aquifer occurs over a time period of several decades to a century.

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

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

WHP Plan Goal means an overall outcome of implementing the WHP plan, e.g., ensuring a safe and adequate drinking water supply.

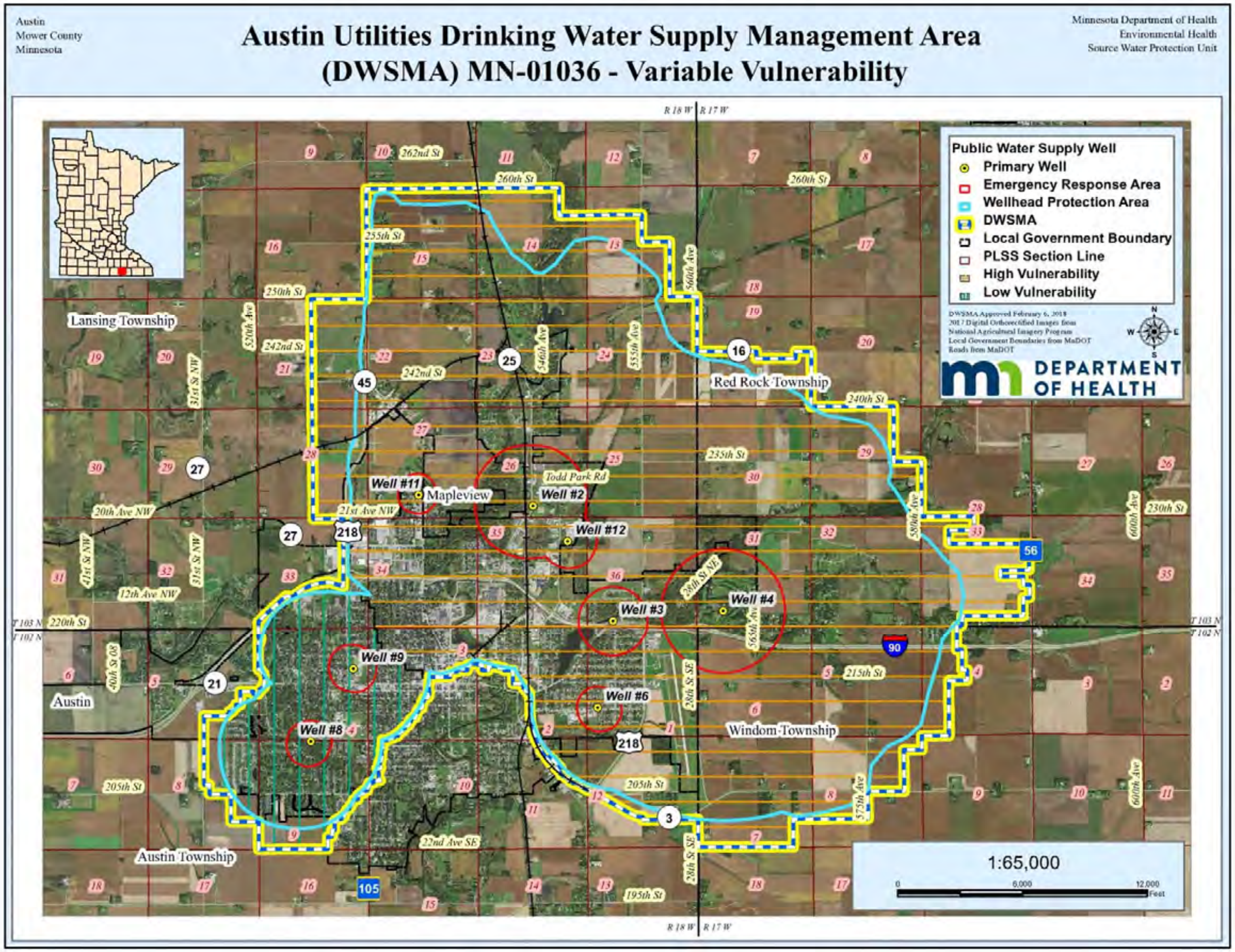
WHP Measure means a method adopted and implemented by a public water supplier to prevent contamination of a public water supply, and approved by the Minnesota Department of Health under Minnesota Rules parts 4720.5110 to 4720.5590.

WHP Plan Objective means what the public water supplier intends to do to achieve the related WHP goals, e.g., implementing WHP measures to address high priority potential contamination sources within 8 years.

Acronyms

AU – Austin Utilities
BWSR – Board of Water and Soil Resources
CRWD – Cedar River Watershed District
DNR – Minnesota Department of Natural Resources
MDA - Minnesota Department of Agriculture
MDH – Minnesota Department of Health
MPCA – Minnesota Pollution Control Agency
MRWA—Minnesota Rural Water Association
SWCD – Mower County Soil and Water Conservation District
USEPA – United States Environmental Protection Agent

Figure 1. Austin Utilities Drinking Water Supply Management Area and Vulnerability Assessment.



Chapter 1: Introduction

1.1 Background

The Austin Utilities (AU) drinking water supply management area (DWSMA) was approved by the Minnesota Department of Health (MDH) on February 6th, 2018. Wellhead protection (WHP) is an ongoing process and WHP plans need to be periodically reviewed and updated. Land and groundwater uses within a DWSMA are likely to change over time and the WHP plan must be modified to reflect those changes. A public water supplier is required to review and update an approved WHP plan every ten years to ensure the plan reflects current conditions within the DWSMA.

This WHP plan for AU was prepared in cooperation with the MDH, Minnesota Department of Natural Resources (DNR), Minnesota Department of Agriculture (MDA), the City of Austin, Mower County Environmental Services, Mower County Soil and Water Conservation District and the Cedar River Watershed District. This plan provides both technical information and management strategies for all production wells used by AU located in Austin, Minnesota. The wells are used to supply drinking water to 9,100 connections and about 24,700 residents in the City of Austin. The WHP plan contains specific actions that AU 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 county agencies will provide is presented to identify their roles in protecting AU's drinking water supply. The plan is effective for 10 years after the approval date specified by the MDH. AU is responsible for implementing its WHP plan of action as described in Chapter 9 and Appendix D of this plan. Furthermore, AU 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 General Description of Austin Utilities Public Water Supply

The following provides a summary of characteristics of the DWSMA that is part of the AU source water system.

> **<u>AU DWSMA</u>** – all of AU's production wells are located within the municipal boundaries of the City of Austin, Minnesota located in the western part of Mower County (Figure 1). The eight production wells produce on a five-year average about 1,900 million gallons per year (MGY) from a series of limestone and sandstone aquifers (Table 1-1). Source water from two wells drawing water from the Spillville aquifer exhibit slightly elevated nitrate levels (Appendix A – Exhibit E). However, AU produces drinking water that meets all state and federal drinking water standards without the need to treat prior to being distributed to consumers.
>
> AU currently obtains its drinking water supply from eight active wells completed in multiple bedrock aquifers, including the upper carbonate aquifers - Spillville Dolomite, Maquoketa Dolomite, and St. Peter Sandstone, and the deeper Prairie du Chien Dolomite and Jordan Sandstone aquifers. The bedrock aquifers serving the AU's wells are capable of supplying the community wells with high volumes of water, though the flow in each aquifer is of a different nature. Flow in the St. Peter and Jordan aquifers occurs through the pore spaces in the sandstone, known as porous flow. Flow in the dolomite aquifers (Spillville, Maquoketa, and Prairie du Chien) is largely through cracks, fractures, and solution cavities within the carbonate bedrock, which is known as fractured flow, though

porous flow may also take place. Both types of flow need to be accounted for in the development of this plan.

Table 1-1

AU Water Supply Well Information

Local Well ID	Unique Number	Use/ Status[1]	Casing Diameter (inches)	Casing Depth (feet)	Well Depth (feet)	Date Constructed/ Reconstructed	Aquifer
No. 2	227063	P	72	20	110	1947	Spillville
No. 3	227064	P	140	16	578	1956	Maquoketa- St. Peter
No. 4	226631	P	120	20	132	1949	Spillville
No. 6	223359	P	626	16	1010	1954-65	Prairie du Chien - Jordan
No. 7	227065	Sealed	496	16	561	1957	St. Peter
No. 8	226364	P	658	16	1017	1961	Prairie du Chien - Jordan
No. 9	223360	P	688	16	1075	1954	Prairie du Chien – Jordan
No. 11	127258	P	590	16	992	1976	Prairie du Chien – Jordan
No. 12	788722	P	584	18	990	2012	Prairie du Chien – Jordan

[1] Denotes Primary Well

Additional information regarding the physical setting and how the AU DWSMA delineation and vulnerability assessments were determined are found in *"Wellhead Protection Plan for the Austin Utilities – Part 1"* in Table 1.

Wells #2 and #4 draw from the highly vulnerable Spillville aquifer and exhibit slightly elevated nitrate-nitrogen in the raw water. Minimal soil cover overlying the Spillville aquifer, relatively shallow public wells, and combined agricultural and urban land uses expose this vulnerable aquifer to contamination from nitrate-nitrogen. Wells #3, #6, #8, #9, #11 and #12 all draw groundwater from aquifers that are much deeper and subsequently do not have nitrate-nitrogen in the source water although land cover is generally similar to wells #2 and #4.

The 2018 AU Consumer Confidence Report (CCR) indicates the distribution water contains nitrate-nitrogen at a maximum level of 3.4 parts per million (ppm) for Well #4 and 1.5 ppm for Well #2 in the raw water. AU distributes water that meets all federal drinking water standards. See Appendix E for the complete CCR and Chapter 3 for a detailed discussion of AU public wells and DWSMA vulnerability.

1.3 Plan Appendices

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. In particular:

- Appendix A contains documents and discussion regarding the data elements used for this plan as specified in the MDH Second Scoping Decision and Notices. Data elements used in this plan are summarized in Chapter 2.
- Appendix B contains the first part of the WHP plan, consisting of the delineation of the wellhead protection area (WHPA), the DWSMA for the primary wells and the vulnerability assessments for the public water supply wells in the DWSMA. Part 1 is summarized in Chapter 3.
- Appendix C contains the potential contamination sources inventory (PCSI) for the DWSMA. This inventory is discussed in Chapter 4 in terms of how the inventory was completed for the DWSMA and the assignment of a level of risk that various potential contaminant sources may pose to AU's source water supply.
- Appendix D contains the wellhead protection measures the WHP team has identified for implementation over the ten year period that the WHP plan is in effect. Chapter 9 provides detail on how action items are determined by the wellhead protection team.
- Appendix E contains documents that support the WHP plan.

Chapter 2: Identification and Assessment of the Data Elements Used to Prepare the Plan

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

A scoping meeting (scoping 1) held on May 13th, 2013 identified the data elements required to support the delineation and vulnerability assessment of the WHPA and the DWSMA (Part 1 of the WHP plan). The Part 1 plan for AU was approved by the MDH on February 6th, 2018.

A second scoping meeting (scoping 2) held on March 13th, 2018 discussed the data elements required to complete the remainder of the WHP plan. The second scoping meeting utilizes the completed Part 1 delineation and vulnerability report to select additional data elements which 1) identify potential risks to the public water supply, and 2) develop effective management strategies to protect the public water supply relative to each well and DWSMA vulnerability. This becomes the basis for the remainder of the WHP plan. The results of each meeting were communicated to AU by the MDH through a formal scoping decision notice and are included in Appendix A.

Appendix A also contains an assessment of each data element identified in the MDH scoping 2 documents for its present and future impact on:

- The use of the public water supply wells;
- Delineation of the WHPAs;
- The quality and quantity of water supplying the public water supply wells; and
- Land and groundwater uses within the DWSMA.

Availability of information relating to each data element that is used in this plan was evaluated by staff from the MDH and AU. If the evaluation process determines that information pertaining to a particular data element may be considered an issue, concern or opportunity, AU can then address identified issues, concerns, and opportunities in this plan. In Chapter 6, Table 6-1 lists the issues, concerns, and opportunities identified by the AU WHP team. Measures identified to address deficiencies found during the data element assessment process in either the quality or quantity of data are included in the plan of action (Chapter 9 and Appendix D).

Appendices A and D also contain supporting documents (maps, tables, exhibits, etc.) that are required by the MDH scoping 2 documents.

Chapter 3: Delineation of the Wellhead Protection Area, Drinking Water Supply Management Area, and Vulnerability Assessments

3.1 WHPA and DWSMA Delineation

Figure 1 shows the boundaries of the ERAs, WHPA, and vulnerability assessments of the AU DWSMA (see Glossary for definitions of ERA, WHPA, and DWSMA terms). A consulting firm specializing in groundwater modeling utilized computer simulations of groundwater movement and individual AU primary well underground capture zones to delineate an ERA and WHPA. The DWSMA boundary is designated using the following criteria:

- Surface water contribution areas for the AU DWSMA;
- Center-lines of township and county roads and Public Land Survey coordinates; and
- Parcel boundaries for the AU DWSMA.

Since the recharge area for the Spillville aquifer may be under the influence of surface waters within the delineation area, an additional delineation of surface waters that flow into the groundwater capture zone was undertaken. A detailed description of the scoping requirements and the process used for delineating the ERA, WHPA, and DWSMA and preparing the vulnerability assessments for the DWSMA is presented in Part 1 (Appendix B).

3.2 Well Vulnerability Assessment

The Part 1 reports for the DWSMA include a vulnerability assessment for each primary well used by AU. These vulnerability assessments are used to help define potential contaminant sources within the DWSMA and to select appropriate measures to reduce the risk a potential contaminant may present to the public drinking water supply. The MDH has produced guidance in determining well vulnerability based on geologic sensitivity mapping, casing integrity, casing depth, pumping rate, isolation distance from any known contaminant source, and chemical and isotopic information.

Water supply well information for each primary well located in the DWSMA is listed in detail in the Part 1 report. The amount of geologic protection documented in well logs from the water supply wells and other nearby wells, along with water quality information was used to determine well vulnerability.

With the exception of Wells #2, #3, and #4, all other AU wells were ranked as "nonvulnerable" based on either well construction data or age-dating analysis that demonstrated less than 0.8 TU of tritium. These wells also have a very low sensitivity to contamination based on geologic data. Therefore, the wells themselves are not a potential source of contamination to a specific aquifer.

Wells #2, #3, and #4 are considered “vulnerable” to contamination, based on the MDH worksheet scoring process. The vulnerable classification is due to the relatively shallow depth of wells #2 and #4, along with the presence of tritium which indicates fairly “young” water in the Spillville aquifer. Well #3 is completed in a deeper aquifer but is considered “vulnerable” due to a well construction method that did not fully extend the well casing past the protective Decorah Shale. Instead the casing terminates in the Maquoketa aquifer, allowing shallower water to potentially reach the deeper St. Peter Sandstone.

3.3 DWSMA Vulnerability Assessment

The vulnerability of the AU DWSMA (Figure 1) was determined by using geologic, soils, and groundwater chemistry information. A detailed hydrogeology report of the AU DWSMA is in Appendix B. Review of geologic information and groundwater quality data for the aquifer within the DWSMA indicate the following:

- The DWSMA was determined to have both a "high" and "low" vulnerability to contamination from spills and leaks at the land surface.
- The high vulnerability areas are due to the capture zones for Wells #2 and #4, where little geologic protection is available to impede infiltration of contaminants.
- Large areas of the drainage basin of Dobbins Creek, Wolf Creek, and the Cedar River upstream of AU's wells #2 and #4 contribute surface water to the upper carbonate aquifer system. This upstream area is referred to as a surface water contribution area (SWCA).
- Because of a limited amount of low permeability material overlying the upper carbonate aquifers, the connection of surface water to the aquifer, and the presence of elevated nitrates in the Spillville aquifer, a large portion of the DWSMA is considered highly vulnerable.
- Wells #8 and #9 draw groundwater from very deep Prairie du Chien-Jordan aquifers which are covered with significant thicknesses of low permeability materials and are considered to have low vulnerability.
- The capture zones for wells #6, #11, and #12 also draw from the low vulnerability Prairie du Chien-Jordan aquifers but since they are overlapped by the capture zones of Wells #2 and #4, the higher vulnerability ranking takes precedence.

In summary, about 90 percent of the AU DWSMA has been determined to be highly vulnerable because of 1) insufficient thickness of soil material overlying the shallow upper carbonate aquifers, 2) the connection of surface water contribution areas to the aquifers used in this DWSMA, and 3) elevated nitrate levels in the source waters.

Generally, the higher the vulnerability rating, the greater the risk that a released contaminant may result in contaminating source water used for drinking water. Therefore, it is important to consider what types of potential contaminant sources can be carried by surface water runoff to groundwater recharge areas where infiltration to an aquifer can occur quickly. Land uses that may contribute nitrates or other types of contaminants to surface or subsurface water recharge to the aquifers within the highly vulnerable portion of the DWSMA is the primary management concern.

The hydrogeology report for the AU DWSMA states that existing geologic reports and groundwater chemistry information indicates that significant thicknesses of low permeability material overlies the Prairie du Chien-Jordan aquifers used by AU. As a result of this natural protection, the geologic sensitivity within the DWSMA that surrounds wells #8 and #9 is considered low. Consequently, abandoned or unused wells that may act as a conduit for surface contaminants to enter an aquifer will be the primary management concern in the low vulnerable portion of the DWSMA.

Chapter 4: Inventory of Potential Contamination Sources, Establishing Priorities, and Assigning Risk to Potential Contamination Sources

Results of the vulnerability assessment of the DWSMA, well vulnerability, and the presence or absence of human-caused contaminants in the source water (Appendix B) were used as a base to guide the WHP team in conducting a risk assessment of various potential sources of contamination (PCS).

Scoping documents contained in Appendix A provide details of the various categories of PCS required by the MDH to be inventoried in the DWSMA based on geologic vulnerability and well water quality sampling. Further, the data element assessment process as described in Appendix A was used in assigning what impact or level of risk the various potential point and nonpoint sources of contamination that are inventoried may have on AU's drinking water supply in the DWSMA.

Discussion of PCSI Requirements Applicable to the Composite Highly Vulnerable Area and Surface Water Contribution Area of the AU DWSMA

- The AU DWSMA has been assigned a high vulnerability ranking in the majority of the DWSMA. This is due to two wells (#2 and #4) pumping from the karsted Spillville limestone aquifer that generally does not have sufficient thickness of clay cover to protect the aquifer from activities at the surface (Figure 1). For the purposes of conducting a potential contaminant source inventory (PCSI) in the highly vulnerable portion of the DWSMA the surface water contribution area (SWCA) and wellhead protection area (WHPA) were combined into one highly vulnerable area.

- Wells #3, #6, #11 and #12 all pump from nonvulnerable aquifers (Maquoketa - St. Peter and Prairie du Chien - Jordan). The capture zones for these wells have low vulnerability, but since they are overlapped by the capture zones of wells #2 and #4, the higher vulnerability ranking takes precedence.

- The MDH requires the PCSI conducted in a highly vulnerable area must include all PCS related to buried and above-ground tanks, hazardous waste generators or handlers, dumps and solid waste facilities, feedlots, stormwater facilities, septic systems, wells – including U.S. Environmental Protection Agency Class V wells, various types of contaminated sites, and many other types of both point and nonpoint sources of potential contaminants.

Discussion of the Low Vulnerable Portion of the AU DWSMA

Geologic conditions vary across the AU DWSMA. The groundwater capture zones for wells #8 and #9 are rated as "low" in vulnerability due to the multiple confining layers the Prairie du Chien - Jordan aquifer in this area have that protect these aquifers from contamination (Figure 1). For the purposes of inventorying PCS in the low vulnerable portion of the DWSMA, the low vulnerability assessment indicates that, generally, only wells, other types of boreholes or excavations that may reach the aquifer, and certain types of EPA Class V wells are likely to impact the production wells.

4.1 Conducting the Potential Contaminant Sources Inventory

Introduction

Conducting the PCSI is a multi-phased process. Various local, state and federal databases are reviewed to determine 1) if the types of PCS as listed in the MDH scoping documents for the DWSMA may be present, and 2) verification of the location of each PCS. Geographic information system (GIS) mapping techniques are used to display preliminary PCS data on aerial photo base maps and associated PCSI data sheets for the DWSMA. The WHP team then reviewed each data point to determine if the location and associated data for each PCS is accurate; a map number was then assigned to each PCS in the DWSMA. This process is repeated for both the low vulnerability sector and the highly vulnerable WHPA and SWCA portions of the DWSMA.

The geologically sensitive portions of the DWSMA required a very rigorous process of utilizing GIS techniques, multiple databases, local knowledge, and historical records to establish where PCS are located and what the current status of each PCS may be. The results of these efforts follow in this chapter.

As a start point in the inventory process, the MDH and DNR provided AU with information about wells from the Minnesota Well Index and other databases. These data sources include wells with known and unknown locations and well sealing records that were systematically reviewed by the WHP team to determine if any of the documented wells are located within the DWSMA. Historical photos were also reviewed for possible well or septic system locations. The MDH has provided AU with records of historic public water wells that AU had used in the distant past. Historic Sanborn Fire Insurance maps are also available to AU as a tool in searching for old, unused municipal wells. Existing records are often incomplete and inaccurate regarding the location and status of old wells and require extended effort to develop accurate accounting. Therefore, the task of determining the location and status (active, sealed or unknown) of any unused public wells will be included as a WHP plan implementation activity.

State, federal, and local databases were examined for listings of other types of point sources of potential contaminants (septic systems, storage tanks, landfills, feedlots, etc.) listed in the MDH scoping 2 documents for the DWSMA (Appendix A). The same data review procedures as described above were employed by the WHP team in developing the PCS inventory.

Nearly fifty percent of the highly vulnerable portion of the DWSMA is comprised of urban land uses, which by the nature of urbanized areas, contain a very large number of PCS located in the DWSMA. Although approximately 80 percent of the total PCS within the entire DWSMA have been accurately located in the process of developing this WHP plan, the balance of the PCS inventory process remains to be completed. The existence of large numbers of potential contaminant sources can cause an inventory and mapping effort to become an unworkable task to accomplish during plan development. However, the MDH recognizes this issue and requires at a minimum, that at least 25 of each type of potential contaminant source and land use must be inventoried, location verified, and mapped during plan development by the public water supplier. This step has been accomplished during plan development. If more than 25 of each type of potential contaminant source exist, a management strategy for the first year of plan implementation must specify a plan of action to complete the inventory and mapping effort. AU will prioritize the completion of the PCS inventory within the first year of WHP plan implementation with an emphasis on verifying locations and status of wells, septic systems, tanks, and hazard waste sites as these are the most numerous of potential contaminant sources in the DWSMA. See Appendix C for detailed data of each inventoried PCS and locations. Due to hundreds of PCS currently located within the DWSMA, use of GIS-based data management tools is required to display the data points and information about each point. This inventory will likely increase after the PCSI is completed.

The method of collecting PCS data within the DWSMA was augmented by conducting a ‘windshield’ survey to tally and accurately locate various types of PCS and if possible, determine status. The results were recorded and mapped in addition to the above discussed information collected from various state and local databases.

Highly Vulnerable Portion of the DWSMA

In the highly vulnerable portions of the DWSMA, the WHP team considered certain types of land cover and intensity of land uses as presenting a potentially greater risk to groundwater quality from nitrate-nitrogen or other forms of contaminants defined as nonpoint sources of pollution. Point sources of potential pollutants were also examined including their proximity to a city well and the quantity of the category of point source within the highly vulnerable portion of the DWSMA.

Stormwater runoff generated within the SWCA portion of the highly vulnerable portion of the DWSMA can contribute recharge to the vulnerable Spillville aquifer. GIS mapping provided the WHP team with data illustrating 1) the different types of land cover that may be potential sources of nitrate-nitrogen, 2) areal distribution of the different land cover types, and 3) the quantity and type of point and nonpoint sources of potential contaminants within the highly vulnerable portions of the DWSMA. The primary wells were also shown on these maps to better understand the proximity of certain land uses and point sources of potential contamination to each primary well. Historical water sampling for nitrate-nitrogen from the primary wells was also reviewed during this process. Utilizing the information and tools provided by GIS, the WHP team concluded that the potential to convey pollutants to the highly vulnerable WHPA/SWCA is of concern. Therefore, developing effective measures to reduce the impact potential pollutants may have on the vulnerable aquifer is a high priority.

The point and non-point PCS inventoried in the DWSMA were assessed and assigned a level of risk each PCS category may have on the aquifer. The process of 'risk assignment' to each PCS, be it a point or non-point source, is discussed in greater detail later in this chapter. Tables in subsection 4.3 illustrate the results of the inventory and assigned risk of PCS for the highly vulnerable portions of the ERA and DWSMA.

Low Vulnerable Portion of the DWSMA

Due to geologic conditions, the southwest portion of the DWSMA exhibits low vulnerability (Figure 1). The two primary wells located in this area do not contain any of the contaminants monitored by the state MDH and federal EPA. Therefore, in the low vulnerable portion of the DSWMA, the PCSI was confined to inventorying wells deeper than 380 feet and certain types of EPA Class V wells.

4.2 Contaminants of Concern

Low nitrate-nitrogen (nitrate) concentrations in the Spillville aquifer used by AU in the vulnerable portion of the DWSMA have been documented for many years (Appendix A, Exhibit E). Nitrate levels range from about 1.0 to 1.5 mg/liter in well #2 and are slightly elevated to around 2.0 to 3.0 mg/liter in well # 4. Nitrate levels in groundwater sourced from the Spillville aquifer appear to be at a consistent concentration over a long period, neither increasing nor decreasing. Consequently, AU is not required to blend well water from the Spillville aquifer with water from other aquifers, nor is nitrate removal necessary to meet drinking water standards.

Under most commonly used management practices, specific types of land use associated with point and nonpoint sources of nitrate such as row crop production, animal feedlots, and onsite sewage treatment systems present a moderate potential of impacting groundwater quality. High intensity developments typical to an urban area have a high percentage of impervious surfaces that are associated with commercial and industrial areas and can pose high potential for impacting a vulnerable aquifer. These types of urban land uses also contain high quantities of hazardous waste generators, above ground, and buried liquid storage tanks, stormwater facilities, and other types of contaminants commonly associated with a densely populated area.

In conclusion, elevated levels of nitrate-nitrogen have been detected historically in the two AU production wells (#2 and #4) that draw source water from the Spillville aquifer. Due to the low level of nitrate-nitrogen present in source water from these two wells, no nitrate removal or blending with other well water is necessary. All water distributed by AU pumped from all the wells in the DWSMA is disinfected with chlorine to ensure potability.

None of the human-caused contaminants regulated under the federal Safe Drinking Water Act have been detected at levels indicating that the AU wells themselves do not serve to draw contaminants into the aquifer as a result of pumping. Further, no naturally occurring contaminants of concern have been detected in AU wells and the water supplier continues to provide safe drinking water that meets or exceeds all state and federal drinking water standards.

See the 2018 Consumer Confidence Report (Appendix E) for additional details regarding source water quality for the AU system.

4.3 Inventory Results and Risk Assessment

Background

The AU DWSMA is split almost evenly between urban/suburban areas with higher density land uses and rural, low population density areas. Land use in the rural area of the SWCA is dominated by row crop agriculture and livestock production. Farm sites typically have a well, a septic system, and, potentially, both a feedlot and a few small-sized above-ground tanks on site. Tanks less than 1100 gallons are not required to be inventoried. The urban areas within the highly vulnerable portion of the DWSMA are dominated by industrial and commercial properties. Within these areas there are hazardous waste generators or handlers, buried and above ground storage tanks, landfills (one active), various contaminated sites that are under federal and state regulatory overview, stormwater facilities, gravel pits, bridges over water bodies, wells, onsite septic systems, federally-regulated Class V wells, and other forms of potential contaminant sources within the DWSMA. There are also a few gravel pits in the DWSMA.

One interstate highway and many other state, county and township roads are located within the highly vulnerable portions of the DWSMA. A natural gas pipeline is present in the DWSMA and a railroad track crosses the Cedar River dissects the DWSMA. Linear features such as roads, pipelines, or rail tracks are not required to be inventoried, but where these features cross water bodies there is the potential for accidental spills of petroleum-based products or agricultural chemical products.

Potential Contaminant Source Inventory Requirements

The MDH WHP rules require a PCS inventory to address all land parcels within a DWSMA and land use information must be included in the inventory. The vulnerability assessments of the public water supply wells and DWSMA are used to determine the extent of PCS inventory. MDH scoping documents (Appendix A) provide detailed listings of the specific types of PCS data based on vulnerability that AU must inventory. Parcel data for the entire DWSMA and known PCS are required and included in GIS-based data submitted to the MDH. Parcel data was sourced from Mower County.

The potential contaminant source inventory for the low vulnerable portion of the DWSMA is limited to inventorying only wells that are constructed to a depth of 380 feet or deeper.

In the highly vulnerable portion of the DWSMA, the combination of 1) high vulnerability of the WHPA and SWCA, and 2) elevated nitrates in the well water required that the PCS inventory must address all types of land and water uses that include point sources and nonpoint sources of potential contaminants. The PCSI in a SWCA is generally orientated toward those types of PCS that may become transportable due to excessive surface or subsoil water runoff and/or infiltration rates. Each category of PCS must be assigned a level of risk that a particular PCS may pose to the aquifer specific to the highly vulnerable portion of the DWSMA.

Assigning Risk

All point and non-point sources of potential contamination were assessed by the WHP team and assigned a level of risk the various PCS categories may have on the aquifers used by AU. The level of risk assigned to each type of PCS and/or land cover type addresses 1) the number of units inventoried, 2) its proximity to a public water supply well, 3) the capability of local geologic conditions to absorb a contaminant (geologic vulnerability), 4) the effectiveness of existing regulatory controls, 5) the areal extent of a land use, and 6) the time required for AU to obtain cooperation from governmental agencies that regulate a potential contaminant. Assigned risk categories are defined by the WHP team to mean the following:

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

The following is a discussion of the results of the point and nonpoint PCS inventory for the DWSMA. Tables are used to present the PCSI and land cover data and associated assigned risk of each PCS and land cover category within 1) the WHPA and SWCA of the highly vulnerable portion in the DWSMA and 2) the low vulnerable portion of the DWSMA.

Results of Inventorying of Point Sources of Potential Contamination

A point source of potential contamination can be defined as a stationary location or fixed facility from which pollutants are discharged or emitted, or any single, identifiable discharge point of potential pollution. Examples are a septic system, a storage tank, or feedlot.

Table 4-1 provides an overview of the point sources of potential contaminant sources inventoried in the highly vulnerable portion of the DWSMA. Table 4-2 summarizes the PCSI conducted in the low vulnerable portion of the DWSMA. The tables also reflect an assigned risk to each potential contaminant source inventoried.

Table 4-1
Assigned Risk of Potential Contamination of Groundwater from Point Sources in the High Vulnerable Portion of the AU DWSMA

Point Source Category	Emergency Response Area		High Vulnerable Portion of DWSMA	
	Quantity	Risk	Quantity	Risk
Above Ground Storage Tank	4	H	11	M
Animal Feedlots	-	-	28	M
Class V disposal wells	-	-	3	M
Dump (unpermitted)	-	-	7	H
Graveyard	-	-	1	L
Hazardous Waste Generator	15	H	49	H
Leaking Underground Storage Tank	7	H	35	H
Pit (gravel)	-	-	4	H
Potential Contaminant Source (PCS) - Brownfields	1	H	-	-
PCS – Federal Superfund Site	1	H	2	H
PCS – State Superfund Site	-	-	1	H
PCS – Voluntary Investigative Cleanup	2	H	3	H
PCS- State Assessment Site	2	H	3	H
Rail Crossing Water	1	H	3	H
Road Crossing Water	5	H	21	H
Sinkhole	1	H	3	H
Solid Waste Mgt. Site	1	H	7	M
Spills (MPCA & MDA)	2	L	-	-
State Disposal System Permit	-	-	3	M
Stormwater Basin	8	H	20	M
Subsurface Sewage Treatment System	24	H	161	H
Underground Storage Tank	6	H	39	H
Waste Water Disposal Site (WWDS)	1	L	2	L
NPDES	-	-	3	L
Wells	11	H	74	H
Multiple Contaminant Source site (MPCA)			7	
TOTAL Point Sources	92		488	

<u>Table 4-1 Summary</u>

In the AU DWSMA 580 PCS have been inventoried with verified locations. About 93 (~16 percent) of the PCS are located inside an emergency response area (ERA) within the highly vulnerable portion of the DWSMA. Within the ERA, point sources of potential contamination such as septic systems, wells, hazardous waste generators, and leaking underground storage tanks are of greatest concern.

Table 4-1 includes a PCS category of 'MPCA Multiple Contaminant Source Sites' which typically contains multiple categories of PCS. There are seven of this category of PCS that remain to be fully examined to determine the type of each point source contaminant on the site and the actual quantity of each type.

Most farm sites contain above ground storage tanks that are <1100 gallons in size and are used to hold fuel for equipment. However, these smaller tanks are not regulated by the MPCA and, therefore, are not required to be inventoried by the MDH.

Of the remaining 84 percent of the PCS within the highly vulnerable portion of the DWSMA, septic systems, wells, hazardous waste generators, feedlots, leaking underground storage tanks, above and below ground storage tanks, stormwater basins, and a variety of historically contaminated sites are of greatest concern. Animal feedlots and particularly septic systems are numerous and of concern regarding the generation of nitrate-nitrogen and the potential infiltration of nitrates into a groundwater recharge area within the SWCA. There are also gravel pits, USEPA designated Class V injection wells, historical spill sites, and railroad and roadway crossings over the Cedar River and its tributaries located in the SWCA.

The types of PCS discussed above were assigned a moderate to high risk to the Spillville aquifer by the WHP team. There is one (1) cemetery located in the DWSMA that is considered a low risk to the aquifer. The vast majority of the wells located in the DWSMA are privately owned. All wells within the highly vulnerable portion of the DWSMA were required to be inventoried. In the low vulnerable portion of the DWSMA, only those well greater than 380 feet deep were inventoried. However, little or no information is available regarding depth or construction of many of the private wells, and therefore, the WHP team assigned a high ranking of potential risk to the multiple aquifers used by AU in the DWSMA.

The gravel pits located within the highly vulnerable portion of the DWSMA are considered to be 'wet' pits because the excavations have reached the water table. This results in an elevated potential of introducing potential contaminants to the Spillville aquifer used by AU.

Utilizing measures to determine the current status of activity (active, remediated, closed, etc.) and compliancy to state or local regulations of these PCS will be helpful in determining 1) the most effective best management practices to reduce the impact of nitrate-nitrogen or hazardous materials on the Spillville aquifer, and 2) a timeline to implement the selected measures.

A table listing all point source PCS and associated maps showing locations of the inventoried Austin PCS are in Appendix C.

<u>Land Cover Inventory and Non-Point Sources of Potential Contamination</u>

By definition, non-point sources (NPS) of pollution are generated and discharged over a broad land area. Pollution derived from NPS can occur when rainwater or snowmelt runs off from parking lots and roadways, residential yards, industrial or commercial areas, and cultivated fields or sports facilities, as examples. This process can transport sediment, nutrients, and organic and/or toxic substances originating from land-use activities, to surface waters and/or aquifers.

The following tables list the different types of land cover in the highly vulnerable and low vulnerable portions of the DWSMA. Within the highly vulnerable portion of the DWSMA, each land cover type has been assessed and assigned a risk level by the WHP team based on 1) the geologic vulnerability, and 2) the potential of contaminating the aquifer with nitrate-nitrogen or other forms of contaminants from nonpoint pollution that may be associated with each land cover category. Land cover data is derived from a digitized 2011 national land cover database. A land cover map for the entire DWSMA is in Appendix A - Exhibit C.

The WHP team was not required to assign a risk level for any of the land cover types within the low vulnerability portion of the DWSMA.

Highly Vulnerable Portion of AU DWSMA
The total area of the DWSMA is 17,677 acres, of which the highly vulnerable portion comprises about 15,739 acres or about 89 percent of the DWSMA.

Table 4-2
Land Cover Categories and Assigned Risk of Potential Contamination to Groundwater from Nonpoint Sources of Pollution in the High Vulnerable Portion of AU DWSMA
(Source: 2011 National Land Cover Data Set)

Land Cover Category	Emergency Response Area Within High Vulnerable Portion of DWSMA			High Vulnerable Portion of DWSMA		
	Acres	Percent of ERA	Risk	Acres	Percent of H.V. DWSMA	Risk
Cultivated Crop	196.2	12.3	M	7948.0	56.2	M
Hay/Pasture	72.5	4.6	L	540.9	3.8	L
Herbaceous	172.2	10.8	L	1294.2	9.2	L
Emergent Herbaceous Wetland	21.6	1.4	L	125.6	0.9	L
Woody Wetland	259.3	16.3	L	355.6	2.5	L
Open Water	10.8	0.7	L	155.4	1.1	L
Barren Land	-	-	-	2.5	<0.1	L
Deciduous Forest	33.2	2.1	L	222.5	1.6	L
Evergreen Forest	14.8	0.9	L	4.0	<0.1	L
Shrub/Scrub	0.5	<0.1	L	13.5	0.1	L
Developed, Low Intensity	284.5	17.8	L	1235.6	8.7	L
Developed, Medium Intensity	134.4	8.4	M	559.7	4.0	M
Developed, High Intensity	11.5	0.7	H	250.5	1.8	H
Developed, Open Space	383.0	24.0	L	1436.5	10.2	L
Total Acres	**1594.4**	100.0		**14144.2**	100.0	

Table 4-2 Summary

Total area of the high vulnerable portion of the DWSMA is about 15,739 acres, of which about 10 percent (1594 acres) is within six ERAs.

Highly Vulnerable Area (excluding ERAs):

- Cultivated lands comprise about 56 percent of land cover;
- Permanent cover of pasture and hay lands comprise about 3.8 percent;
- Permanent cover (trees, shrubs, grass lands, and developed open spaces) comprise about 21 percent;
- Wetlands comprise about 4.8 percent;
- Low, Medium, and High intensity developments comprise about 15 percent;
- Open water comprises about 1.1 percent total acreage.

Highly Vulnerable (including ERAs):

- Cultivated lands comprise about 12 percent of the land cover;
- Permanent cover of pasture and hay lands comprise about 4.6 percent;
- Permanent cover (trees, shrubs, grass lands and developed open spaces) comprise about 38 percent;
- Wetlands comprise about 17.7 percent;
- Low, Medium and High intensity developments comprise about 27 percent;
- Open water comprises less than 1 percent of total acreage.

Low Vulnerable Portion of AU DWSMA

The total area of the DWSMA is 17,677 acres of which the low vulnerable portion comprises about 1,938 acres or about 11 percent of the DWSMA. See Appendix A – Exhibit C for a map illustrating the land cover in the low vulnerable portion of the AU DWSMA.

Table 4-3
Land Cover in Low Vulnerable Portion of AU DWSMA
(Source: 2011 National Land Cover Data Set)

Land Cover	Acres	%
Developed, Low Intensity	886.51	45.74%
Developed, Open Space	440.25	22.72%
Cultivated Crops	252.02	13.00%
Developed, Medium Intensity	140.74	7.26%
Woody Wetlands	99.00	5.11%
Herbaceous	78.04	4.03%
Developed, High Intensity	27.24	1.41%
Emergent Herbaceous Wetlands	8.05	0.42%
Deciduous Forest	3.07	0.16%
Open Water	2.29	0.12%
Evergreen Forest	0.92	0.05%
Total	1,938.13	100.02

Table 4-3 Summary

Total area of the low vulnerable portion of the DWSMA is about 1,938 acres. The dominant land cover is low density development and open space (residential and recreational areas) comprising about 68 percent of the total acreage within the low vulnerable area. About 13 percent of this part of the DWSMA is used for cultivated crops and about 9 percent is medium to high intensity land uses (commercial/industrial). The remaining 10 percent is mostly wetlands and wooded areas.

Inner Well Management Zone

A survey was conducted to identify specific categories of PCS that may occur within 200 feet of each public water supply well. This area is referred to as the inner well management zone (IWMZ). The Minnesota State Well Code, administered by the MDH, defines the various categories of potential contaminants inventoried and establishes required setbacks from public water supply wells for each category of PCS. The IWMZ inventory was conducted by the MDH Source Water Protection and AU staff with risk prioritization assigned by the MDH. Table 4-4 identifies the type of PCS that are located within 200 feet of each AU production well.

Table 4-4
Potential Contaminant Source Inventory Within the Inner Well Management Zone for AU Primary Wells

Austin Well No.	Unique Number	Potential Contaminant Within IWMZ
2	227063	3 operating observation wells; cooling water pond; deicing chemicals, gravel pocket. All meet required setbacks. Petroleum tank, 280 gal.
3	227064	Gravel pocket; high water flood level. All meet required setbacks.
4	226631	1 buried sewer – meets required setback; gravel pocket; high water flood level.
6	223359	1 buried sewer; 2 stormwater pipes; gravel pocket. All meet required setbacks.
8	226364	3 buried sewer lines; gravel pocket; high water flood level. All meet required setbacks.
9	223360	2 buried sewer lines; 1 stormwater pipe; gravel pocket; All meet required setbacks.
11	127258	4 buried sewer lines; 1 stormwater pipe. All meet required setbacks.
12	788722	1 stormwater pond; gravel pocket. All meet required setbacks.

The two highly vulnerable production wells (#2 and #4) are exposed to the types of potential contaminants associated with a suburban or urban area, including the potential for flooding at well #3 and #4. The remaining wells are ranked as low vulnerable and are generally isolated from potential sources of contamination. AU will implement specific measures as prescribed by the MDH on the IWMZ forms to address potential contaminant sources. The detailed IWMZ inventory forms for each AU production well are on file at the AU office in Austin, MN.

Summary of PCSI

The DWSMA is split into two areas; one area designated as highly vulnerable with the other designated as low vulnerability. AU's source water is derived from eight wells dispersed within one DWSMA. Six of the eight AU production wells utilize deep aquifers that are geologically protected from human activities at the surface with four of the deep wells located within the highly vulnerable area. Two deep wells are located within the low vulnerable portion of the DWSMA. Two shallow wells are constructed in the highly vulnerable Spillville aquifer.

The following is a brief overview of the potential contaminant inventory conducted in the AU DWSMA.

High Vulnerable Portion of DWSMA

- The water supplier uses two wells (#2 and #4) that have elevated levels of nitrate-nitrogen in the groundwater. Both wells are located within the highly vulnerable SWCA of the DWSMA.
- Both point sources and nonpoint sources of contamination can contribute nitrates to the Spillville aquifer in the vulnerable portion of the DWSMA. The PCSI and inventory of land cover data indicate a few potential sources of nitrate-nitrogen that require long-term attention: row crop agriculture with associated subsoil drainage, animal feedlots, and onsite sewage treatment systems.
- Irrigation of crop land is currently concentrated in the northern portion of the highly vulnerable DWSMA but is likely to expand in areal extent. Irrigated row crops located on coarse-textured soils overlying shallow aquifers can impact aquifers with nitrates and therefore, are assigned a high risk by the WHP team.
- About 89 percent of the total area within the DWSMA is determined to be highly vulnerable to potential contaminant sources of which:
    - About 52 percent is used for cultivated crops, 18 percent in suburban/urban land uses, and 29 percent in different types of permanent vegetative cover or open water.
- Storage tanks, leaking underground storage tanks, brownfields or other forms of contaminated areas, landfills, stormwater facilities, and wells are concentrated in the suburban/urban portions of the highly vulnerable portion of the DWSMA
- Linear-shaped features such as major and minor roads, railroad tracks, and pipelines that cross surface water are present in the highly vulnerable portion of the DWSMA and are considered potential contaminant sources to the upper carbonate aquifers due to the potential for spills.

Low Vulnerable Portion of DWSMA

- About 11 percent of the entire DWSMA is ranked as low geologic vulnerability.
- Land cover is dominated by residential housing with smaller concentrations of commercial or industrial areas.
- Two production wells are located within the low vulnerable portion of the DWSMA. Source water pumped from these two wells is of high quality. Only wells that are 380 feet or more deep are required to be inventoried.

Conclusions

About 50 percent of the DWSMA can be characterized as rural, low density population with agriculture being the dominant land use. Nearly all of the cropland and high intensity land uses are within the highly vulnerable portion of the DWSMA. The remainder of the DWSMA is mostly low intensity development (residential) that is typical of suburban and urban land uses. Cropland, industrial, and commercial land covers represent the most intensive land uses and pose the greatest risks to the upper aquifers used by AU. The majority of the management strategies in Appendix D address these three most intensive land uses. The relatively high percentages of permanent vegetative cover within the emergency response areas is likely an important factor in protecting the individual wells from potential contaminants. Efforts should be made to maintain or increase permanent vegetative cover and wetlands within the surface water contribution area of the DWSMA.

About 80 percent of the PCSI has been completed in the preparation of this WHP plan. Upon approval of this WHP plan, additional effort is required to complete the review and compilation of PCS data. While the PCSI included in this WHP plan indicates accurate locations and category of the PCS, the data sources used to compile this listing often do not contain information regarding current status (active, inactive, closed) of many of the PCS. Also of interest is to determine:

- What type of liquids are stored in tanks and volumes;
- The location of abandoned or unused wells in both the public and private sectors.

AU's source water from the Spillville aquifer contains low levels of nitrates which is generally indicative of human impacts. These upper carbonate aquifers like the Spillville are very vulnerable to impacts of land use and are important source waters serving residents and businesses in the City of Austin and rural residents. This aquifer system provides plentiful water that is economical to extract and currently requires no additional treatment to remove nitrate-nitrogen. This combination of a good quality and high quantity water supply is of great benefit to public and private groundwater users in the City of Austin and surrounding area. Therefore, it is of great interest to the public from both an economic standpoint and overall public health, that AU, with the assistance of partners, establishes efforts necessary to protect and preserve the current good water quality and quantity in the multiple aquifers providing drinking water to the public.

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

AU 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 exercise is necessary 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. Any anticipated changes would most likely occur within incorporated areas, with some changes also likely in the surrounding unincorporated areas. Therefore, AU will need to rely on the City of Austin and Mower County to enforce any applicable land use ordinances within the DWSMA providing source water to AU customers.

Day to day administrative duties will be the responsibility of the wellhead protection manager.

The following table 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 AU and property owners within the DWSMA.

Table 5-1.
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
Physical Environment – AU DWSMA			
There is potential for expanded aggregate mining within the AU DWSMA within the next ten years.	Mining operations (removal of cover, equipment maintenance, dewatering) can expose source water to potential contamination	Existing state and local environmental review and permitting processes can reduce potential impacts to groundwater	No additional administrative, technical, or financial considerations are required.
Land Use – AU DWSMA			
1. Row crops and livestock production is the dominate land use in the highly vulnerable portion of the DWSMA (~52% land cover in row crops). Acreage in row crops is generally consistent, whereas, livestock production in the agricultural portions of the DWSMA fluctuates up or down due to market conditions.	It is difficult to predict long-term trends insofar as groundwater quality. However, current nitrate monitoring indicates two wells utilizing the Spillville aquifer have slightly elevated nitrate concentrations. Nitrate levels do not seem to be increasing.	AU is planning on closing well #4 due to long-term maintenance issues and the presence of nitrate in the source water. Programs or practices implemented to reduce nitrogen losses from cropland to groundwater have historically not been monitored to determine effectiveness. State and county agencies regulate animal feedlots and associated manure management.	AU must rely on all local governments regarding land use. The DNR regulates groundwater quantity and both the MDA and the MDH regulate nitrogen impacts to groundwater and drinking water. However, AU must comply with federal and state drinking water standards to assure public health.
2a. Current enrollment of acreage in the conservation reserve program (CRP) is level. Response of land owners to future CRP enrollments is unknown. 2b. The 2015 Minnesota Buffer Initiative may be applicable to parts of the SWCA within the highly vulnerable portion of the DWSMA.	2a. Increases in enrollment in long-term row crop reduction programs can lead to a decrease in acreage of row crops grown in the highly vulnerable portion of the DWSMA thereby decreasing non-point pollutant delivery to a vulnerable aquifer. 2b. Dependent on design and placement, buffers may reduce nitrates from reaching the Spillville aquifer.	2a. Increased voluntary enrollment in CRP easement programs offered on a voluntary basis by the USDA and state programs can reduce potential impacts that non-point source pollution may have on an aquifer. Adequate funding may be an issue. 2b. Required buffers adjacent to public waters in Minnesota can benefit surface water quality in the SWCA.	2a. The Mower County SWCD and the USDA-FSA/NRCS currently administer various vegetative cover programs that are available to property owners. 2b. BWSR and Mower County SWCD will implement buffer programs as applicable in the DWSMA.

Table 5-1 (Continued)

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
Land Use (continued) – AU DWSMA			
3. There may be an increase in adoption of BMPs supporting conservation tillage, cover crops and nutrient management practices in the highly vulnerable portion of the DWSMA.	Water quality in the aquifers serving the two vulnerable wells (#2 and #4) would benefit from adoption of practices that reduce nitrogen loss from land uses.	Voluntary conservation practices and nutrient BMP programs offered by USDA and state programs can reduce potential water quality impacts that non-point source pollution can have on aquifers. Adequate funding for conservation programs may be an issue.	Both the Mower County SWCD and USDA-FSA/NRCS currently administer various agriculture-related BMP soil and water conservation programs that are available to property owners. Demand for conservation programs may be greater than available funding.
4a. Growth in the City of Austin and surrounding area is currently stable. However, there may be minor expansions of Austin municipal boundaries to address needs for additional housing. Industrial areas currently have room for additional capacity. 4b. There is potential for additional growth of residential homes in areas outside of the Austin's municipal public water and sewage treatment service area. This potential growth is more likely to occur within the highly vulnerable portion of the DWSMA.	4a. Urban land uses range from low intensity residential areas to medium and high intensity commercial and industrial areas. More impervious surfaces associated with medium and high intensity land uses can increase runoff to nearby streams and the Cedar River. The potential for spills or mishandling of potential contaminant sources also increases with intensive land uses like commercial or industrial uses. 4b. Growth of unsewered areas will most likely be within the highly vulnerable portions of the DWSMA resulting in more wells and subsoil sewage treatment systems (SSTS). SSTS generally do not remove nitrates from residential sewage which could impact the Spillville aquifer.	4a. City of Austin planning and zoning regulations are in place including a) building code requirements, and b) stormwater management rules for any activity that requires a building permit. Stormwater rules address sedimentation, storm sewers, spills, or other activities that may impact the city stormwater and sanitary sewer systems. 4b. City of Austin has zoning authority regarding the subdivision of land within two miles of municipal boundaries. Mower County has zoning authority in a majority of the highly vulnerable portion of the DWSMA outside of Austin city limits. Also, the City of Mapleview and Red Rock Township have zoning controls within their jurisdictions.	4a. Existing City of Austin zoning rules may be adequate at this time to address most potential contaminant sources inventoried. However, a review of existing zoning rules or performance standards may be considered to address EPA Class V disposal wells, other wells, storage tanks, and spills that may impact the City's drinking water supply. 4b. Dependent on available funding, the City of Austin may consider review of existing long-term planning documents regarding unsewered development and/or recreational land uses within the highly vulnerable portions of the DWSMA.

Table 5-1 (Continued)

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
Surface Water – AU DWSMA			
1. No major changes anticipated in the surface water features within the AU DWSMA.	There are two surface water appropriation permits in the DWSMA, both for golf courses. Both appropriations are not expected to change. Any impact to the Spillville aquifer is unknown.	Existing governmental rules or regulations applicable to surface waters are deemed to be sufficient.	No additional administrative, technical, or financial considerations are required.
2. Increased subsoil drainage in the SWCA may occur.	Increased subsoil tiling may increase surface water flow into the Cedar River. Unknown what impact this activity may have on recharge water quantity or quality in the Spillville aquifer.	Public drainage systems are regulated, but no state, federal or local controls on private property subsoil tiling except when impacting certain types of wetlands.	Adoption of voluntary drainage best management practices in DWSMAs can improve water quality in tile water discharges. Legislative action would be required to address subsoil drainage activities occurring on private property.
3a. The Cedar River Watershed District (CRWD) is involved in implementing more flood control measures on tributaries to the Cedar River. 3b. The CRWD is developing a watershed-wide planning process that will include all governmental units involved with water quality and quantity programs within the Cedar River watershed.	3a. Reducing peak flows of flood events reduces sediment and other potential contaminants that flow through the highly vulnerable portion of the DWSMA. This is beneficial to the Spillville aquifer. 3b. Greater coordination and funding of various water quality and/or quantity programs should benefit wellhead protection efforts implemented by AU.	Currently, various local and state units of government often implement their water-orientated programs as individual entities. CRWD is charged with developing a 'One Watershed, One Plan' approach to reduce flooding and improve water quality within the Cedar River watershed. The goal of aligning local water planning on major watershed boundaries with state agency-sponsored water programs, should produce prioritized strategies and measurable implementation plans.	'One Watershed, One Plan', once implemented should provide greater efficiencies in administering a variety of water-orientated programs. Technical assistance and funding can be prioritized and likely implemented quicker.

Table 5-1 (Continued)

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
Groundwater AU DWSMA			
1a. AU groundwater appropriations are projected to decrease in the Spillville aquifer in the future due to Well #4 closure. 1b. Currently, acreage under crop irrigation appears to be stable in the AU DWSMA but there may be increased use of irrigation in the future of the highly vulnerable Spillville aquifer used by AU.	1a. There should not be any impact on the multiple aquifers used by AU if overall current pump rates are maintained. 1b. Additional irrigation wells and increased pumping for irrigation may impact aquifer quantity and quality available for public water supply usage. Irrigation on coarse-textured soils have been shown by studies to increase the potential for leaching of nitrate-nitrogen to shallow aquifers.	Existing regulatory programs regarding groundwater appropriation permitting are adequate. DNR controls groundwater appropriations for irrigation wells.	Under current AU water usage, no additional administrative, technical, or financial considerations are required.
2a. AU anticipates discontinuing the use of Well #4 in the highly vulnerable portion of the DWSMA due primarily to location and associated maintenance issues. 2b. A new well is planned to offset the loss of quantity from the current Spillville well.	2a. Less demand from AU on the Spillville aquifer currently serving as an AU source water. However, new sources of water will be needed to offset the reduction of water currently sourced from the Spillville aquifer. 2b. A new well will likely be completed in a deeper aquifer. Well #4 would be sealed	Current AU groundwater appropriation permit may be revised by the MNDNR. MDH requires abandoned wells to be sealed.	Administrative, technical, or financial considerations will need to be revised to design, construct, and produce water from a new well. MDH grant may be available to assist in sealing Well #4.

5.1 Summary of Expected Land and Water Use Changes in the AU DWSMA

- There are may be expansion of aggregate mining within the DWSMA.

- Agricultural land uses are not expected to change although livestock production may increase dependent on market demand. Continued enrollment in long-term crop retirement programs is stable at this time. New enrollments may be contingent on future crop commodity markets and available program funding. However, new state public waters buffer requirements may have some impact on row crop acreage.

- Adoption of nutrient management, conservation tillage practices, and use of cover crops may increase in the highly vulnerable portion of the DWSMA.

- There may be minor expansions of the City of Austin municipal boundary, primarily for residential purposes.

- No changes anticipated in surface water features in the DWSMA. However, there may be an increase in subsurface tiling in the highly vulnerable portion of the DWSMA in the future. Impacts to surface or groundwater resources due to increased subsoil tiling are unknown at this time.

- AU does not anticipate an overall increase in water usage from the DWSMA aquifers but there may be an increase in private wells pumping from the vulnerable Spillville aquifer for new residential areas and/or irrigating crops.

- AU will discontinue the use of a primary well in the highly vulnerable Spillville aquifer. One new primary well is planned that will be constructed in a deeper, low vulnerable aquifer.

- AU does not anticipate revising current water treatment facilities.

Chapter 6: Issues, Problems, and Opportunities

6.1 Identification of Issues, Problems, and Opportunities

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

Identifying the issues, problems, and opportunities as well as resource needs enables AU 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.

Table 6-1 also contains the issues, problems, and opportunities identified by the WHP team for the AU mixed vulnerability DWSMA.

Table 6 - Issues, Problems, and Opportunities: AU DWSMA

AU DWSMA				
Issue Identified	**Impacted Feature**	**Problem Associated with the Identified Issue**	**Opportunity Associated with the Identified Issue**	**Adequacy of Existing Controls to Address the Issue**
1. Two of AU wells (#2 and #4) are completed in a karsted, upper carbonate formation (Spillville) aquifer which is generally covered by about 20 to 100 feet of sandy soil materials with little or no clayey barrier between the ground surface and the top of the aquifer.	Aquifer, well water quality and quantity; DWSMA.	The WHPA/SWCA has insufficient natural protection to diminish potential contaminants or land uses from impacting the Spillville aquifer.	State and local technical staff could work with AU to develop information for citizens regarding the geology vulnerability of the area. AU could apply for funding educational efforts regarding the Spillville aquifer via the MDH-SWP grant program.	No official controls needed. This would be a voluntary effort to educate citizens, schools, and local governments about the local geology and aquifers.
2. Well water in AU wells #2 and #4 indicate nitrate-nitrogen concentrations ranging from about 1 to 3.4 ppm. Historical groundwater quality monitoring data, in conjunction with geologic information results in the majority of the DWSMA being classified as highly vulnerable.	Aquifer, well water quality and quantity; DWSMA.	The absence of natural protective barriers to upper carbonate aquifers beneath the SWCA can expose these aquifers to potential contamination from activities conducted on the surface. Surface water runoff does recharge the Spillville aquifer.	AU can continue to work with interested private and public entities to reduce nitrogen and promote various BMPS within the SWCA that would protect groundwater recharge water quality. AU can explore opportunities that arise from time to time with both private and public sources to promote cover crops, turf management and storm or wastewater treatment within the SWCA.	Efforts to protect a vulnerable aquifer from contaminated runoff is dependent on landowners that voluntarily enroll in applicable state or federal nitrogen management programs and sufficient funding of effective programs. The MDA is the lead state regulatory agency in Minnesota for nitrogen fertilizer and has authority to regulate the use of nitrogen fertilizer if necessary to protect groundwater quality.
3. There is limited hydrological data available to define the locations and rates of recharge or discharge between groundwater and surface waters in the SWCA.	Aquifers, well water quality and quantity; DWSMA.	Effective measures to address recharge/discharge surface water areas are dependent on accurate understanding of where these recharge/discharge areas are located and the association between surface water runoff rates and aquifer recharge rates.	Completion of a hydrological study of the relationship between surface water and ground water in the DWSMA would provide a) the foundation of an effective groundwater monitoring program, b) a better understanding of water quality and quantity in the upper carbonate aquifers used by public and private interests, and c) would be beneficial to selecting the best aquifer protection activities.	Ground water appropriation permits are regulated by the DNR. A comprehensive study will lead to better understanding of how the DWSMA can provide sustainable water yields for various uses.

Table 6 (Continued) - Issues, Problems, and Opportunities: AU DWSMA

AU DWSMA				
Issue Identified	**Impacted Feature**	**Problem Associated with the Identified Issue**	**Opportunity Associated with the Identified Issue**	**Adequacy of Existing Controls to Address the Issue**
4. Well #3 is ranked as vulnerable due to insufficient information regarding how the well was constructed.	Aquifer, well water quality	Well #3 is ranked as "vulnerable" because the well casing does not fully end past the protective Decorah Shale. Instead it terminates in the Maquoketa aquifer, allowing shallower water to potentially reach the deeper St. Peter Sandstone.	AU could use video technology to record the casing of well #3 to determine actual construction. Dependent on outcome of video, work with the MDH to determine if any revision of well #3 casing is necessary.	Well #3 construction predates state well code, therefore, continued use of this well is permitted. The well is regularly monitored for potential contaminants – no detects of nitrate-nitrogen.
5. New high capacity wells constructed in or near the DWSMA may influence the shape and size of WHPA, SWCA, or DWSMA.	Aquifer, DWSMA and potentially water well quantity and quality.	A large capacity well could potentially impact the ability of an AU water supply well to supply water. AU doesn't have any controls regarding use or placement of a new high capacity well or pumping rates which may influence the capture area of AU wells.	AU will need to work closely with the MDH and DNR to identify any new high capacity wells which may be drilled within or near the DWSMA. The MDH and DNR can assist AU to determine if a high capacity well may influence the capture area of AU wells.	Current Minnesota state law and rules requires all wells to be constructed according to state well construction codes and setbacks. The MDH and DNR consider the potential impact a high capacity well may have on water quality or quantity of an AU well prior to permitting.
6. There may be unused or abandoned wells within the DWSMA that may be unsealed or poorly maintained.	Aquifers, well water quality.	Unused/unsealed or poorly maintained public or private wells may provide a direct route for contaminants to enter an aquifer.	AU can work with the MDH, the City of Austin and Mower County to continue to inventory and prioritize which wells should be sealed within the DWSMA. AU can request assistance from the MDH Well Management in locating unused or abandoned municipal wells. AU can apply for a MDH-SWP grant for assistance in prioritizing, locating, and sealing public or private wells that are determined to be abandoned or unused within the DWSMA.	AU will need to work with citizens, local governmental units, the MDH, and other state or federal staff to locate wells and promote the proper sealing of abandoned or unused wells located within the DWSMA.

Table 6 (Continued) - Issues, Problems, and Opportunities: AU DWSMA

AU DWSMA				
Issue Identified	**Impacted Feature**	**Problem Associated with the Identified Issue**	**Opportunity Associated with the Identified Issue**	**Adequacy of Existing Controls to Address the Issue**
7. Less than one percent of land cover in the vulnerable portion of the DWSMA that is classified as herbaceous wetlands still exist.	Aquifers, well water quality	Loss of wetlands on the landscape reduces potential to remove nitrates prior to surface water infiltrating into aquifers.	Promote targeted wetland restoration in SWCA as a primary priority. Technical and potentially financial assistance is available from the USDA, BWSR, or private organizations for wetland restoration.	Current state rules exempt filling or drainage of Type 1 and 2 wetlands on agricultural lands.
8. Crop irrigation in vulnerable portion of the DWSMA may increase.	Aquifers, well water quality and quantity.	Irrigation on sandy soils or shallow soils overlying sands and gravels can transport excess nitrate-nitrogen rapidly to underlying aquifers. High capacity wells may alter the size and shape of the WHPA or DWSMA or cause interference with public or private wells.	Promote adoption of irrigation BMPs. DNR is reviewing all existing appropriation permits to assure sustainable use of vulnerable aquifers. A proposed irrigation well would be subject to groundwater modeling by the DNR/MDH to determine compatibility with AU wells prior to permitting.	The MDA and U of M have developed BMPs addressing irrigation; however, adoption rates are currently low. There are adequate state rules in place to address ground water appropriation permitting.
9. Subsoil tiling in the SWCA can increase concentrations of nitrates in surface waters that are connected to the Spillville aquifer used by AU.	Aquifers, well water quality.	Loss of nitrate-nitrogen from the soil is an important environmental concern. Nitrates can be conveyed to surface waters via tile lines which can recharge aquifers underlying the highly vulnerable portions of the DWSMA.	Prioritize and promote adoption of subsoil tile BMPs in vulnerable portion of the DWSMA. Promote and adopt storm water BMPs for agricultural areas.	Subsoil tiling is not regulated by the State of Minnesota.

Table 6-1 (Continued) - Issues, Problems, and Opportunities: AU DWSMA

AU DWSMA				
Issue Identified	**Impacted Feature**	**Problem Associated with the Identified Issue**	**Opportunity Associated with the Identified Issue**	**Adequacy of Existing Controls to Address the Issue**
10. There are numerous point and nonpoint sources of potential contaminants within the highly vulnerable portion of the DWSMA. The verified PCSI data set completed to date is very large and will increase upon completion .	Aquifers, well water quality and quantity;	Very large number of PCS (~600) spread over multiple jurisdictions, will create a challenge to AU to effectively track and manage implementation efforts aimed to protect drinking water sources. Multiple hazardous waste generators, SSTS, liquid storage tanks, stormwater discharges, wells, and other types of land uses associated with potential contaminant sources can impact aquifers if not carefully regulated and managed.	PCSI can be completed within the first year of WHP plan implementation using GIS tools combined with ground-truthing methods. AU can request collaboration with those LGUs that administer land use and/or environmental regulations in the development of a GIS-based risk-assessment/management approach to prioritize management of PCSI implementation efforts across multiple jurisdictions.	There are multiple state or federal agencies that regulate different categories of contaminant sources. There are also multiple local governmental units that have land use regulations in place. A collaboration between multiple agencies and local jurisdictions to address drinking water issues is possible within existing agreement templates.
11. Nonconforming or noncomplying SSTS can contaminate aquifers with pathogens and nitrates.	Aquifers, well water quality.	There is limited SSTS-related data to determine if septic systems are in compliance with local and state standards. The majority of SSTS are located outside the Austin or Mapleview municipal boundaries.	AU SWCA could be made a high priority area for SSTS compliance inspections. The MDH SWP or MPCA grants could assist in costs to conduct inspections and improve records. Low interest loan programs may be available to counties from MDA or BWSR and could address SSTS issues in the highly vulnerable DWSMA.	Mower County has adopted state rules addressing SSTS issues.

Table 6-1 (Continued) - Issues, Problems and Opportunities: AU DWSMA

AU DWSMA				
Issue Identified	**Impacted Feature**	**Problem Associated with the Identified Issue**	**Opportunity Associated with the Identified Issue**	**Adequacy of Existing Controls to Address the Issue**
12. Transportation corridors such as major and minor highways, pipelines, and a railroad that cross water bodies located within the DWSMA.	Aquifers, well water quality.	Accidental spills of various liquid products from trucks, pipelines, or trains could contaminate a highly vulnerable aquifer.	AU can work with the City of Austin fire department, state and county emergency teams, and pipeline and railroad companies to a) increase awareness of the DWSMA boundaries and geological conditions, and b) promote spill response training for local responders.	AU can continue to work with MN Dept. of Transportation, Mower County and the Iowa, Chicago & Eastern railroad to improve communications between all parties and inform all about the potential impact that spills may have on AU source water.
13. The Cedar River and its tributaries are prone to periodic flooding within the DWSMA.	Aquifers, well water quality and quantity	Flood waters may carry potential contaminates washed from upland sites to groundwater recharge areas. Detailed information is needed regarding locations of aquifer recharge/discharge zones and determining the best locations for water quality/quantity monitoring of surface and ground waters.	Flood control structures and/or changes in land cover within the Cedar River watershed could reduce the impacts of flooding within the DWSMA. Development of an effective surface water and ground water monitoring program within the DWSMA during flood events would provide a better understanding of water quality and quantity in the aquifers under the DWSMA. More effective water management practices can be a result of a comprehensive monitoring program.	The Cedar River Watershed District works with the Mower County SWCD, state agencies and local property owners to establish flood mitigation structures, wetland restoration and land cover programs that reduce impacts of flooding. The watershed district could request technical and/or financial assistance from various state, federal, and local partners to develop a comprehensive monitoring program.
15. AU has limited resources to implement the wellhead protection plan.	Aquifer, water well quality and DWSMA.	With limited resources implementing the WHP plan could be a challenge for the AU Board.	AU could partner with the local governmental units and state agencies that may have regulatory authority or programs to assist AU in WHP implementation.	A MDH-SWP grant program is available to a public water supplier with an approved WHP plan to implement the WHP plan.

Table 6-1 (Continued) - Issues, Problems and Opportunities: AU DWSMA

AU DWSMA				
Issue Identified	**Impacted Feature**	**Problem Associated with the Identified Issue**	**Opportunity Associated with the Identified Issue**	**Adequacy of Existing Controls to Address the Issue**
16. It is important to educate the citizens within the DWSMA and county officials and other local or state agencies about AU's WHP program.	Aquifer, water well quality and quantity and DWSMA	Periodic turnover in elected officials and staff from various local and state agencies can be a challenge to maintain continuity and momentum in future WHP plan implementation efforts.	AU staff can work with the MDH SWP or MRWA staff to provide WHP-related information to elected officials, citizens, and other local or state technical staff. This keeps decision-makers informed of the importance and need for effective WHP plan implementation as they relate to AU's drinking water supply. AU could join with the Cities of Austin and Mapleview and Mower County to develop a comprehensive public education program addressing spills, stormwater and other potential contaminant sources within the DWSMA.	AU can formally request assistance from the MDH, MRWA, City of Austin, Mower County environmental offices, and SWCD in the development of appropriate educational materials related to the AU WHP.

6.2 Summary of Issues, Opportunities and Problems associated with AU DWSMA

Identified issues within the AU DWSMA:

- Two of AU's wells are located in a geological sensitive, shallow aquifer that is vulnerable to contamination from nitrate-nitrogen or other forms of nonpoint source pollution.
- The highly vulnerable portion of the DWSMA is dominated by row cropping and livestock production.
- Less than one percent of land cover in the highly vulnerable portion of the DWSMA is classified as wetlands.
- Crop irrigation and subsoil tiling as crop management tools may contribute nitrates to the upper carbonate aquifers used by AU.
- Transportation (highways, pipeline, and railroad) corridors may be a source of accidental spills that could impact the vulnerable upper carbonate aquifers.
- Various types of point sources of potential contaminant sources - abandoned wells, storage tanks, septic systems, hazardous waste generators, storm water discharges, and manure storage facilities can pose a threat to the aquifers if not properly managed.
- Flooding by the Cedar River and tributaries within the highly vulnerable SWCA of the DWSMA.
- High capacity wells (new or existing) may impact size or shape of the DWSMA.
- There are unused or abandoned public and private wells located in the DWSMA that may pose a threat to the aquifers.
- There is currently no comprehensive approach to monitoring and managing groundwater quality and quantity in the aquifers used by AU.
- The DWSMA is large sized, covering multiple local governments and environmental regulations, thereby creating a management challenge to AU and partners.
- There is a need to develop a comprehensive, GIS-based data management and budget plan to keep PCSI current and track WHP implementation efforts in the DWSMA.
- A WHP/Groundwater-orientated educational plan should be developed for citizens, civic leaders, and elected officials served drinking water by AU.

In summary, the combination of coarse-textured soils with rapid infiltration properties, a lack of sufficient thicknesses of clayey materials overlying the upper carbonate aquifer used by AU, the knowledge that the Spillville aquifer used by the City contains 'young' water, meaning the aquifer is readily recharged from the surface provides a highly vulnerable geologic condition in the AU's DWSMA. Overlying this geologically vulnerable setting are land uses within the highly vulnerable area of the DWSMA that are of concern 1) commercial or industrial activities that include businesses that utilize many hazardous materials, impervious surfaces that increase stormwater runoff into the surface water that recharges aquifers, and major transportation corridors prone to accidental spills which cross streams or rivers, and 2) intensive row crop agriculture that requires high levels of nitrogen-based fertilizer and pesticide inputs. In addition, there are a large number of wells and subsurface sewage treatment systems that may pose a threat to the aquifer if not managed carefully. The WHP team has considered all of the issues, problems, and opportunities presented in Table 6-1 resulting in a variety of goals, objectives (Chapters 8 and 9), and implementation actions (Appendix D) to address these concerns.

6.3 Comments Received

There have been several occasions for local governments, state agencies, and the general public to identify issues and comment on AU's WHP plan. At the beginning of the planning process, local units of government were notified that AU 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 assessment; meetings of the WHP team were open to the public. Also, a public hearing was held before the completed WHP plan was sent to the MDH for state agency review and approval. No written or oral comments regarding the WHP plan were received from local government units or the general public at the public hearing. The Minnesota Department of Health did provide written comments prior to the public hearing. Those comments have been addressed prior to this WHP plan being submitted to state agency review.

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

Austin Utilities has no legal authority to control land uses or to develop and implement regulatory programs. Therefore, AU will have to rely upon partnerships formed with local units of government and state 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 AU

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

Table 7-1
Controls and Programs of AU

Type of Control or Program	Program Description
AU has no official controls regarding land uses or environmental regulations.	AU must abide by all local, state, and federal laws and rules applicable to producing, treating, and distributing drinking water.
AU establishes fees for providing drinking water to AU system customers.	Fees are used to cover costs of producing, treating, and distributing drinking water.
AU has rules regarding a ban on cross connections and requiring back flow prevention apparatus.	Prevents potential contamination of the public water supply.
AU, as an organization or in partnership with others, can apply for grants or loans from federal or state agencies and/or private organizations to assist in funding drinking water protection efforts.	Most grants are typically targeted toward mitigating identified environmental issues impacting groundwater. Grants may also be available to assist in developing efficient data management practices. Federal or state loans may be available to address infrastructure needs (water treatment, distribution, etc.)
AU has a rebate program to encourage consumers to use less water and energy.	Rebates are available for various items that meet certain energy and water use efficiencies. Examples include clothes washers, showerheads, low volume toilets, irrigation controls, and rain barrels.

7.2 Local Government Controls and Programs

The following departments or programs within Mower County and the City of Austin may be able to assist AU 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 7-2
Controls and Programs of Local Agencies

Government Unit	Name of Control/Program	Program Description
Mower County Public Works Department	1. Zoning and Conditional Use Permits 2. Shoreland Ordinance 3. Feedlots & manure storage facilities serving <1000 animal units 4. Subsurface Sewage Treatment System (SSTS) Ordinance 5. Solid Waste Program including Household Hazardous Waste Collection 6. Floodplain Management 7. Emergency Management 8. Water Planning 9. Comprehensive Land Planning	1. Sets standards and orderly growth of various land uses within a County and allows a County to apply permit conditions to land uses they deem necessary. 2. Sets standards and orderly growth within Shoreland districts adjacent to designated public waters. 3. Sets standards for animal feedlots within a county. 4. Sets standards for septic systems within a county. 5. Provides education to landowners regarding solid waste and a collection program for disposing of household hazardous waste. 6. Administers federal floodplain rules. 7. Emergency response to man-made or natural disasters.
Mower Soil and Water Conservation District	1. Agricultural BMPs 2. Wetland management 3. Ag BMP programs 4. State Cost-Share programs 5. Reinvest in Minnesota program 6. Clean Water Land and Legacy grant funding programs 7. MN Buffer Law 8. Cedar River 1 Watershed 1 Plan	The SWCD promotes the protection of water and soil resources in the county through educational programs, providing technical assistance to property owners, cost-sharing and collaboration with other local, state, and federal agencies.
Cities of Austin and Mapleview	1. Land Use/Zoning 2. Building Code 3. Comprehensive Planning 4. Flood Plain Management 5. Stormwater Management The City of Mapleview has land use and zoning controls withing their jurisdiction.	1. Sets standards and orderly growth of various land uses within the City and allows the City to apply permit conditions to land uses they deem necessary. 2. Adopted state building code to insure safe plumbing practices. 3. Planning for future land uses and infrastructure. 4. Control floodplain land uses and provide information re: flood mitigation efforts. 5. Utility fees; illicit discharges; control erosion & sedimentation; education.
Cedar River Watershed District	1. Capital Improvement Plan 2. Cedar River 1Watershed 1 Plan 3. Conservation Programs 4. Educational Outreach	1. Flood reduction projects. 2. Coordinate with SWCD and others to improve water quality with the watershed and provide environmental education to citizens.
Lansing and Red Rock Townships	Zoning Controls	Both Townships have adopted zoning requirements for specific land uses.

7.3 State Agency and Federal Agency Support

The 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.

Table 7-3 identifies specific regulatory programs or technical assistance that state and federal agencies may provide to AU 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 AU’s WHP plan was first approved by the MDH.

Table 7-3
State and Federal Agency Controls and Programs
Supporting WHP Plan Implementation

Government Unit	Type of Program	Program Description
MN Dept. of Health (MDH)	State Well Code (MR Chapter 4725); Source Water Protection; Public Drinking Water Protection.	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. MDH can provide technical and financial assistance to AU for WHP activities and also help identify technical and financial support that other governmental agencies can provide.
MN Dept. of Natural Resources (DNR)	Water Appropriation Permitting (MR Chapter 6115); Public Waters (Shoreland zoning, streams & buffer requirements).	DNR controls permitting of high capacity wells and requests to increase pumping rates for an existing groundwater or surface water appropriation permit. Establishes special requirements for land uses, vegetative cover, and soil disturbances within shore land areas adjacent to protected waters.
MN Pollution Control Agency (MPCA)	Feedlot Rules; Registered Storage Tanks; Storm water management; Subsurface Soil Treatment Systems; Solid Waste Facilities; Hazardous Wastes; TMDL assessments	MPCA regulates minimum state-wide standards for county feedlot regulations and regulates both feedlots >1000 animal units and manure storage facilities. Also administers programs addressing liquid storage tanks, septic systems, stormwater, and waste management. Partners with LGU to administer TMDL for Cedar River watershed.
MN Dept. of Agriculture (MDA)	Nitrogen Management; Agricultural Chemical Storage and Preparation facilities; Chemical and fertilizer spills.	MDA administers programs which regulate the storage and application of nutrients (fertilizers) and chemicals (pesticides and herbicides) and provide financial and technical assistance programs to farmers.
MN Board of Water and Soil Resources (BWSR)	1 Watershed 1 Plan; Local Water Planning; Conservation Program Implementation; Wetland Programs.	BWSR programs provide financial and technical assistance to county soil and water districts to implement local conservation programs. Also promotes local and regional watershed planning and wetland reestablishment/restoration efforts.
U.S. Dept. of Agriculture (USDA)	FSA - Federal Farm Bill Programs (EQIP, CRP, CSP, etc.); NRCS - Soil health, soil and water conservation BMP programs; Wetland restoration; Rural Development - Funding for clean and reliable drinking water systems.	The local USDA Service Center (FSA and NRCS) can provide technical and financial support for qualifying individual property owners and farmers through the current federal Farm Bill programs. Long term, low interest loans for drinking water sourcing, treatment, storage, and distribution
Environment Protection Agency (EPA)	Shallow Disposal Well Program	EPA has the regulatory authority over Class V Injection Wells, also known as Shallow Disposal Wells.

7.4 Support Provided by Nonprofit Organizations

The Minnesota Rural Water Association will assist AU with implementing its WHP plan by providing 1) reference education and outreach materials for landowners, 2) technical support for implementing specific individual WHP action items listed in the plan, and 3) assisting AU with assessing the results of plan implementation. The Cedar River Watershed Partnership may also be of assistance to AU in management strategies calling for outreach to landowners and producers within the DWSMA.

Chapter 8: Goals

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

1. **Continue to meet all state and federal drinking water standards;**

2. **Increase awareness of wellhead protection among public officials, land owners and general public;**

3. **Maintain low levels or below detection limits of nitrates in source water;**

4. **Utilize a comprehensive approach to manage potential contaminant sources;**

5. **Support data collection to enhance current and future WHP activities.**

Chapter 9: 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 A), 2) the potential contaminant source inventory (Chapter 4 and Appendix C), 3) the impacts that changes in land and water use present (Chapter 5), and 4) issues, problems, and opportunities referenced to administrative, financial, and technical considerations (Chapter 6).

9.1 Objectives

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

1. Create public awareness and general knowledge about the importance of WHP for ensuring an adequate and safe drinking water supply;
2. Expand nitrogen-reducing best management practices within the SWCA;
3. Identify county and state agency partners to better define the surface water/groundwater properties within the DWSMA;
4. Manage wells that are owned and operated by AU;
5. Provide guidance to property owners regarding management of potential contaminant sources;
6. Collect additional information needed to support management of potential contamination sources, assessment and evaluation of the adequacy of management measures, and future updates of the wellhead protection plan; and
7. Develop partnerships with LGUs and state agencies in the management of potential contaminant sources within the DWSMA.

9.2 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 a priority to each measure. 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 needed to acquire cooperation from other agencies and cooperators.
- The resources needed, i.e., staff, money, time, legal, and technical resources.

Management strategies within the vulnerable portion of the DWSMA should focus on protecting the current water quality of the aquifers used by AU by minimizing the impact of nutrients, chemicals, or biological sources of contamination on the public water supply. If opportune, implementation of nitrate-reducing measures should be emphasized in the SWCA first, followed by increased public awareness of the vulnerability of the majority of the DWSMA.

9.3 WHP Measures and Action Plan

Based upon these factors, the WHP team has identified WHP measures (actions) that will be implemented by AU over the 10-year period that its WHP plan is in effect. The objective that each measure supports is noted as well as 1) the lead party and any cooperators, 2) the anticipated cost for implementing the measure, and 3) the year or years in which it will be implemented.

The following categories are used to further clarify the focus that each WHP measure provides, in addition to helping organize the measures listed in the action plan:

A. Education and Outreach
B. Potential Contaminant Source Management
C. Water Resource Planning
D. WHP Coordination, Evaluation, and Reporting
E. Monitoring, Data Collection and Assessment
F. Contingency Planning

Appendix D contains tables for each of the above categories that lists each measure that will be implemented over the 10-year period that AU's WHP plan is in effect, including the priority assigned to each measure. Unless otherwise specified, all efforts to implement identified measures listed in Appendix D must be summarized by the eighth year after WHP approval to coincide with the beginning of the formal process to amend this current version of the WHP plan.

Dates noted in the tables are target dates to implement the WHP action and may be modified to fit the schedule of AU or partners. The WHP Manager is the lead responsible party for all actions so that implementation activity can be tracked. The cost for each action is an estimate and could vary significantly from what is indicated. The in-kind cost means that AU is already conducting a related activity and the action is carried out as an item already budgeted through normal AU activity. AU fully intends to implement all actions listed in Appendix D. However, completion of the action items are subject to the availability of resources sufficient to complete them.

9.4 Commitments from Cooperators

Local and state agencies have indicated various levels of support to AU during the WHP implementation stage. Table D-1 in Appendix D provides an overview of the categories of measures in which each agency may provide in-kind expertise and/or possible financial assistance. Support levels may vary for implementation efforts over the timeline of this WHP plan based on agency staffing and budget considerations.

Chapter 10: Evaluation Program

Evaluation is used to support plan implementation and is required under Minnesota Rules, part 4720.5270 prior to amending AU's WHP plan. Plan evaluation is specified under Chapter 9.1, Objective 6, 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. AU has identified the following procedures that it will use to evaluate the success with implementing its WHP plan.

1. The WHP team will meet, at a minimum, every two-and-one-half years to assess the status of plan implementation and to identify issues that impact the implementation of action steps throughout the DWSMA; and

2. AU will prepare a written report that documents how it has assessed plan implementation and the action items that were carried out over the life of this WHP plan. The report will be presented to MDH at the first scoping meeting held with AU to begin amending the WHP plan.

Chapter 11: Contingency Strategy

The WHP plan includes a contingency strategy that addresses disruption of the water supply caused by either contamination or mechanical failure. AU has a Minnesota Department of Natural Resources water supply plan in effect that was approved by the DNR on December 5th, 2017 and fulfills the contingency planning requirements for wellhead protection. A copy of the plan is available for public review during regular business hours at the AU office located in Austin, Minnesota and is hereby referenced in this section. Appendix E contains the DNR approval letter.

APPENDICES

Appendix A

DWSMA Scoping Documents and Assessment of Data Elements

Appendix B

WHPA and DWSMA Delineation/Vulnerability Report (Part 1 of the WHP Plan)

Appendix C

Potential Contaminant Source Inventory, Land Cover and Associated Data

Appendix D

WHP Plan Implementation Measures for the DWSMA

Appendix E

Supporting Documents

Appendix A

Assessment of Data Elements

Exhibits

A-1 Scoping 2 Decision Notice and Meeting Summary

A-2 Assessment of Data Elements Used to Prepare This Plan

B Physical Environment Data Elements

C Land Use Data Elements

D Water Quantity Data Elements

E Water Quality Data Elements

Exhibit A-1

March 22, 2018

Mr. Todd Jorgenson, Gas and Water
Engineering Operations Director
Austin Utilities
1908 14th Street Northeast
Austin, Minnesota 55912

Dear Mr. Jorgenson:

Subject: Scoping 2 Decision Notice and Meeting Summary – Austin Utilities – PWSID 1500002

This letter provides notice of the results of the second scoping meeting held with you, Keven Maxa, and Mark Nibaur (Austin Utilities), Terry Bovee (consultant), and me (Minnesota Department of Health) on March 13, 2018, at Austin 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.

Austin 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. Austin Utilities will have until March 30, 2019, to complete its WHP plan. Austin Utilities was given additional time due to Minnesota Rules, part 4720.5130, subpart 4, items D and E.

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 understand a consultant 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 jennifer.ronnenberg@state.mn.us or by phone at (507) 206-2734.

Sincerely,

Jennifer Ronnenberg

Jennifer Ronnenberg, Principal Planner
Source Water Protection Unit
Environmental Health Division
18 Wood Lake Drive Southeast
Rochester, Minnesota 55904-5506

JR:ds-b
Enclosures
cc: Paul Halvorson, MDH Engineer, Rochester District Office
Terry Bovee, Consultant
Ron Struss, Minnesota Department of Agriculture

Exhibit A-1

SCOPING 2 DECISION NOTICE
Variable Vulnerable DWSMA and SWCA

Remainder of the Wellhead Protection Plan

<table>
<tr><td colspan="2">Name of Public Water Supply:

Austin Utilities PWSID: 1500002</td><td>Date:

March 22, 2018</td></tr>
<tr><td colspan="3">Name of the Wellhead Protection Manager:

Mr. Todd Jorgenson, Gas & Water Engineering Operations Director</td></tr>
<tr><td>Address:

1908 14th Street Northeast</td><td>City:

Austin</td><td>Zip:

55912</td></tr>
<tr><td colspan="2">Unique Well Numbers:

227063 (Well #2), 227064 (Well #3), 226631 (Well #4), 223359 (Well #6), 226364 (Well #8), 223360 (Well #9), 127258 (Well #11), 788722 (Well #12)</td><td>Phone:

507-433-8886</td></tr>
</table>

<u>Instructions for Completing the Scoping 2 Form</u>

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.

Exhibit A-1 (continued)

DATA ELEMENTS ABOUT THE PHYSICAL ENVIRONMENT

PRECIPITATION

N	R	S	Data Element
	X	X	An existing map or list of local precipitation gauging stations.

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	Data Element
	X	X	An existing table showing the average monthly and annual precipitation in inches for the preceding five years.

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

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

N	R	S	Data Element
	X		Existing records of the geologic materials penetrated by wells, borings, exploration test holes, or excavations, including those submitted to the department.

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	Data Element
	X		Existing borehole geophysical records from wells, borings, and exploration test holes.

Technical Assistance Comments: The management of all the Drinking Water Supply Management Area(s) must reflect the geology of the areas.

N	R	S	Data Element
	X		Existing surface geophysical studies.

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	Data Element
	X	X	Existing maps of the soils and a description of soil infiltration characteristics.

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	Data Element
	X	X	A description or an existing map of known eroding lands that are causing sedimentation problems.

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.

Exhibit A-1 (continued)

WATER RESOURCES			
N	**R**	**S**	An existing map of the boundaries and flow directions of major watershed units and minor watershed units.
	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.
	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.
	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.
	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.
	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	A map and an inventory of the current and historical agricultural, residential, commercial, industrial, recreational, and institutional land uses and potential contaminant sources.
	X	X	

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:

<u>Groundwater and Surface Water Contribution Vulnerability</u>

1) All potential contaminant sources as listed below. Two DWSMA Vulnerability Figures for the Austin Utilities 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).

<u>Areas with Low Vulnerability Groundwater</u> <u>(only for the DWSMA surrounding Wells 8 and 9)</u>
1) All potential contaminant sources as listed on the attachment: Potential Contaminant Source Inventory Requirements for Low Vulnerable DWSMA.
A: Inventory all wells that are 380 feet in depth of the bottom of the well and deeper.

<u>Areas with Combination High Vulnerability Groundwater and Highly Vulnerable SWCA</u>
1)All potential contaminant sources as listed on the attachment: Potential Contaminant Source Inventory Requirements for Highly and Very Highly Vulnerable DWSMA.

As a starting point, MDH will provide a land cover map and table from federal databases. 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	An existing comprehensive land-use map..
	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 zoning map.
	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.

PUBLIC UTILITY SERVICES

N	R	S	An existing map of transportation routes or corridors.
	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 storm sewers, sanitary sewers, and public water supply systems.
	X	X	

Exhibit A-1 (continued)

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 pipeline used by gas and oil suppliers..
	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 map or list of public drainage systems.
	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 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 this data element.

DATA ELEMENTS ABOUT WATER QUANTITY

SURFACE WATER QUANTITY

N	R	S	An existing description of high, mean, and low flows on streams.
	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.
	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 permitted withdrawals from lakes and streams, including source, use, and amounts withdrawn.
	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 and streams for which state protected levels or flows have been established.
	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 description of known water-use conflicts, including those caused by groundwater pumping.
	X	X	

Technical Assistance Comments: The management of all the Drinking Water Supply Management

Exhibit A-1 (continued)

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.

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.

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	
	X		An existing summary of water quality data, including: 1. bacteriological contamination indicators; 2. inorganic chemicals; and 3. organic chemicals.

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 water chemistry and isotopic data from wells, springs, or other groundwater sampling points.

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

Exhibit A-1 (continued)

N	R	S	
	X		An existing report of groundwater tracer studies.

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 site study and well water analysis of known areas of groundwater contamination.

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	
	X		An existing property audit identifying contamination.

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 report to the Minnesota Department of Agriculture and the Minnesota Pollution Control Agency of contaminant spills and releases.

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

Exhibit A-1 (continued)

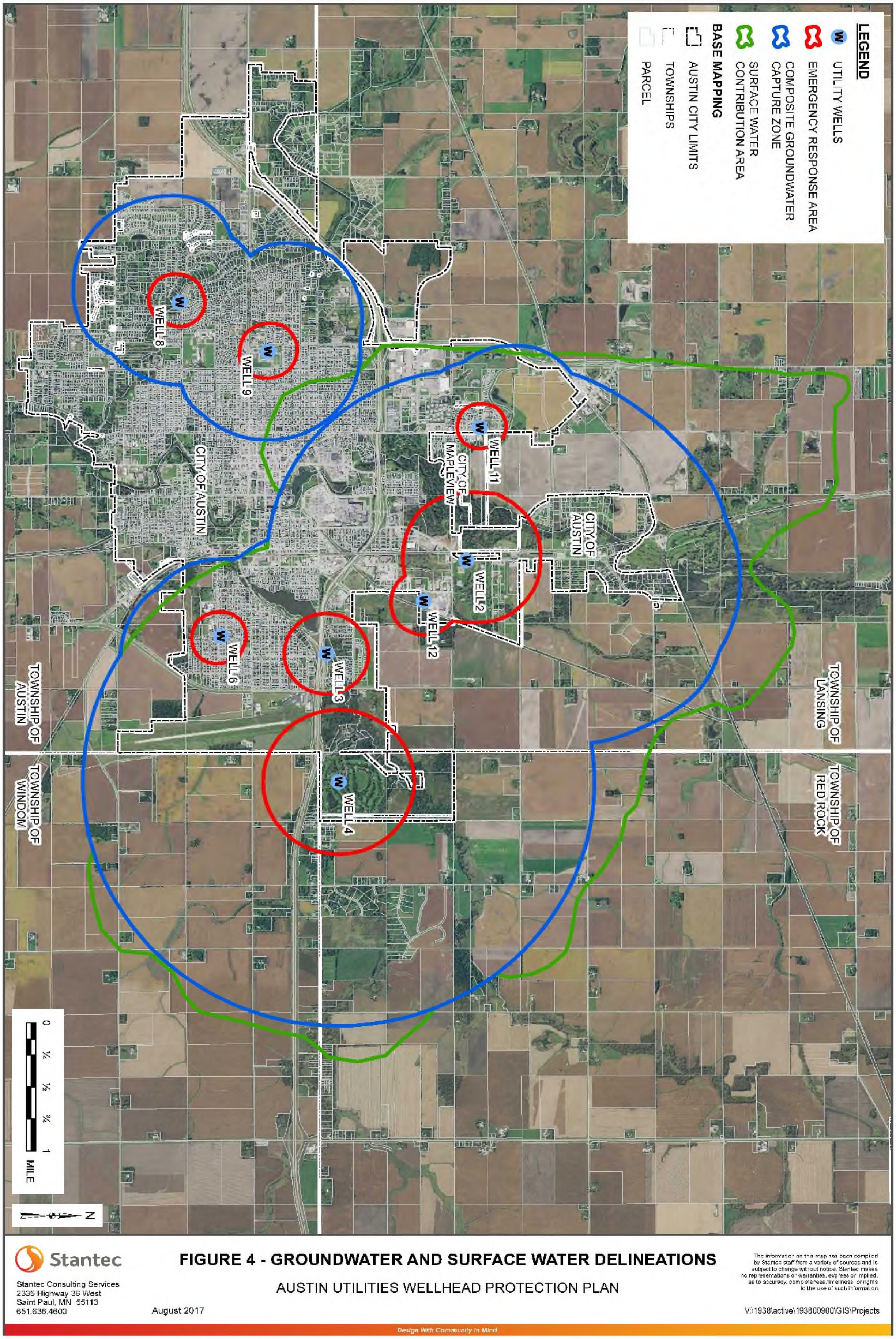


Exhibit A-1 (continued)

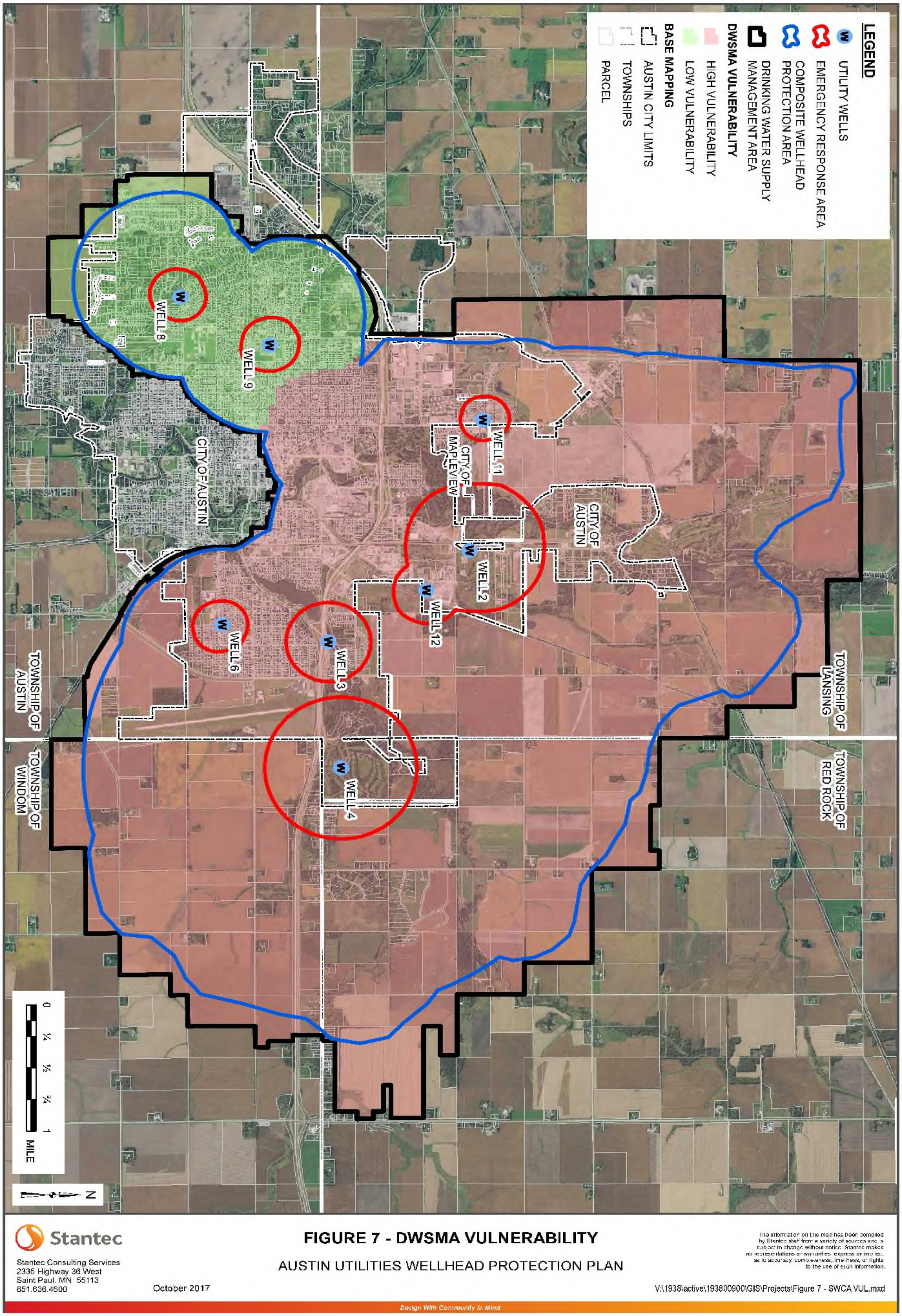


Exhibit A-1 (continued)

Austin Utilities Scoping 2 Meeting
Wellhead Protection (WHP) Planning Issues Summary

Drinking Water Protection Issues Identified to Date:

- Surficial bedrock in the area is karsted and contains sinkholes and springs with areas of potentially rapid infiltration of surface water.
- Wells 2 and 4 are shallow and highly vulnerable to contamination from surface water infiltration.
- The full DWSMA extends beyond city limits and contains portions of Lansing, Red Rock, Austin and Windom townships, as well as the city of Mapleview
- There are multiple, unused/unsealed wells that need to be located and sealed if possible. This includes older wells at Hormel.
- There are several documented spill/leak and hazardous waste sites in the DWSMA.
- Other high capacity wells have the potential to influence the PWS wells.
- Investigate for septic systems in subdivisions and mobile home parks.

Water Quality Detections and Implications:

- Wells 2 and 4 have tritium levels at 3.9 TU and detections of nitrate that implicate surface water influence to the source water aquifer.
- Nitrate levels do not exceed SDWA MCL standards and are not expected to in the next 10 years.

Old Municipal Well Information:

➢ The Minnesota Department of Health has compiled historical information for use in the planning process.
A copy of this report has been given to the PWS.

Sanborn Maps:

☒ Sanborn Maps are available for this area (and Fire Insurance Maps for nine separate years)

☐ Sanborn Maps are not available for this area.

Recommended WHP Measures:

- Collect additional data to better define aquifer transmissivity (ie: well data, pump tests, etc.).
- SWP monitoring for the Wellhead Protection Program should be conducted near year five.
- Review records for Well #3 to verify construction and casing depth within or below the Decorah Shale formation.

Other: In the low vulnerable areas, only wells 380' or deeper need to be inventoried. In highly vulnerable areas, all wells need to be inventoried, and all other PCSI items in the attachment.
Potential partners include: Mower County, city of Austin, Townships, city of Mapleview, Cedar River Watershed District & Mower Co. SWCD

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.

Exhibit A-1 (continued)

Scoping 2 Decision Notice Attachment

Potential Contaminant Source Inventory Requirements

Low Vulnerable DWSMA

The following current and historical potential contaminant sources and related codes and activity status and related codes are required to be included in the potential contaminant source inventory. All potential contaminant sources must be assigned an activity status and related code using state program descriptors or local knowledge.

Potential Contaminant Sources (PCS)	**PCS Codes**
Large Capacity Cesspool (potential Class V)	CVLCC
Large Capacity Waste Water Disposal Site (potential Class V)	CVWWD
Motor Vehicle Waste Disposal Well (potential Class V)	CVMVW
Wells	WEL

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.

Exhibit A-1 (continued)

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

Exhibit A-1 (continued)
PCS Inventory Requirements: High and Highly Vulnerable DWSMA

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

Exhibit A-1 (continued)
PCS Inventory Requirements: High and Highly Vulnerable DWSMA

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)

Exhibit A-1 (continued)
PCS Inventory Requirements: High and Highly Vulnerable DWSMA

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.

Revised: December 1, 2015

Exhibit A-1 (continued)

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
Hazardous Waste Generator with Outside Storage	HWG		For aboveground outside storage
Hazardous Waste Handler	HWH		Aboveground storage and runoff, spills

Exhibit A-1 (continued)

Potential Contaminant Sources (PCS) Material	PCS Codes	Material Codes	Comments / Caveats
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
Rail Crossing Over Water	RAILX		
Road Crossing Over Water	ROADX		
Sludge Disposal Site	SLDG		
Solid Waste Management Site	SWMS		Aboveground storage runoff issues

Exhibit A-1 (continued)

Potential Contaminant Sources (PCS) Material	PCS Codes	Material Codes	Comments / Caveats
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	
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		

Exhibit A-1 (continued)

Potential Contaminant Sources (PCS) Material	PCS Codes	Material Codes	Comments / Caveats
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	
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		

Exhibit A-1 (continued)

<u>Footnotes</u>:

[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)

<u>Activity Status; Codes; and Descriptions</u>

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.

Exhibit A-2

Assessment of Data Elements Used to Prepare This Plan

The following data elements were identified by the MDH to be used in the WHP plan (Plan) and were specified in the scoping decision notices that were presented to the Austin Utilities (AU). The selection of a data element for inclusion in the plan is based on 1) the hydrogeological setting, 2) vulnerability of the wells used by AU, and 3) vulnerability of the DWSMA known at the time that the scoping meeting was held. Each data element is 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 well, and 4) land and groundwater uses within both the low and highly vulnerable areas in the DWSMA.

All figures and tables referenced in this document are located at the end of this document unless stated otherwise.

A. Physical Environment Data Elements (Exhibit B)

1. **Precipitation:**

   Austin DWSMA

   The Austin DWSMA receives on average about 34 inches of precipitation annually. The precipitation table (Table B-1) is based on the Minnesota State Climatology Office http://climate.umn.edu/ which provides listings of 'normalized' annual precipitation records over thirty year segments (1981-2010). The location used to derive the data is as follows: Austin DWSMA = T103N, R18W, Sec 26 (Lansing Township); see Table B-1 for 2008 to 2018 precipitation data and refer to the State Climatology website to view yearly and/or monthly updates after 2018.

   According to information contained in Part I of this WHP Plan, there is likely a connection between surface and groundwater in the SWCA. The potential for impact to groundwater quality from storm surface water runoff within the highly vulnerable area is of concern. The relationship between sources of contamination, precipitation, and subsequent infiltration of surface water is a primary consideration in the development of this plan (see Chapter 4 of the Plan).

2. **Geology:**

   This data element has been addressed in the Part I portions of the Plan (Appendix B). The DWSMA map (Figure 1 in the Plan) illustrates the vulnerability of the well water capture areas. A complete description of the geological conditions present in the AU DWSMA is on file with the MDH.

   Current geologic information indicates that in the AU DWSMA there is a lack of geologic protection of the upper carbonate aquifers from potential infiltration of contaminants from the surface. Therefore the upper carbonate aquifers are considered to be highly vulnerable. This corresponds with the highly vulnerable surface water contribution area (SWCA) noted in the DWSMA map shown in Figure 1 of the Plan.

3. Soil:

   Soils and their characteristics are considered in the development of this Plan since there is a direct connection between the land surface, land use activities, and the upper carbonate aquifer in the AU DWSMA. Due to the lack of a thick protective layer of clay rich soil or rock material between the earth's surface and the top of the aquifer in the SWCA area of the DWSMA, local soil types (Figure B-1) and soil hydraulic/infiltration characteristics (Figure B-2) may impact local water quality.

Generally, the soils near the Cedar River have loamy or silty textured upper horizons overlying coarser-textured sands or gravels. Soils further from the river may have more clay in the profile, but are more poorly drained and hence more likely to be artificially drained with outlets to tributaries of the Cedar River. Soil hydrologic characteristics range from moderate infiltration rates in the upper sediments to very rapid in the sands and gravels below the silty veneer of soil. Erodibility characteristics (K-Factor) and distribution are illustrated in Figure B-3.

4. Water Resources:
Surface water features can be regulated under several different government rules and programs. These regulations and programs can be used as drinking water protection management tools for administering land use and potential contaminant sources where these surface water features exist and overlap the DWSMA. Quality and quantity of surface water recharge can directly impact two of the public water supply wells used by the AU. The Part 1 Report states that infiltration of precipitation is the largest source of recharge to the Spillville Aquifer. The aquifer is, in turn, a major source of the baseflow for the Ceder River and it's tributaries (Appendix B).

The watershed map for the AU DWSMA is shown in Figure B-4. The DWSMA is within the Cedar River watershed.

Public waters in this DWSMA are confined to those streams, public ditches or impoundments as designated in Figure B-5.

Figure B-5 also illustrates federally-designated floodways within the AU DWSMA. Federal Emergency Management Agency Flood Insurance Rate Maps, Panels 27099C0167D, 27099C0178D, 27099C0179D, 27099C0186D, 27099C0187D and 27099C0188D cover the AU DWSMA. The maps are effective dated September 4, 2013 with some maps revised as of February 22, 2017. AU Well #3 is within the Cedar River 500 year floodplain and would be sandbagged if deemed necessary. No other AU wells are located within a floodplain.

Both the City of Austin and Mower County enforce 'shoreland' zoning as an overlay district that borders the public waters shown in Figure B-5. Specific shoreland zoning areas are listed in Table B-2.

Assessments of the Physical Environment Data and Their Impact on the Following:

(a) Use of the PWS Wells:
According to the data collected, the amount of precipitation received is adequate to provide recharge to AU's wells and to meet current demand. The soils information provides insight into the pathways that recharging water takes to enter the multiple aquifers. Soils, surface waters, and geology in AU's vulnerable portion of the DWSMA influence recharge to the upper carbonate aquifer. Factors such as rainfall intensity, soil type, slope, vegetation, and thickness of soil cover over the aquifer influence the rate and amount of precipitation or surface water that infiltrates to the aquifers. The areas that are designated as highly vulnerable are covered by either coarser-textured soils or a thin veneer of loamy textured soils overly the Spillville aquifer thereby allowing infiltration of precipitation or runoff to the aquifer relatively fast. It is thought that the water resources data element information does have a direct impact on the use of the PWS wells.

(b) Delineation of the Highly Vulnerable Portion of the AU DWSMA:
Precipitation provides recharge from surface water infiltration that influences the size of the

WHPA for the two vulnerable wells and affects the use of the wells and the amount of groundwater that can be pumped without damage to the aquifer and surface water resources. The soils and geologic information was used to address aquifer transmissivity and hydrologic boundaries delineation criteria. Additionally, it was the principal information used to assess DWSMA vulnerability, of which it was determined that there is a highly vulnerable area within the protection area. Also, since there are thin and/or permeable soils at the surface, it is expected that precipitation and runoff from upland areas will infiltrate to the aquifers used by AU. Because of these factors, a surface water contribution area (SWCA) was delineated that includes any topographically higher area that may contribute runoff to the WHPA. Specific water resources data element information was used to identify surface water hydrologic features that define hydrologic boundaries impacting delineation of the WHPA and the vulnerability of the DWSMA. Appendix A – Scoping Documents for Austin Utilities and Appendix B provide greater detail of the delineation process.

Delineation of the Low Vulnerable Portion of the Austin DWSMA:
Precipitation information was not required because of the hydraulically confined aquifers used by AU in the DWSMA. Geologic information was obtained from 1) existing maps, reports, and studies that are listed in the References section of the Part 1 report, and 2) the records of wells, test borings, and well sealing records that are on file at the MDH and stored in the Minnesota Well Index (MWI) database. Soil data was not required because of the hydraulically confined aquifers used by AU. Geologic information was used to determine 1) the extent and composition of the aquifers used by AU's wells, 2) the vulnerability of the aquifer at the location of each well used by the Public Water Supplier, and 3) the vulnerability of the DWSMA (see Appendix B). Geologic information affects the delineation of the WHPA because it is used to address the aquifer transmissivity and hydrologic boundaries delineation criteria. Also, geologic information provides insight into the pathways that recharging water takes to enter the aquifer, which impacts 1) the use of the well, and 2) the quality and quantity of water that is pumped. Finally, it is the principle information that is used to assess DWSMA vulnerability, which impacts land and groundwater uses within the DWSMA.

(c) Quality and Quantity of Water Supplying the PWS Wells:
Precipitation data is used as an input for predicting nitrate leaching from agricultural fields to aid in prioritizing areas that may need increased nutrient management within the highly vulnerable portion of the DWSMA. The SWCA within the DWSMA that is characterized as highly vulnerable has a potential to be impacted from vertical infiltration from precipitation and surface water runoff. The geologic and soils information provides insight into the pathways taken to recharge the upper carbonate aquifers. The water resources data element information does have a direct impact on the quality and quantity of water supplying the PWS wells located in vulnerable DWSMA.

(d) Land and Groundwater Uses Within the DWSMA:
Precipitation, when used to assess contaminant loading to the aquifer, affects the use of land and groundwater resources within the DWSMA because it is influencing potential contaminant loading to an aquifer. The geologic and soils information was used to determine the vulnerability of the aquifer to contamination from land use activities in the DWSMA. For the highly vulnerable area of the DWSMA, an inventory of all land uses, both presently occurring and historical, is included in the plan and management strategies have been developed to address the level of risk the various land covers may pose to groundwater. The wellhead protection team also ranked the level of risk each point or nonpoint source of potential contamination poses to groundwater. Water resources information affects the use of land and water resources within the DWSMA because it defines regulations that are in place to assist with managing 1) the uses for surface water, and 2) potential contamination

sources that may contribute contaminants to the aquifers used by the AU. Shore land classifications can affect the management of the DWSMA because they are required to be adopted by local governments and regulate land use within specified distances of surface water features, including lakes, rivers, and streams. AU can work with the City of Austin and Mower County Shore Land Ordinance administrators who possess the authority to restrict or prohibit future potential contamination sources that may introduce contamination into groundwater by recharge from surface water features, especially within the SWCA area within the AU DWSMA.

That area within the DWSMA that is categorized as low vulnerable due to an increased level of protection provided by geologic features as compared with the areas designated as highly vulnerable should identify land use sources including other wells or borings that are at least 380 feet deep and Class V wells, and provide management strategies to adequately reduce the risk to the groundwater supply.

B. Land Use Data Elements (Exhibit C)

1. Land Use:
The location and numbers of potential contaminant sources and land uses past and present identifies what are the greatest potential risks to the public water supply wells and aquifers. This is subsequently used to develop and prioritize actions or measures. The land ownership information and political and public land surveys helps to locate potential contaminant sources (Appendix C). Those land owners and government units identified in the DWSMA can assist with implementing management strategies and actions.

A land cover map (Figure C-1) and legend (Table C-1), City of Austin and Mower County comprehensive land use maps (Figures C-2, C-3 and C-4 respectively) and zoning maps for the City of Austin, and Austin, Lansing, Red Rock, and Windom townships (Figures C-5, C-6, C-7, C-8 and C-9 respectively) provide the background for evaluating current and future land uses and the compatibility of these planning documents with protecting the PWS wells and aquifers used by AU. The city of Mapleview does not have a comprehensive plan map or zoning map.

Land use in the highly vulnerable portion of the DWSMA is mostly agricultural, and with a large amount of suburban and urban land uses. Land use controls within the DWSMA are administered by the City of Austin, Red Rock Township, and Mower County Planning and Zoning Departments. The City of Austin and Mower County have Comprehensive Land Use Plans and city and county-wide zoning. No significant changes from existing land uses presently found in the DWSMA are anticipated in the foreseeable future. Because of the high vulnerability of a large portion of the AU DWSMA, the groundwater is susceptible to contamination from many land uses typical for the area. Figure 1 within the Plan illustrates political boundaries and public land survey information.

Land cover tables and maps for the DWSMA are discussed thoroughly in Chapter 4 of the Plan and in Appendix C. Efforts to continue or expand areas of permanent cover (especially within the surface water/groundwater recharge areas) in the highly vulnerable SWCA are important in order to preserve current groundwater quality and the long-term protection of groundwater and drinking water quality.

2. Public Utility Services:
The AU DWSMA is split between urban and rural areas. Only the areas within municipal boundaries are served by storm sewers and sanitary sewers. AU does have maps of the storm and sanitary sewer systems but due to large scale maps and the extensive network, those maps are not included in this document. Public ditches are of limited extent in the AU DWSMA or are

designated ‘public waters’ and are shown in Figure B-5. However, surface water runoff and subsoil water from private subsoil tile lines do exit to the Cedar River which can affect land and water uses because they can transport potential contamination. The drainage systems are located in the SWCA and are primarily used for agricultural purposes. As such, they may limit future groundwater uses because of nonpoint source pollution and/or potential contaminant releases or the risk that they may present to public health. Construction and maintenance records on public wells within the vulnerable DWSMA provide information on whether these wells may serve as pathways for contaminants into the aquifer (Appendix B).

A natural gas pipeline network transects portions of the SWCA (Figure C-10). Also, federal, state and local highways, and railroads cross water bodies in the vulnerable portion of the DWSMA and are illustrated in Appendix C, (Figure 9). Because the upper carbonate aquifers are vulnerable to spills and accidental discharges, spill response measures to reduce potential contamination of the Spillville aquifer should be addressed in Mower County and City of Austin Emergency Response Plans.

3. Potential Contaminant Source Inventory:

Records of how the public water supply wells are constructed are on file with AU and MDH. Information regarding other wells is limited to that displayed in the public accessible Minnesota Well Index or local records.

With the assistance of MDH, the AU Wellhead Protection Team conducted an inventory of known potential contaminant sources (PCS) located within the DWSMA; see Chapter 4 of the Plan and Appendix C for details. Numerous categories of point and nonpoint PCS are currently found within the DWSMA and are discussed in detail in Chapter 4 of this Wellhead Protection Plan. Also, Appendix C provides detailed maps and lists of specific point sources of potential contaminant sources.

Management of AU’s DWSMA will involve strategies to address all categories of PCS identified in the DWSMA. See Chapters 4, 8, 9 of the Plan and Appendix D.

Assessments of the Land Use Data and Their Impact on the Following:

(a) Use of the PWS Wells:

Information relating to the parcel boundaries, public land survey coordinates, and center lines of roads have no direct impact on the use of the public water supply wells.

Priorities assigned to the action steps in the plan are based on information relating to the comprehensive land use and zoning maps and can impact the use of the AU wells by using the information as a tool to direct land use activities that can either increase or decrease the amount of water required to be produced by AU wells.

Ground water monitoring information associated with potential contaminant sources in the DWSMA have the ability to impact the use of the PWS wells when the sources contribute contaminants to the ground water aquifer. Ground water contamination of the highly vulnerable aquifer that AU utilizes for their drinking water may result in the necessity to limit use of a well or discontinue the use of a well altogether.

The distribution of the public water supply system, specifically the amount of water storage and treatment capabilities, affects the amount of pumping that is needed to meet water supply needs and to maintain potable water standards.

(b) Delineation of the WHPA:

Information relating to the parcel boundaries, public land survey coordinates, and centerlines of roads have no impact on the delineation of the WHPA. The public water supply distribution system influences the number of wells that must be pumped to meet water demands of the public, which affects the boundaries of the WHPA and emergency response area (ERA). The pumping of AU's wells affects the delineation of the WHPA because the pumping amount is a delineation criterion.

(c) Quality and Quantity of Water Supplying the Wells:

Information relating to the parcel boundaries, public land survey coordinates, and center lines of roads have no impact on the quality and quantity of water supplying the AU wells.

The information in Appendix A – Exhibit B relating to the comprehensive land use and zoning maps provides the basis for defining the types of potential contamination sources that may or do impact the quantity and quality of the well water used by the public water supply.

Information about land uses and the PCSI is important to the quality of the water supplying AU's wells because it includes locations and data about potential contaminant sources within the DWSMA that could introduce contaminants into the drinking water aquifer that AU uses as its drinking water source. The highly vulnerable portion of the DWSMA is more susceptible to contamination from land use activities, which therefore, are more likely to have a greater impact on the quality of AU's drinking water than land uses within the low vulnerable area.

The information related to the transportation routes and corridors and the lack of both a municipal sanitary sewer system and storm water collection management system in a large portion of the highly vulnerable DWSMA can all be considered potential contaminant sources and therefore, have the ability to impact AU's quality and quantity of drinking water.

(d) Land and Groundwater Uses In the DWSMA:

Information relating to the parcel boundaries, public land survey coordinates, and center lines of roads have impact on the land and groundwater uses in the DWSMA because they define where the WHP plan will be implemented.

The comprehensive land use and zoning maps affect land and water use within the DWSMA because they provide a basis for limiting future land uses that may be incompatible with ordinances or planning goals. As such, they may be used for denying new potential contamination sources or imposing performance standards that affect the use of existing or new public water supply wells and both the quantity and quality of the well water used by AU. The effective use of these tools will be most critical in the highly vulnerable areas of the DWSMA where the aquifers being used for AU's drinking water source is more susceptible to contamination from land uses.

Information about the potential contaminant sources located within the various land cover categories is important to the land and groundwater uses within the DWSMA because the inventory identifies locations of various land uses that have been known to contribute to ground water contamination. In the highly vulnerable areas of the DWSMA where land use activities have the potential to impact AU's drinking water, AU will rely on Mower County, Red Rock Township and the Cities of Austin and Mapleview to employ the land use and zoning maps along with existing zoning ordinances to disallow certain land uses, direct land use activities to areas that will see less impact to the groundwater quality, or place restrictions on land use permits in order to prevent contamination from activities to occur. The low vulnerable portion of the DWSMA will be influenced by City of Austin zoning requirements to a greater extent. However, activities that would solely fall into this category (wells) are also regulated by other agencies, such as the MDH.

Transportation routes and corridors such as major and minor highways, railroads and pipelines all represent potential contamination sources. As such, they may limit future land and groundwater uses because of potential spills or releases and/or the risk that they may present to public health and safety.

C. Water Quantity Data Elements (Exhibit D)

1. Surface Water and Groundwater Quantity:
   Characteristics of surface water flows, protected streams and flows and permitted withdrawals provide information to assess the response of a vulnerable aquifer, like that serving the AU DWSMA, to various flow and water level regimes. The impact of water well pumping can affect the flow rate of local streams or the water level in nearby lakes or wetlands. Therefore, pumping restrictions on surface water or groundwater appropriation permits may be warranted to reduce negative impacts on surface water and to reduce recharge of contaminated surface water to the water supply aquifer.

   Pumping of high capacity wells may affect the movement of contamination toward or away from another well and should be considered when managing contamination already in an aquifer. The continued use of a contaminated well or how much an uncontaminated well can be pumped before it affects the movement of contamination to other wells needs to be considered in managing a DWSMA. Pumping may impact groundwater levels when recharge is less than withdrawal such as during times of drought. Therefore, pumping may impact water use within the DWSMA and may impact land uses such as agricultural purposes. The pumping limits for most community public water supply wells are set under the DNR appropriations permit. AU will continue to work with the MDH and DNR to identify any new high capacity wells in the area that may affect the AU public water supply or alter the current WHPA delineations.

   Details regarding streams' flows, ordinary high water marks, protected water levels or flows, permitted withdrawals from surface waters and ground waters, and well interference problems or water-use conflicts are listed in Table D-1. Data collected for the Part 1 report indicates there are several known wells covered by state groundwater appropriation permits located within the DWSMA. Groundwater levels and quantity are adequate for the amounts that AU currently is permitted for groundwater appropriations that are administered by the DNR. Presently, there appears to be sufficient groundwater quantity based upon existing pumping capacity of all wells completed in the various aquifers used by AU.

   The relationship between surface and ground waters in and near the DWSMA is not fully understood. There are no surface water or groundwater hydrologic studies being conducted currently in conjunction with the Cedar River and the AU DWSMA. Therefore, additional data collection in collaboration with the DNR and MDH will be undertaken as part of this WHP Plan.

Assessments of the Water Quantity Data and Its Impact on the Following:

(a) Use of the PWS Wells:
   Water quantity (both surface and groundwater) data impacts the use of the public water supply well because a maximum annual amount for the public water supply system is specified under the DNR appropriations permit.

   Information related to the pumping of high-capacity wells in or near the DWSMA may impact the use of the AU wells because the use of the high-capacity wells has the ability to influence the direction of flow of groundwater as well as any existing contaminant plumes in an area. If an area near AU's wells becomes contaminated, AU may be required to change the current use of the wells to slow the progression of a plume towards AU's wells, or prevent a contaminant plume from entering the drinking water supply.

(b) Delineation of the WHPA:
Water quantity (both surface and groundwater) data impacts the WHPA delineation because the pumping amounts are used to calculate the daily well discharge, which is a WHPA delineation criterion.

Data relating to the high, mean, and low flow rates of streams affects the delineation of the WHPA because it can be used to 1) determine the interconnectivity between surface water and the aquifers used by the AU wells, and 2) calibrate the groundwater model that was used for delineation of the WHPA. Also, the interaction between surface water and the aquifer that is used as the source of drinking water affects the vulnerability of the wells and DWSMA.

Information related to the pumping of high-capacity wells is used for the delineation of the WHPA in the DWSMA because it may present a flow boundary (which is a delineation criterion), and may affect the movement of groundwater flow in an area.

(c) Quality and Quantity of Water Supplying the Wells:
Water quantity (both surface and groundwater) may directly affect the future quantity and quality of the water from the public water supply wells.

The data related to the pumping of high-capacity wells in or near the DWSMA has the ability to impact the quality and quantity of water supplying AU's wells because 1) the amount of water being pumped by these high-capacity wells have the ability to affect the static water levels of the aquifer, and 2) the pumping of these wells can influence the direction of ground water flow and the direction of flow of existing contaminant plumes.

(d) Land and Groundwater Uses Within the DWSMA:
Water quantity (both surface and groundwater) data impacts the land and groundwater uses within a DWSMA because pumping may impact whether other wells or existing land uses may cause contamination of the aquifer or contamination to move toward the public water supply wells.

Land and groundwater uses within the DWSMA may be influenced by the pumping of high-capacity wells in or near the DWSMA when recharge is less than withdrawal, such as during times of drought. The result of this would require that the city enact stricter water conservation measures for its system users, or may limit certain types of land uses with its jurisdiction in order to ensure that higher priority water users' demands are satisfied.

D. Water Quality Data Elements (Exhibit E)

1. Surface Water Quality:
State water quality classification indicates the designated beneficial uses of surface waters. Surface waters such as trout streams and trout lakes, calcareous fens, and other outstanding resource value waters may receive a high priority for protection. As a result, pumping of water supply wells in proximity may be restricted if it impacts an important surface water feature. Lands adjacent to surface waters considered of high priority may also be targeted for conservation

and best management practices by government or conservation groups. These organizations may provide incentives for improving land use practices. These improvement efforts can provide multiple benefits, including to the aquifer, if they reduce contaminant loading to surface water features that are interconnected with the source water aquifer or serve to prevent future contamination.

Surface water chemistry data (Tables E-1 and E-2) provides information about contaminant risks to the aquifer when there is a surface water contribution area or a situation where the wells are under the direct influence of a surface water feature. Surface water quality monitoring provides a basis for evaluating the interconnectivity between surface water and the aquifer by comparing contaminants or isotopic signatures that are found both in surface water and the aquifer. When a strong interconnectivity between a surface water feature and the PWS aquifer has been established, the WHP plan must identify management strategies to reduce the risk of contamination to the aquifer from this source.

There are three man-made lakes present in the AU DWSMA formed by dams on the Cedar River or tributaries. A state water quality classification of 2BG, 3C, 4A, 4B, 5, and 6 is assigned to a portion of the Cedar River from Lower Austin Dam to Dobbins Creek (AUID 0780201-513).

The Cedar River is included in the 2018 Minnesota Impaired Waters as compiled by the MPCA. Three recent studies have been completed addressing surface water quality in the Cedar River watershed: *Cedar River Watershed Monitoring and Assessment Report, July 2012, Draft Cedar River Watershed Restoration and Protection Strategy Report, Feb 2019* and *Draft Cedar River Watershed Total Suspended Solids, Lake Eutrophication, and Bacteria Total Maximum Daily Load, Feb 2019.* These studies can be reviewed at www.pca.state.mn.us/water/watersheds/ . Overall, the quality of surface water can impact the quality of the groundwater produced by the AU public water supply wells. Activities identified in this plan aim to protect or improve surface water which ultimately effects groundwater quality.

2. Groundwater Quality:

Groundwater quality data indicates the presence of human-caused contaminants within the groundwater. This data is used to evaluate the current water quality condition and sustainability of the PWS aquifers and to identify potential sources of contamination or land uses that pose greater risk to the PWS aquifers. These potential sources of contamination or land uses should receive higher priority when assigning management strategies in the plan. Groundwater quality information collected throughout the DWSMA can be used to assess the pathways of recharge to a specific aquifer and therefore provides information for prioritizing areas within the DWSMA that need land management measures.

The extent that groundwater quality may already be impaired by previous land and groundwater use practices can be indicated in studies, spill reports, and property audits. This information can assist in developing priority actions for managing land and groundwater uses within the DWSMA. These reports and studies may also indicate the rate that a contamination plume is moving towards or into the aquifer used by the PWS, as well as the likelihood that the PWS may need to consider implementing water treatment methods in the future.

There is ongoing public well water quality monitoring of nitrates (Table E-3) by AU and MDH staff. Well water quality from the two wells completed in the Spillville aquifer is impacted by low levels of nitrate-nitrogen. Federal Safe Drinking Water Standards are currently met without the need for nitrate removal treatment. Additional groundwater quality data is contained in the Part 1 of this Plan (Appendix B).

AU also provides annual detailed results of required Safe Drinking Water Act testing of a battery of water quality standards from each production well. The annual reports are on file with AU and are available to the public. The 2018 Consumer Confidence Report is located in Exhibit F-1.

No property audits identifying contaminants are on record for the AU DWSMA. A review of the MDA's "What's In My Neighborhood" website indicates there are two identified spill or release sites within the AU DWSMA and both are assigned a "closed" status. The MPCA also has a similar website which indicates a large quantity of hazardous waste generators and other categories of potential contaminant sources and Mower County data indicates a large number of feedlots and septic systems within the highly vulnerable portion of the DWSMA. These potential contaminants and others are listed in the PCSI (Appendix C).

Assessments of the Water Quality Data and Its Impact on the Following:

(a) Use of the PWS Wells:
Information related to groundwater quality is generally used to characterize the rate of recharge to the aquifers used by AU for its drinking water supply, and the degree of hydraulic connection between those aquifers and surface hydrologic features. Also, the presence of human-made or naturally occurring contaminants may influence pumping of the public water supply well because pumping may impact the rate at which contamination may be moving into the aquifer. Furthermore, the level of contamination may require that the water be treated for potable use or be blended with other water to reduce contaminant levels to drinking water standards.

(b) Delineation of the WHPA:
Information related to groundwater quality is used to assess the pathways that recharge takes to the aquifer which may impact the selection of methods that are used to delineate the WHPA and to assess well and DWSMA vulnerability. The presence of human-made contaminants is used to 1) calibrate a groundwater flow model by providing a means of checking travel time distance from the source of a contaminant to a public water supply well, and 2) assess the vulnerability of the well and the DWSMA. The presence of naturally occurring contaminants is used to assess the extent that the source water aquifer is isolated from surface water recharge.

(c) Quantity and Quality of Water Supplying the Wells:
Groundwater quality data influences the quality of the water supplying the wells (especially in the SWCA of the highly vulnerable DWSMA) due to the ability of contaminants that can be introduced on the land surface, infiltrate through the soils, and reach the aquifer where it can travel, over time, to AU's wells. Wells # 2 and #4 are impacted by low levels of nitrate-nitrogen. The remaining AU wells use deeper aquifers and monitoring indicates no water quality impacts resulting from human activities on the surface. Overall, the groundwater quantity and quality serving the AU DWSMA is good. Water quantity from AU wells is sufficient to supply current needs.

(d) Land and Groundwater Uses in the DWSMA:
The shallow, upper carbonate aquifers supplying drinking water to AU are impacted by human-made contaminants as indicated by groundwater monitoring. Natural groundwater buffers such as grasslands, wetlands, and open-space vegetated areas (Chapter 4 of the Plan) provide active filtering of those surface waters recharging the upper aquifer. The PCSI indicates a number of potential contaminant sources within the highly vulnerable portion of the DWSMA that AU will place a high priority on the development of actions in this plan that focus on working with property owners to manage these potential contaminant sources thereby reducing the risk of impact to the drinking water aquifer. The deeper aquifers are not impacted by land or groundwater uses.

Exhibit B

Physical Environmental Data Elements

Tables

Figures

Table B-1. Precipitation Data for AU DWSMA.

Minnesota State Climatology Office

State Climatology Office - DNR Division of Ecological and Water Resources   University of Minnesota

home | current conditions | journal | past data | summaries | agriculture | other sites | about us

Precipitation Data Retrieval from a Gridded Database

Obtaining a long-term precipitation data time-series can be a difficult and time-consuming process. Locating the nearest precipitation monitoring station to a site of interest often proves challenging. Once a nearby monitoring location is identified, retrieving the data, accounting for gaps in the record, and generating the summary statistics can provide further challenges.

By offering access to "synthetic" data, this application assists users in overcoming some the challenges inherent in assembling a precipitation data set. The synthetic data are made up of regularly-spaced grid nodes whose values were calculated using data interpolated from Minnesota's outstanding, but spatially and temporally irregular, precipitation data base.

Click to learn more about **Precipitation Grids**.

county: **Mower** township number: **103N**
township name: **Lansing** range number: **18W**
nearest community: **Ramsey** section number: **26**

precipitation totals are in inches

color key:
total is in lowest 30th percentile of the period-of-record distribution
total is => 30th and <= 70th percentile
total is in highest 30th percentile of the period-of-record distribution

multi-month totals:
WARM = warm season (May thru September)
ANN = calendar year (January thru December)
WAT = water year (Oct. previous year thru Sep. present year)

A 'R' following a monthly total indicates a provisional value.

Period-of-Record Summary Statistics

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
30%	0.53	0.55	1.26	1.78	2.87	3.28	2.79	2.53	1.95	1.51	0.74	0.77	17.35	28.22	28.90
70%	1.24	1.14	2.16	3.28	4.75	5.60	4.99	4.66	4.24	2.57	1.92	1.42	22.29	34.28	34.30
mean	0.99	0.95	1.74	2.77	4.08	4.69	3.97	3.87	3.54	2.28	1.58	1.17	20.15	31.53	31.66

1981-2010 Normals

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
normal	1.04	0.87	1.81	3.22	4.22	4.55	4.76	4.58	3.66	2.45	1.82	1.36	21.77	34.34	34.20

Year-to-Year Data

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	WARM	ANN	WAT
2018	1.56	1.10	1.09	3.85	7.03	6.01	5.54	4.20	7.25	3.67R			30.03		43.61
2017	2.25	1.59	2.27	3.85	4.02	4.42	5.39	2.86	3.88	5.14	0.35	0.49	20.57	36.51	38.60
2016	0.73	0.42	4.10	1.73	4.17	5.11	8.30	5.55	8.55	4.70	1.44	1.93	31.68	46.73	47.36
2015	0.53	0.80	0.93	4.96	4.86	6.81	6.14	4.12	3.67	1.25	3.52	3.93	25.60	41.52	36.63
2014	0.70	1.33	1.12	5.16	2.17	9.25	1.30	5.96	3.61	2.00	0.59	1.22	22.29	34.41	36.82
2013	0.59	1.01	2.66	6.11	7.94	6.20	3.56	1.76	1.15	4.11	1.25	0.86	20.61	37.20	34.68
2012	0.71	1.89	1.44	3.08	4.31	2.99	1.17	1.95	1.31	1.62	0.56	1.52	11.73	22.55	21.16
2011	0.64	1.02	2.47	4.74	3.63	4.11	6.43	1.14	2.03	0.82	0.32	1.17	17.34	28.52	32.99
2010	0.58	0.79	1.51	1.62	2.45	6.79	6.65	1.92	9.02	0.79	2.78	3.21	26.83	38.11	41.85
2009	0.64	0.74	1.16	2.82	3.49	6.00	2.14	3.45	1.21	7.72	0.31	2.49	16.29	32.17	27.40
2008	0.70	0.68	1.40	4.94	4.14	8.33	3.02	2.05	1.87	2.30	1.88	1.57	19.41	32.88	33.56

This is an example of Precipitation Data found at: http://climateapps.dnr.state.mn.us/gridded_data/precip/monthly/monthly_gridded_precip.asp . This website is maintained at the Minnesota State Climatology Office - DNR Division of Ecological and Water Resources University of Minnesota and is updated monthly. Data at this web site for most locations in Minnesota date from 1891 to present. The example above is for a location in Mower County, near the center of the Austin DWSMA.

Figure B-1. Soil Map of AU DWSMA.

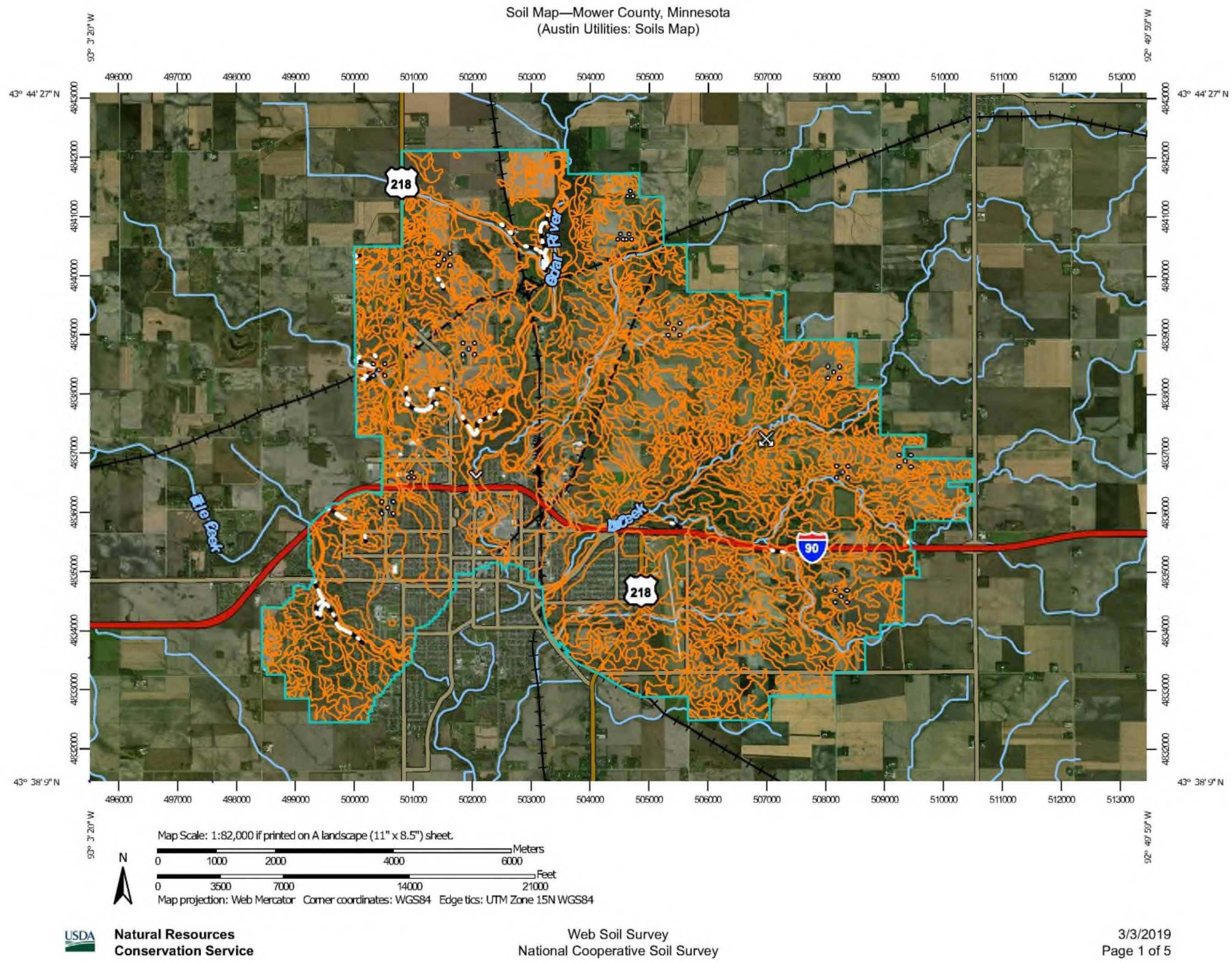


Figure B-1 (continued).

Soil Map—Mower County, Minnesota
(Austin Utilities: Soils Map)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Mower County, Minnesota
Survey Area Data: Version 14, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 1, 2013—Feb 17, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Figure B-1 (continued).

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
23	Skyberg silt loam, 0 to 3 percent slopes	490.8	2.8%
24B	Kasson silt loam, 1 to 4 percent slopes	80.4	0.5%
27A	Dickinson fine sandy loam, 0 to 2 percent slopes	4.7	0.0%
27B	Dickinson fine sandy loam, 2 to 5 percent slopes	10.8	0.1%
44	Ankeny fine sandy loam	71.1	0.4%
79B	Billett fine sandy loam, 2 to 6 percent slopes	101.8	0.6%
83	Maxcreek silty clay loam, swales	108.4	0.6%
88	Clyde silty clay loam, 0 to 3 percent slopes	305.9	1.7%
99A	Racine silt loam, 0 to 2 percent slopes	25.8	0.1%
99B	Racine silt loam, 2 to 6 percent slopes	22.7	0.1%
99C	Racine silt loam, 6 to 12 percent slopes	4.7	0.0%
129	Cylinder loam	124.4	0.7%
135	Donnan silt loam	110.6	0.6%
156A	Fairhaven silt loam, 0 to 2 percent slopes	573.7	3.2%
190	Hayfield loam	537.5	3.0%
244A	Lilah sandy loam, 0 to 2 percent slopes	109.3	0.6%
244B	Lilah sandy loam, 2 to 6 percent slopes	18.3	0.1%
244C	Lilah sandy loam, 6 to 12 percent slopes	44.8	0.3%
252	Marshan clay loam, 0 to 2 percent slopes, rarely flooded	444.2	2.5%
253	Maxcreek silty clay loam	413.6	2.3%
307	Sargeant silt loam	2,224.2	12.6%
313	Spillville loam, occasionally flooded	63.6	0.4%
331	Tripoli silty clay loam, 0 to 2 percent slopes	198.2	1.1%
334B	Vlasaty silt loam, 1 to 4 percent slopes	271.3	1.5%

Figure B-1 (continued).

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
377	Merton silt loam	9.2	0.1%
380	Havana silt loam	674.6	3.8%
381	Newry silt loam	449.1	2.5%
382B	Blooming silt loam, 2 to 6 percent slopes	759.6	4.3%
382C	Blooming silt loam, 6 to 15 percent slopes	111.4	0.6%
393	Udolpho silt loam	846.8	4.8%
444	Canisteo silty clay loam	7.6	0.0%
465	Kalmarville loam, frequently flooded	516.1	2.9%
467	Sawmill silty clay loam, shallow loess, 0 to 2 percent slopes, occasionally flooded	14.2	0.1%
479	Floyd silt loam, 1 to 4 percent slopes	22.7	0.1%
483A	Waukee loam, 0 to 2 percent slopes	960.1	5.4%
483B	Waukee loam, 2 to 5 percent slopes	63.8	0.4%
485	Lawler silt loam	53.5	0.3%
516A	Dowagiac loam, 0 to 2 percent slopes	448.3	2.5%
516B	Dowagiac loam, 2 to 6 percent slopes	261.5	1.5%
517	Shandep clay loam	284.3	1.6%
539	Palms muck	52.9	0.3%
632	Kensett variant silt loam	83.9	0.5%
633B	Nordness variant loam, 2 to 6 percent slopes	62.8	0.4%
635	Riceville silt loam	36.7	0.2%
637	Schley silt loam	465.2	2.6%
638B	Taopi silt loam, 1 to 6 percent slopes	48.8	0.3%
699A	Rossfield silt loam, 0 to 2 percent slopes	22.9	0.1%
1003	Anthroportic Udorthents-Pits-Dumps complex, abandoned, 2 to 45 percent slopes	19.4	0.1%
1030	Pits, sand and gravel	127.5	0.7%
1078	Anthroportic Udorthents, 2 to 9 percent slopes	212.5	1.2%
1812	Terril silt loam	3.3	0.0%

Figure B-1 (continued).

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1841	Hayfield loam, loamy substratum	1,243.0	7.0%
1884	Stateline silt loam	122.5	0.7%
1891	Faxon variant silty clay loam	98.9	0.6%
1903	Udolpho silt loam, loamy substratum, swales	522.5	3.0%
1904	Udolpho silt loam, loamy substratum	909.7	5.1%
1905	Brownsdale silt loam	1,239.7	7.0%
1974	Coland-Spillville loams, frequently flooded	206.5	1.2%
1992	Sargeant variant silt loam	157.6	0.9%
RIVER	Water, rivers and streams	203.7	1.2%
W	Water	7.1	0.0%
Totals for Area of Interest		**17,690.9**	**100.0%**

Figure B-2. Soil Hydrologic Unit Map.

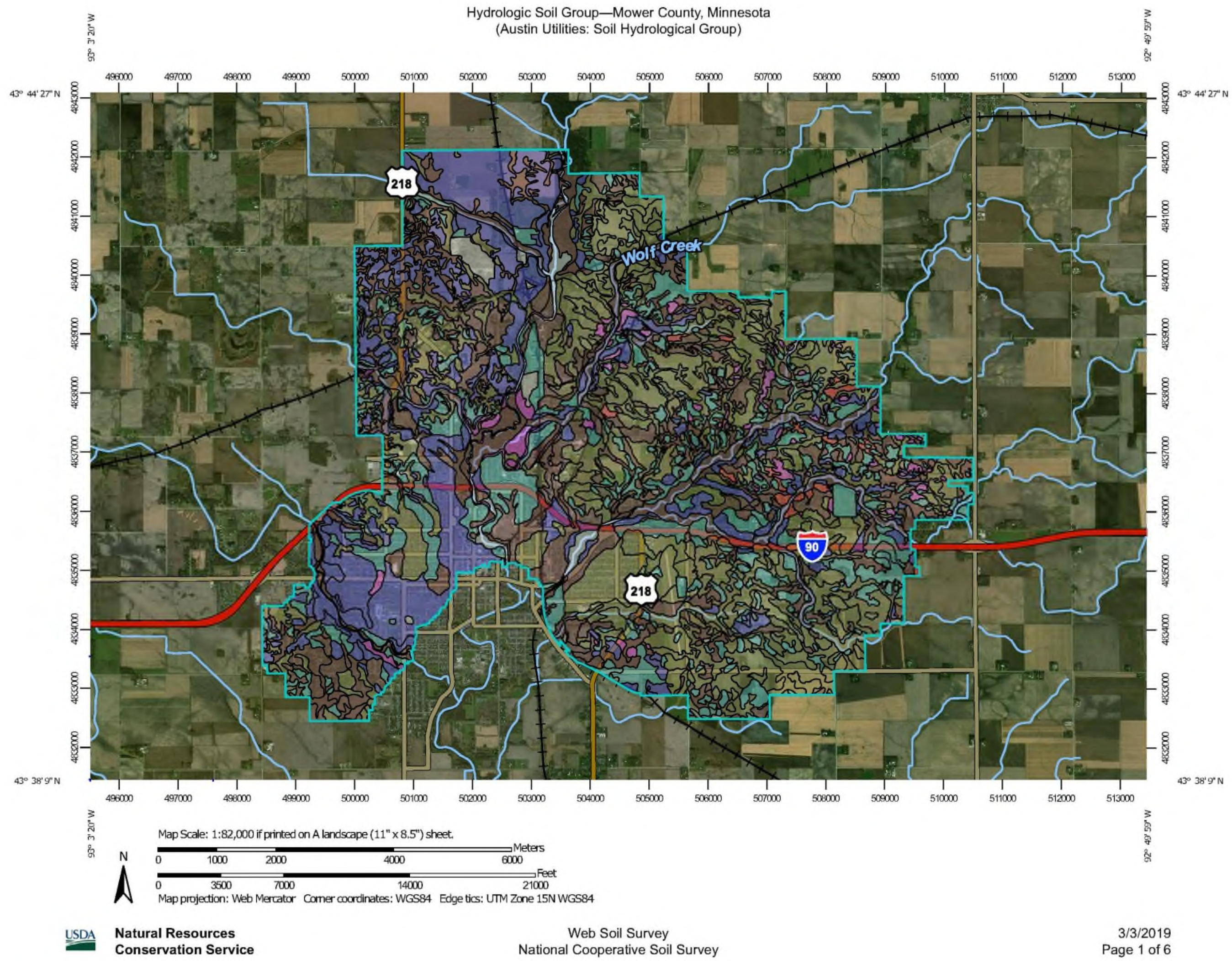


Figure B-2 (continued).

Hydrologic Soil Group—Mower County, Minnesota
(Austin Utilities: Soil Hydrological Group)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Mower County, Minnesota
Survey Area Data: Version 14, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 1, 2013—Feb 17, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Figure B-2 (continued).

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
23	Skyberg silt loam, 0 to 3 percent slopes	C/D	490.8	2.8%
24B	Kasson silt loam, 1 to 4 percent slopes	C	80.4	0.5%
27A	Dickinson fine sandy loam, 0 to 2 percent slopes	A	4.7	0.0%
27B	Dickinson fine sandy loam, 2 to 5 percent slopes	A	10.8	0.1%
44	Ankeny fine sandy loam	A	71.1	0.4%
79B	Billett fine sandy loam, 2 to 6 percent slopes	A	101.8	0.6%
83	Maxcreek silty clay loam, swales	B/D	108.4	0.6%
88	Clyde silty clay loam, 0 to 3 percent slopes	C/D	305.9	1.7%
99A	Racine silt loam, 0 to 2 percent slopes	B	25.8	0.1%
99B	Racine silt loam, 2 to 6 percent slopes	B	22.7	0.1%
99C	Racine silt loam, 6 to 12 percent slopes	B	4.7	0.0%
129	Cylinder loam	B/D	124.4	0.7%
135	Donnan silt loam	C	110.6	0.6%
156A	Fairhaven silt loam, 0 to 2 percent slopes	B	573.7	3.2%
190	Hayfield loam	C	537.5	3.0%
244A	Lilah sandy loam, 0 to 2 percent slopes	A	109.3	0.6%
244B	Lilah sandy loam, 2 to 6 percent slopes	A	18.3	0.1%
244C	Lilah sandy loam, 6 to 12 percent slopes	A	44.8	0.3%
252	Marshan clay loam, 0 to 2 percent slopes, rarely flooded	C/D	444.2	2.5%
253	Maxcreek silty clay loam	B/D	413.6	2.3%
307	Sargeant silt loam	C/D	2,224.2	12.6%
313	Spillville loam, occasionally flooded	C	63.6	0.4%

Figure B-2 (continued).

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
331	Tripoli silty clay loam, 0 to 2 percent slopes	C/D	198.2	1.1%
334B	Vlasaty silt loam, 1 to 4 percent slopes	C/D	271.3	1.5%
377	Merton silt loam	C	9.2	0.1%
380	Havana silt loam	C/D	674.6	3.8%
381	Newry silt loam	C	449.1	2.5%
382B	Blooming silt loam, 2 to 6 percent slopes	B	759.6	4.3%
382C	Blooming silt loam, 6 to 15 percent slopes	B	111.4	0.6%
393	Udolpho silt loam	B/D	846.8	4.8%
444	Canisteo silty clay loam	B/D	7.6	0.0%
465	Kalmarville loam, frequently flooded	B/D	516.1	2.9%
467	Sawmill silty clay loam, shallow loess, 0 to 2 percent slopes, occasionally flooded	C/D	14.2	0.1%
479	Floyd silt loam, 1 to 4 percent slopes	B/D	22.7	0.1%
483A	Waukee loam, 0 to 2 percent slopes	B	960.1	5.4%
483B	Waukee loam, 2 to 5 percent slopes	B	63.8	0.4%
485	Lawler silt loam	C	53.5	0.3%
516A	Dowagiac loam, 0 to 2 percent slopes	B	448.3	2.5%
516B	Dowagiac loam, 2 to 6 percent slopes	B	261.5	1.5%
517	Shandep clay loam	B/D	284.3	1.6%
539	Palms muck	B/D	52.9	0.3%
632	Kensett variant silt loam	C	83.9	0.5%
633B	Nordness variant loam, 2 to 6 percent slopes	B	62.8	0.4%
635	Riceville silt loam	C	36.7	0.2%
637	Schley silt loam	B/D	465.2	2.6%
638B	Taopi silt loam, 1 to 6 percent slopes	B	48.8	0.3%
699A	Rossfield silt loam, 0 to 2 percent slopes	B	22.9	0.1%
1003	Anthroportic Udorthents-Pits-Dumps complex, abandoned, 2 to 45 percent slopes	C	19.4	0.1%
1030	Pits, sand and gravel		127.5	0.7%

Figure B-2 (continued).

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1078	Anthroportic Udorthents, 2 to 9 percent slopes	C	212.5	1.2%
1812	Terril silt loam	B	3.3	0.0%
1841	Hayfield loam, loamy substratum	C	1,243.0	7.0%
1884	Stateline silt loam	D	122.5	0.7%
1891	Faxon variant silty clay loam	B/D	98.9	0.6%
1903	Udolpho silt loam, loamy substratum, swales	B/D	522.5	3.0%
1904	Udolpho silt loam, loamy substratum	B/D	909.7	5.1%
1905	Brownsdale silt loam	C/D	1,239.7	7.0%
1974	Coland-Spillville loams, frequently flooded	B/D	206.5	1.2%
1992	Sargeant variant silt loam	C/D	157.6	0.9%
RIVER	Water, rivers and streams		203.7	1.2%
W	Water		7.1	0.0%
Totals for Area of Interest			**17,690.9**	**100.0%**

Figure B-2 (continued).

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Figure B-3. Soil Erodibility (K-Factor) Map.

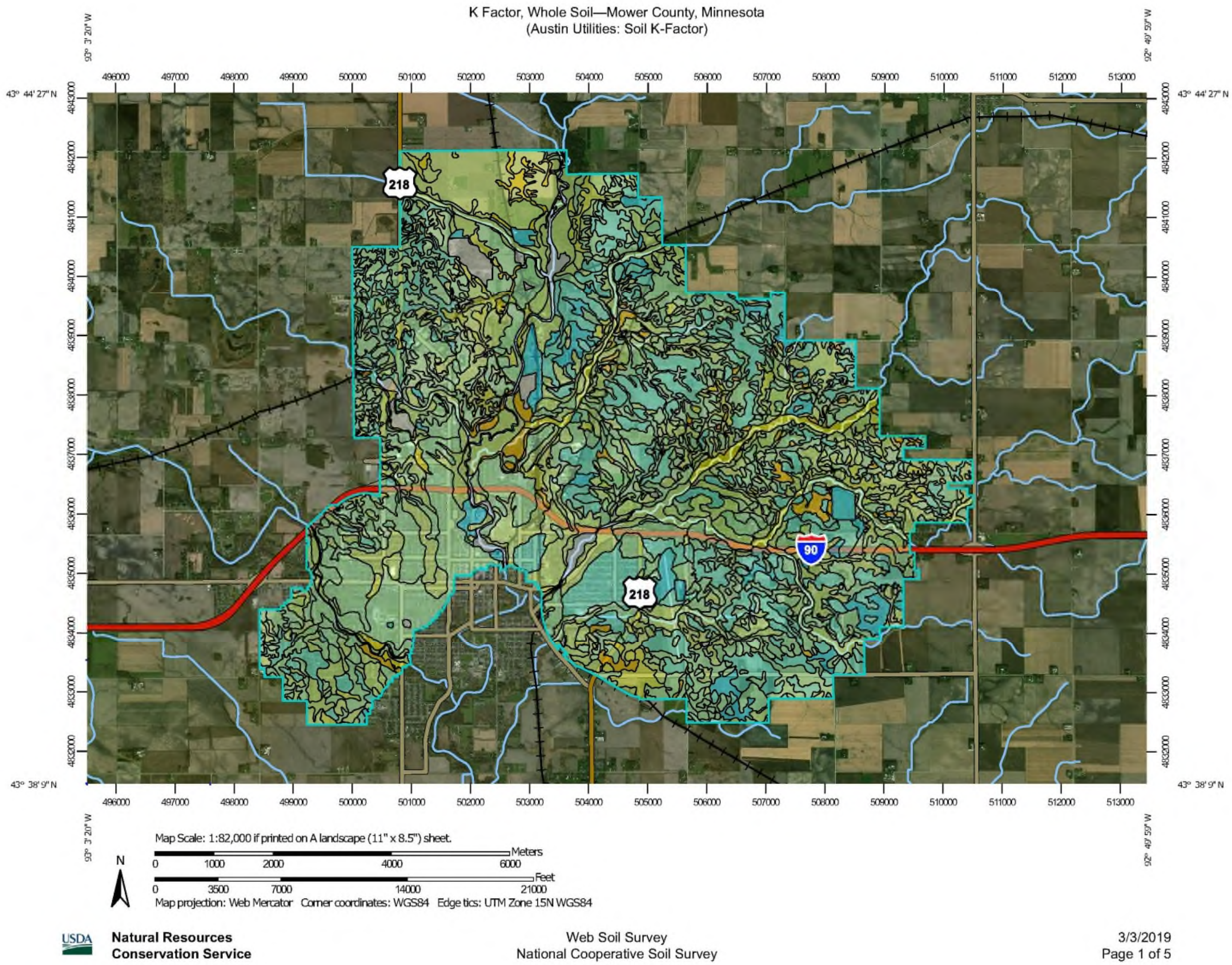


Figure B-3 (continued).

K Factor, Whole Soil—Mower County, Minnesota
(Austin Utilities: Soil K-Factor)

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Soil Rating Lines

- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Soil Rating Points

- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Mower County, Minnesota
Survey Area Data: Version 14, Sep 12, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 1, 2013—Feb 17, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Figure B-3 (continued).

K Factor, Whole Soil

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
23	Skyberg silt loam, 0 to 3 percent slopes	.37	490.8	2.8%
24B	Kasson silt loam, 1 to 4 percent slopes	.32	80.4	0.5%
27A	Dickinson fine sandy loam, 0 to 2 percent slopes	.20	4.7	0.0%
27B	Dickinson fine sandy loam, 2 to 5 percent slopes	.20	10.8	0.1%
44	Ankeny fine sandy loam	.15	71.1	0.4%
79B	Billett fine sandy loam, 2 to 6 percent slopes	.20	101.8	0.6%
83	Maxcreek silty clay loam, swales	.32	108.4	0.6%
88	Clyde silty clay loam, 0 to 3 percent slopes	.24	305.9	1.7%
99A	Racine silt loam, 0 to 2 percent slopes	.24	25.8	0.1%
99B	Racine silt loam, 2 to 6 percent slopes	.24	22.7	0.1%
99C	Racine silt loam, 6 to 12 percent slopes	.24	4.7	0.0%
129	Cylinder loam	.17	124.4	0.7%
135	Donnan silt loam	.32	110.6	0.6%
156A	Fairhaven silt loam, 0 to 2 percent slopes	.24	573.7	3.2%
190	Hayfield loam	.28	537.5	3.0%
244A	Lilah sandy loam, 0 to 2 percent slopes	.15	109.3	0.6%
244B	Lilah sandy loam, 2 to 6 percent slopes	.15	18.3	0.1%
244C	Lilah sandy loam, 6 to 12 percent slopes	.15	44.8	0.3%
252	Marshan clay loam, 0 to 2 percent slopes, rarely flooded	.20	444.2	2.5%
253	Maxcreek silty clay loam	.32	413.6	2.3%
307	Sargeant silt loam	.32	2,224.2	12.6%
313	Spillville loam, occasionally flooded	.17	63.6	0.4%

Figure B-3 (continued).

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
331	Tripoli silty clay loam, 0 to 2 percent slopes	.24	198.2	1.1%
334B	Vlasaty silt loam, 1 to 4 percent slopes	.32	271.3	1.5%
377	Merton silt loam	.32	9.2	0.1%
380	Havana silt loam	.28	674.6	3.8%
381	Newry silt loam	.24	449.1	2.5%
382B	Blooming silt loam, 2 to 6 percent slopes	.28	759.6	4.3%
382C	Blooming silt loam, 6 to 15 percent slopes	.28	111.4	0.6%
393	Udolpho silt loam	.24	846.8	4.8%
444	Canisteo silty clay loam	.24	7.6	0.0%
465	Kalmarville loam, frequently flooded	.24	516.1	2.9%
467	Sawmill silty clay loam, shallow loess, 0 to 2 percent slopes, occasionally flooded	.28	14.2	0.1%
479	Floyd silt loam, 1 to 4 percent slopes	.24	22.7	0.1%
483A	Waukee loam, 0 to 2 percent slopes	.28	960.1	5.4%
483B	Waukee loam, 2 to 5 percent slopes	.28	63.8	0.4%
485	Lawler silt loam	.24	53.5	0.3%
516A	Dowagiac loam, 0 to 2 percent slopes	.24	448.3	2.5%
516B	Dowagiac loam, 2 to 6 percent slopes	.24	261.5	1.5%
517	Shandep clay loam	.24	284.3	1.6%
539	Palms muck		52.9	0.3%
632	Kensett variant silt loam	.20	83.9	0.5%
633B	Nordness variant loam, 2 to 6 percent slopes	.24	62.8	0.4%
635	Riceville silt loam	.24	36.7	0.2%
637	Schley silt loam	.28	465.2	2.6%
638B	Taopi silt loam, 1 to 6 percent slopes	.28	48.8	0.3%
699A	Rossfield silt loam, 0 to 2 percent slopes	.24	22.9	0.1%
1003	Anthroportic Udorthents-Pits-Dumps complex, abandoned, 2 to 45 percent slopes	.37	19.4	0.1%
1030	Pits, sand and gravel		127.5	0.7%

Figure B-3 (continued).

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1078	Anthroportic Udorthents, 2 to 9 percent slopes	.37	212.5	1.2%
1812	Terril silt loam	.28	3.3	0.0%
1841	Hayfield loam, loamy substratum	.28	1,243.0	7.0%
1884	Stateline silt loam	.32	122.5	0.7%
1891	Faxon variant silty clay loam	.15	98.9	0.6%
1903	Udolpho silt loam, loamy substratum, swales	.24	522.5	3.0%
1904	Udolpho silt loam, loamy substratum	.24	909.7	5.1%
1905	Brownsdale silt loam	.28	1,239.7	7.0%
1974	Coland-Spillville loams, frequently flooded	.17	206.5	1.2%
1992	Sargeant variant silt loam	.28	157.6	0.9%
RIVER	Water, rivers and streams		203.7	1.2%
W	Water		7.1	0.0%
Totals for Area of Interest			**17,690.9**	**100.0%**

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Figure B-4. Watershed Map.

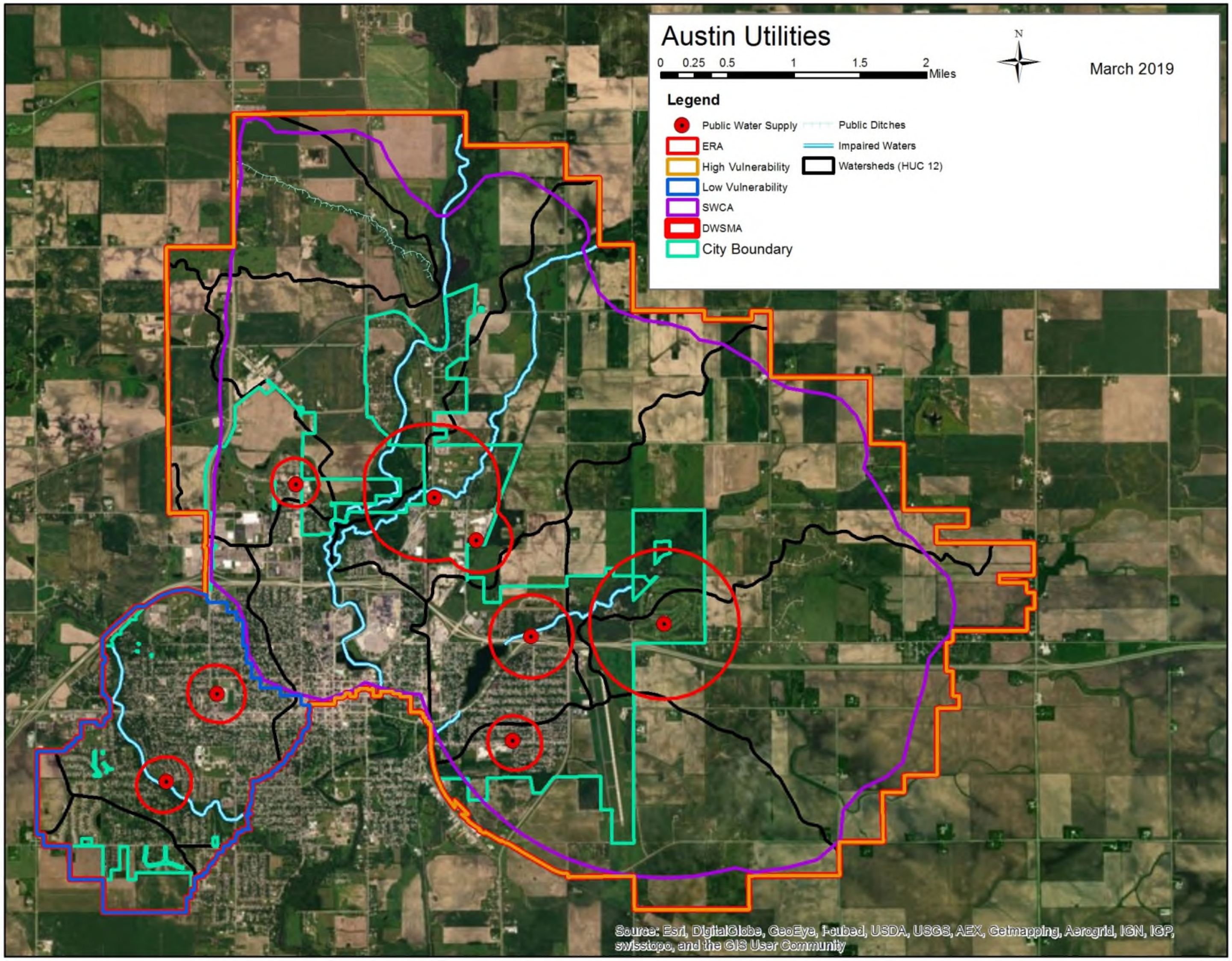


Figure B-5. Public Waters and Floodplain Map.

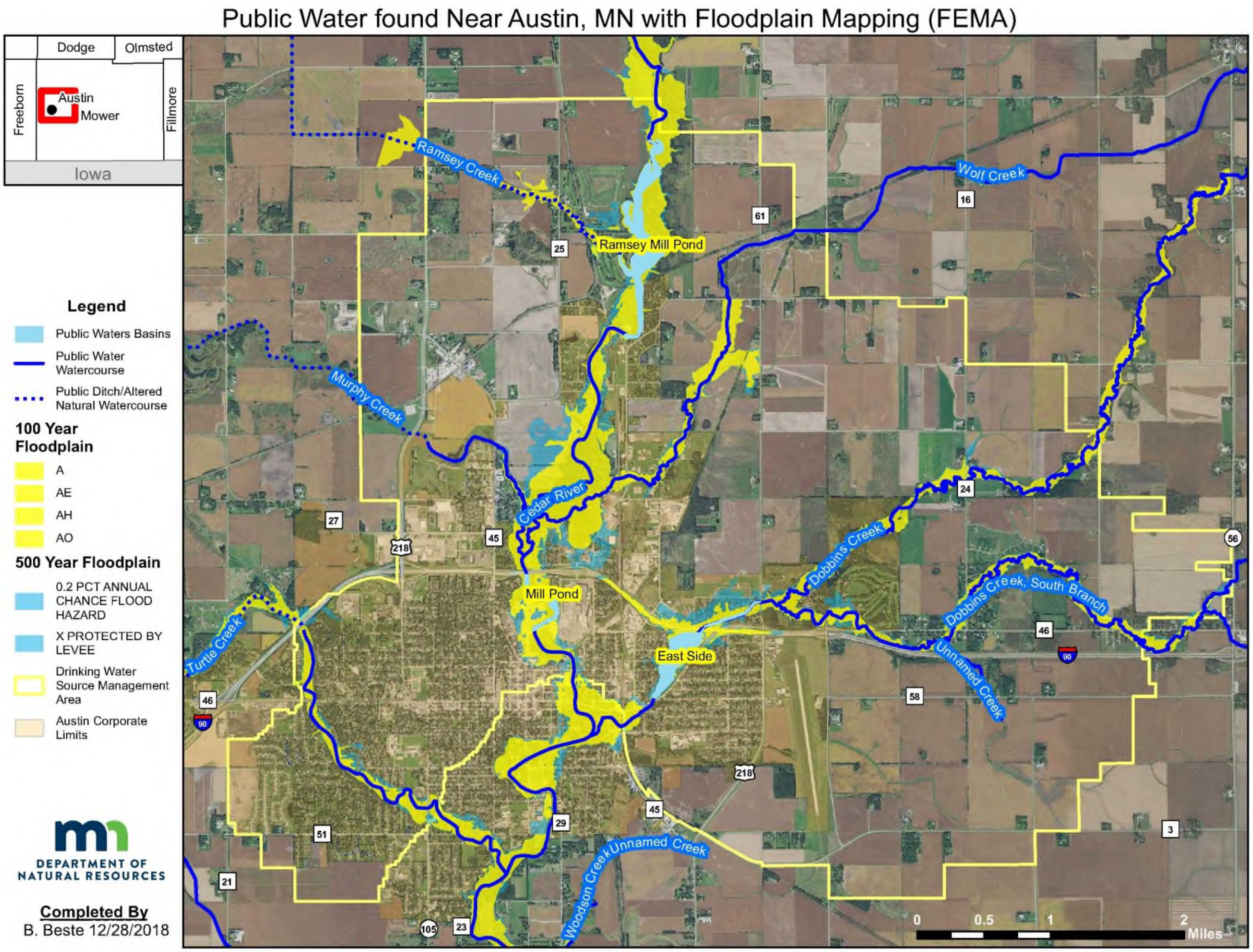


Table B-2. Shoreland Classifications of Surface Water Basins within the AU DWSMA.

BASIN ID	PW BASIN NAME	WETTYPE	PWI Label	Acres	SHORE MILES	DNR_SHORELAND_CLASS
17748	East Side	5	Public Water Basin	50.07	2.49	Recreational Development
17749	Mill Pond	5	Public Water Basin	16.15	1.49	General Development
17750	Ramsey Mill Pond	5	Public Water Basin	97.93	4.93	Natural Environment

Figure B-6. AU Wetlands.

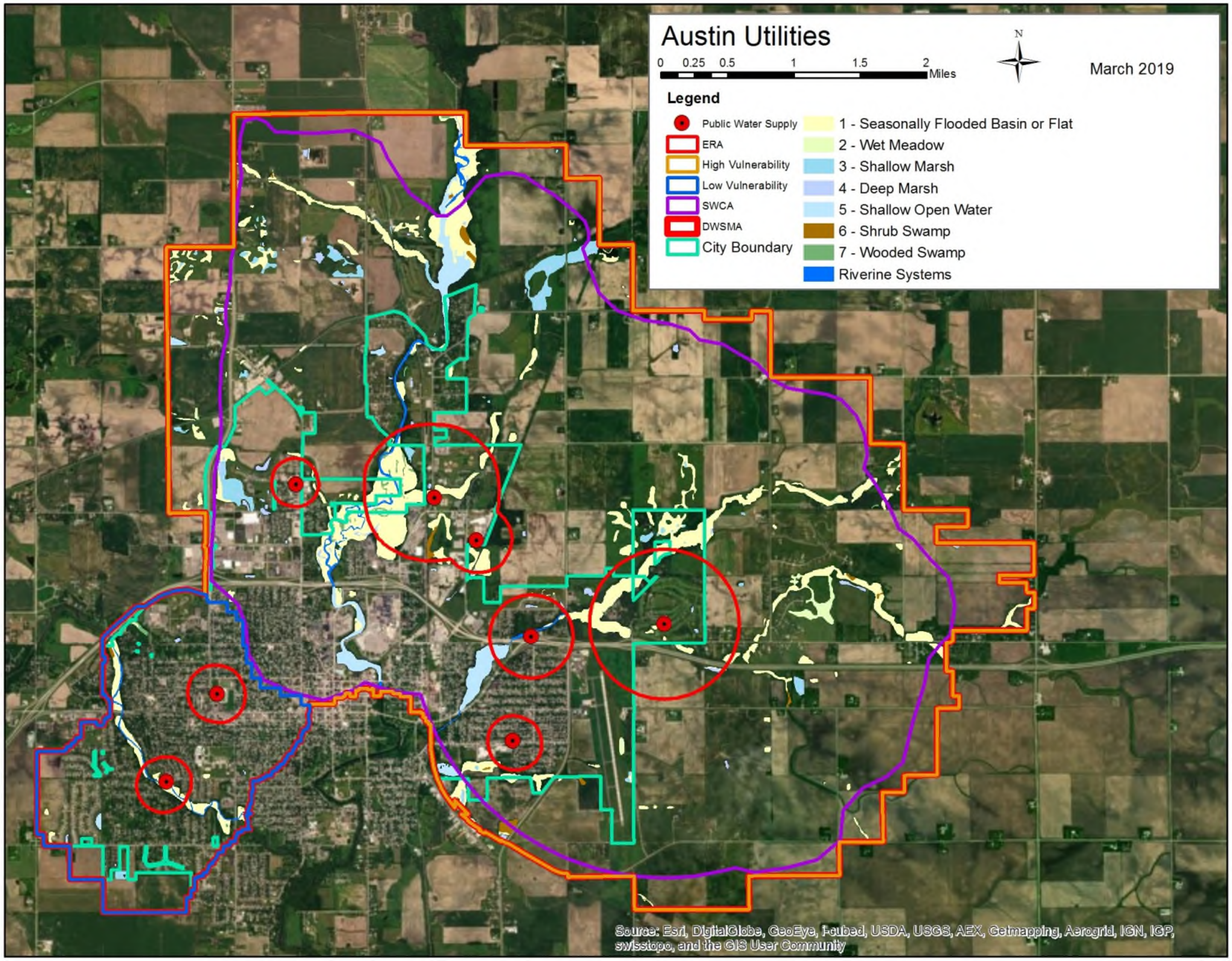


Exhibit C

Land Use Data Elements

Tables

Figures

Figure C-1. Land Cover Map.

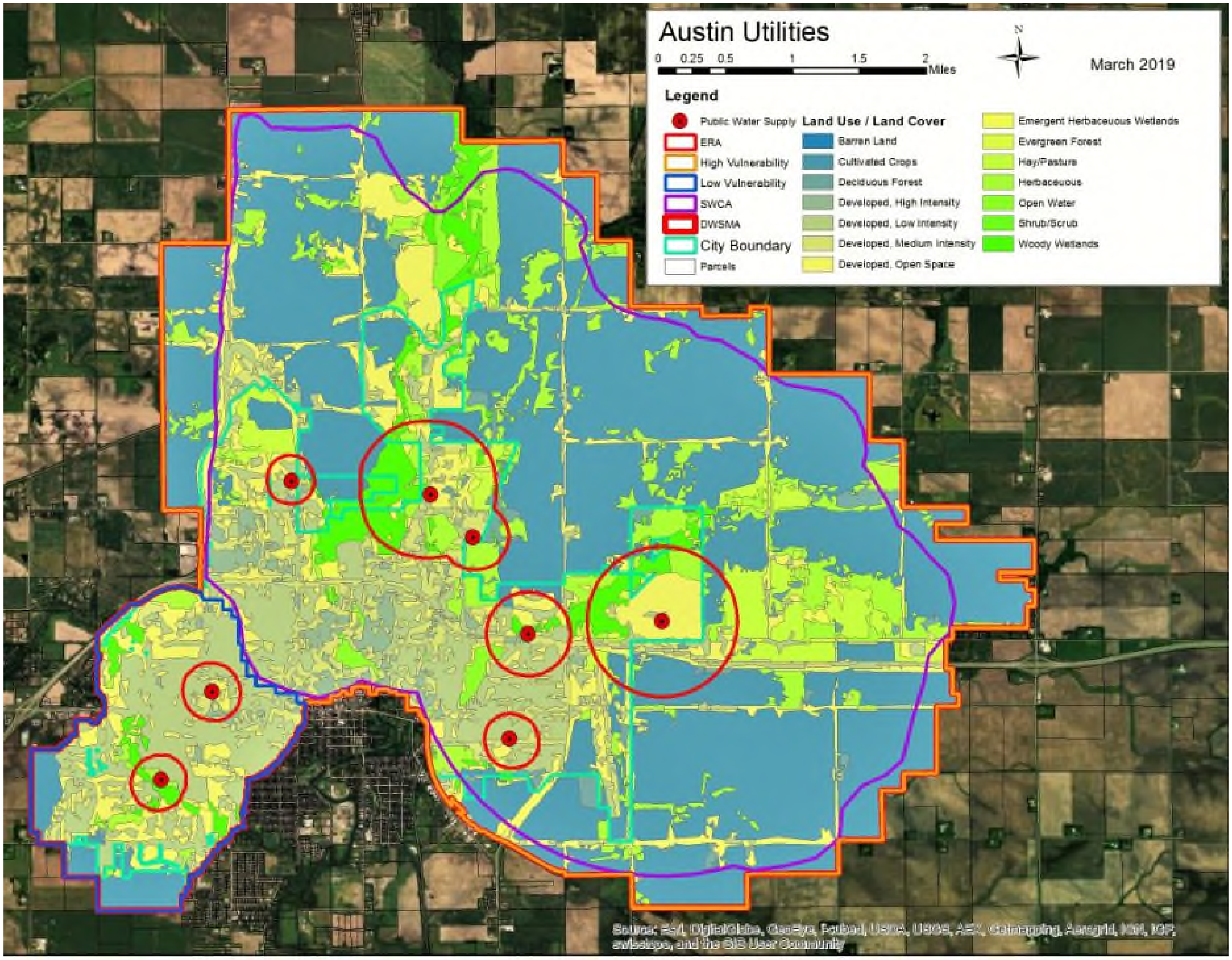


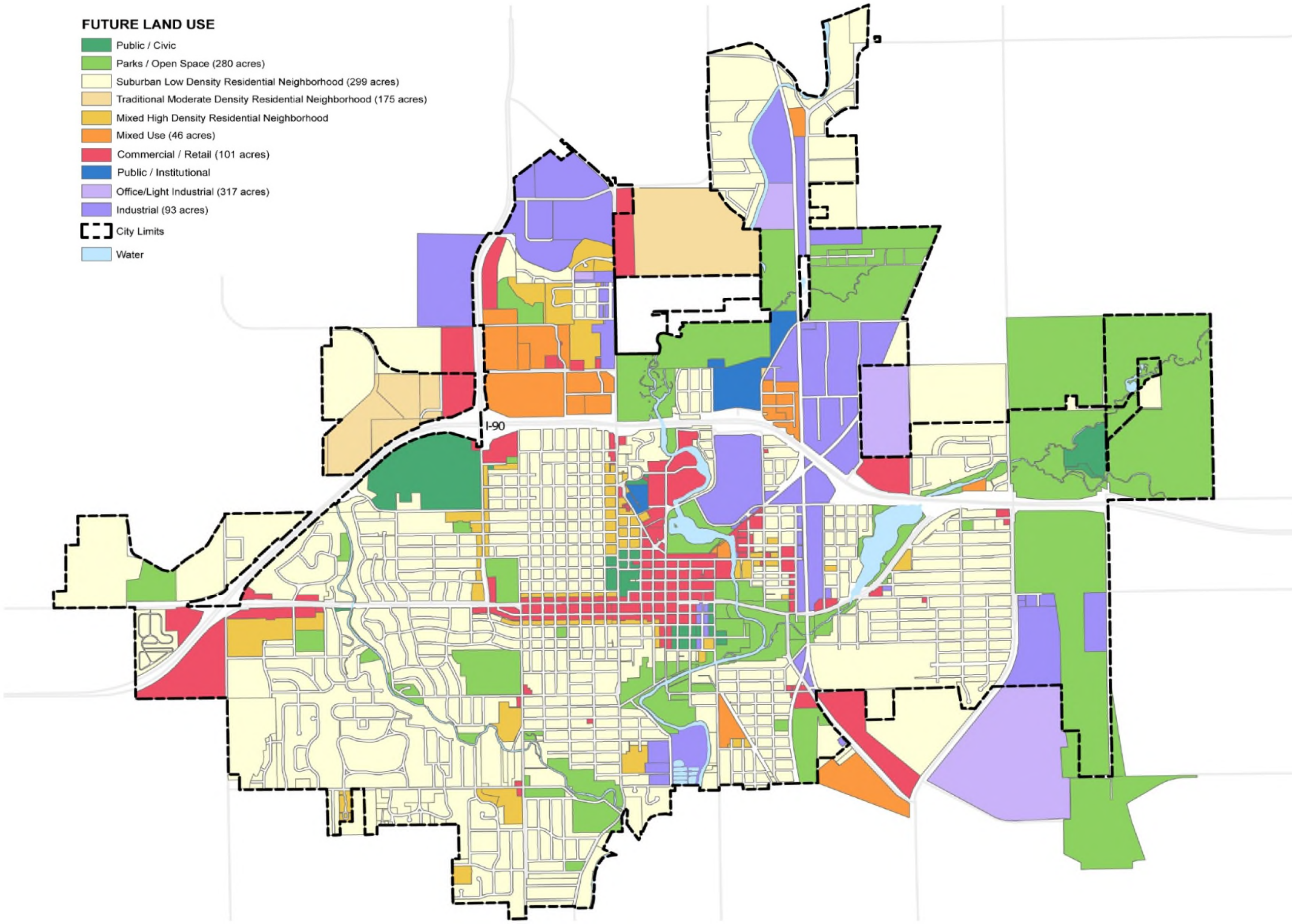
Table C-1

2011 National Land Cover Data Set Legend

Source: https://www.mrlc.gov/data/legends/national-land-cover-database-2011-nlcd2011-legend

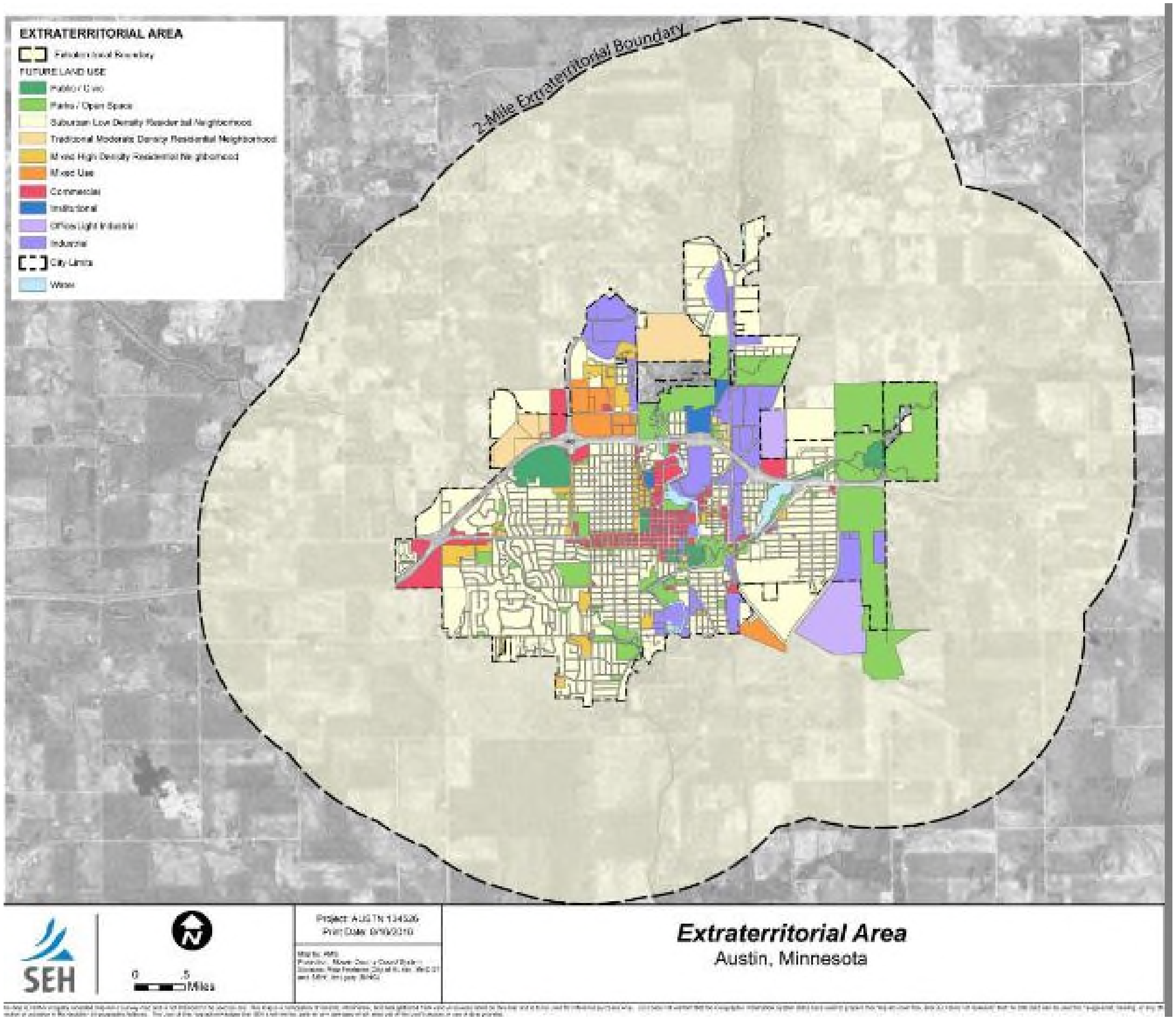
Open Water- areas of open water, generally with less than 25% cover of vegetation or soil.
Developed, Open Space- areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
Developed, Low Intensity- areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.
Developed, Medium Intensity -areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
Developed High Intensity-highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.
Barren Land (Rock/Sand/Clay) - areas of gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.
Deciduous Forest- areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.
Evergreen Forest- areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.
Shrub/Scrub- areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.
Herbaceous- areas dominated by gramanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
Pasture/Hay-areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.
Cultivated Crops -areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.
Woody Wetlands- areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
Emergent Herbaceous Wetlands- Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

Figure C-2. City of Austin Future Land Use Map.



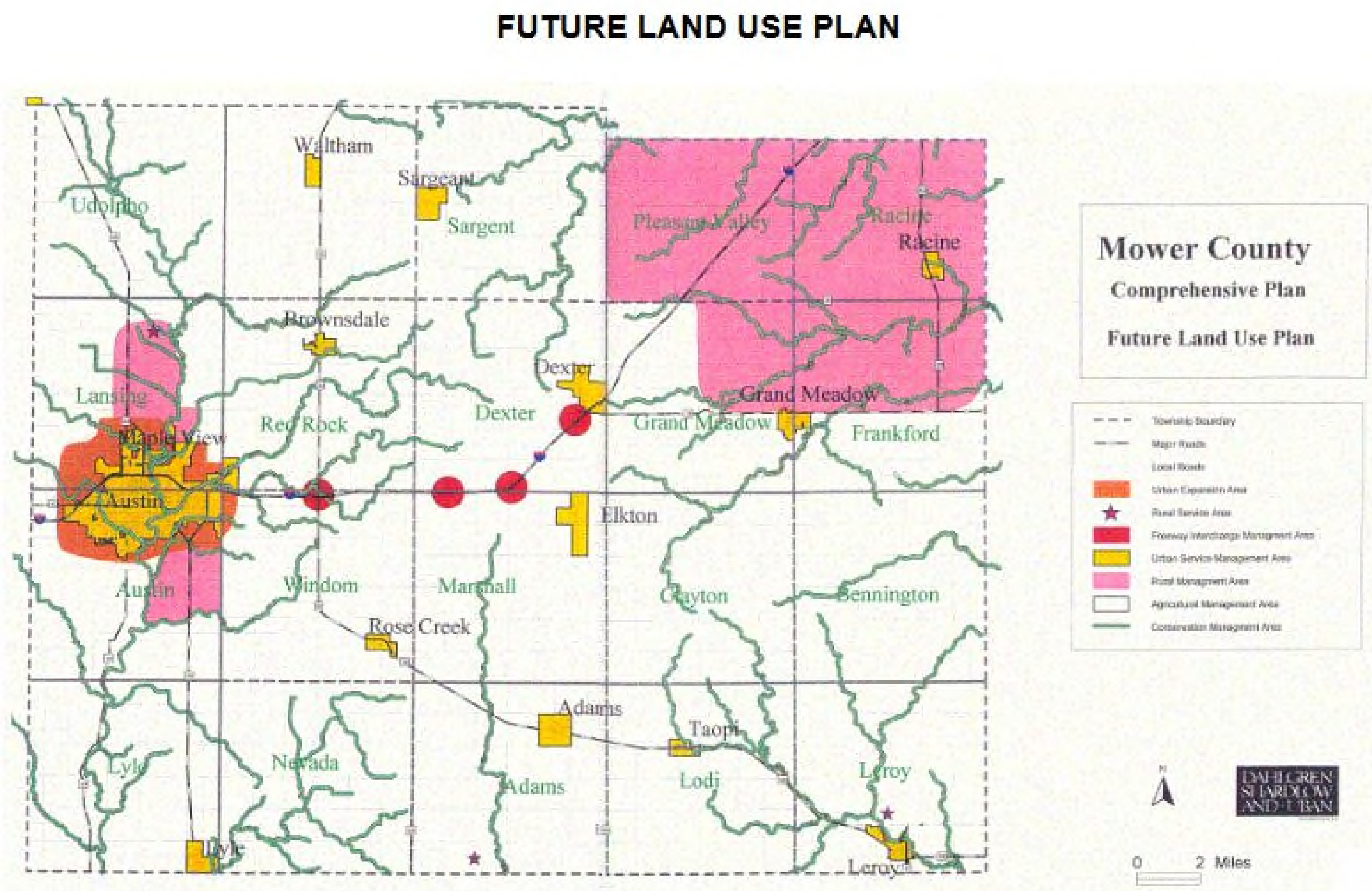
Source: City of Austin Comprehensive Plan – 2016

Figure C-3. City of Austin 2016 Extraterritorial (2 mile) Map.



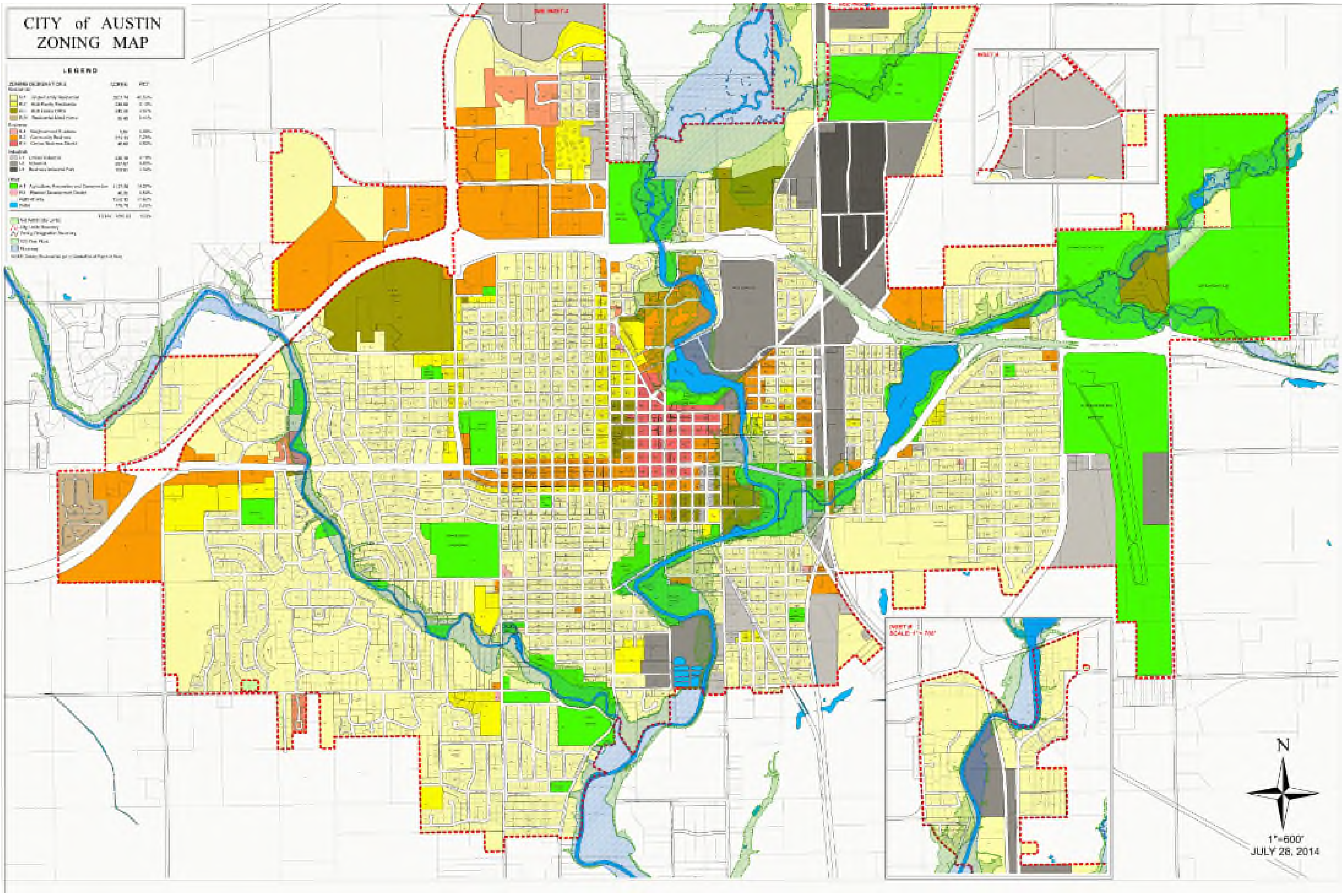
Source: City of Austin Comprehensive Plan – 2016

Figure C-4. Mower County 2002 Comprehensive Plan Map.

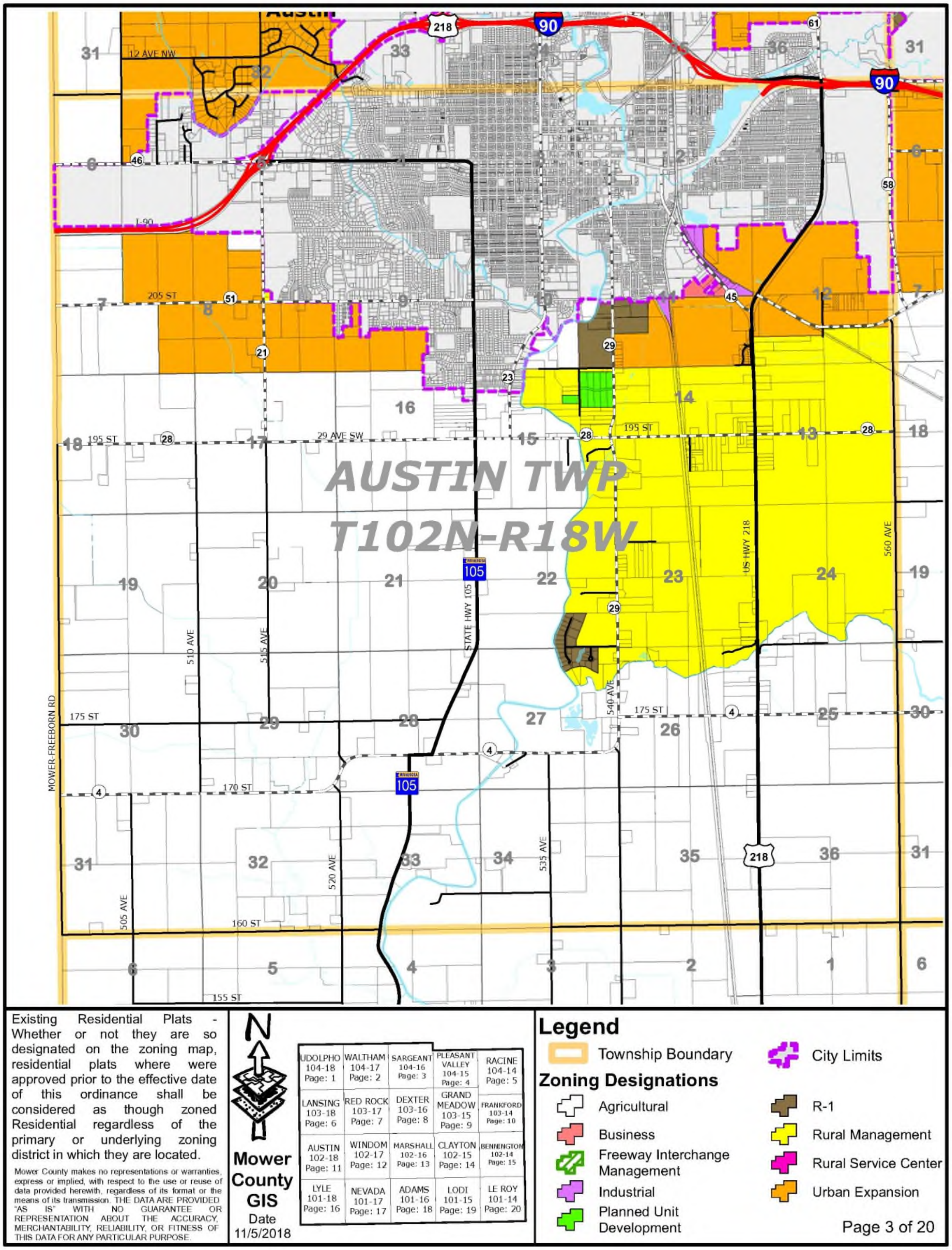


Source: Mower County Comprehensive Plan – 2002

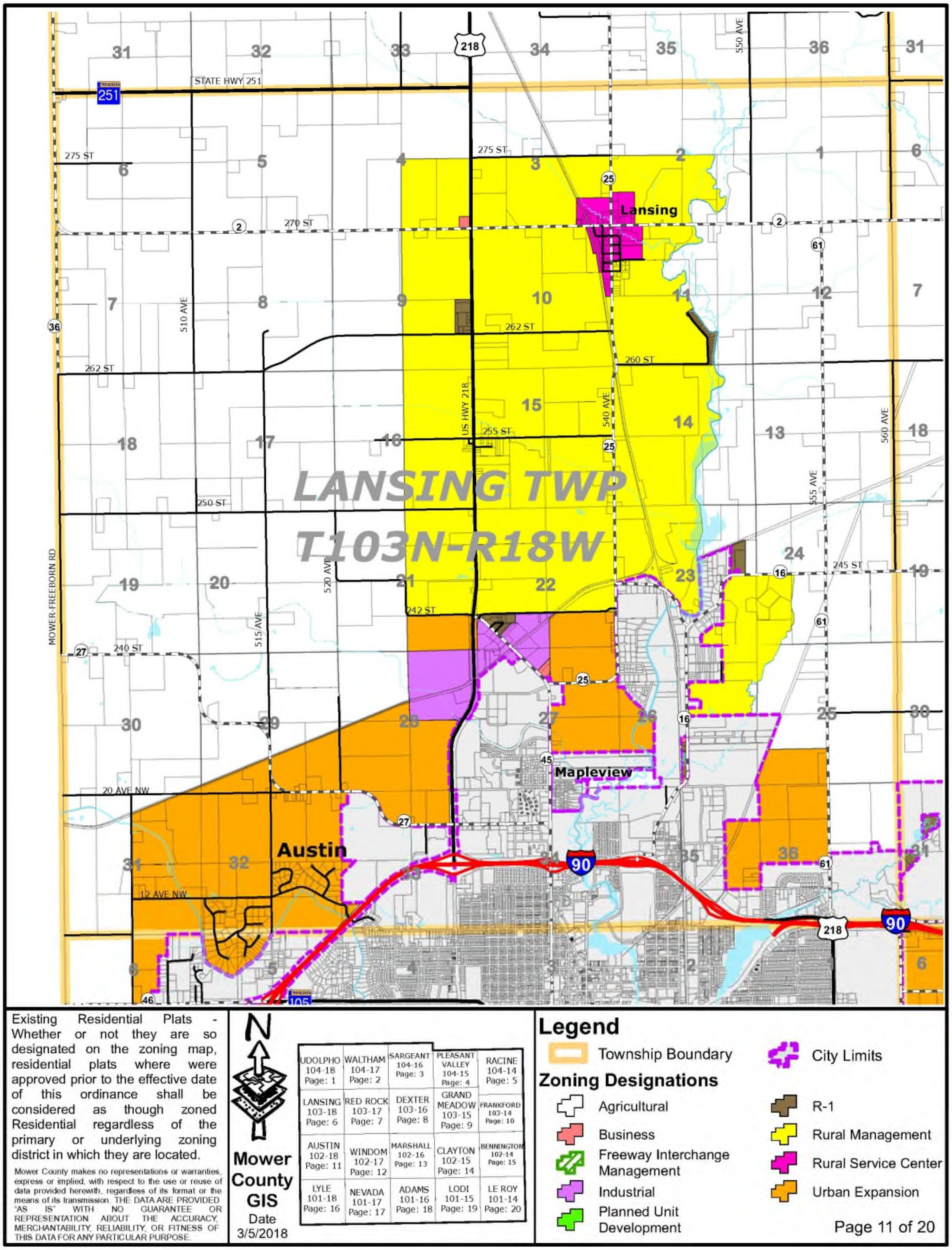
Figure C-5. City of Austin Zoning Map.



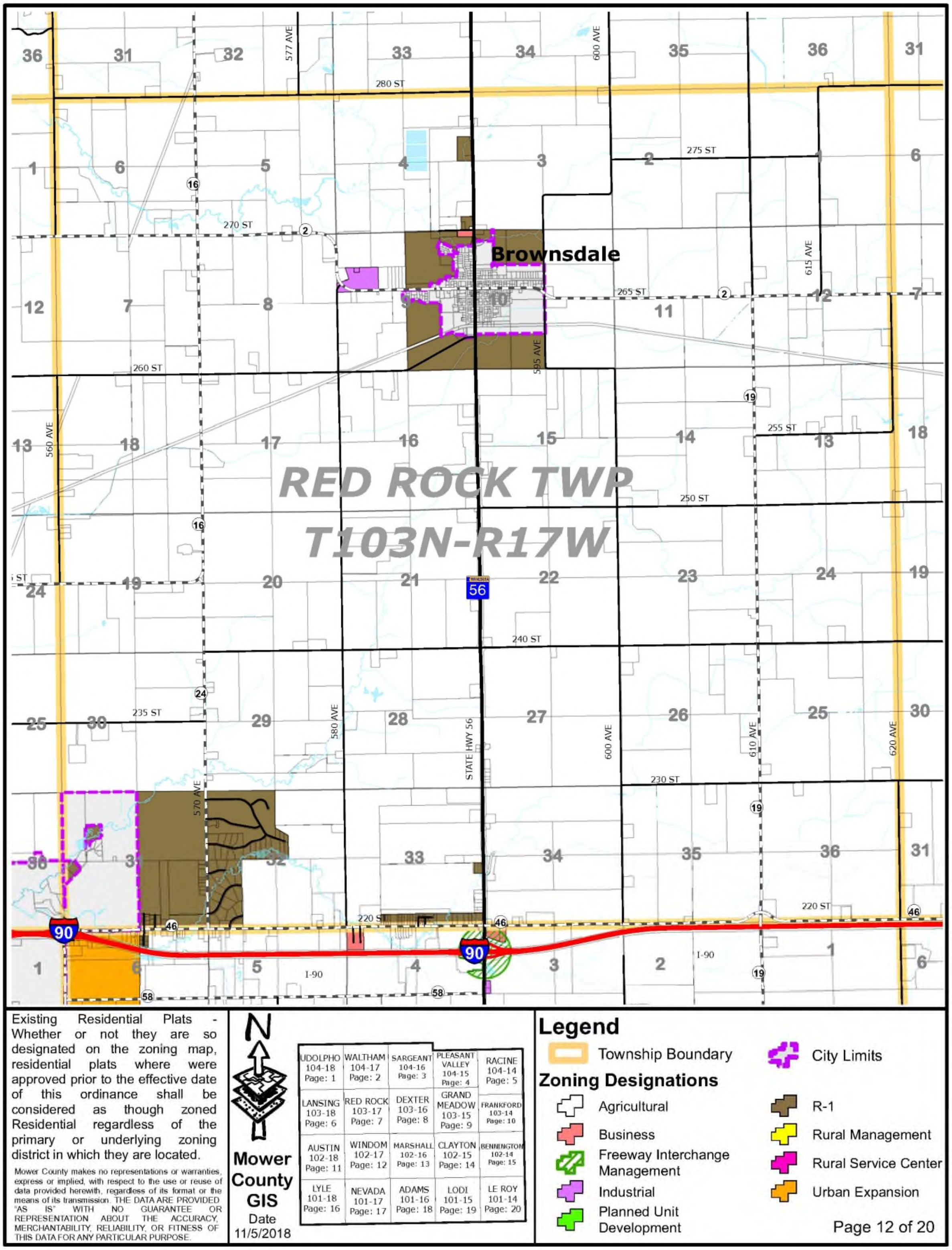
C-6. Austin Township Zoning Map.



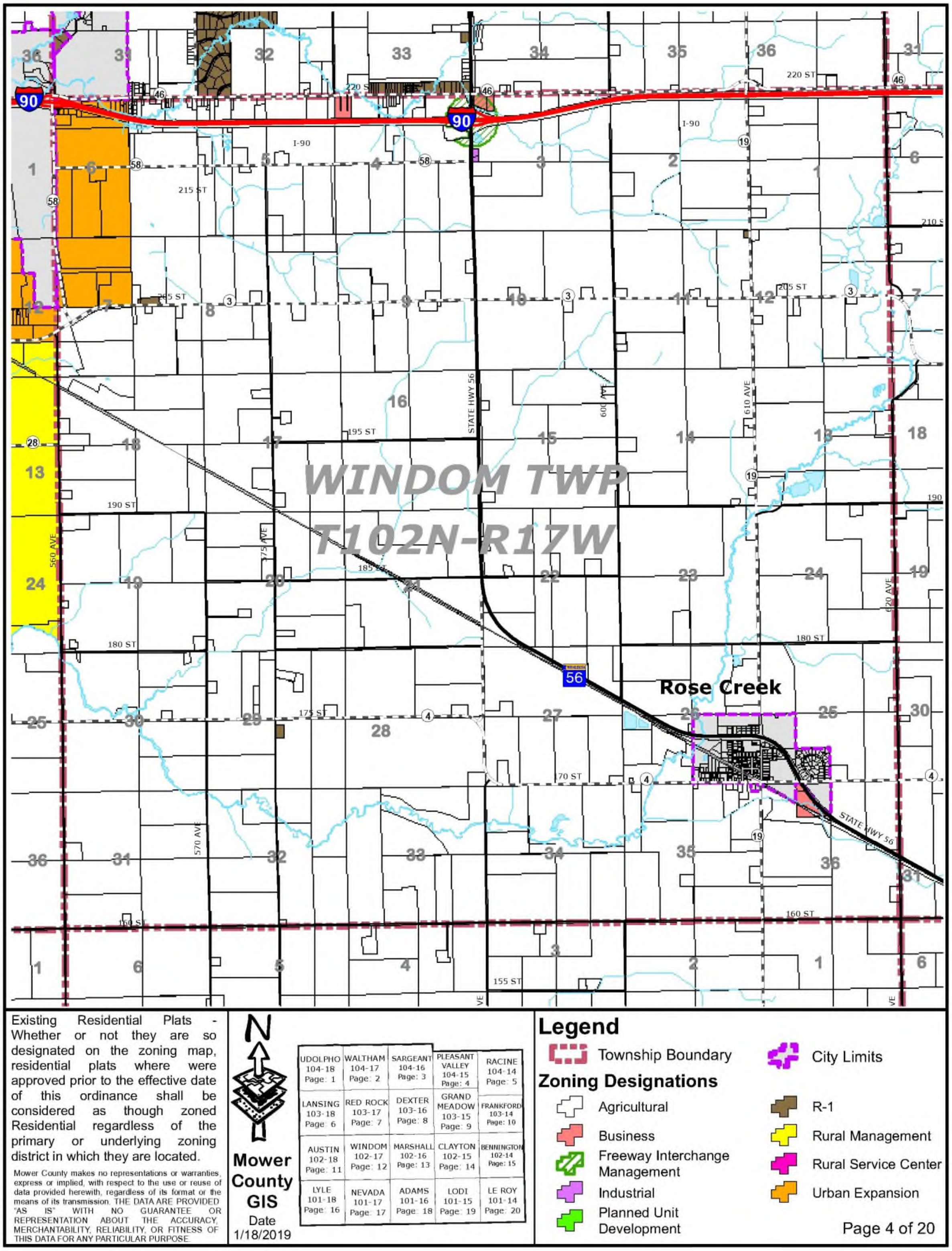
C-7. Lansing Township Zoning Map.



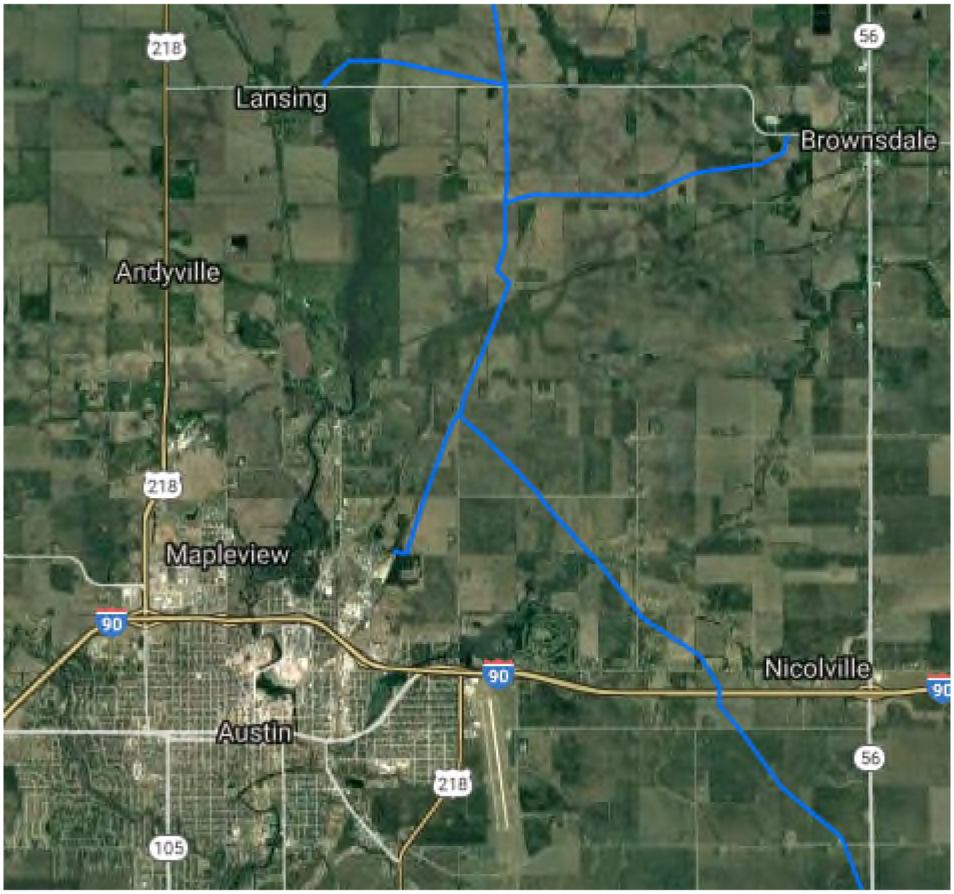
C-8. Red Rock Township Zoning Map.



C-9. Windom Township Zoning Map.



C-10. Natural Gas Pipelines in the Austin DWSMA.



Source: National Pipeline Mapping System https://www.npms.phmsa.dot.gov/

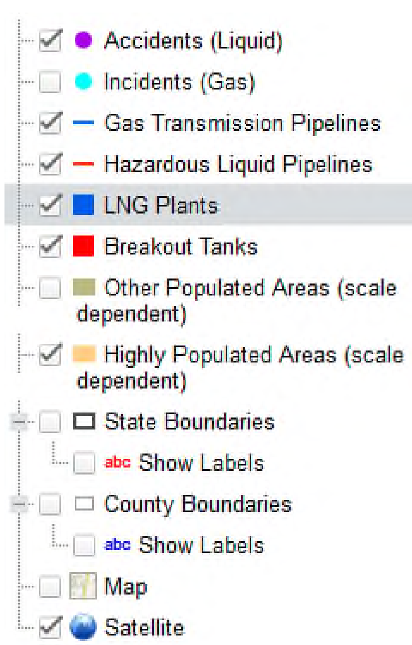


Exhibit D

Water Quantity Data Elements

Tables

Figures

Exhibits

Exhibit D-1. DNR Comments Regarding Surface Water and Ground Quantity.

Surface Water and Groundwater Information Provided by the Minnesota DNR – Mankato, MN

1. Description of high, mean or low flows on streams within the DWSMA –
   - DNR does not have established information. NWS/USGS has information available at the websites below.
   - Dobbins Creek: https://water.weather.gov/ahps2/hydrograph.php?wfo=arx&gage=dobm5
   - Cedar River at Lansing: https://water.weather.gov/ahps2/hydrograph.php?wfo=arx&gage=lanm5
   - Cedar River at Austin: https://water.weather.gov/ahps2/hydrograph.php?wfo=arx&gage=astm5
2. Data on OHWM for any lakes within the DWSMA –
   - No lakes have an OHWL Established – information can be found at: https://www.dnr.state.mn.us/lakefind/search.html?name=&county=50
3. An existing list of permitted withdrawals from lakes or streams including source, use and amounts withdrawn.
   - No surface water withdrawals are currently permitted from public water features in Mower County
4. An existing list of lakes and streams within the DWSMA for which state protected levels or flows have been established.
   - There are no established protected flow levels in the DWSMA. The state standard for water appropriations is the annual 90% exceedance value for new appropriations in public water courses
5. An existing description of known water-use conflicts, including those caused by groundwater pumping.
   - No known water use conflicts
6. An existing list of wells covered by state appropriation permits, including amounts of water pumped, type of use and aquifer source.
   - See attached spreadsheet
7. An existing description of known well interference problems and water-use conflicts.
   - Two known well interference issues from the mid 1980's related to irrigation near the northern edge of the DWSMA in the shallow bedrock. The A new well was required due to a combination of well pumping and well construction issues. There have been no water use issues in the DWSMA since. Just outside of the DWSMA in 2016, a complaint was received and solved by lowering a pump.
8. A map and list of any DNR observation/monitoring wells in the DWSMA – including unique numbers and location if available.
   - See map and list

Figure D-1. DNR Cedar River Flow Data.

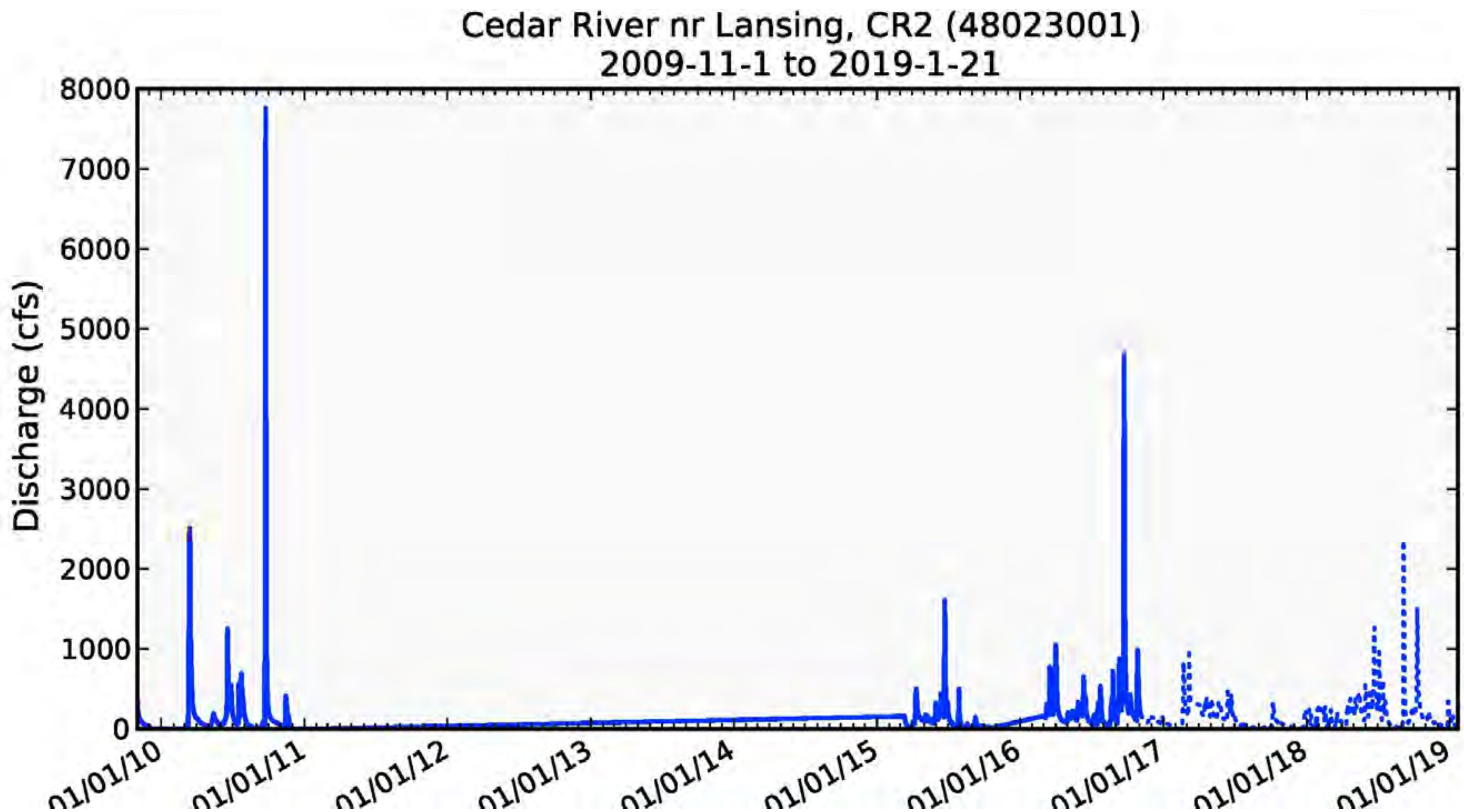


Figure D-2. DNR Dobbins Creek Flow Data.

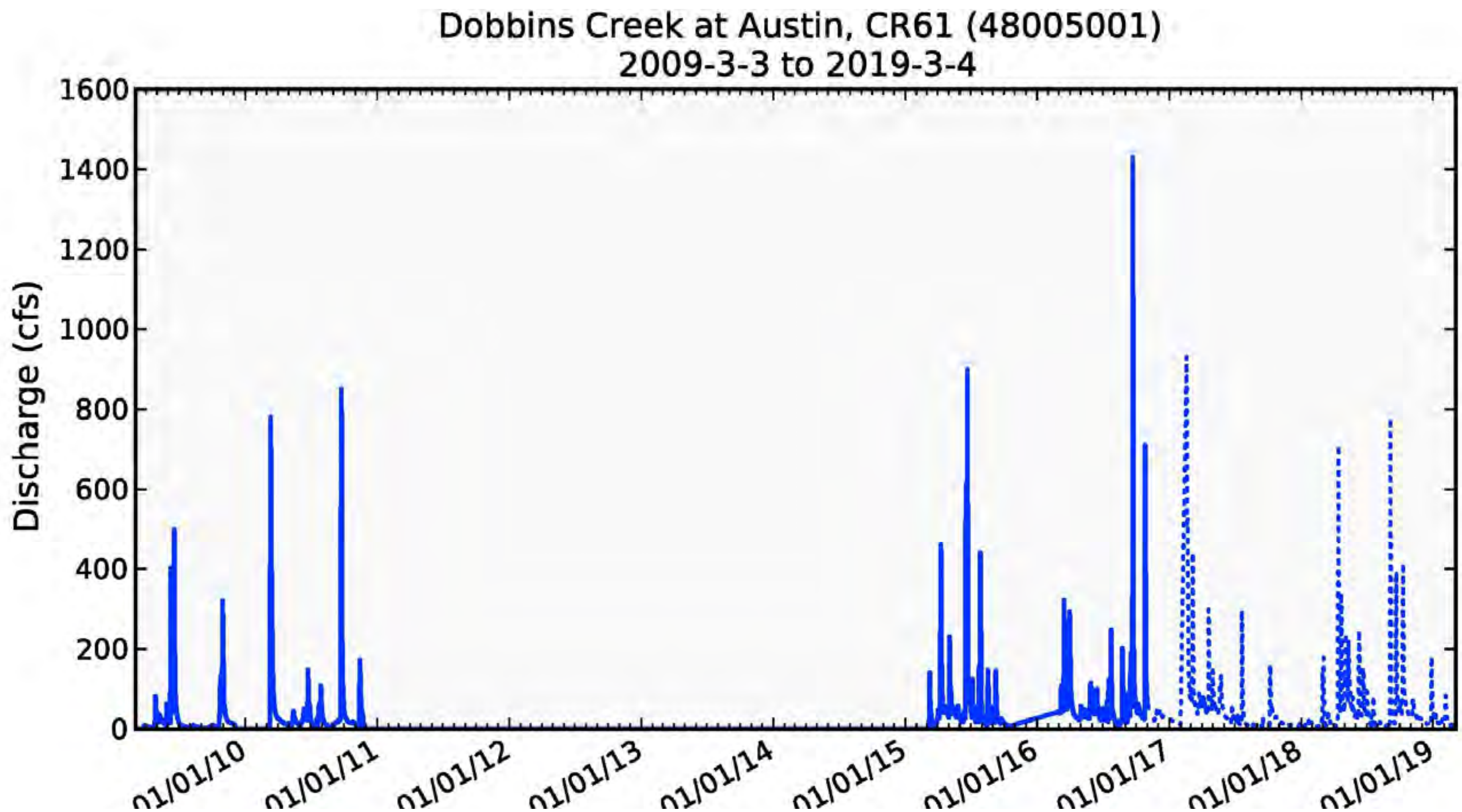


Figure D-3. DNR Observation Wells.

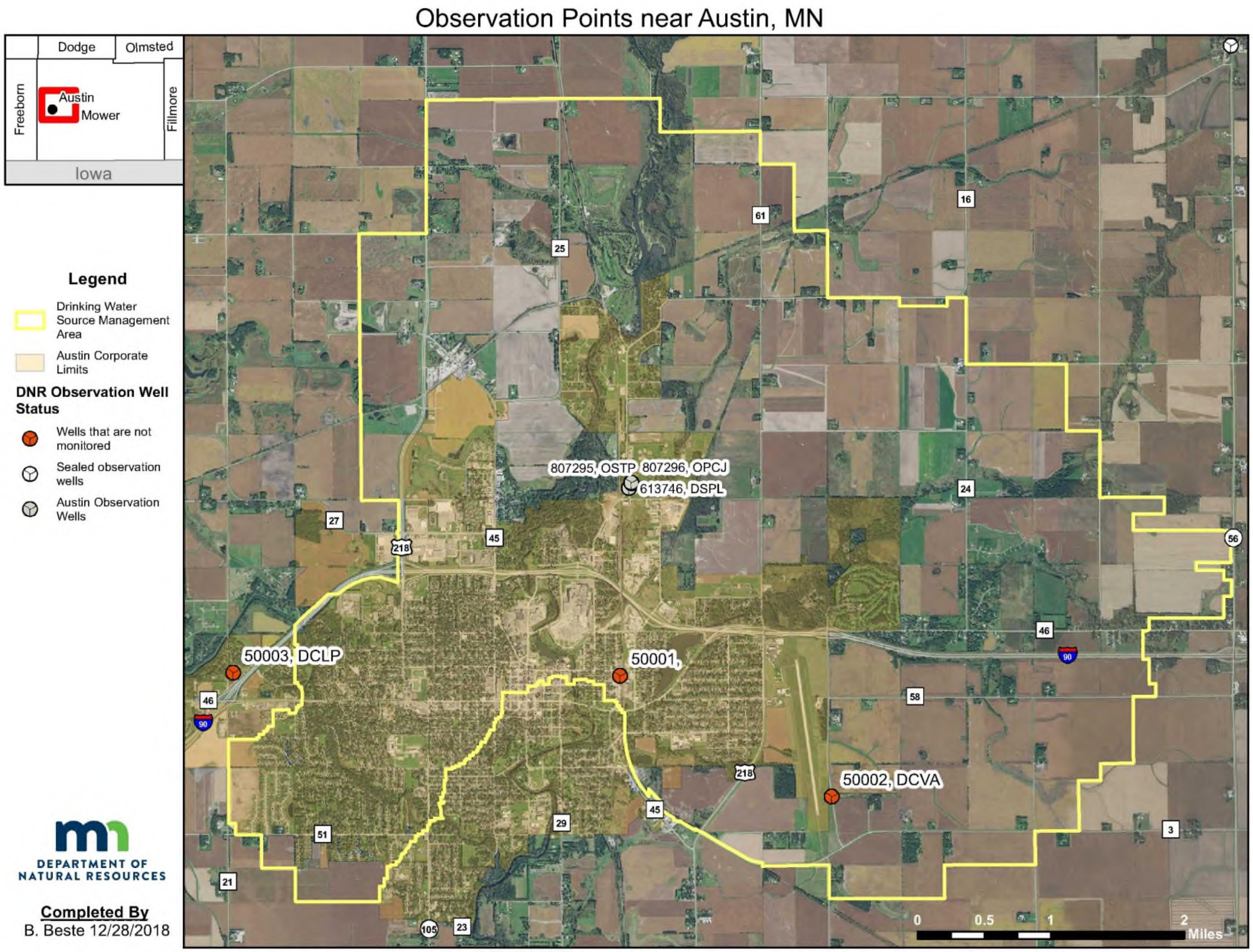


Table D-1. DNR Observation Well Data.

Well Name	Depth	Remarks	aq_type	aq_name	Status	Well Type	Well #	MDH Unique #	Permit #
DCVA at Brownsdale, BROWNSDALE CREAMERY	130	According to CWI sealed. Sealing record H048720. MM	Bedrock	Cedar Valley Group	Sealed	DNR	50000	244222	
DSPL nr Austin, Austin Municipal Utilities	110	Austin Municipal Utilites Monitoring Well	Bedrock	Wapsipinicon / Spillville Fm	Active	Appropriator		613746	1981-5043
OMQG at Austin, CHICAGO MILWAUKEE RR.	244	<Null>	Bedrock	Galena	Inactive	DNR	50001	244223	
DCLP nr Austin, LATTER DAY SAINTS	100	9-18-2002 Well readings on hold" as we try to find a volunteer to read the well. TLG			Inactive	DNR			
DCVA nr Austin, CITY OF AUSTIN	212	Changed aquifer designation from OPDCOPDC to DCVADCVA. TLG	Bedrock	Cedar Valley Group	Inactive	DNR	50002	244224	
OPCJ nr Austin, Austin Municipal Utilities	880	Austin Municipal Utilities Monitoring Well	Bedrock	Prairie du Chien - Jordan	Active	Appropriator		807296	1981-5043
OSTP nr Austin, Austin Municipal Utilities	540	Austin Municipal Utilities Monitoring Well	Bedrock	SNDS	Active	Appropriator		807295	1981-5043

Exhibit D-2. DNR Austin Area Aquifer Pumping Data.

Figure 2: Wells Identified in the Jordan Aquifer by Austin Utilities

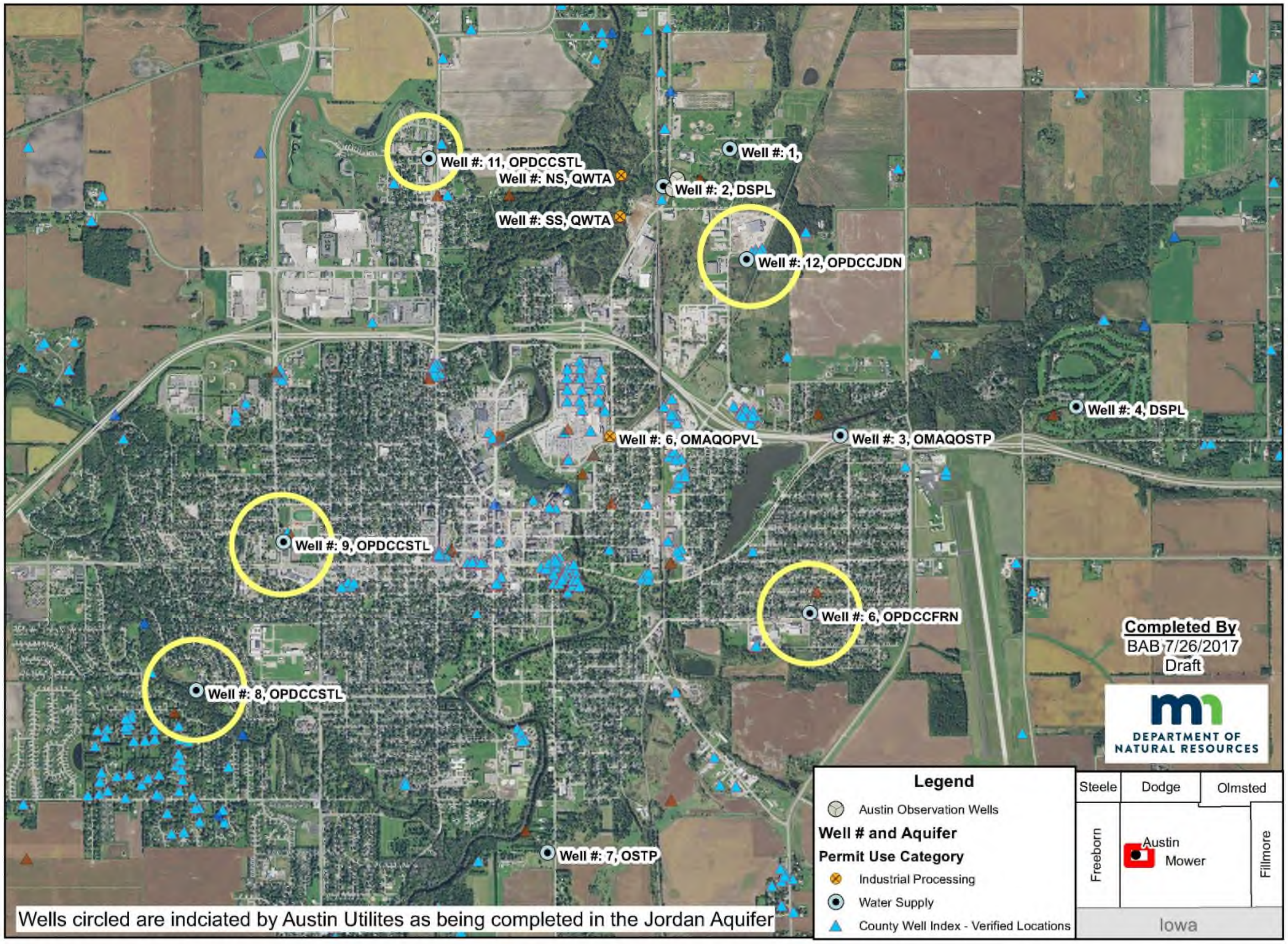


Exhibit D-2 (continued).

Water Use Changes in Austin - Comparison of 2011 and 2016

Aquifer	2007-2011 Avg Use	2013-2017 Avg Use	Percent Change
Prairie du Chien	393.5 mg	1153.3 mg	193%
Maquoketa	418.4 mg	0.0 mg	-100%
Springs	721.0 mg	0.0 mg	-100%
Spillville	489.5 mg	544.9 mg	11%
St. Peter	132.1 mg	202.8 mg	54%
Total	2154.5 mg	1918.2 mg	-11%
STP-PDC-JDN Total	525.6 mg	1356.2 mg	158%

	% Change
Austin 6 (PDC)	193%
Austin 8 (PDC)	140%
Austin 12 (PDC)	
Austin 2 (DSPL)	74%
Austin 4 (DSPL)	-30%
Austin 11 (PDC)	74%
Austin 3 (OSTP)	54%
Austin 9 (PDC)	62%

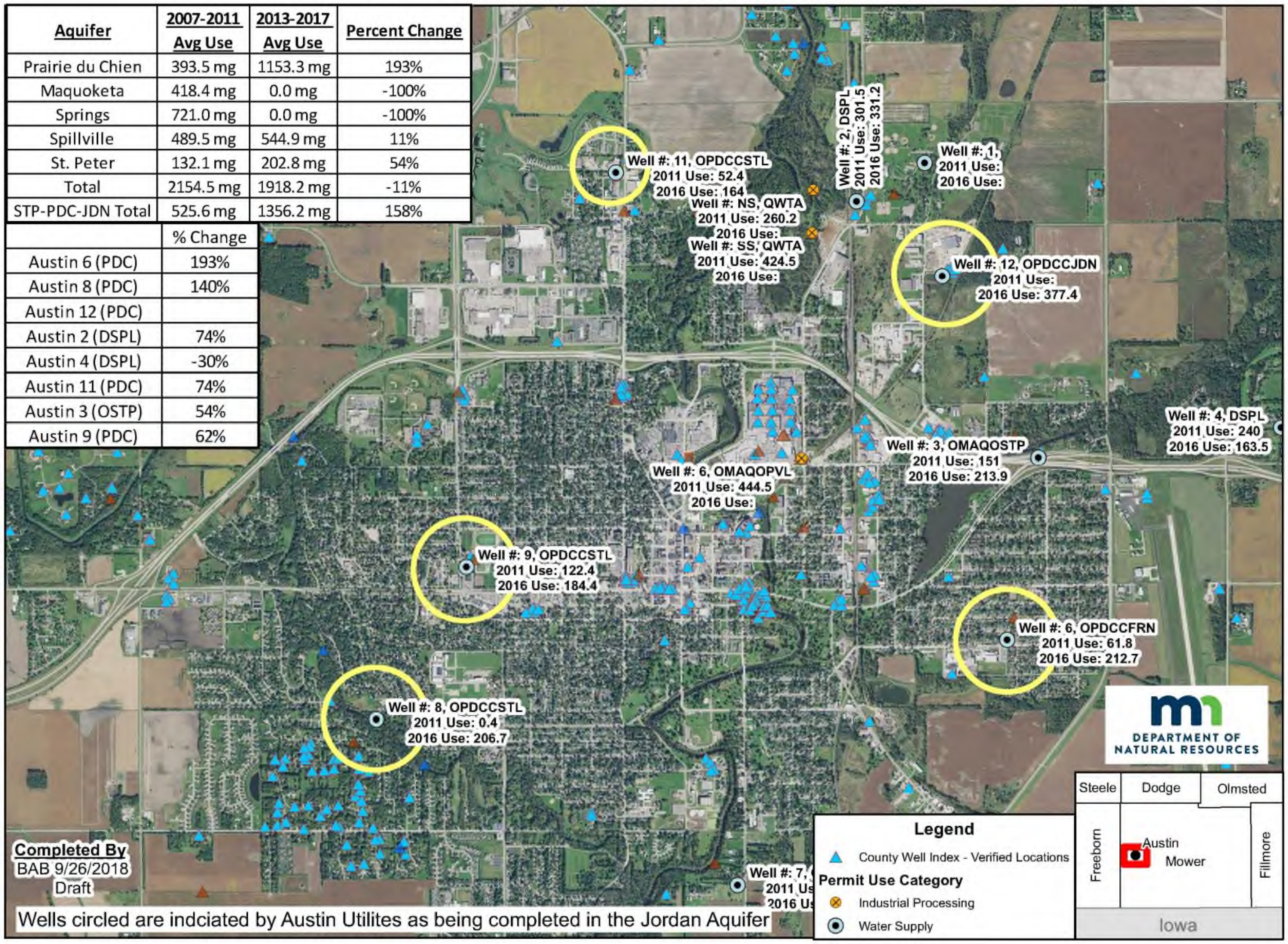


Exhibit D-2 (continued).

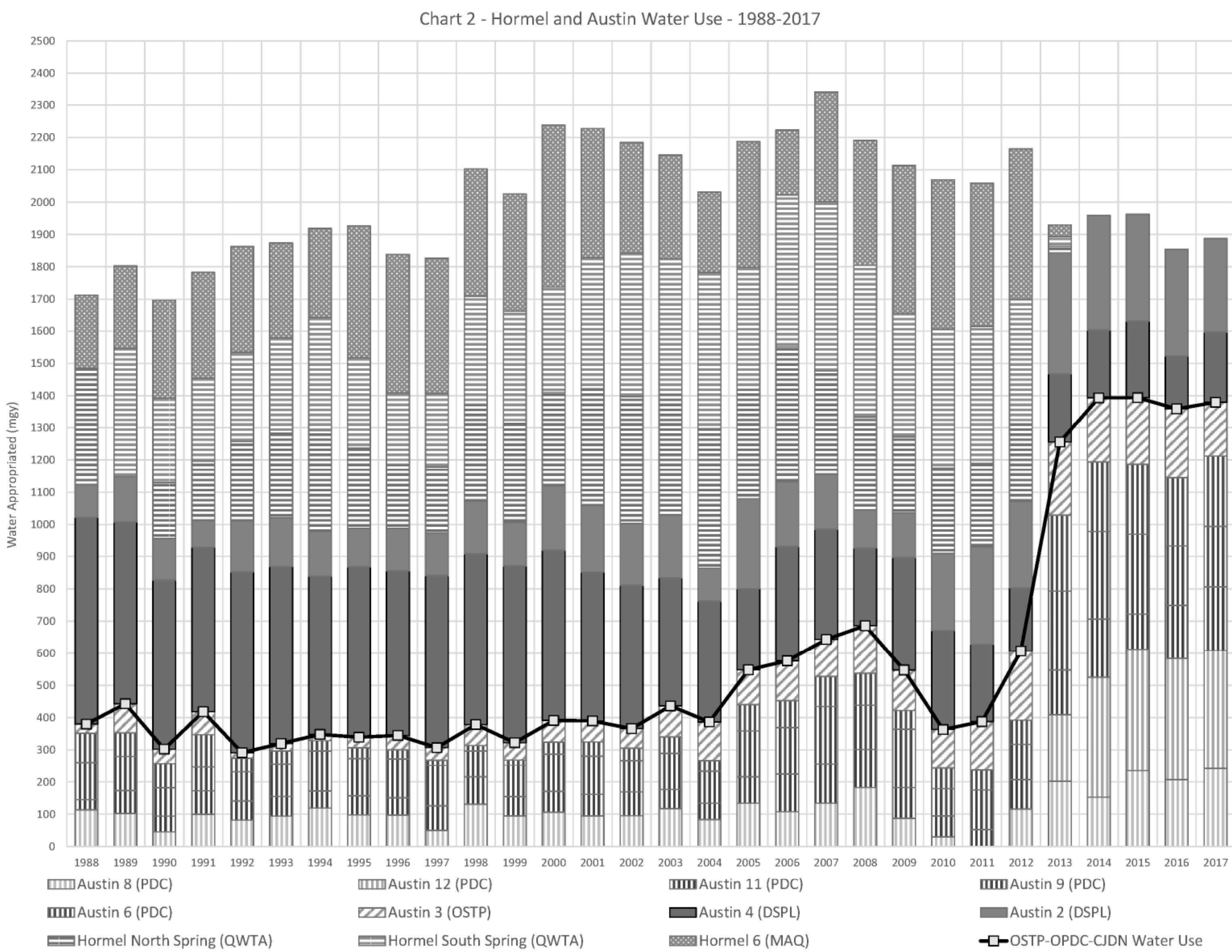


Exhibit D-2 (continued).

Exhibit D-2 (continued).

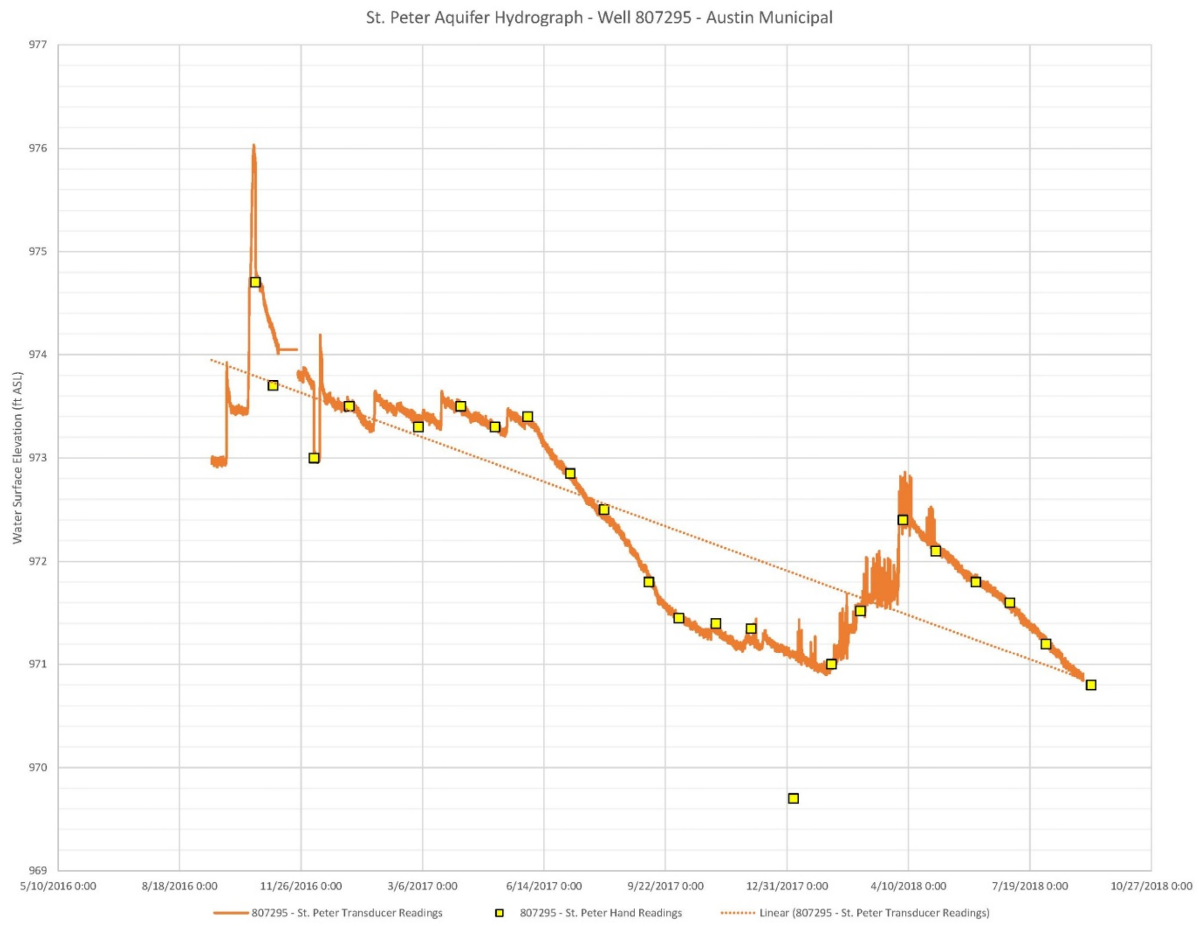


Exhibit D-2 (continued).

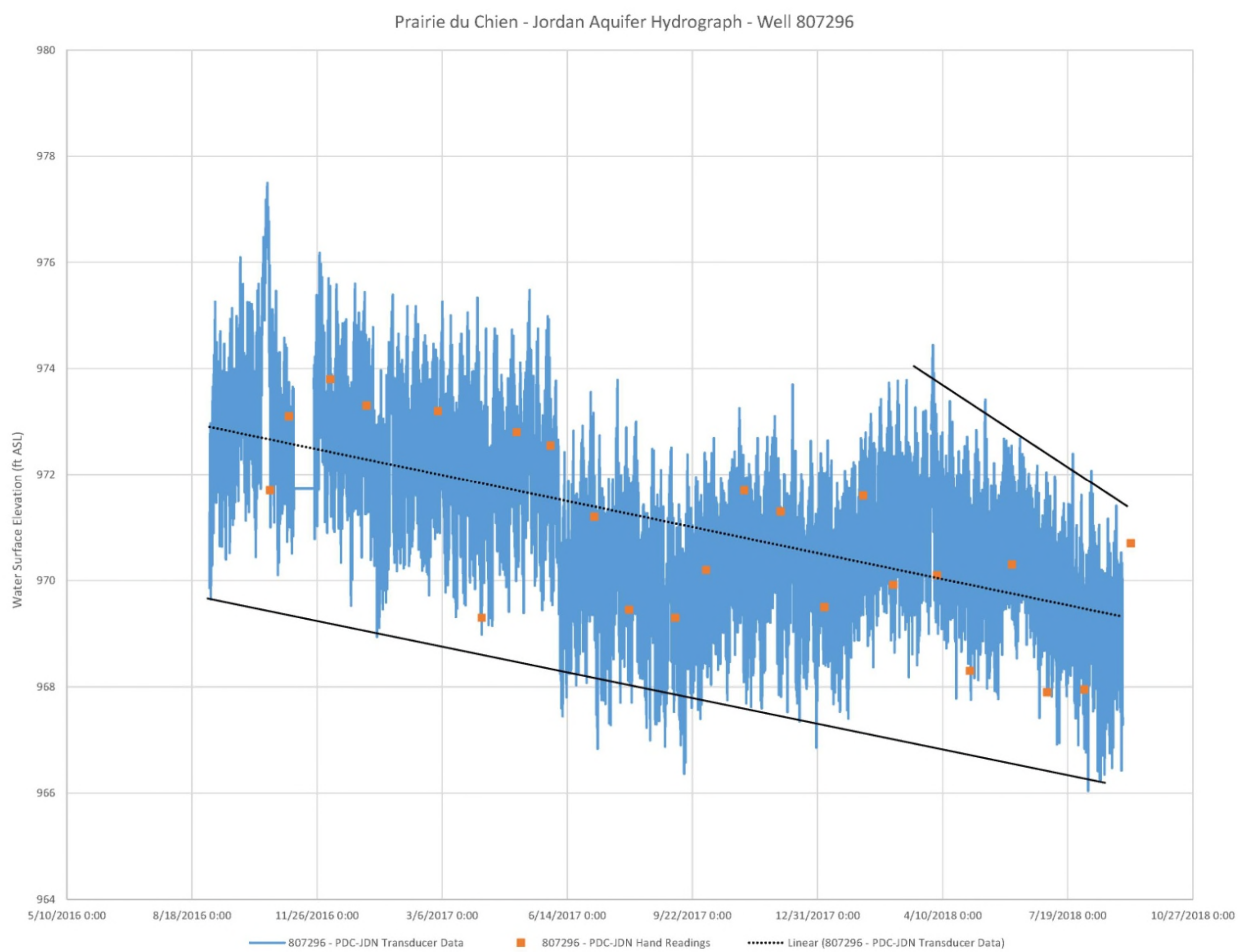


Exhibit D-2 (continued).

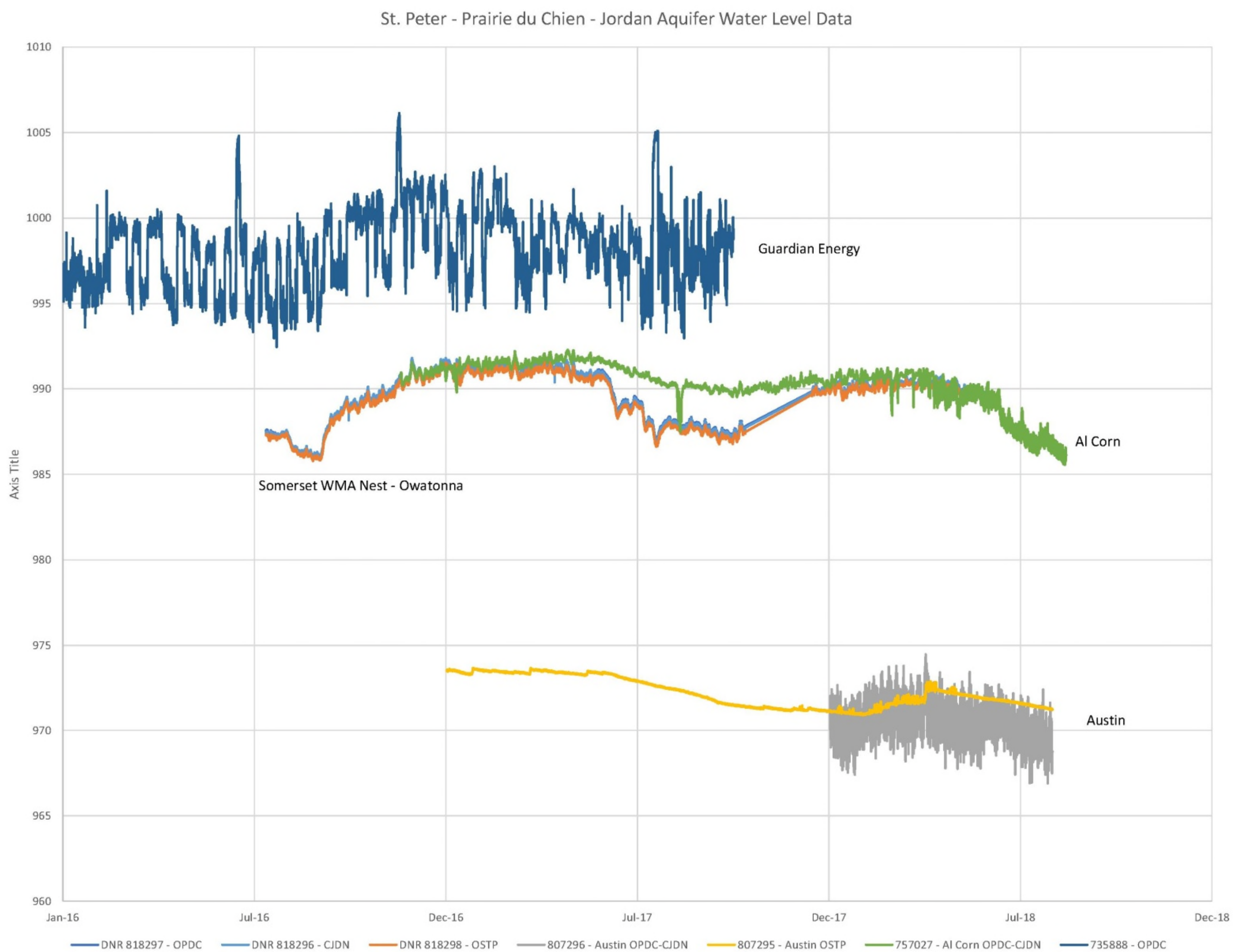


Exhibit D-2 (continued).

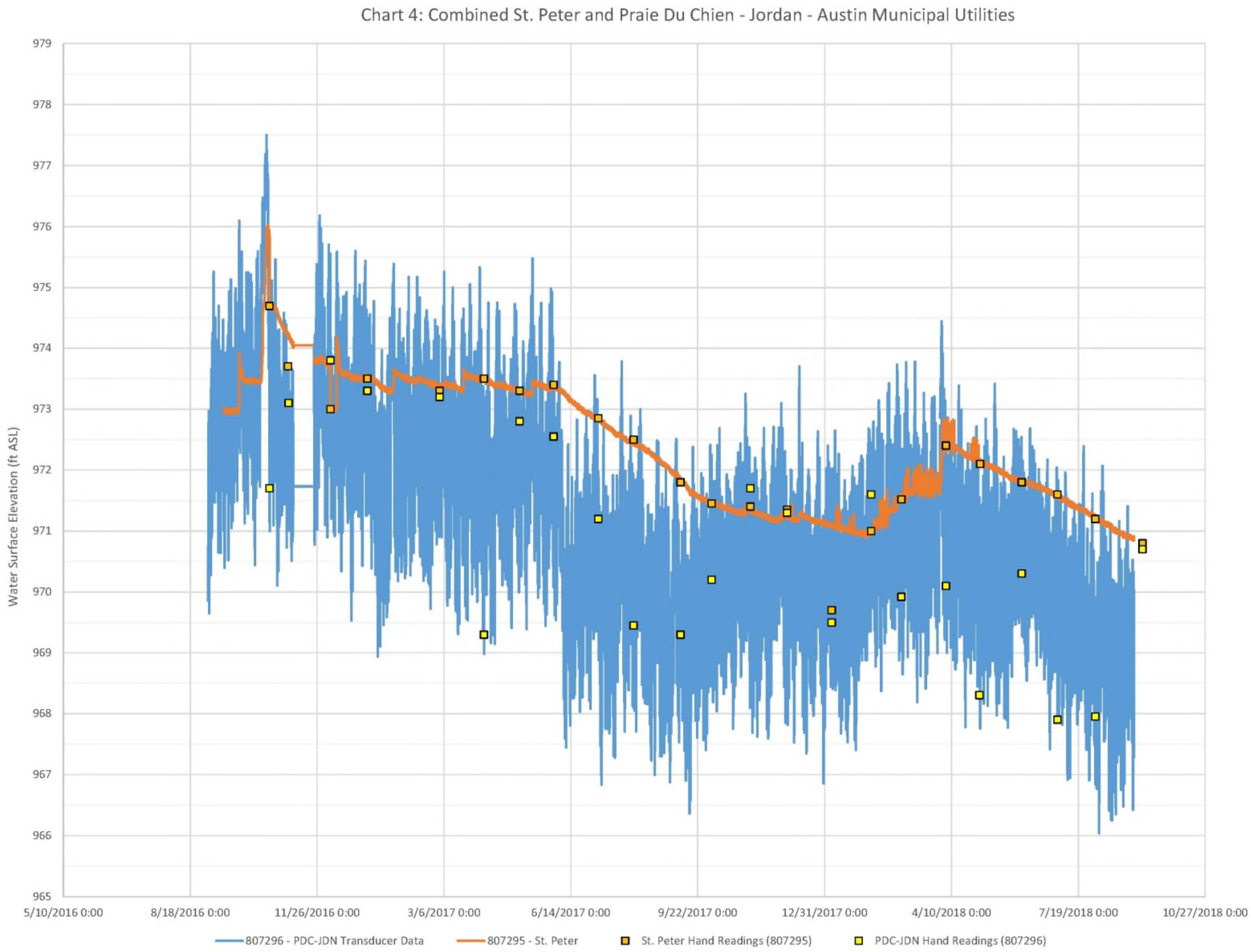


Exhibit D-2 (continued).

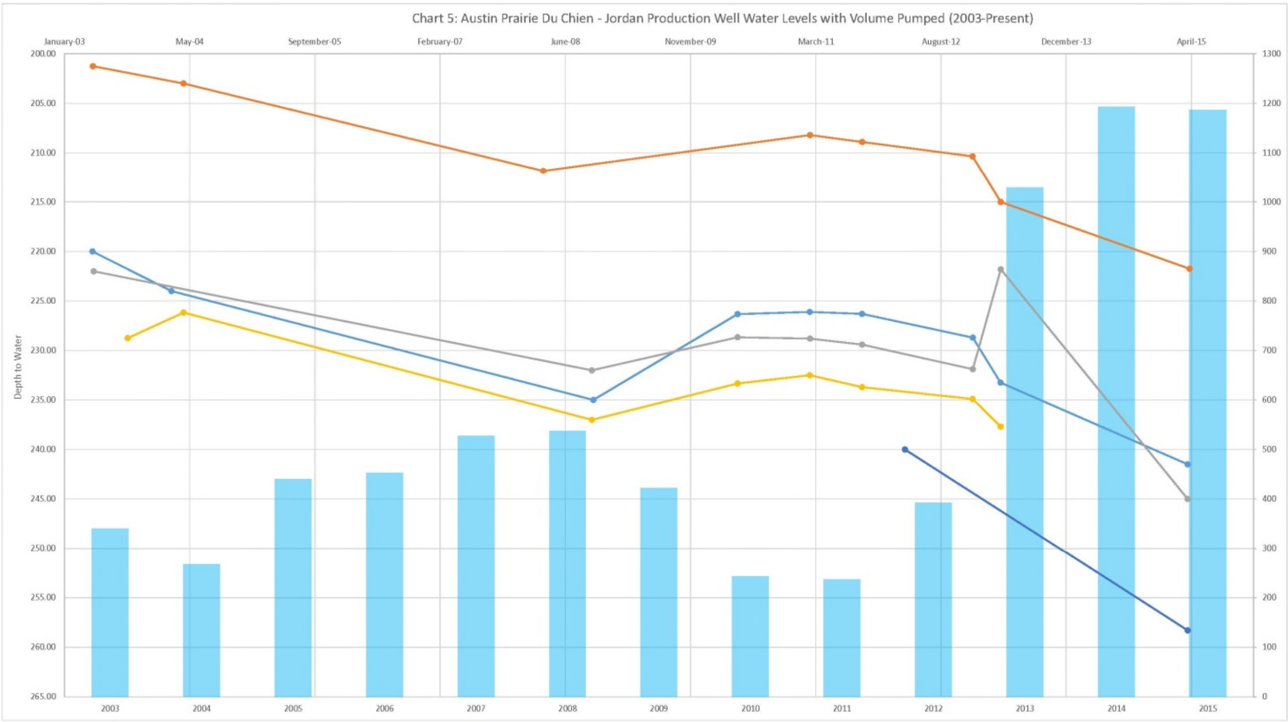


Exhibit D-2 (continued).

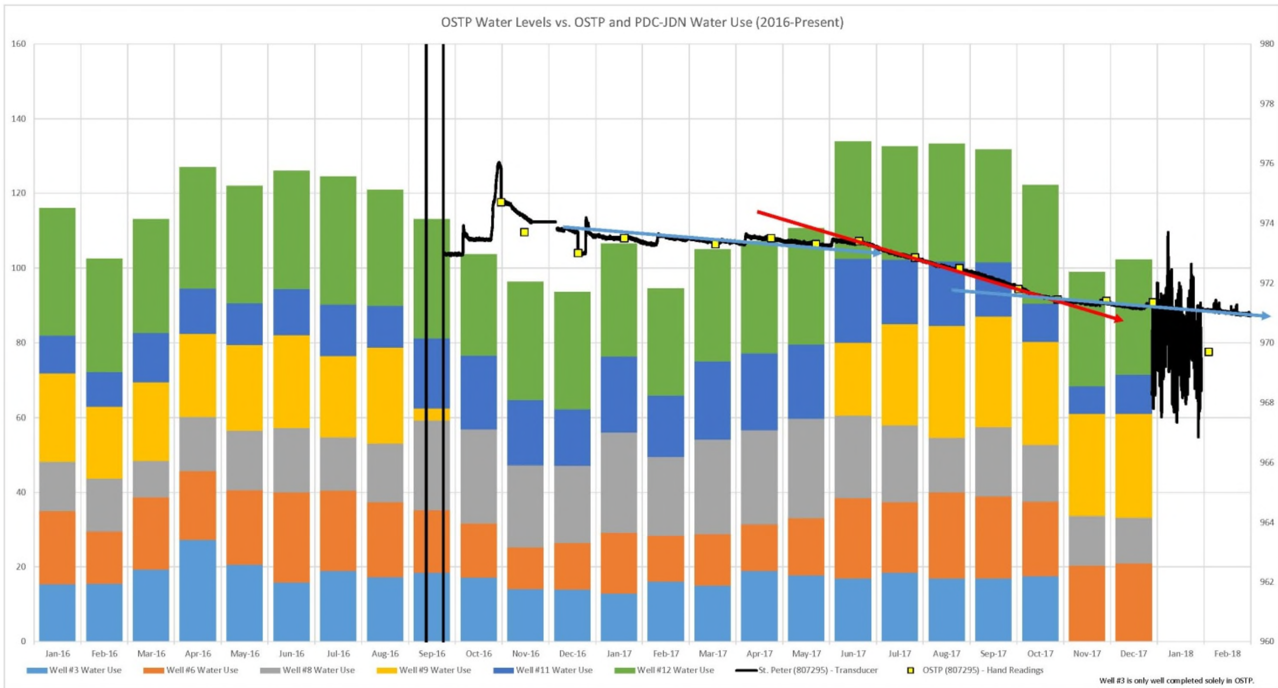


Figure D-4. DNR Water Appropriations.

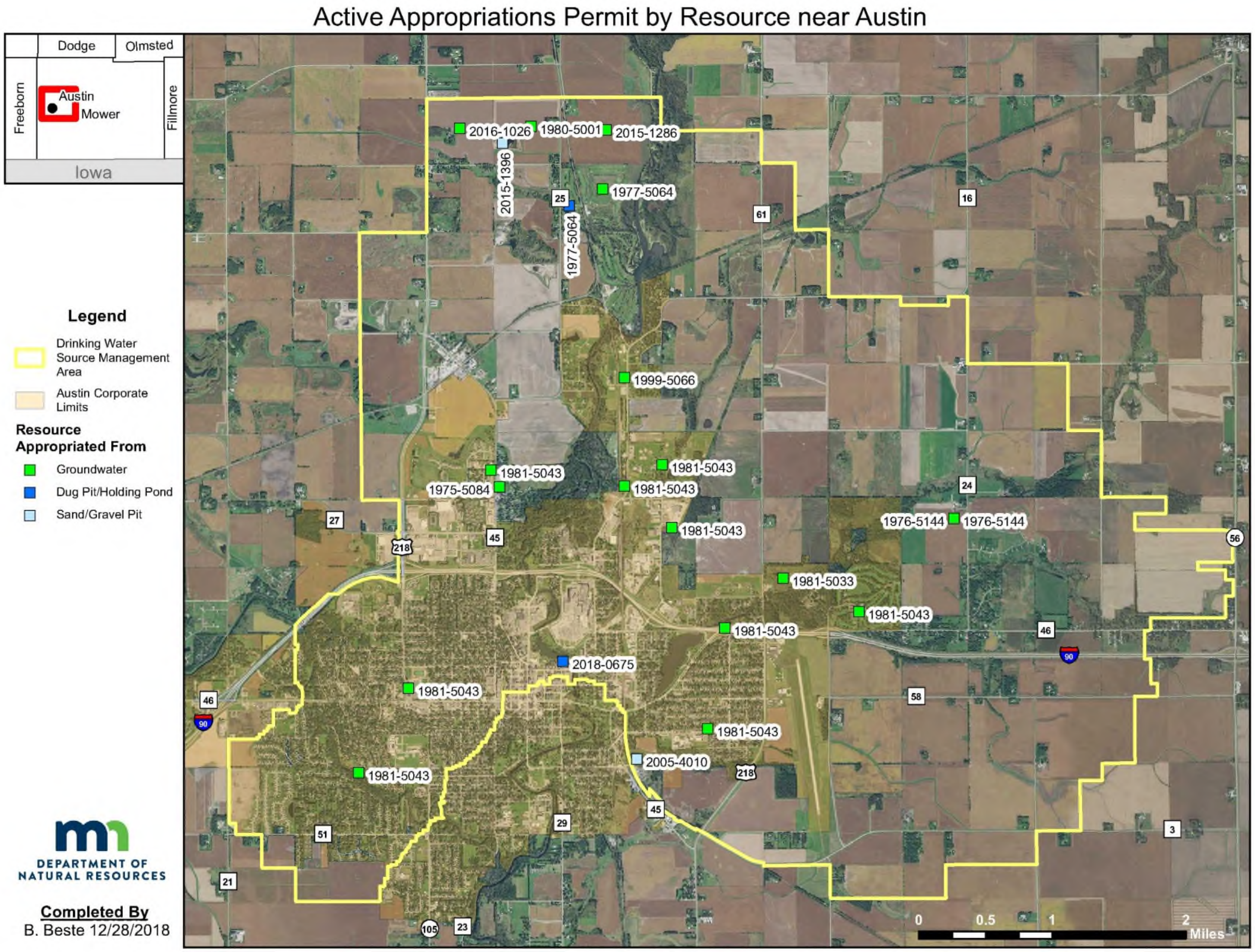


Table D-2. DNR Water Appropriations in AU DWSMA.

permit_number	permit_class	permit_status	well_number	use_type	use_category	resource_type
1975-5084	Individual Permit	Active	240060	Municipal/Public Water Supply	Water Supply	Groundwater
1976-5144	Individual Permit	Active	132689	Golf Course Irrigation	Non-Crop Irrigation	Groundwater
1976-5144	Individual Permit	Active	132690	Golf Course Irrigation	Non-Crop Irrigation	Groundwater
1977-5064	Individual Permit	Active		Golf Course Irrigation	Non-Crop Irrigation	Dug Pit/Holding Pond
1977-5064	Individual Permit	Active	135605	Golf Course Irrigation	Non-Crop Irrigation	Groundwater
1980-5001	Individual Permit	Active	178738	Agricultural Crop Irrigation	Agricultural Irrigation	Groundwater
1981-5033	Individual Permit	Active	152305	Basin (Lake) Level Maintenance	Water Level Maintenance	Groundwater
1981-5043	Individual Permit	Active	223359	Municipal/Public Water Supply	Water Supply	Groundwater
1981-5043	Individual Permit	Active	226364	Municipal/Public Water Supply	Water Supply	Groundwater
1981-5043	Individual Permit	Active	788722	Municipal/Public Water Supply	Water Supply	Groundwater
1981-5043	Individual Permit	Active	227063	Municipal/Public Water Supply	Water Supply	Groundwater
1981-5043	Individual Permit	Active	127258	Municipal/Public Water Supply	Water Supply	Groundwater
1981-5043	Individual Permit	Active	227064	Municipal/Public Water Supply	Water Supply	Groundwater
1981-5043	Individual Permit	Active	226631	Municipal/Public Water Supply	Water Supply	Groundwater
1981-5043	Individual Permit	Active	223360	Municipal/Public Water Supply	Water Supply	Groundwater
1999-5066	Individual Permit	Active	226391	Thermoelectric Power Cooling - Recirculating	Power Generation	Groundwater
2005-4010	Individual Permit	Active		Sand and Gravel Washing	Industrial Processing	Sand/Gravel Pit
2015-1286	Individual Permit	Active	799940	Agricultural Crop Irrigation	Agricultural Irrigation	Groundwater
2015-1396	Individual Permit	Active		Sand/Gravel Pit Dewatering	Water Level Maintenance	Sand/Gravel Pit
2016-1026	Individual Permit	Active	183066	Agricultural Crop Irrigation	Agricultural Irrigation	Groundwater
2018-0675	General Permit Authorization	Active		Construction Dewatering	Water Level Maintenance	Dug Pit/Holding Pond

(yellow)	Austin Utilities Water Supply
(orange)	Austin Country Club
(green)	Ramsey Golf Club

Exhibit E

Water Quality Data Elements

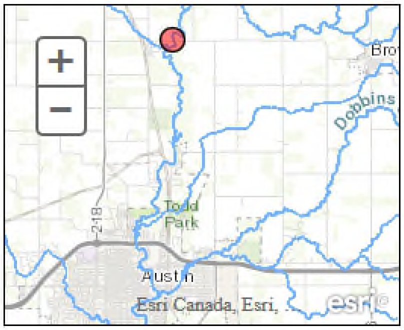
Tables
E-1: MPCA Cedar River Water Quality Data
E-2: MPCA Dobbins Creek Water Quality Data

Exhibits
E-1: MDH Nitrate Data for AU Primary Wells
E-2: 2017 Austin Utilities Consumer Confidence Report

Table E-1. MPCA Cedar River Water Quality Data.

Environmental Data Access

Print Report New Search



Stream Station Information

Station Name:	CEDAR RIVER AT CSAH-2, 0.5 MILES EAST OF LANSING
Waterbody Name:	Cedar River
Data Steward Org:	MPCA
Station ID:	S000-137
Hydrologic Unit Code (HUC):	07080201
Assessment Unit:	07080201-502
Period of Record:	1967 through 2018
Lat/Lon	43.746639,-92.958139

Chemical | Projects

Download this station

Year 2018 Data

Station Data

Sample Date	Type	Temp	BOD	Chl-a	Stream Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli
	Information														
10-10-18	Routine	12.79			11	8.32		6.88			0.283	29.6			4106
09-21-18	Routine	17.49			9	6.90		6.64			0.370	53.2			> 2419.6
09-05-18	Routine	19.82			7	6.48		1.76			0.525	84.0	133.7		> 2419.6
08-29-18	Routine	17.26			78	7.78		4.34			0.172	10.4	6.6		816
07-31-18	Routine	18.16			> 100	8.23							0		
06-27-18	Routine	17.44			30	8.25							13.6		
05-31-18	Routine	17.00				7.07		16.2			0.274	36	61.4		882
05-01-18	Routine	11.55			56	9.64		12.2			0.063	8	2.5		20
03-28-18	Routine	1.21			61	11.80		4.99			0.166	8	2.9		20

Year 2017 Data

Year 2016 Data

Year 2015 Data

Year 2014 Data

Year 2013 Data

Year 2012 Data

Year 2011 Data

Year 2010 Data

Table E-1 (continued).

Chemical | Projects

Projects that are associated with this station are as follows

Project	Purpose
Cedar River Watershed Stream Monitoring	Surface Water Assessment
Cedar River TMDL	TMDL monitoring
Mercury Lakes	
Minnesota Department of Agriculture Water Quality Monitoring Program	To help preserve and protect Minnesota water resources, the MDA has been monitoring the impacts of pesticides and fertilizers on the State's water resources for over 20 years.
Ambient Trace Metals	Program is a condition monitoring program that began in 1996 to assess total and dissolved fraction concentrations of arsenic, cadmium, chromium (added in 2003), copper, lead, mercury, nickel and zinc (added in 1997) in Minnesota's river basins using impr
MPCA Stream Monitoring Program Project	This is an inclusive project created to migrate data to modernized STORET from the 21MINN Agency Code in Legacy STORET where project information was not stored on the sample or result level. Specific purposes for Legacy STORET data collection may be avail
Cedar River Turbidity/Nutrients TMDL	TMDL monitoring
Cedar Watershed stressor identification monitoring	
Mercury Trends	Effectiveness monitoring for aquatic mercury changes in response to source reductions.
Major Watershed Pollutant Load Monitoring Network	The purpose of the project is to meet the information goal of determining status and trends (temporal and spatial) in nutrient and sediment loads carried by streams in the state.
Minnesota Milestone Site River Monitoring Program	Monitor site specific long term trends, at a fixed set of more than 80 stream locations with sufficient length of data record, for a limited list of parameters that measure an aspect of stream health.
Shell Rock River Watershed Assessment	

Table E-2. MPCA Dobbins Creek Water Quality Data.

Environmental
Data Access

Print Report New Search

Stream Station Information

Station Name:	DOBBINS CK AT THE NATURE CENTER IN AUSTIN
Waterbody Name:	Dobbins Creek
Data Steward Org:	MPCA
Station ID:	S003-065
Hydrologic Unit Code (HUC):	07080201
Assessment Unit:	07080201-535
Period of Record:	1987 through 2018
Lat/Lon	43.6769,-92.9395

Year 2018 Data

Station Data

Sample Date	Type Information	Temp	BOD	Chl-a	Stream Trans	DO	TKN	NO2NO3	pH	Pheo	TP	TSS	Turb	FC	Ecoli
10-10-18	Routine	13.45			16	8.25		5.01			0.264	27.2			3282
09-21-18	Routine	17.07			7	7.09		4.01			0.371	53.0			> 2419.6
09-12-18	Routine	16.01				8.35									
09-05-18	Routine	19.91			6	6.52		0.847			0.589	101	133		> 2419.6
08-29-18	Routine	15.58			79	8.13		3.87			0.107	5.2	4.7		> 2420
07-31-18	Routine	16.27			> 100	8.73							0		
06-27-18	Routine	17.28			39	8.55							14.8		
06-20-18	Routine	17.24				7.6									
05-31-18	Routine	16.79				8.91		9.39			0.063	12	5.1		1071
05-23-18	Routine	13.76				9.35									
05-01-18	Routine	11.52			51	10.65		8.04			0.041	6	1.1		20
04-26-18	Routine	5.86				11.11									
03-28-18	Routine	2.37			> 100	12.06		3.84			0.101	2	0.9		10
03-14-18	Routine	0.711				11.53									

Year 2010 Data

Year 2009 Data

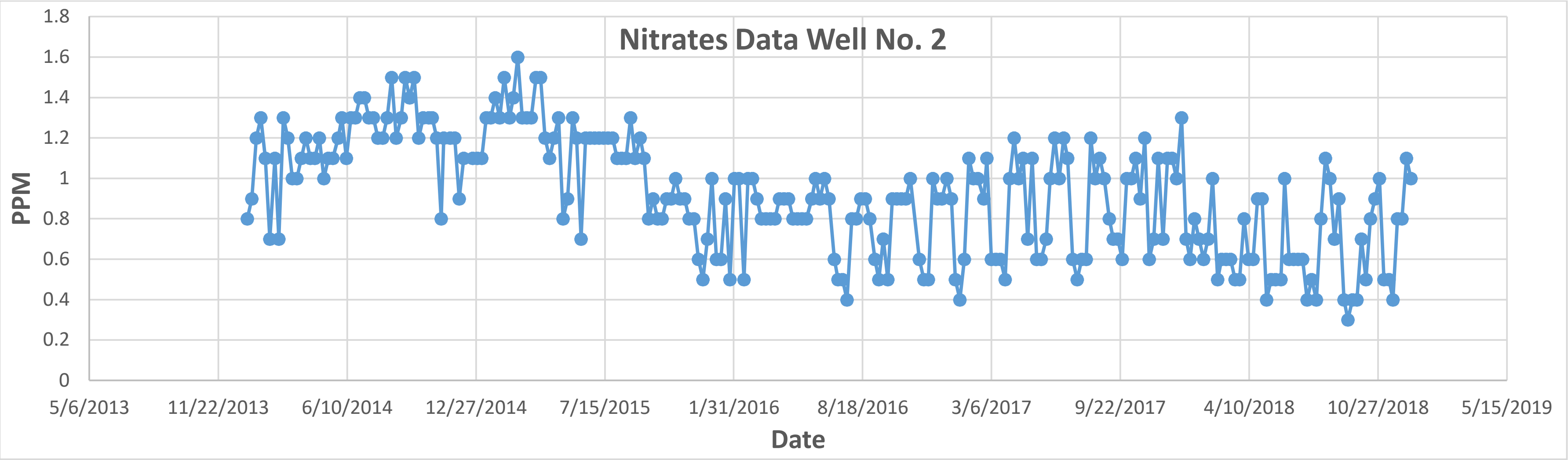
Table E-2 (continued).

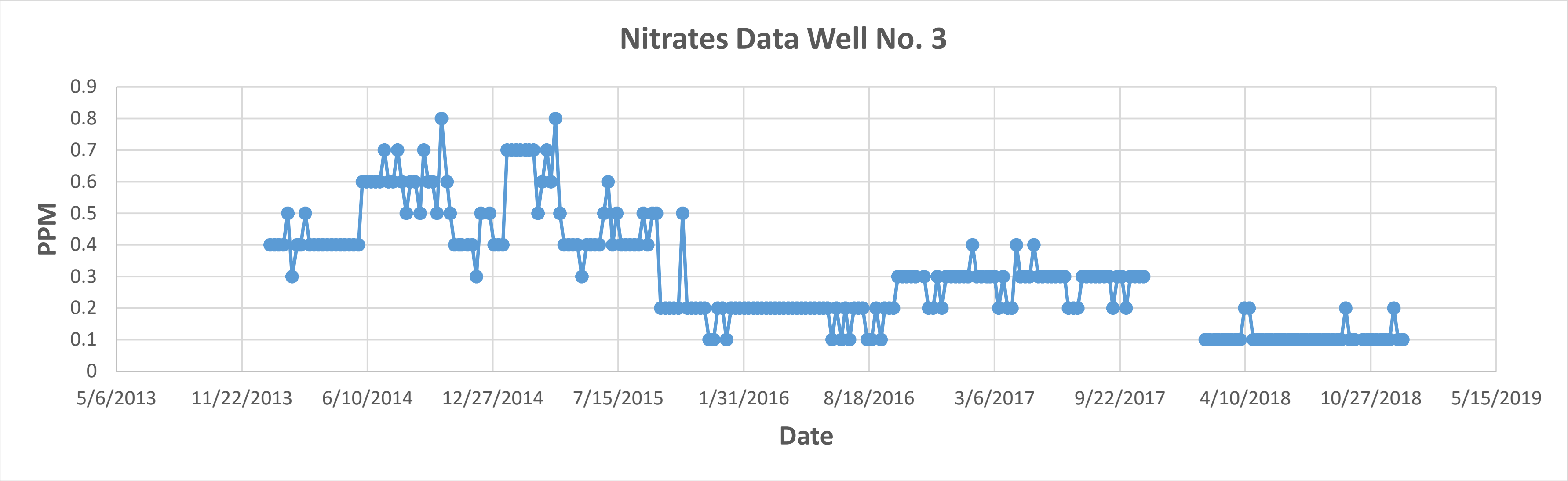
Chemical | Projects

Projects that are associated with this station are as follows

Project	Purpose
Cedar River Watershed Stream Monitoring	Surface Water Assessment
Cedar River TMDL	TMDL monitoring
Cedar River Study by Mower County Environmental Health Dept.	
MPCA Stream Monitoring Program Project	This is an inclusive project created to migrate data to modernized STORET from the 21MINN Agency Code in Legacy STORET where project information was not stored on the sample or result level. Specific purposes for Legacy STORET data collection may be avail
Cedar River Turbidity/Nutrients TMDL	TMDL monitoring
Cedar SID - Cycle 2	MDH
Citizen Stream Monitoring Program	
Major Watershed Pollutant Load Monitoring Network	The purpose of the project is to meet the information goal of determining status and trends (temporal and spatial) in nutrient and sediment loads carried by streams in the state.
Shell Rock River Watershed Assessment	

Exhibit E-1. MDH Nitrate Data for AU Primary Wells.





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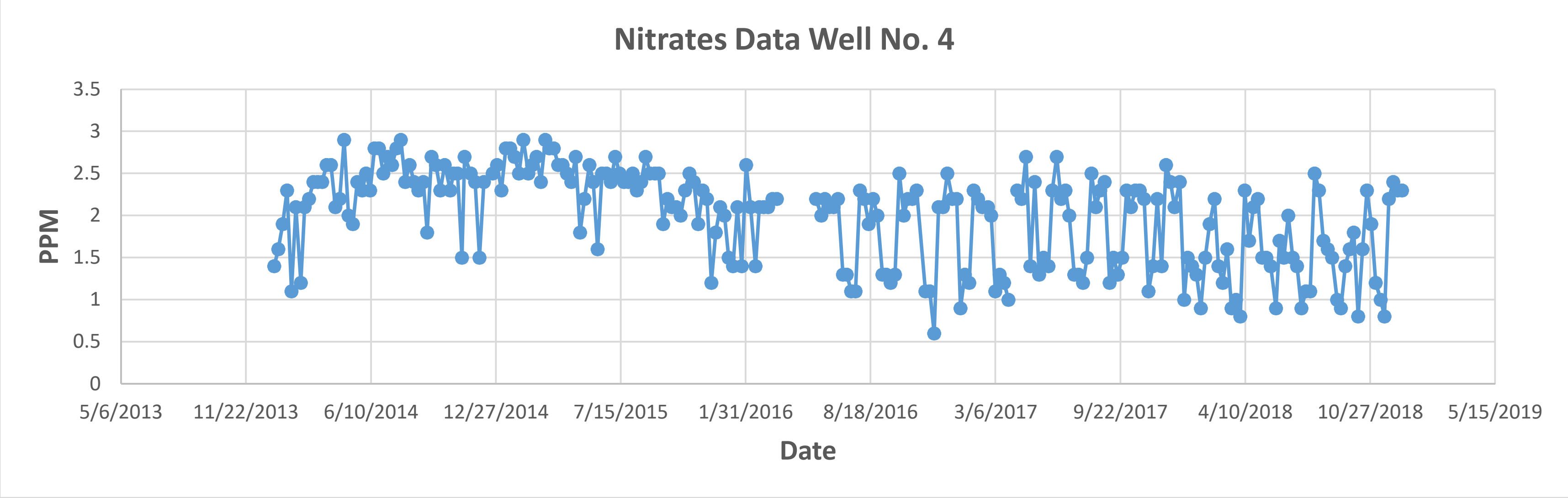

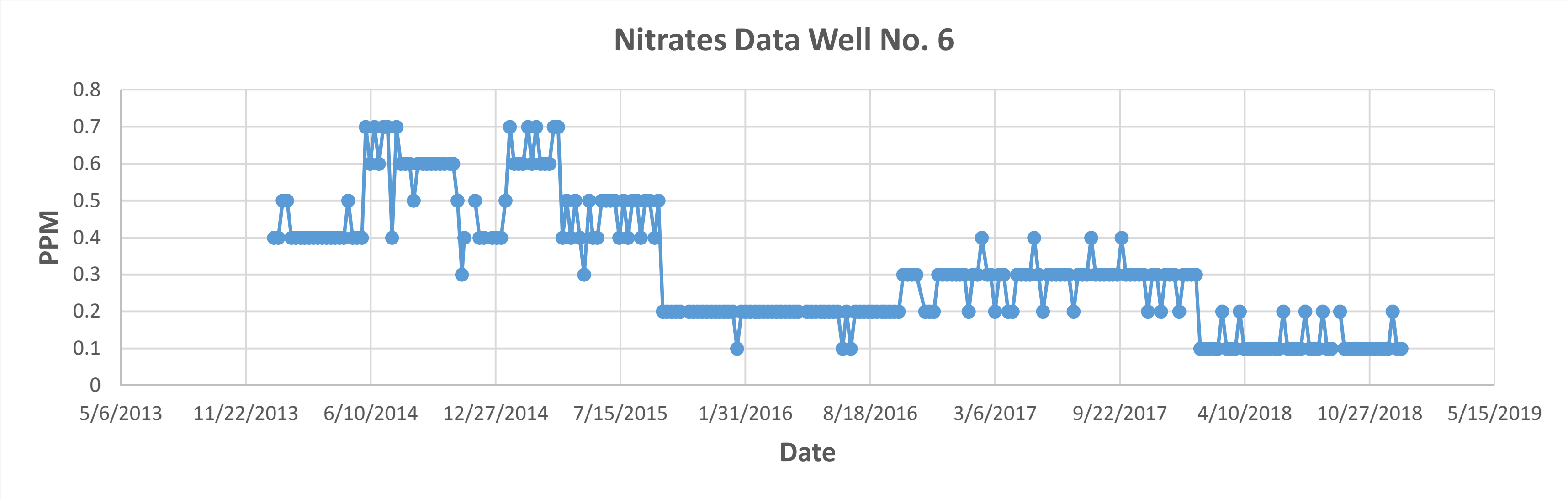

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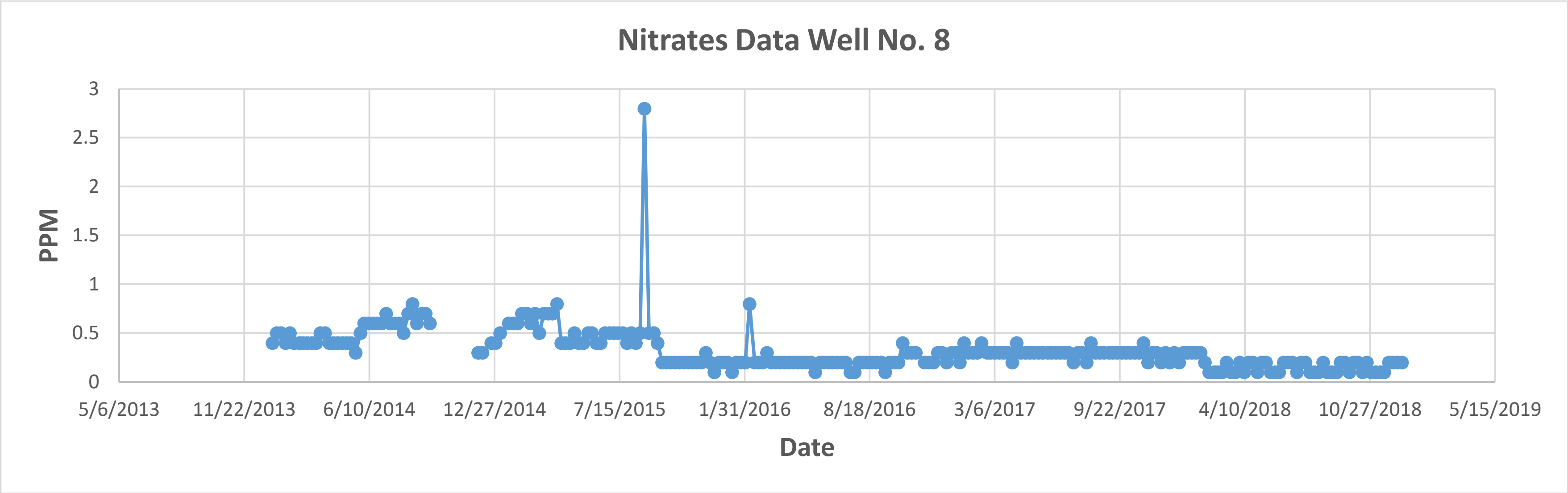


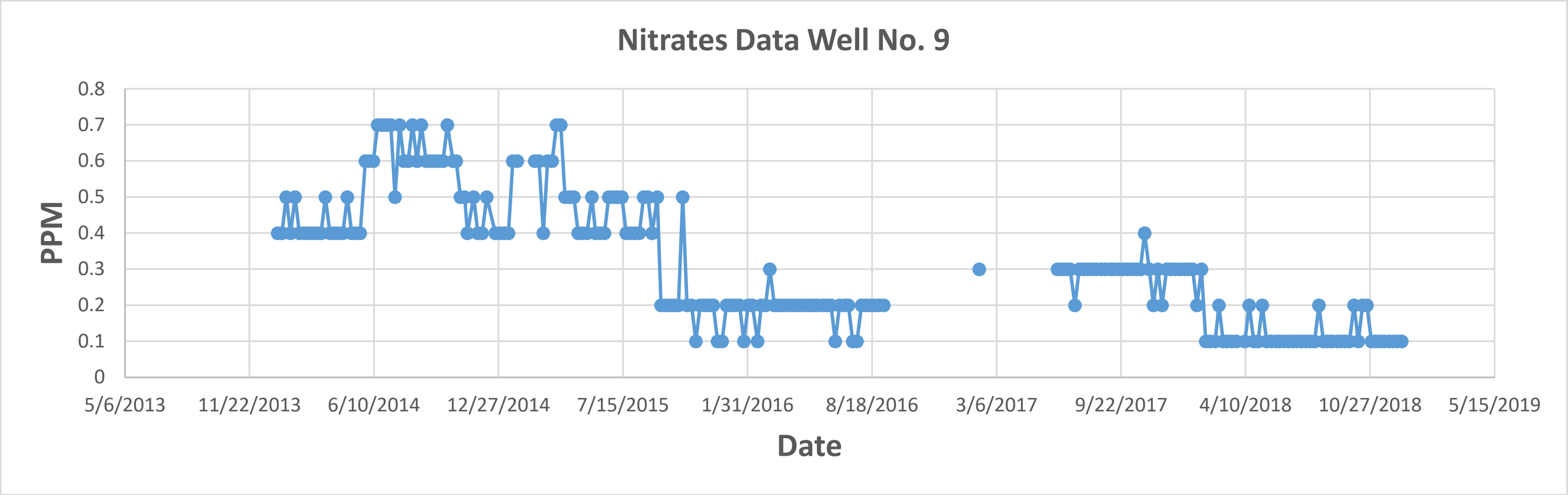
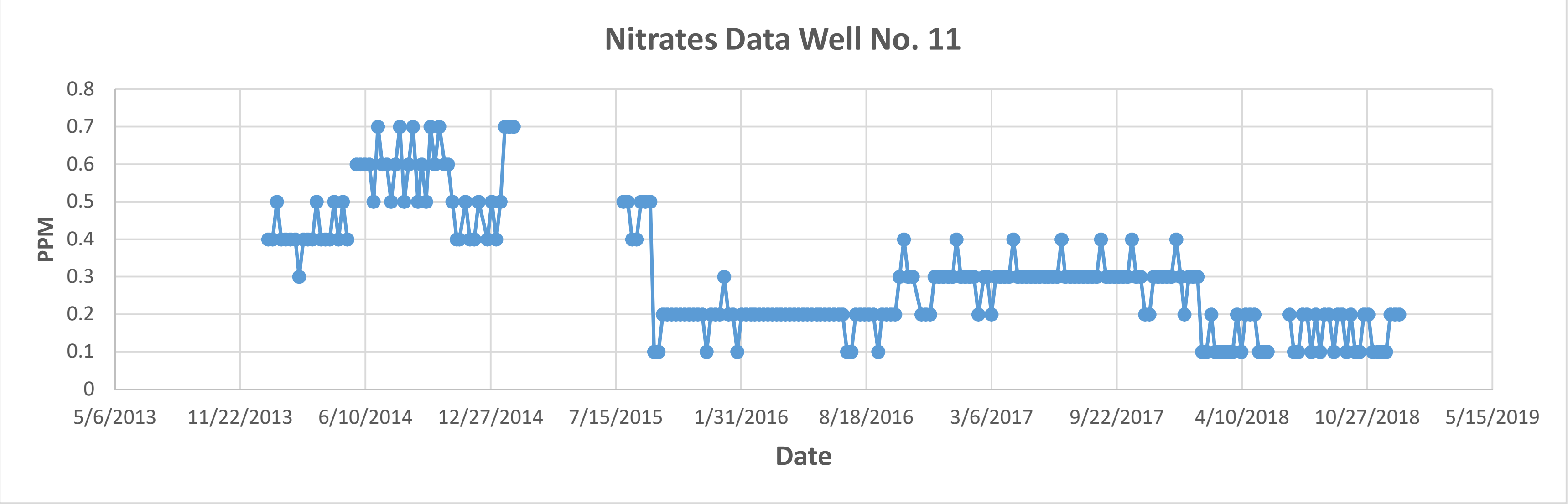


Exhibit E-1 (continued).



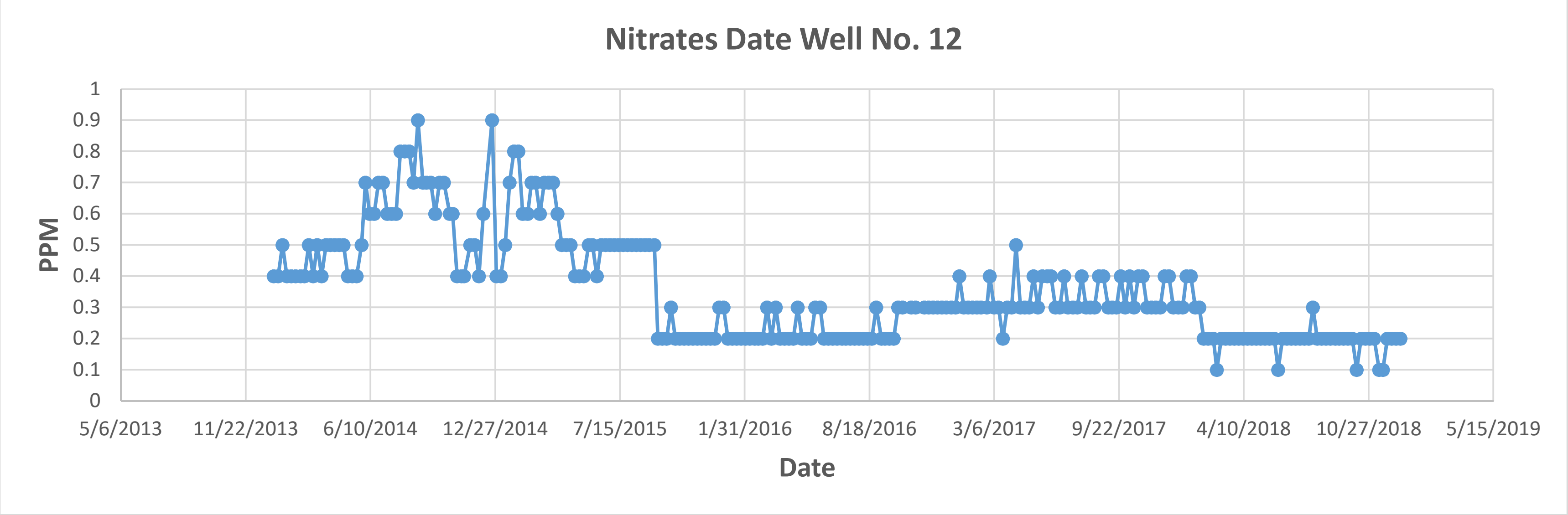


Exhibit E-2 2017 Austin Utilities Consumer Confidence Report

2017
Water Quality Report

AUSTIN UTILITIES
Connections for Better Living®

Austin Utilities is issuing the results of monitoring done on its drinking water for the period from January 1 to December 31, 2017. The purpose of this report is to advance consumers' understanding of drinking water and heighten awareness of the need to protect precious water resources.

Source of Water

Austin Utilities provides drinking water to its residents from a groundwater source: eight wells ranging from 110 to 1075 feet deep that draw water from the Prairie Du Chien-Jordan, Spillville, and St. Peter aquifers.

The water provided to customers meets current drinking water standards, but the MN Department of Health has also made a determination as to how vulnerable the source of water may be to future contamination incidents. If you wish to obtain the entire source water assessment regarding your drinking water, please call 651-201-4700 or 1-800-818-9318 during normal business hours or view it online at:

www.health.state.mn.us/divs/eh/water/swp/swa

Call 507-433-8886 if you have questions about Austin's drinking water or would like information about opportunities for public participation in decisions that may affect the quality of the water.

Water Treatment

Austin's water quality is especially high due to the depth of the wells and the quality of the source; therefore there is little need for treatment. At each of our wells, the following water treatment products are added to the groundwater before it enters into the distribution system:

- ***Fluoridation***
  The State of Minnesota requires all municipal water systems to add fluoride to the drinking water to promote strong teeth and prevent tooth decay. The approved range from the Minnesota Department of Health for Austin's water system has been established at a range of 0.5 to 0.9 ppm, with Austin maintaining a 0.71 average in year 2017. Last year alone the staff at Austin Utilities performed a total of 1,854 fluoride tests at different residential and business sites around the city.

- ***Disinfection***
  Chlorine is added to the water at each well to minimize the chance for any bacteria, viruses or fungi affecting the safety of the drinking water. Total Chlorine is measured weekly at seven specific locations and once a month at 25 other specific locations throughout the water distribution system. In 2017, staff at Austin Utilities conducted 664 chlorine tests with a result of 1.4 ppm average.

- ***Corrosion Control***
  A blended polyphosphate solution is used for corrosion control by coating the water distribution system and household piping to prevent the leaching of lead and copper into the drinking water. The blended polyphosphate solution is also used to minimize the appearance of rusty water. Polyphosphates do not remove iron from water but simply stabilize and disperse the iron so that the water remains clear and does not produce iron stains. Polyphosphates are water purification chemicals that are employed to correct problems caused by inorganic groundwater contaminants (iron, manganese, calcium, etc.) and also to preserve water quality in distribution systems. Testing for polyphosphate concentration is conducted monthly at 7 selected locations with results of 1.99 ppm average for the year 2017.

Compliance with National Primary Drinking Water Regulations

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

- ***Microbial contaminants***, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- ***Inorganic contaminants***, such as salts and metals, which can be naturally-occurring or result from urban storm runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- ***Pesticides and herbicides***, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- ***Organic chemical contaminants***, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.
- ***Radioactive contaminants***, which can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protections Agency (EPA) prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at 1-800-426-4791.

Results of Monitoring

No contaminants were detected at levels that violated federal drinking water standards. However, some contaminants were detected in trace amounts that were below legal limits. The table that follows shows the contaminants that were detected in trace amounts last year. (Some contaminants are sampled less frequently than once a year; as a result, not all contaminants were sampled for 2017. If any of these contaminants were detected the last time they were sampled for, they are included in the table along with the date the detection occurred.

Contaminant	EPA's Limit (MCL or MRDL)	EPA's Ideal Goal (MCLG or MRDLG)	Highest Average or Single Test Result	Range of Detected Test Results	Violation	Typical Source of Contaminant
Inorganic & Organic Contaminants (Tested in drinking water.)						
Arsenic (03/25/13)	10.4 ppb	0 ppb	1.02 ppb	NA	NO	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes.
Nitrate	10.4 ppm	10 ppm	3.3 ppm	0.00-3.30 ppm	NO	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.
Barium (06/17/13)	2 ppm	2 ppm	0.13 ppm	NA	NO	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.
Selenium (03/25/13)	50 ppb	50 ppb	7.93 ppb	NA	NO	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines.
Gross Alpha	15.4 pCi/l	0 pCi/l	11 pCi/l	5.7-11.0 pCi/l	NO	Erosion of natural deposits.
Combined Radium	5.4 pCi/l	0 pCi/l	4.5 pCi/l	2.2-4.5 pCi/l	NO	Erosion of natural deposits.
Contaminants Related to Disinfection (Tested in drinking water.)						
Total Trihalomethanes (TTHMs)	80 ppb	NA	27.7 ppb	0.00-27.70 ppb	NO	By-product of drinking water disinfection.
Total Haloacetic Acids (HAA)*	60 ppb	NA	5.80 ppb	0.00-5.80 ppb	NO	By-product of drinking water disinfection.
Total Chlorine	4.0 ppm	4.0 ppm	1.45 ppm	1.32-1.55 ppm	NO	Water additive used to control microbes.
Other Substances (Tested in drinking water.)						
Fluoride	4.0 ppm	4.0 ppm	0.59 ppm	0.56-0.58 ppm	NO	Erosion of natural deposits; Water additive to promote strong teeth

*Total HAA refers to HAA5

Regulated Substances Controlled in the Distribution System (Tested in drinking water.)

Contaminant	EPA's Action Level	EPA's Ideal Goal (MCLG)	90% of Results Were Less Than	# of Homes with High Levels	Violation	Typical Source
Copper (06/09/16)	90% of homes less than 1.3 ppm	0 ppm	0.76 ppm	1 out of 30	NO	Corrosion of household plumbing.
Lead (06/09/16)	90% of homes less than 15 ppb	0 ppb	2.8 ppb	0 out of 30	NO	Corrosion of household plumbing.

AU samples and tests for Lead and Copper every 3 years to comply with the EPA's Lead & Copper Rule. The next round of sampling and testing is July 2019.

Lead in Drinking Water

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from material and components associated with service lines and home plumbing. Austin Utilities is responsible for providing high quality drinking water, but cannot control the variety of material used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in our water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at **www.epa.gov/safewater/lead.**

Key

90% Level. . 90% of samples must be below the AL.
AL . . . . Action Level is the concentration of a contaminant which triggers treatment or another requirement which a water system must follow.
gpg . . . . Grains per gallon.
MCL . . . . . . (Maximum Contaminant Level) Highest level of a contaminant allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
MCLG . . . . . (Maximum Contaminant Level Goal) Level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
MRDL . . . . . Maximum Residual Disinfectant Level
MRDLG . . . . Maximum Residual Disinfectant Level Goal
N/A . . . . Not Applicable.
ND. . . . . Not Detected.
NT. . . . . Not Tested.
Ntu . . . . Nephelometric units.
PCi/L. . . . . . Pico curies per liter (a measure of radioactivity).
ppb . . . . Parts per billion.
ppm . . . . . . Parts per million.
Range . . . . . Lowest to the highest a contaminant was detected in 2015.
SMCL . . . . . Secondary Maximum Contaminant Level.

Water Conservation

Austin Utilities pumps an average of 5.5 million gallons of water per day; however, during the summer, demand can dramatically increase to over 9.5 million gallons per day. You can help make a difference conserving water by using the following tips:

- Monitor your water bill for unusually high use. Your bill and water meter are tools that can help you discover leaks.
- When buying new appliances, consider those that offer cycle and load size adjustments. They are more water and energy efficient.
- Use a water-efficient showerhead. They're inexpensive, easy to install, and can save you up to 750 gallons a month.
- Keep a gallon of water in the refrigerator rather than running the tap for cold water.

Austin Utilities offers CONSERVE & SAVE® rebates on qualifying equipment purchases to promote and encourage water conservation. For full details and a list of rebates available, visit www.austinutilities.com.

CONSERVE & $AVE®

Austin Utilities Water System

Water Hardness

The average water hardness for Austin is at 16 grains per gallon (gpg).

Total Water Storage

- 500,000 Gallon Elevated Storage Reservoir (Ellis Tower)
- 1,000,000 Gallon Elevated Storage Reservoir (Belair Tower)
- 2,500,000 Gallon Ground Storage Reservoir (Downtown Plant)
- 2,000,000 Gallon Ground Storage Reservoir (Energy Park)

Total Number of Wells in Service – 8

- Well No. 2 (Todd Park)
- Well No. 3 (Service Drive)
- Well No. 4 (Sargeant Springs at Country Club)
- Well No. 6 (Ellis)
- Well No. 8 (8th Ave SW)
- Well No. 9 (Belair)
- Well No. 11 (Elmhurst)
- Well No. 12 (Energy Park)

Monitoring may have been done for additional contaminants that do not have MCLs established for them and are not required to be monitored under the Safe Drinking Water Act. Results may be available by calling 651-201-4700 or 1-800-818-9318 during normal business hours.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Appendix B
Part 1 - Wellhead Protection Plan
Austin Utilities

<u>Exhibit</u>

Austin Utilities – Part 1 Wellhead Protection Plan
October 27, 2017 - Stantec

AUSTIN UTILITIES
WELLHEAD PROTECTION PLAN
PART I

OCTOBER 27, 2017

Stantec Project No. 193800900

AUSTIN UTILITIES

WELLHEAD PROTECTION PLAN – PART 1

October 27, 2017

WELLHEAD PROTECTION AREA AND DRINKING WATER SUPPLY MANAGEMENT AREA DELINEATION AND VULNERABILITY ASSESSMENTS

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

Print Name: MARK JANOVEC

Signature: ______________________

Date: October 27, 2017 License # 45625

Table of Contents

TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

This report documents the delineation of the wellhead protection area (WHPA) and drinking water supply management area (DWSMA) and the vulnerability assessments for the wells and DWSMA for the Austin Utilities drinking water supply wells. The plan covers the wells listed in Table 1. Well logs are presented in Appendix A. The delineation was performed in accordance with rules (Minnesota Rules 4720.5100 to 4720.5590) for preparing and implementing wellhead protection measures for public water supply wells. The rules are administered by MDH, and the results described in this report were prepared by Stantec.

Austin Utilities currently obtains its drinking water supply from eight active wells completed in multiple bedrock aquifers aquifers, including the Spillville dolomite, the Makquoketa dolomite, the St. Peter Sandstone, the Prairie du Chien dolomite, and the Jordan sandstone. The bedrock aquifers serving the Utilities' wells are capable of supplying the community wells with high volumes of water, though the flow in each aquifer is of a different nature. Flow in the St. Peter and Jordan aquifers occurs through the pore spaces in the sandstone, known as porous flow. Flow in the dolomite aquifers (Spillville, Maquoketa, and Prairie du Chien) is largely through cracks, fractures, and solution cavities within the carbonate bedrock, which is known as fractured flow, though porous flow may also take place. Both types of flow need to be accounted for in the development of this plan.

A computer groundwater modeling platform was utilized for this project. The porous-flow capture zones for Austin Utilities's wells were delineated using MLAEM (multi-layer analytic element model) models. The models were created to reflect current pumping and geological conditions in and near the area around the Austin Utilities well field. The model was used to delineate one-year and ten-year capture zones for Austin Utilities' wells (Figure 1).

A fracture flow analysis was then undertaken to predict the area of the dolomite aquifers that may be capable of rapidly transmitting water to the Utilities' wells. This fracture flow delineation was created by utilizing MDH guidance developed for fracture flow settings. The calculated area is shown in Figure 2.

A composite Wellhead Protection Area (WHPA) was created using the results shown in Figures 1 and 2. This composite area is shown in Figure 3.

Since the recharge area for the Spillville aquifer may be under the influence of surface waters within the delineation area, an additional delineation of surface waters that flow into the groundwater capture zone was undertaken. The results of this delineation are shown in Figure 4.

The drinking water supply management area (DWSMA) was determined for the composite groundwater and surface water delineations by using property parcels and roadways as boundaries. Figure 5 shows the boundaries of both the WHPA and the DWSMA.

The amount of geologic protection documented in well logs from the water supply wells and other nearby wells, along with water quality information was used to determine well vulnerability. Wells 2, 3, and 4 are considered "vulnerable" to contamination, based on the MDH worksheet scoring process. The vulnerable classification is due to the relatively shallow depth of these Wells 2 and 4, along with the presence of tritium which indicates fairly "young" water in the Spillville aquifer. Well 3 was considered "vulnerable" due to the the well construction method, where the well casing ends above the top of the aquifer, allow for the potential of younger water to enter the aquifer. All of other Austin Utilities wells appear to meet the construction standards of the State Well Code.

The DWSMA was determined to have a both a "high" and "low" vulnerability to contamination from spills and leaks at the land surface. The high vulnerability areas are due to the capture zones for Wells 2 and 4, where little geologic protection is available to impeded infiltration of contaminant. The capture zones for Wells 8 and 9 were "low" in vulnerable due to the deep nature of the Prairie du Chien-Jordan aquifers in this area, with multiple confining layers to protect these aquifers from contamination. The capture zones for the remaining wells would also be fairly "low" in vulnerability, but since they are overlapped by the capture zones of Wells 2 and 4, the higher vulnerability ranking takes precedence. Aquifer vulnerability will be used to define the scope of activities required to complete Part 2 of the Wellhead Protection Plan.

CHAPTER ONE
DATA ELEMENTS and ASSESSMENT (4720.5200)

PART 1. REQUIRED DATA ELEMENTS

This section contains required data elements that were outlined in the Scoping Decision Notice provided to Austin Utilities by the MDH. Appendix D contains a table assessing the data elements required for this plan. Below is a summary of each data element.

A. Physical Environment Data Elements

1. **Precipitation** – Monthly and annual precipitation in Austin, Minnesota is provided in the table below. Precipitation amounts were calculated using the Minnesota Climatology Working Group's gridded database. This method calculates a precipitation amount for a given location by locating the nearest monitoring stations and filling in any gaps in the precipitation data by using data from other nearby stations.

   Average annual precipitation is 34.87 inches for the past ten years.

   Precipitation (in inches) in Austin, Minnesota

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016	0.74	0.42	4.13	1.67	4.16	5.35	8.53	5.58	8.58	4.70	1.43	1.95	47.87
2015	0.54	0.79	0.91	5.14	4.79	6.87	6.56	4.28	3.77	1.25	3.50	3.96	37.45
2014	0.68	1.32	1.09	5.10	2.09	9.32	1.26	5.65	3.68	1.95	0.59	1.26	36.53
2013	0.59	1.00	2.60	6.13	8.50	6.20	3.54	1.97	1.14	4.24	1.27	0.83	35.43
2012	0.71	1.89	1.42	3.11	4.20	3.00	1.33	1.99	1.38	1.64	0.60	1.52	21.38
2011	0.62	1.02	2.42	4.89	3.74	4.06	6.07	1.27	1.92	0.90	0.31	1.14	32.76
2010	0.58	0.84	1.54	1.67	2.51	6.91	6.90	2.10	8.77	0.81	2.76	3.18	42.33
2009	0.65	0.75	1.20	2.80	3.63	5.66	2.23	3.33	1.30	7.74	0.30	2.47	27.33
2008	0.62	0.69	1.38	4.98	4.09	8.38	3.05	2.30	1.80	2.29	1.88	1.61	33.71
2007	1.01	2.14	1.63	2.01	4.12	2.63	3.58	8.20	4.04	4.74	0.25	1.43	33.93
Avg	**0.67**	**1.09**	**1.83**	**3.75**	**4.18**	**5.84**	**4.31**	**3.67**	**3.64**	**3.03**	**1.29**	**1.94**	**34.87**

   The Spillville Dolomite is the uppermost bedrock aquifer likely to be under the most influence from infiltrating precipitation. Recharge to deeper bedrock aquifers is through vertical migration of water from upper aquifers or aquitards.

2. **Geology** – Throughout the Austin area, the bedrock geology contains the full strata of units from the Spillville dolomite down to the Mt. Simon Sandstone. Within this strata also lie the Maquoketa dolomite, the St. Peter Sandstone, the Prairie du Chien Dolomite, and the Jordan sandstrone, which are utilized as aquifers for the Utilities' public water supply wells. Additionally, the Dubuque formation, the Galena Group, Decorah Formation, Platteville Formation, and Glenwood Shale are present within the strata and overlie the well Prairie du Chien-Jordan aquifers. The Decorah Shale and Glenwood Shale act as aquitards. These aquitards are laterally present throughout the area. The Geologic Atlas of Mower County (Minnesota Geologic Survey, 1998) shows the layout of bedrock units in the area. Geologic cross-sections of the Austin area are presented in the Geologic Atlas. Additional cross-sections are provided as Figures 8A and 8B in this report.

Surficial geology is comprised mostly of geologic till, comprised of a mixture of sand, gravel, and clay deposits. This drift layer appears to vary in thickness from 49-108 feet in the Austin Utilities wells. See the Geologic Atlas of Mower County (Minnesota Geologic Survey, 1998) for a layout of surficial geologic deposits as found at the land surface.

Since the Austin Utilities wells primarily pump from the bedrock layers, the bedrock geology was considered to be the main focus of the delineation effort.

3. **Soils** – Soils may play an impact for where infiltration is likely to be more rapid. However, for the scale of this study, it is assumed that infiltration through soils is generally uniform. The computer models utilized did not include a recharge component, in order to produce delineations that are more conservative. Soil types will play a role in helping to develop the Part 2 Wellhead Protection Plan, showing where spills may more rapidly infiltrate at the land surface. Soil types will be mapped during the Part 2 planning process.

4. **Water Resources** – The Cedar River is the most prominent surface water feature to flow through the study area. The Cedar River also has a number of tributaries within the study area. The Hydrologic Assessment of the Upper Cedar River Watershed (University of Iowa, 2014) noted that for the Cedar River in the Austin area, there is a high ratio of baseflow to surface runoff, suggesting that the majority of flow derives from groundwater discharge. Of the precipitation that falls in the area, 22% is believed to leave as baseflow compared to 10% which leaves as surface flow. A higher percentage of precipitation appears to infiltrate instead of runoff, existing the aquifer through baseflow into the river.

   Also, while the tributaries that feed the Cedar River also receive groundwater discharge, there is additional evidence that a direct hydraulic connection may not always exist between the upper bedrock aquifer and these tributaries. Austin Utilities Well 4 has a static water level reading that is approximately 20 feet lower than Dobbins Creek, the nearest tributary to the Cedar River.

   Water Resources were used in the delineation effort to determine a surface water component to the Wellhead Protection Area. This is discussed in further detail in Chapter Two.

B. Land Use Data Elements

1. **Land use** – Land use is generally not heavily considered for the Part 1 wellhead protection activities. Land use will be covered in greater detail in the Part 2 plan, where the role of land use on water quality will be closely reviewed.

2. **Public utility services** – The public utilities that play the largest role in the Part 1 Wellhead Protection Plan are the municipal water supply wells operated by Austin Utilities. Table 2 shows the modeled rates of these wells, showing the historic pumping rates for the past five years in comparison with predicted pumping five years into the future. The higher of these two values was utilized for the wellhead protection delineation effort.

C. Water Quantity Data Elements

1. **Surface water quantity** – Surface waters do not appear to be directly recharging the aquifers that serve the Austin Utilities wells and are more likely a discharge point for the water table aquifer. Surface water features are included in the MLAEM model for

the Spillville aquifer, where it is believed they may have some hydraulic influence on the aquifer.

2. **Groundwater quantity** - Review of groundwater appropriations permits in the State Water Use Data System (SWUDS) database was performed to identify high capacity wells in the area that might affect delineation of the wellhead protection area. Wells with permitted discharges are included in Table 3.

   It should be noted that the water supply wells which previously supplied the Hormel facility in Austin were taken offline in 2013. The wells operated by Austin Utilities now supply the water to the Hormel Facility. As such, the Hormel wells were not included in the groundwater modeling effort. The modeled pumping rates for the Austin Utilities wells take into account the additional pumping demands from the Hormel facility.

D. Water Quality Data Elements

1. **Surface water quality** – The MDH collected water quality data from both groundwater wells and the Cedar River in the Austin area. Results of this effort are included in Appendix E. It is believed that surface water quality and groundwater quality for the uppermost bedrock aquifer (Spillville aquifer) have a correlation, based on the data presented. This correlation was considered in developing a surface water delineation for the Austin Utilities wells.

2. **Groundwater quality** – Recent groundwater sampling results are also summarized in the memo provided in Appendix E.

   Sampling of tritium has taken place at Austin Utilities Wells No. 2 and 4. Tritium is an isotope of hydrogen that was released into the atmosphere during the above-ground testing of nuclear weapons in the early 1950s. While harmless, the presence of tritium in aquifers indicates that some portion of the water was in contact with the atmosphere within the past 60 years. A tritium level of 1 tritium unit (TU) or greater is an indication that these aquifers are somewhat vulnerable to contamination. The tritium levels in Well 2 and 4 were both at 3.9 TU.

   The presence of nitrates in Wells 2 and 4 also indicates that human-sourced contamination from agricultural land uses and septic systems is having an impact on the aquifer. Nitrates levels in Well 2 were found between 1.0-1.6 mg/L. Nitrates levels found in Well 4 were between 2.8-3.2 mg/L. The regulatory limit for nitrates is 10.0 mg/L. While the nitrates levels do not appear to pose a health threat, they are evidence that the Spillville aquifer is vulnerable to contamination from activities at the land surface.

PART 2. ASSESSMENT OF DATA ELEMENTS USED TO DELINEATE THE WELLHEAD PROTECTION AREA

A. **Use of the Wells** – The wells shown in Table 1 serve as the primary drinking water source for Austin Utilities. Pumping from the wells is rotated based on water demand and seasonal usage.

Table 2 shows a comparison of the usage of the Austin Utilities wells for the past five years versus a projected pumping rate five years into the future. The greatest amount of pumping from any of these years is used to represent the pumping rate for that well in the groundwater model. This is done for the purpose of developing a delineation that is conservative and takes into account the potential volume each well may be used in the near future.

Other high capacity wells within the Austin area are shown on Table 3. These wells (with the exception of the now-dormant Hormel wells), were included in the groundwater model.

B. **Wellhead Protection Area Delineation Criteria**

1. **Time of travel** – The minimum time-of-travel for porous-flow aquifer delineations is 10-years, which is what was used for the Jordan aquifer. A 1-year time-of-travel zone was also delineated using standard techniques and represents the Emergency Management Area.

2. **Hydrologic flow boundaries** – The upper and lower limits of the aquifers, along with the pumping wells, serve as the major flow boundaries modeled in the Austin area. Upper and lower elevations of each aquifer were modeled based on data from Austin Utilities's wells. See Table 5 for local characteristics of each aquifer. This is described in additional detail in Chapter Two.

3. **Daily volume** – Projected annual pumping volumes for the Austin Utilities wells are shown in Table 2. The maximum projected annual pumping volumes were converted to cubic meters per day in order to be applied to the groundwater model(s).

4. **Groundwater flow field** – The groundwater flow field was calculated by the groundwater flow model for the porous flow within the Spillville, St. Peter, Prairie du Chien. And Jordan aquifer. Gradient in the aquifer is relatively shallow in the deeper aquifers and is difficult to measure, due to the small number of wells that penetrate to these aquifers. Past estmiates made by the MDH indicate deep aquifer flow is generally to the south, with an estimated gradient of 0.0002. This estimate of gradient and flow direction applies to the St. Peter, Prairie du Chien, and Jordan aquifers. Flow within the Spillville aquifer is believed to be more towards the Southwest, based on available well water level data. But a good understanding of flow direction and gradient is not available, since data has been collected different periods of time where water levels may have fluctuated due to climate variations.

5. **Aquifer transmissivity** – Aquifer Test Plans are provided in Appendix D for the aquifers that the Austin Utilities wells utilize. Transmissivity and hydraulic conductivity were estimated based on available aquifer tests and specific capacity tests. Where nearby data was not available, regional estimates were utilized. A summary of transmissivity and hydraulic conductivity is provided for each aquifer in Table 5.

   Should the Austin Utilities wells even be rehabilitated in the future, an opportunity may exist to collect more site-specific aquifer performance values.

C. **Quality and Quantity of Water Supplying the Public Water Supply Well** - Water in the

Austin Utilities water distribution system is regularly sampled and analyzed for contaminants regulated under the federal Safe Drinking Water Act. Routine monitoring by the Public Water Supply Program at MDH does not indicate contamination at levels that may pose a public health risk.

The bedrock aquifers appears to have sufficient transmissivity and recharge to remain a long-term source of drinking water for the residents of Austin. Any future water supply wells will most likely be completed within these aquifers. Monitoring of water levels within the aquifers in the region will help establish the long term sustainability of the aquifer over the coming years. Water level data collected in the Austin Utilities wells will contribute to the understanding of groundwater sustainability.

D. **The Land Uses in the Drinking Water Supply Management Area** – Land uses in the DWSMA for the Austin Utilities wells are a mixture of various use types, including residential, commercial, recreational, agricultural, and other uses. Land uses will be discussed in greater detail in the Part 2 Wellhead Protection Plan, which will include the contaminant source inventory for parcels within the DWSMA.

CHAPTER TWO

WELLHEAD PROTECTION AREA AND DRINKING WATER SUPPLY MANAGEMENT AREA DELINEATION (4720.5205)

A. Physical setting and subsurface hydrogeology – The Austin Utilities wells draw water from five different bedrock aquifers. The aquifers utilized by each well are summarized in Table 1. The groundwater in these aquifers (with the exception of the Spillville aquifer) generally has a low gradient and is not influenced by surface waters or other significant hydrogeologic boundaries, other than the upper and lower confining units. High capacity pumping wells have the greatest impact on localized flow directions within these aquifers. Other high capacity wells within the Austin area have been considered for this modeling effort and are summarized on Table 3.

Flow within the St. Peter and Jordan aquifers is porous in nature, with the majority of the flow believed to be from primary porosity between the grains of sandstone that comprise the bedrock. Flow within the remaining aquifers (Spillville, Maquoketa, Prairie du Chien) is believe to mostly be from secondary porosity features, such as fractures and solution cavities within the bedrock. This type of flow is referred to as fracture flow. All of the Austin Utilities wells are either open to fracture flow aquifers or are influenced by them. Therefore, both types of flow must be accounted for in the delineation process. Also, since the percentage of water that each aquifer contributes to the wells are not known with good certainty, the delineation methodologies must take this into account.

B. Delineation of the Wellhead Protection Area

1. Porous Flow Delineation Method

The delineation of the Spillville, St. Peter, Prairie du Chien, and Jordan aquifers was accomplished through multi-layer analytic element models (MLAEM), modeling each aquifer as a single layer that contributes water to Austin Utilities' wells. For the purposes of this study, porous flow through the Spillville and Prairie du Chien aquifer was also modeled, even if it is not necessarily the primary method of flow for this unit. Table 5 shows the modeled parameters that were input into MLAEM for the porous flow delineation runs. The following assumptions were made for the MLAEM model delineations:

1. 100% of the water discharged from Austin Utilities's wells is originating from each layer modeled in each modeling. While this likely doesn't reality, it offers up the most conservative delineation scenario to address the uncertainty of what the actual percentage of flow is originating from each aquifer.
2. The aquifers are homogeneous in the Austin Utilities area and do not exhibit variations of thickness or conductivity. While no aquifer is truly homogeneous, there is not enough geologic data to support small scale variations in aquifer parameters for the scope of this study.
3. Flow is uniform across the model domain.
4. No vertical recharge is applied to each modeled layer. While recharge is expected to occur from the overlying units, the amount of that recharge is not known with a high degree of certainty. Omitting recharge from the model results in a more conservative delineation.
5. Only the Spillville model included use of flow boundaries in the form of river elements, to simulate the influence of surface waters on aquifer flow.

6. The Maquoketa aquifer was not modeled for the porous delineation, because only a small portion of this aquifer is open to Well 3. The majority of the water from this well is believed to originate in the St. Peter sandstone. However, a fracture flow delineation is provided for the Maquoketa formation to help account for the uncertainty over how much water is provided by this aquifer.

The delineations were created using particle tracking in MLAEM. Pathlines we traced, tracking backwards (upgradient) with 40 particle lines per well. The path line groupings were then outlined to develop capture zones for 1-year and 10-year time-of-travel delineations. Figure 1 shows the outlined result of the delineation effort. Individual capture zones are presented for the 10-year delineations, color-coded by aquifer. Model files and delineation shape files are provided as supplemental data in Appendix D.

2. Fracture Flow Delineation

Since the Spillville, Maquoketa, and Prairie du Chien aquifers are fractured, they are capable of rapidly transmitting water through its secondary porosity features (fractures and solution cavities). The Minnesota Department of Health has developed a guidance for delineating the fracture flow component to the delineation of wells in this type of setting. The methodology is outlined in greater detail in *Guidance for Delineating Wellhead Protection Areas in Fractured and Solution-Weathered Bedrock in Minnesota* (Minnesota Department of Health, December 2011).

The first step of the process was to determine the ratio of the well discharge to the discharge vector. This determines whether the fracture flow delineation is a fixed radius circle, or a fixed radius circle with an upgradient extension. Table 6 shows the calculation of the ratio. Since the ratio for both wells was less than 3000, no upgradient extension is required for any of the three aquifers. Only a fixed-radius delineation is needed to account for fracture flow.

The next step was to delineate the fixed-radius 1-year and 10-year capture zones around each municipal well. Table 7 shows the values used to create the fixed-radius calculation for each well. This calculation takes into account aquifer thickness (based on the saturated open interval in each well), aquifer porosity (5%, as noted previously), and the total estimated pumping volume of each well over the established time interval. Since the exact percentage of water that the Prairie du Chien aquifer contributes to the Wells 8-12 is not known, the most conservative percentage (100%) was used. A 1-year and 10-year fixed radius for each well was identified using this method.

Since the fixed 10-year radii of the two sets of wells with the same aquifer overlap each other, the calculated areas had to be increased accordingly (since two wells cannot share the same capture area). The next step was to apportion a volume of the overlap area of each well, by calculating the volume of the shared area and determining the percentage of the shared area that should be added to each well's delineated area. Table 8 shows this calculation and shows the resulting modified fixed radius.

Figure 2 shows the final calculated fracture flow delineations for the two Austin Utilities wells.

A composite of the porous-flow delineations displayed in Figure 1 and the fracture-flow delineations displayed in Figure 2 was used to determine the overall groundwater delineation for Austin Utilities' wells. This is displayed in Figure 3. Since the delineations of the fracture-flow analysis extend beyond the boundaries of most of the porous-flow delineations produced by the MLAEM model, the fracture-flow delineations will largely define the majority of the new WHPA boundary.

C. Conjunctive Flow Delineation

Since water chemistry data suggests that surface water and the water within the Spillville aquifer are of a similar nature, it is believed that surface water infiltration is impacting this aquifer and helping to influence the capture zone for Wells 2 and 4. It is believed that direct infiltration of precipitation is the largest source of recharge to the Spillville aquifer, while the aquifer is in turn a large source of the baseflow for the Cedar River and its tributaries. Therefore, localized surface water flow over land into the groundwater capture zone was added to the delineation for Wells 2 and 4. This was accomplished using topography data from LIDAR studies, which was run through the Watershed Delineator application for ArcView. Pathlines were generated, showing where surface runoff is expected to intersect the capture zones for Wells 2 and 4.

Any pathlines that reach the Cedar River or its main tributaries before entering the Well 2 and 4 capture zone were not included, however. As the river and its tributaries are believed to be "gaining streams" within the Austin area, they are not supply water to the aquifer. Any stormwater that reaches these rivers is believed to exit the capture zones before infiltrating.

Figure 4 shows the additional area that was added to Wells 2 and 4 as a surface water delineation. A composite of the groundwater and surface water delineations in Figure 4 was made to produce the overall Wellhead Protection Area (WHPA) delineation shown in Figure 5.

D. Uncertainties relating to the accuracy of the calculated wellhead protection area boundaries

Using computer models and fixed equations to simulate ground-water capture necessarily involves representing a complicated natural system in a simplified manner. These simplifications are a result of incomplete knowledge or understanding of part of the natural system and the limitations of mathematical models implemented in groundwater modeling computer codes. The necessary simplifications give rise to uncertainty in the delineation results. A reasonable attempt to account for the most significant causes of delineation uncertainty was made when estimating the capture zones of the WHPA. Wherever possible, locally obtained aquifer parameters were used to more accurately represent conditions in and around the Austin Utilities wells.

The largest degrees of uncertainty for the Austin Utilities delineation feel under three categories:

1. <u>Transmissivity uncertainty</u> – Since good, localized aquifer test data were not available for the four of the five aquifers utilized by the Austin Utilities wells, there is not a high degree of uncertainty that the modeled hydraulic conductivity values are a close match to the actual values of hydraulic conductivity.

2. <u>Aquifer yield uncertainty</u> – Since some of Austin Utilities' wells are open to multiple aquifers, there is a degree of uncertainty regarding how much water each aquifer contributes to the yield of each well. The likely answer is that a mix of water from all of the aquifers contributes to the yield, but that mix percentage is unknown.

3. <u>Fractured flow uncertainty</u> – In all geologic settings where a fracture-flow aquifer is present (in this case, the Prairie du Chien), the exact nature of the flow within that aquifer is difficult to characterize. Flow along fractures may occur rapidly, with preference from certain directions based on the layout of the fracture network. Without a good understanding of the fracture network, the calculations of the fracture flow delineation assume a homogeneous flow from all directions.

4. <u>Surface Water Component</u> – The actual contribution of surface water to the delineated area is estimated based on available topographic data. However, over a large capture zone area,

localized flow may be diverted through man-made structures to either inside or outside of the groundwater capture area. There will always be some uncertainty of where the exact boundaries of the surface water capture area are located.

In order to address the uncertainty of the transmissivity and the aquifer yield, the simplest approach was to use an average estimated transmissivity value for each aquifer, while simulating that each individual aquifer supplies 100% of the yield to the porous flow delineation, even if multiple aquifers were involved. Additionally, it was simulated that the fractured aquifers supplied 100% of the water to the well for the fracture flow delineation. While this approach is arguably unrealistic, it was the most practical way to address this uncertainty, ensuring that the final delineated WHPA accounts for the full range of possible flow volumes from each aquifer.

The MDH guidance for fracture flow delineations is designed to account for the uncertainty of flow within fractured aquifers. It is believed that using the delineation method outlined gives a reasonable accounting for the uncertainties within these flow systems for the purposes of wellhead protection planning.

E. Delineation of the DWSMA

The Drinking Water Supply Management Area (DWSMA) is shown on Figure 5. This area includes the composite Wellhead Protection Area (WHPA) using both porous-flow, fracture-flow, and surface water capture zones. The DWSMA was delineated using a combination of parcel boundaries, street and road centerlines, and municipal boundaries. Any parcel of land either wholly or partially within one of the delineation areas was included within the DWSMA.

The DWSMA represents the area of land that will be considered during the creation of the management plan for Part 2. The vulnerability of the DWSMA is discussed in Chapter 3 of this report.

CHAPTER THREE
VULNERABILITY ASSESSMENT

This chapter documents the vulnerability assessments of the wells and drinking water supply management area (DWSMA) for the Austin Utilities wells listed in Table 1. This assessment was performed in accordance with rules (Minnesota Rule 4720.5210) for preparing and implementing wellhead protection measures for public water supply wells.

The vulnerabilities of the wells were determined by evaluating available information on the 1) geology, 2) well construction, 3) pumping rates, and 3) chemical composition of the well water and comparing these results with the criteria in Minnesota Rule 4720.5550.

The vulnerability of the DWSMA was determined by evaluating available information on 1) the lateral continuity of protective geologic materials overlying the aquifer and 2) the chemical and isotopic composition of well water from the aquifer.

A. **Well vulnerability assessment** - A vulnerability score was calculated for each well based on factors such as well construction, geology at the well site, and chemical data; higher scores correlate to greater perceived vulnerability. A numeric cutoff (of 45 points) is used to identify "vulnerable" from "non-vulnerable" wells (MDH, 1997). Vulnerable wells are also identified based on the presence of contamination, such as nitrate-nitrogen in excess of 10 mg/l, or young (post-1953) water, as indicated by the presence of 1 TU (tritium unit) or greater in the well water. The completed well vulnerability assessment worksheets are provided in Appendix B.

   With the exception of Wells 2, 3, and 4, all other Austin Utilities wells were ranked as "non-vulnerable" based on worksheet scores under 45 or through age-dating analysis that demonstrated less than 0.8 TU of tritium. These wells also have a very low sensitivity to contamination based on geologic data, which L-Scores ranging from 5 to 9. (Each L-score unit is equivalent to 10 feet of protective material that overlies the aquifer.)

   Wells 2 and 4 were ranked as "vulnerable" due to their shallow nature. These wells have tritium levels of 3.9 TU which indicates a component of "young" water in the wells. The presence of nitrates in these wells is further evidence that the wells are susceptible to contamination from activities that occur at or near the land surface.

   Well 3 scored less than 45 points in the MDH worksheet, but was still ranked as "vulnerable" because the casing for this well does not fully extend past the protective Decorah Shale. Instead it terminates in the Maquoketa aquifer, allowing shallower water to potentially reach the deeper St. Peter sandstone.

   Other than the well casing length in Well 3, there is nothing that was discovered in the well vulnerability assessment that indicates that the wells themselves are a likely avenue for contamination to reach the aquifer. The wells appear to meet construction standards set fourth in the State Well Code. Well vulnerability (or lack of) in Austin Utilities is mostly indicative of overall aquifer vulnerability.

B. **Drinking Water Supply Management Area Vulnerability Assessment** - The vulnerability of land parcels located within the drinking water supply management area (DWSMA) for Austin Utilities was evaluated primarily on the basis of the geologic sensitivity. The following data was used to assign a "low" vulnerability to capture zones for the St. Peter, Prairie du Chien, and Jordan aquifer:

   - The Decorah shale, a confining unit, is present throughout the entire DWSMA

- The Glenwood shale, a confining unit, is present throughout the entire DWSMA.
- Age dating information from Austin Utilities's wells indicate low tritium concentrations, supporting a "low" vulnerability designation.

The capture zones for Wells 2 and 4 are considered to be "high" in vulnerability due to a number of factors:

- Tritium for Wells 2 and 4 is at 3.9 TU
- Nitrates are present in both wells
- Geologic L-Score data shown on Figure 6 shows a high percentage of wells within the capture zone having an L-Score of "0," indicating no geologic protection.
- The geologic sensitivity map in the Mower County Geologic Atlas shows the majority of the capture area for Wells 2 and 4 to be "high" or "very high" in sensitivity. While isolated areas of "low" vulnerability may be present, there is not enough geologic data to override the water chemistry data.

Geological cross-sections are provided in Figures 8A and 8B. Additional cross-sections are provided in the Mower County Geologic atlas.

Figure 7 shows the DWSMA Vulnerability for Austin Utilities, with the green-shaded area representing areas of "low" vulnerability and the red shaded area representing "high" vulnerability. In areas where the "low" vulnerability capture zones for deep wells (e.g. Well 12) are overlapped by "high" vulnerability capture zones (e.g. Wells 2 and 4), the higher vulnerability area takes precedence.

The implications of the assigned vulnerability level will be addressed in greater detail in the Part 2 Wellhead Protection Plan. In general, low vulnerability rankings necessitate an effort at identifying and managing other groundwater wells which penetrate the geologic layers that protect the bedrock aquifers. Other wells can provide a direct pathway for contaminants to enter the aquifer, especially if those wells are poorly maintained, improperly constructed, or unused/unsealed. High vulnerability area will necessitate and inventory and management of other potential contamination sources, such as storage tanks, septic systems, feed lots, and hazardous waste generators.

C. **Recommendations** – The following recommendation can help to further define aquifer capture zones and vulnerability as Austin Utilities implements its Wellhead Protection Plan:

- Look for opportunities to better define aquifer transmissivity in the Austin Utilities area, particularly when (and if) new wells are constructed in the future or if existing wells are rehabilitated and test-pumped.

REFERENCES

Minnesota Department of Health, *Assessing Well and Aquifer Vulnerability for Wellhead Protection*, February 1997.

Minnesota Department of Health and Minnesota Geological Survey, *Minnesota County Well Index, Version 4.00.*

Minnesota Department of Health, *Guidance for Delineating Wellhead Protection Areas in Fractured and Solution-Weathered Bedrock in Minnesota*, December 2011.

Minnesota Department of Health, *Description of the Hydrogeologic Setting of the St. Peter-Prairie du Chien-Jordan Aquifer System in Southeaster Minnesota, Memo*, Justin Blum, November 2012

Minnesota Geologic Survey, Geologic Atlas of Mower County, Minnesota, C-11, John H. Mossler, 1998

University of Iowa, *Hydrologic Assessment of the Upper Cedar River Watershed*, Iowa Flood Center, IIHR Technical Report No. 489, July 2014

TABLES

TABLE 1 - AUSTIN UTILITIES WATER SUPPLY WELL INFORMATION

Well Name	Unique Number	Aquifer	Status	UTM E Coordinate	UTM N Coordinate	Casing Depth (feet)	Casing Diameter (in)	Well Depth (feet)	Date Constructed	Well Vulnerability	Aquifer Vulnerability
Well No. 2	227063	Spillville	Primary	503253	4837454	72	20	110	1947	High	High
Well No. 3	227064	Maquoketa-St. Peter	Primary	504424	4835771	140	16	578	1956	Low	Low
Well No. 4	226631	Spillville	Primary	506037	4835919	120	20	132	1949	High	High
Well No. 6	223359	Prairie du Chien - Jordan	Primary	504201	4834503	626	16	1010	1954-65	Low	Low
Well No. 7	227065	St. Peter	Sealed	502416	4832898	496	16	561	1957	Low	Low
Well No. 8	226364	Prairie du Chien - Jordan	Primary	500000	4834006	658	16	1017	1961	Low	Low
Well No. 9	223360	Prairie du Chien - Jordan	Primary	500620	4835068	688	16	1075	1954	Low	Low
Well No. 11	127258	Prairie du Chien - Jordan	Primary	501577	4837613	590	16	992	1976	Low	Low
Well No. 12	788722	Prairie du Chien - Jordan	Primary	503761	4836938	584	18	990	2012	Low	Low

* vulnerability status based on review of well construction, geologic materials encountered during drilling, well use, and water quality.

Table 2 - Historic and Projected Pumping Data - Austin Utilities

Well Name	Unique Number	Aquifer	Historic Pumping Totals (MG/Y)					Projected 2021 Rate (MG/Y)	Modeled Rate for Delineation (MG/Y)	Modeled Rate for Delineation (m^3/d)
			2012	2013	2014	2015	2016			
Well No. 2	227063	Spillville	268.9	375.5	355.5	331.7	331.2	350.0	375.5	3896.9
Well No. 3	227064	Maquoketa-St. Peter	214.4	226.2	199.6	207.1	213.9	225.0	226.2	2347.5
Well No. 4	226631	Spillville	195.9	212.4	209.9	236.9	163.5	250.0	250.0	2594.5
Well No. 6	223359	Prairie du Chien - Jordan	75.1	236.6	214.7	216.8	212.7	225.0	236.6	2455.4
Well No. 8	226364	Prairie du Chien - Jordan	116.0	202.4	152.5	235.5	206.7	200.0	235.5	2444.0
Well No. 9	223360	Prairie du Chien - Jordan	110.1	245.1	272.3	248.2	184.4	250.0	272.3	2825.9
Well No. 11	127258	Prairie du Chien - Jordan	91.4	138.2	181.4	109.6	164.0	150.0	181.4	1882.5
Well No. 12	788722	Prairie du Chien - Jordan		207.1	372.7	376.4	377.4	375.0	377.4	3916.6
		Total	**1071.8**	**1843.5**	**1958.6**	**1962.2**	**1853.8**	**2025.0**	**2154.9**	**22363**

TABLE 3: MODELED HIGH CAPACITY WELLS

Well Name	Unique Number	UTM E Coordinate	UTM N Coordinate	Aquifer	Recorded Discharge (MG/Y)					Average (MG/Y)	Modeled Average (m^3/d)
					2011	2012	2013	2014	2015		
Austin Utilities 1	226391	504488	4817191	Galena-Decorah	11.3	9.2	2.2	0.6	0.3	4.7	49.0
City of Austin (Hormel Nature Center)	152305	505057	4836292	Spillville-Maquoketa	5.6	1.0	3.9	4.1	3.5	3.6	37.6
Hormel Foods 6*	242116	502818	4835741	Maquoketa-Platteville	444.5	464.7	35.3	0.0	0.0		
Hormel Foods NS*	249369	502901	4837514	Drift-Spillville	260.2	238.6	19.0	0.0	0.0		
Hormel Foods SS*	249371	502893	4837229	Drift-Spillville	424.5	389.3	31.5	0.0	0.0		
City of Mapleview Well 1	240060	501713	4837382	Galena	4.9	4.6	4.3	4.8	5.0	4.7	49.0
Austin Country Club Well 1	132689	506213	4836521	Spillville	9.9	13.8	15.3	6.2	11.1	11.3	116.9
Austin Country Club Well 2	132690	506202	4836522	Spillville	9.1	13.8	0.0	6.1	0.0	5.8	60.2

* Wells are no longer in use, water is now being supplied by Austin Utilities

TABLE 4 - GEOLOGIC MEASUREMENTS FROM AUSTIN UTILITIES WELLS

Well Name	Unique Number	Ground Elevation (feet)	Depth to Spillville (feet)	Depth to Maquoketa (feet)	Depth to Galena (feet)	Depth to St. Peter (feet)	Depth to PDC (feet)	Depth to Jordan (feet)	Depth to St. Lawrence (feet)	Thickness Spillville (feet)	Thickness Maquoketa (feet)	Thickness St. Peter (feet)	Thickness PDC (feet)	Thickness Jordan (feet)	Bottom St. Peter Elevation (feet)	Bottom PDC Elevation (feet)	Bottom Jordan Elevation (feet)
Well No. 2	227063	1206	51	110						59							
Well No. 3	227064	1209	56	97	260?	490	578			41		88			631		
Well No. 4	226631	1209	108	132						24							
Well No. 6	223359	1214	49	128	201	525	606	907	980	79	73	81	301	73	608	307	234
Well No. 7	227065																
Well No. 8	226364	1185	60	124	198	505	605	920	965	64	74	100	315	45	580	265	220
Well No. 9	223360	1209	69	140	190	515	575	925	987	71	50	60	350	62	634	284	222
Well No. 11	127258	1217	76	107	177	480	573	896	942	31	70	93	323	46	644	321	275
Well No. 12	788722	1221		115	220	488	573	918	966			85	345	48	648	303	255
									Average	52.7	66.8	84.5	326.8	54.8	624.2	296.0	241.2

TABLE 5A – SPILLVILLE AQUIFER PARAMETERS

PARAMETER	VALUE	SOURCE
Aquifer Material	Dolomite	Well Boring Records
Transmissivity	9,100 ft^2/day	Well 2 Aquifer Test (1999)
Horizontal Hydraulic Conductivity	154.2 ft/day	Well 2 Aquifer Test (1999) using observed aquifer thickness
Stratigraphic Bottom Elevation (at Austin Utilities wells)	1061-1112 feet	Well Boring Records
Stratigraphic Top Elevation (at Austin Utilities wells)	1101-1165 feet	Well Boring Records
Aquifer Thickness	24-79 feet	Well Boring Records
Aquifer Porosity	0.054	Estimated
Hydraulic Confinement	Semi-Confined	Well Boring Records
Groundwater Flow Field	Southwest	Well Water Levels

TABLE 5B – MAQUOKETA AQUIFER PARAMETERS

PARAMETER	VALUE	SOURCE
Aquifer Material	Dolomite	Well Boring Records
Transmissivity	9,000 ft^2/day	Albert Lea Well 9 Aquifer Test (2002)
Horizontal Hydraulic Conductivity	53.3 ft/day	Albert Lea Well 9 Aquifer Test (2002) using observed aquifer thickness
Stratigraphic Bottom Elevation (at Austin Utilities wells)	995-1102 feet	Well Boring Records
Stratigraphic Top Elevation (at Austin Utilities wells)	1061-1112 feet	Well Boring Records
Aquifer Thickness	50-74 feet	Well Boring Records
Aquifer Porosity	0.054	Estimated
Hydraulic Confinement	Semi-Confined	Well Boring Records
Groundwater Flow Field	Southwest	Estimated, based on calculated flow direction in Spillville

TABLE 5C – ST. PETER AQUIFER PARAMETERS

PARAMETER	VALUE	SOURCE
Aquifer Material	Sandstone	Well Boring Records
Transmissivity	4,020 ft^2/day	Well 7 Specific Capacity Data
Horizontal Hydraulic Conductivity	45.7 ft/day	Well 7 Specific Capacity Data and observed aquifer thickness
Stratigraphic Bottom Elevation (at Austin Utilities wells)	580-648 feet	Well Boring Records
Stratigraphic Top Elevation (at Austin Utilities wells)	680-737 feet	Well Boring Records
Aquifer Thickness	60-100 feet	Well Boring Records
Aquifer Porosity	0.20	Estimated
Hydraulic Confinement	Confined	Well Boring Records
Groundwater Flow Field	South, Gradient 0.0002	MDH Estimates, 2015

TABLE 5D – PRAIRIE DU CHIEN AQUIFER PARAMETERS

PARAMETER	VALUE	SOURCE
Aquifer Material	Dolomite	Well Boring Records
Transmissivity	7,460 ft^2/day	MDH Estimated Average for SE Minnesota (2012)
Horizontal Hydraulic Conductivity	21.3-24.8 ft/day	MDH Estimated Average for SE Minnesota (2012), using observed Austin area PDC thickness
Stratigraphic Bottom Elevation (at Austin Utilities wells)	265-321 feet	Well Boring Records
Stratigraphic Top Elevation (at Austin Utilities wells)	580-648 feet	Well Boring Records
Aquifer Thickness	301-350 feet	Well Boring Records
Aquifer Porosity	0.054	Estimated
Hydraulic Confinement	Confined	Well Boring Records
Groundwater Flow Field	South, Gradient 0.0002	MDH Estimates, 2015

TABLE 5E – JORDAN AQUIFER PARAMETERS

PARAMETER	VALUE	SOURCE
Aquifer Material	Sandstone	Well Boring Records
Transmissivity	2,940 ft^2/day*	MDH Estimated Average for SE Minnesota (2012)
Horizontal Hydraulic Conductivity	40.3-65.3 ft/day	MDH Estimated Average for SE Minnesota (2012), using observed Austin area Jordan thickness
Stratigraphic Bottom Elevation (at Austin Utilities wells)	220-275 feet	Well Boring Records
Stratigraphic Top Elevation (at Austin Utilities wells)	265-321 feet	Well Boring Records
Aquifer Thickness	45-73 feet	Well Boring Records
Aquifer Porosity	0.20	Estimated
Hydraulic Confinement	Confined	Well Boring Records
Groundwater Flow Field	South, Gradient 0.0002	MDH Estimates, 2015

TABLE 6 - CALCULATED RATIO OF WELL DISCHARGE TO THE DISCHARGE VECTOR

Well Name	Fractured Aquifer	Pumping Rate, Q (m^3/day)	Aquifer Thickness, L (meters)	Hydraulic Conductivity, K (m/day)	Hydraulic Gradient, i	Q_s (H x K x i)	Ratio (Q/Q_s)	Upgradient Extension Needed?
Well 2	Spillville	3896.9	18.0	85	0.0005	0.765	5094.0	No
Well 3	Maquoketa	2347.5	21.3	16.2	0.0002	0.069	34015.8	No
Well 4	Spillville	2594.5	7.3	85	0.0005	0.310	8362.6	No
Well 6	Prairie du Chien	2455.4	91.7	6.9	0.0002	0.127	19403.2	No
Well 8	Prairie du Chien	2444.0	96	6.9	0.0002	0.132	18448.1	No
Well 9	Prairie du Chien	2825.9	106.7	6.9	0.0002	0.147	19191.7	No
Well 11	Prairie du Chien	1882.5	98.5	6.9	0.0002	0.136	13849.0	No
Well 12	Prairie du Chien	3906.2	105.2	6.9	0.0002	0.145	26906.7	No

TABLE 7 - CALCULATED FRACTURE FLOW FIXED-RADIUS CAPTURE ZONE

Well Name	Fractured Aquifer	Pumping Rate, Q (m^3/day)	10-Year Pumping Volume (m^3)	Aquifer Thickness, L (meters)	Maximum Calculated Aquifer Thickness (m)*	Aquifer Porosity	Calculated 10-Year Radius (m)	Calculated 1-Year Radius (m)
Well 2	Spillville	3896.9	14,223,685	18.0	18.0	0.05	2242.9	709.3
Well 3	Maquoketa	2347.5	8,568,375	21.3	21.3	0.05	1600.3	506.1
Well 4	Spillville	2594.5	9,469,925	7.3	7.3	0.05	2873.8	908.8
Well 6	Prairie du Chien	2455.4	8,962,210	91.7	61.0	0.05	967.1	305.8
Well 8	Prairie du Chien	2444.0	8,920,600	96.0	61.0	0.05	964.9	305.1
Well 9	Prairie du Chien	2825.9	10,314,535	106.7	61.0	0.05	1037.5	328.1
Well 11	Prairie du Chien	1882.5	6,871,125	98.5	61.0	0.05	846.8	267.8
Well 12	Prairie du Chien	3906.2	14,257,630	105.2	61.0	0.05	1219.8	385.7

*maximum thickness allowed for calculation is 200 feet (61 meters)

TABLE 8 - CALCULATED REVISED RADII FOR OVERLAP AREAS OF 10-YEAR FRACTURE FLOW CAPTURE ZONE

Well Name	Original Calculated 10-Year Radius (m)	Area of Original Circle (m^2)	Long Axis of Overlap Area (m)	Short Axis of Overlap Area (m)	Overlap Area (m^2)	Area of Overlap Apportioned to Each Well (m^2)	Revised Total Area (m^2)	Revised 10-Year Radius (m)
Well 8	964.9	2,924,787	1577.6	772.7	957,409	444,013	3,368,800	1035.5
Well 9	1037.5	3,381,815	1577.6	772.7	957,409	513,395	3,895,210	1113.5
Well 2	2242.9	15,804,084	3929.5	1937.6	5,979,859	2,263,642	18,067,726	2398.2
Well 4	2873.8	25,945,532	3929.5	1937.6	5,979,859	3,716,217	29,661,749	3072.7

FIGURES

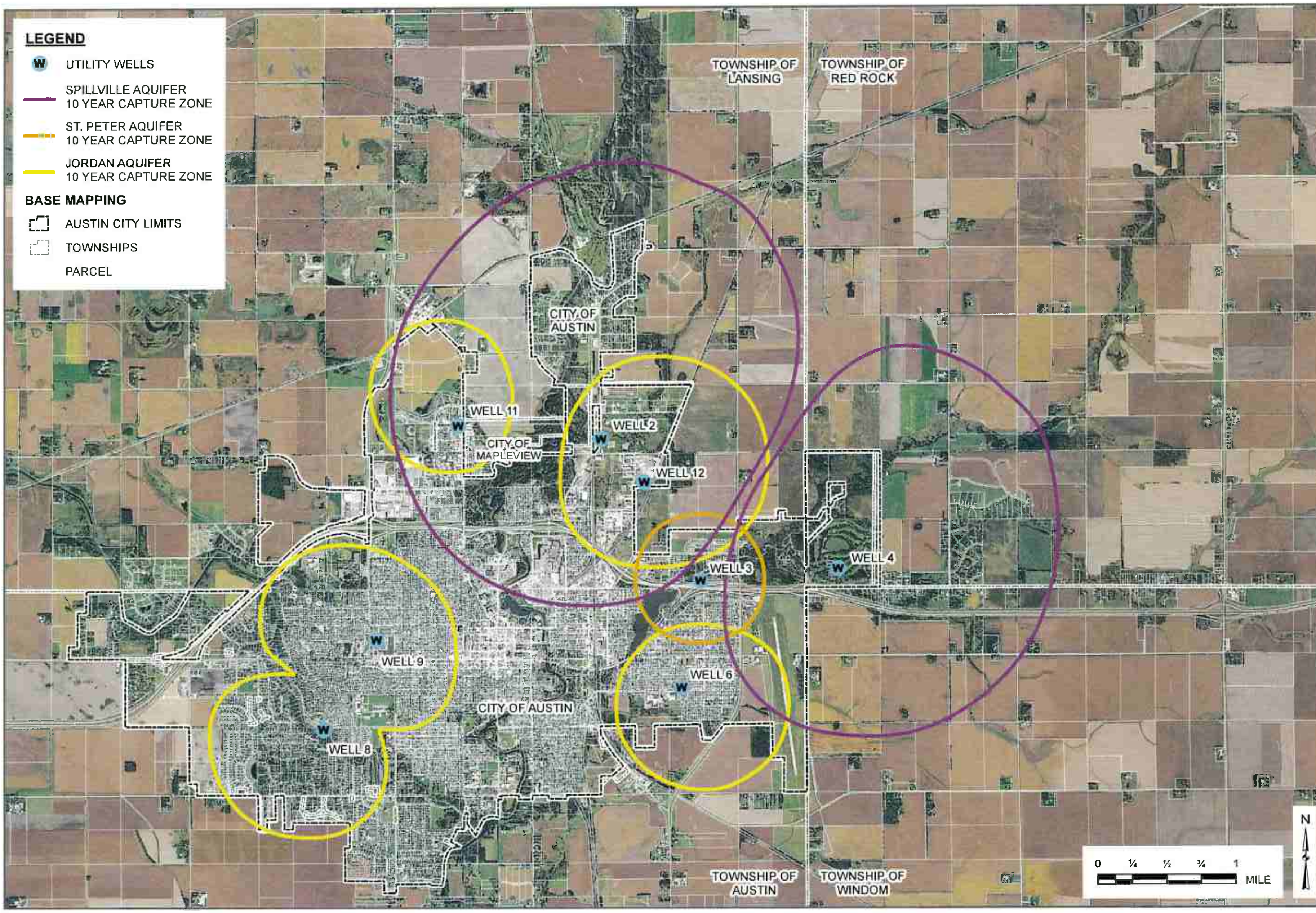

FIGURE 1 - POROUS MODEL GROUNDWATER DELINEATIONS

AUSTIN UTILITIES WELLHEAD PROTECTION PLAN

August 2017

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V:\1938\active\193800900\GIS\Projects\Figure 1 - Porous.mxd

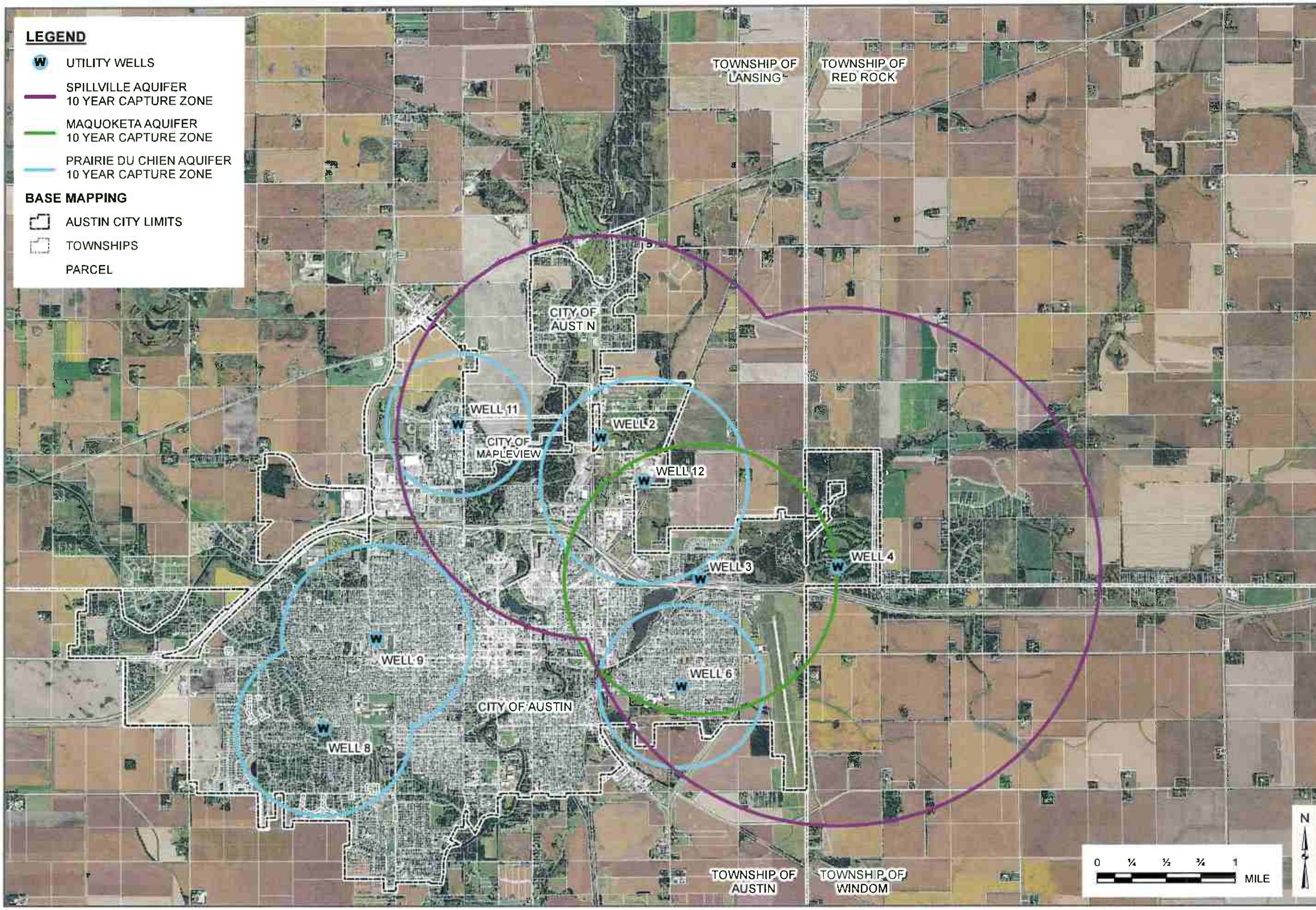

FIGURE 2 - FRACTURE FLOW GROUNDWATER DELINEATIONS

AUSTIN UTILITIES WELLHEAD PROTECTION PLAN

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V:\1938\active\193800900\GIS\Projects\Figure 2 - Fracture.mxd

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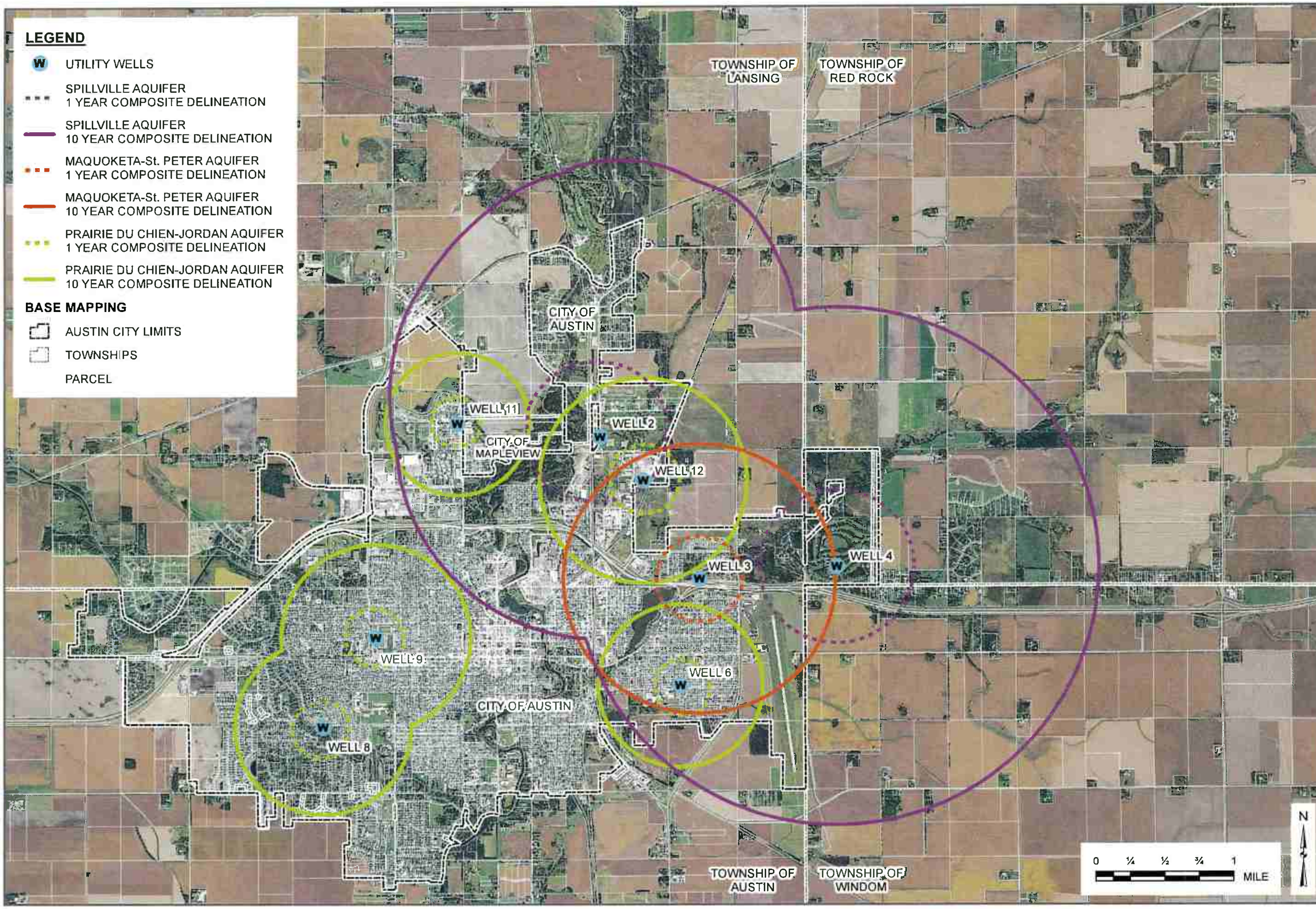

FIGURE 3 - COMPOSITE GROUNDWATER DELINEATIONS

AUSTIN UTILITIES WELLHEAD PROTECTION PLAN

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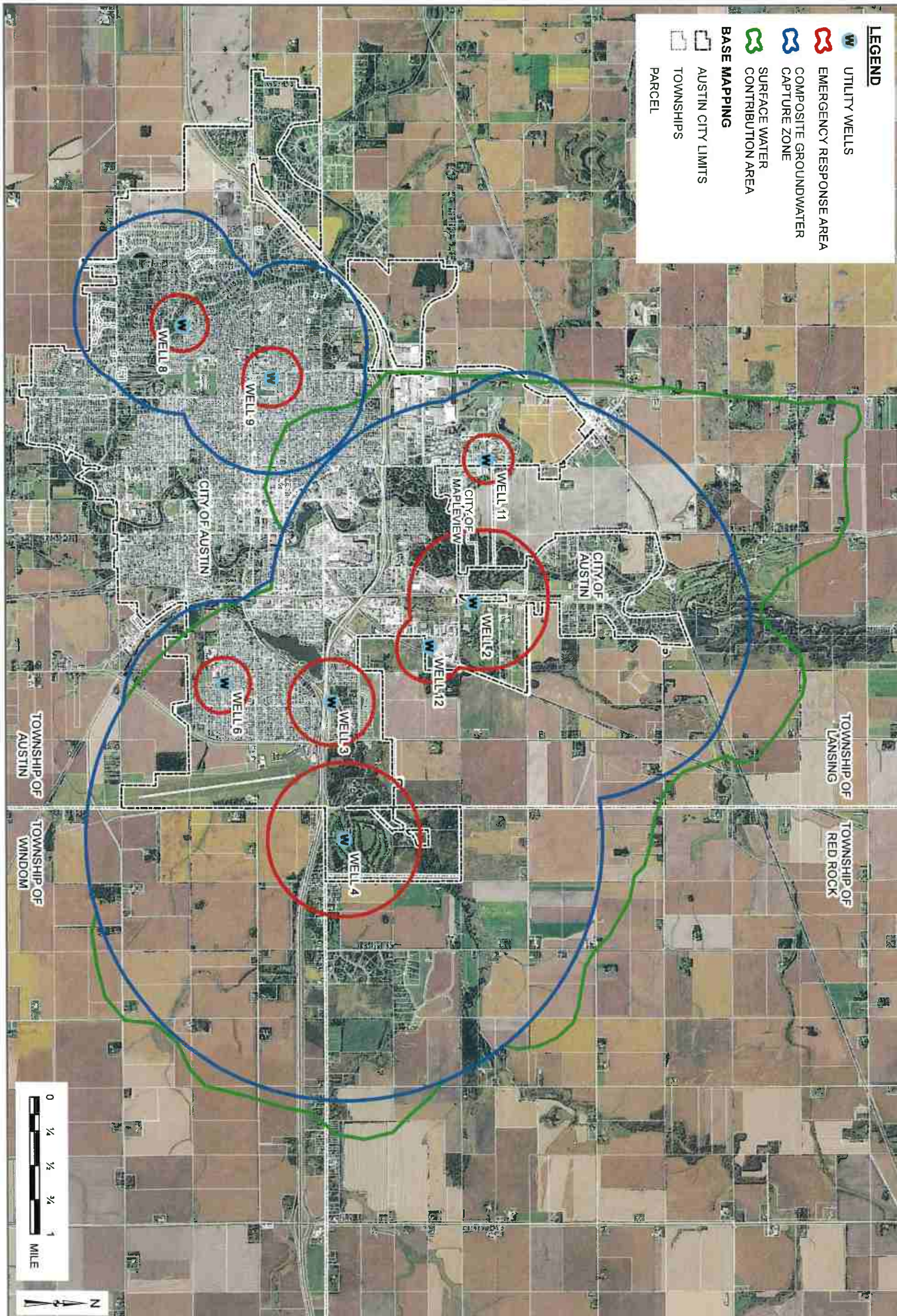

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FIGURE 4 - GROUNDWATER AND SURFACE WATER DELINEATIONS

AUSTIN UTILITIES WELLHEAD PROTECTION PLAN

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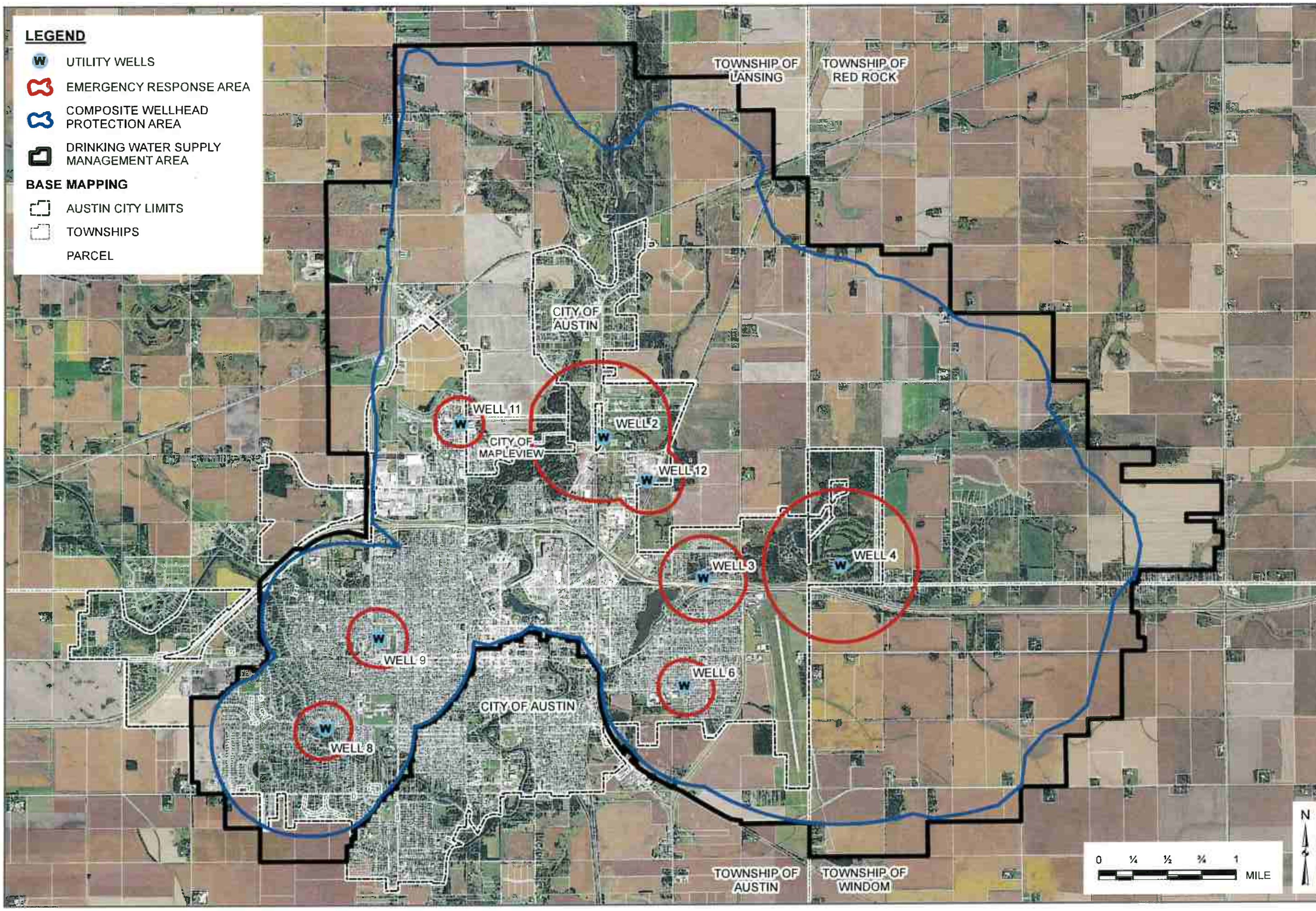

FIGURE 5 - WHPA AND DWSMA DELINEATIONS

AUSTIN UTILITIES WELLHEAD PROTECTION PLAN

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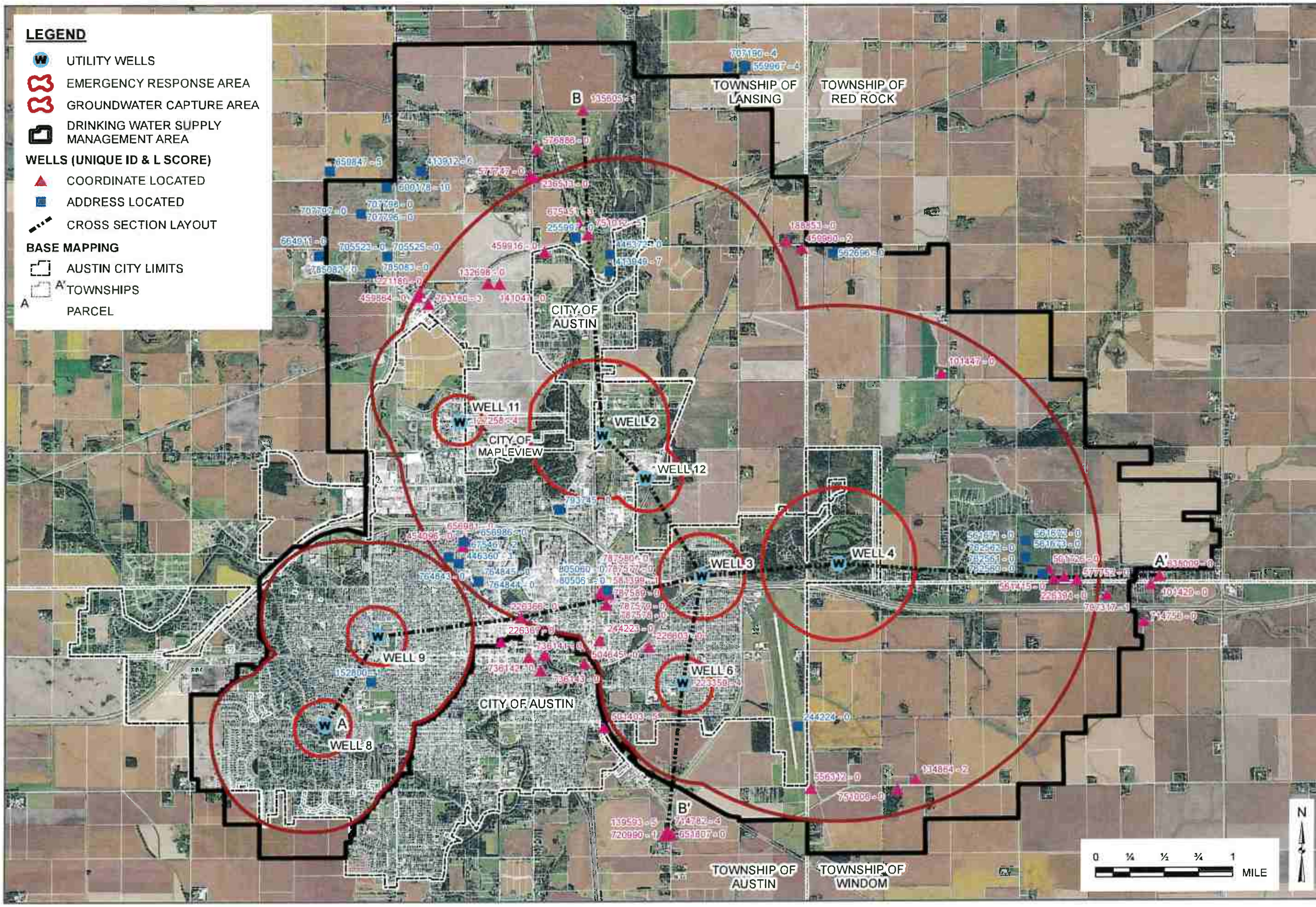

FIGURE 6 - GROUNDWATER VULNERABILITY DATA MAP

AUSTIN UTILITIES WELLHEAD PROTECTION PLAN

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V:\1938\active\193800900\GIS\Projects\Figure 6 - DWSMA VUL.mxd

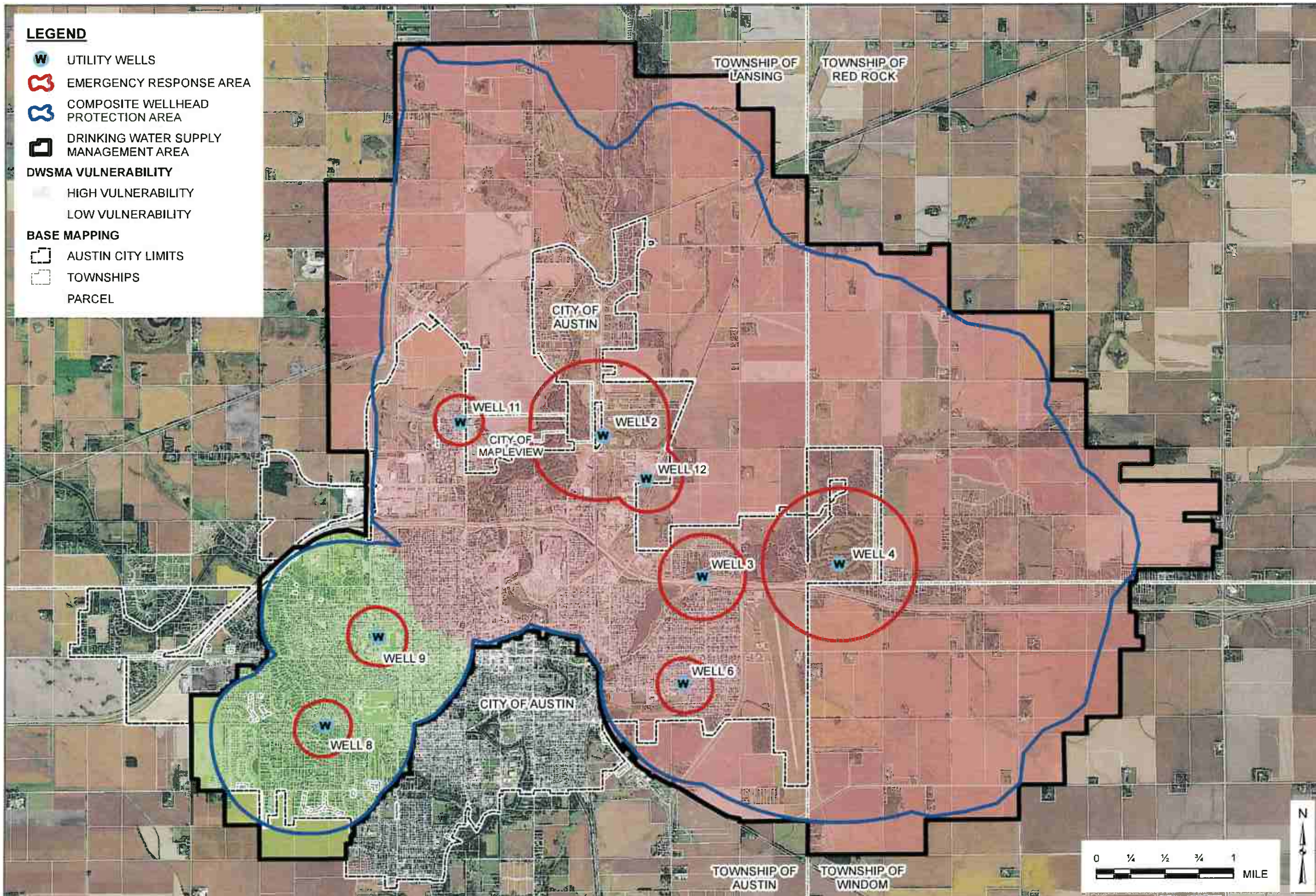

FIGURE 7 - DWSMA VULNERABILITY

AUSTIN UTILITIES WELLHEAD PROTECTION PLAN

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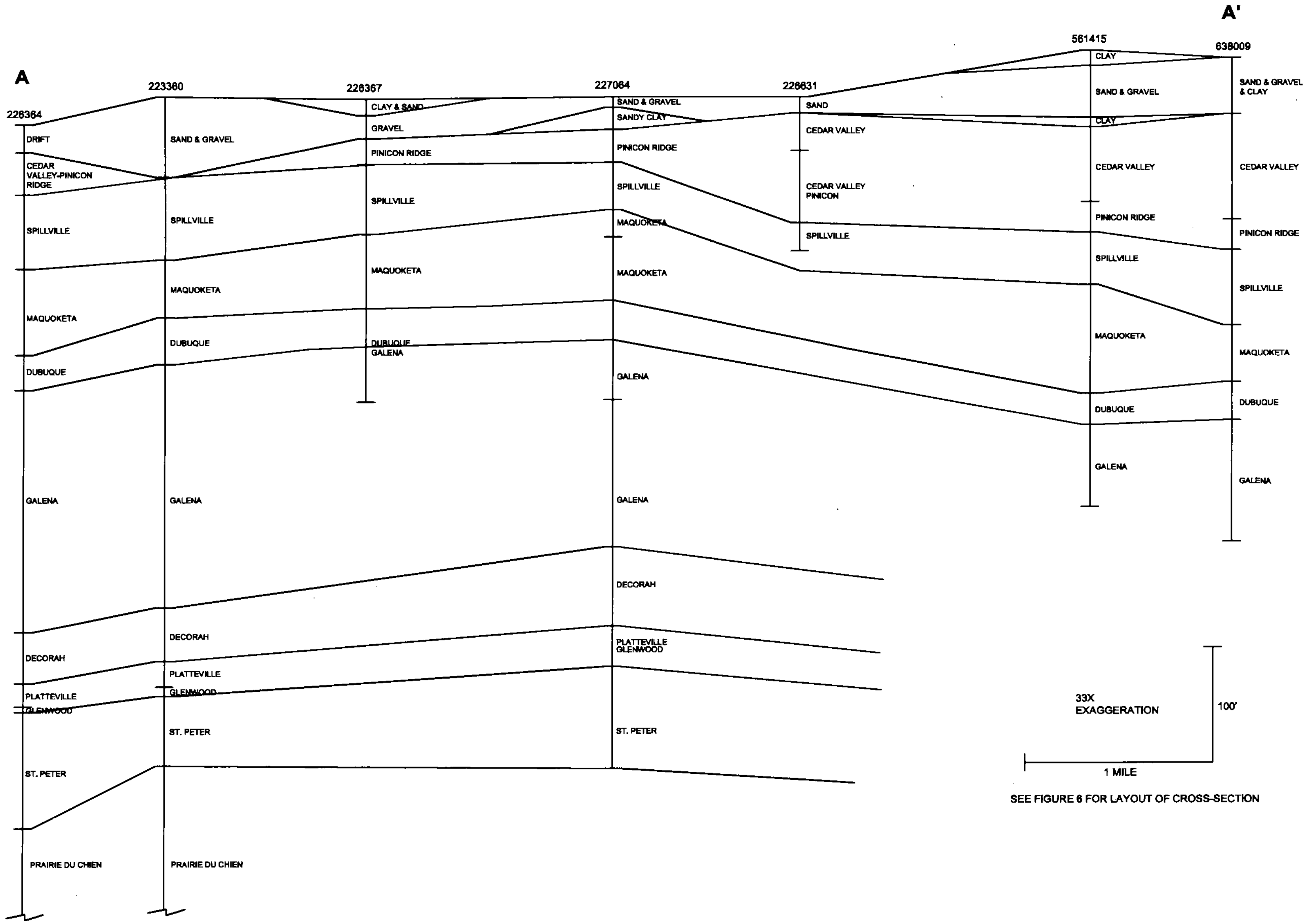
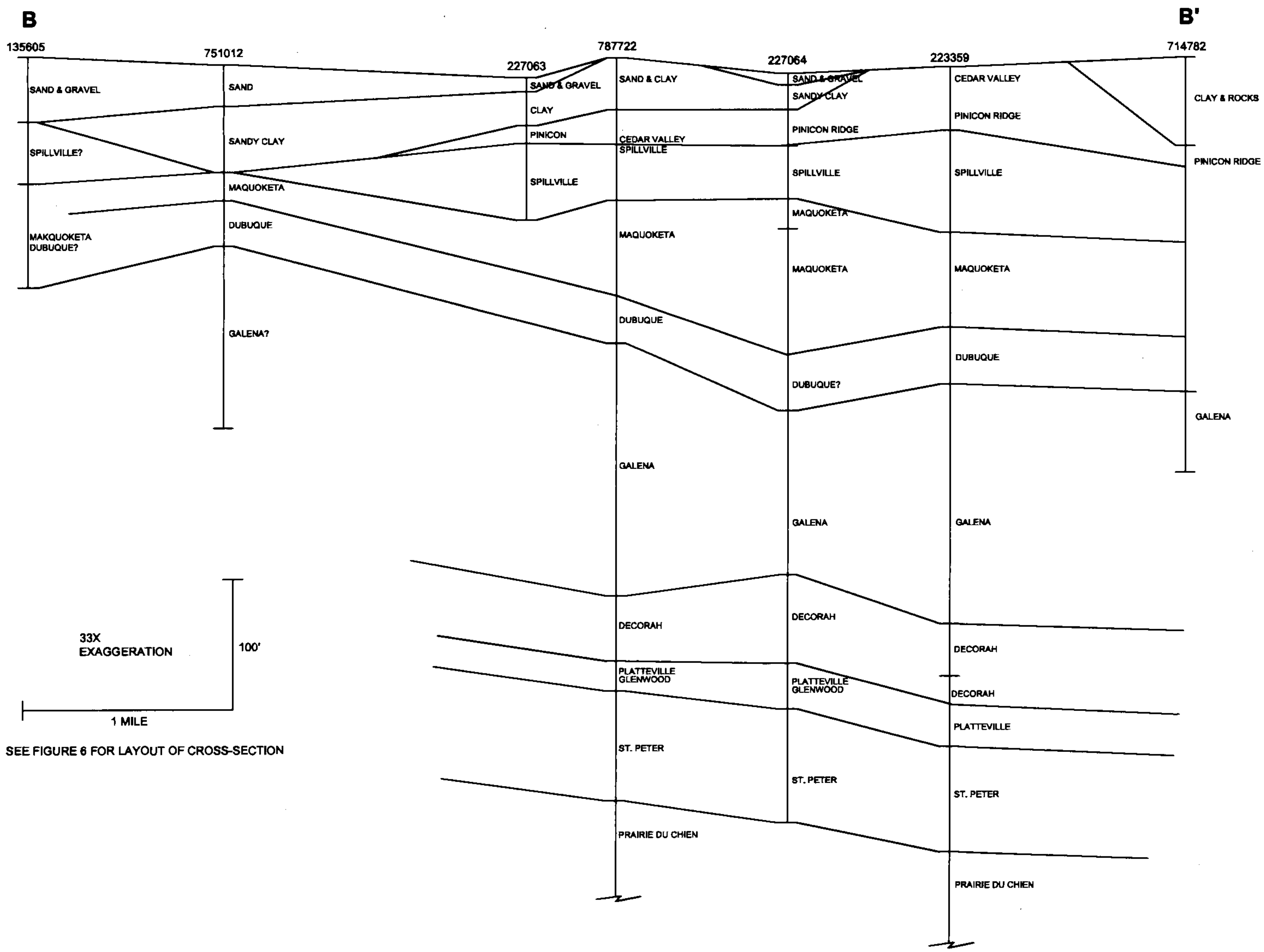
V:\1938\active\193800900\GIS\Projects\Figure 7 - SWCA VUL.mxd

FIGURE 8A - AUSTIN GEOLOGIC CROSS-SECTION A-A'



SEE FIGURE 6 FOR LAYOUT OF CROSS-SECTION

FIGURE 8B - AUSTIN GEOLOGIC CROSS-SECTION B-B'



SEE FIGURE 6 FOR LAYOUT OF CROSS-SECTION

APPENDIX A

AUSTIN UTILITIES WELL LOGS

Unique No. 00227063	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection
	103	18	W	26	DCCBBC

Well Name AUSTIN 2

Well Owner's Name WELL 2
TODD PARK

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO
CLAY			0	2
SAND & COARSE GRAVEL			2	11
CLAY	YELLO		11	37
LIMEROCK SHALE		SOFT	37	51
LIMEROCK			51	108
CAVING SAND	BLACK	SOFT	108	110

USGS Quad Elevation 1206
Aquifer: DSPL Alt Id: 81-5043

Report Copy

Well Depth 110 ft. **Depth Completed** 110 ft. **Date Well Completed** 1947/00/00

Drilling Method

Drilling Fluid

Well Hydrofractured? ☐ Yes ☐ No
From ft. to ft.

Use Community Supply

Casing **Drive Shoe?** ☐ Yes ☐ N

Hole Diameter

Casing Diameter **Weight(lbs/ft)**
20 in. t 72 ft

Screen N **Open Hole** From 72 ft. to 110 ft.
Make Type

Static Water Level 16 ft. from Land surface Date /19/47

PUMPING LEVEL (below land surface)
49 ft. after hrs. pumping 1940 g.p.m.

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

Grouting Information Well grouted? ☐ Yes ☐ No

Nearest Known Source of Contamination
ft. direction type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed Y
Mfr nam
Model HP 0 Volts
Drop Pipe Length ft. Capacity g.p.m
Type T

Any not in use and not sealed well(s) on property? ☐ Yes ☐ No

Was a variance granted from the MDH for this Well? ☐ Yes ☐ No

Well CONTRACTOR CERTIFICATION Lic. Or Reg. No. 27022
License Business Name
Name of Driller

HE-01205-06 (Rev. 9/96)

Unique No. 00227063	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	103	18	W	26	DCCBBC	110 ft.	110 ft.	1947/00/00

Well Name AUSTIN 2 **Lic. Or Reg. No.** 27022 **Name of Driller**

USGS Quad **Elevation** 1206 **Aquifer** DSPL **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
CLAY			0	2	QCUU	CLAY		
QCUU = clay	CLAY = Clay							
SAND & COARSE GRAVEL			2	11	QHUU	SAND	GRVL	
QHUU = sand +larger	SAND = Sand		GRVL = Gravel					
CLAY	YELLOW		11	37	QCUY	CLAY		
QCUY = clay-yellow	CLAY = Clay							
LIMEROCK SHALE		SOFT	37	51	DWPR	DLMT	SHLE	
DWPR = Wapsipinicon/Pinicon Ridge	DLMT = Dolomite		SHLE = Shale					
LIMEROCK			51	108	DSPL	DLMT		
DSPL = Wapsipinicon/Spillville Fm	DLMT = Dolomite							
CAVING SAND	BLACK	SOFT	108	110	DSPL	SNDS		
DSPL = Wapsipinicon/Spillville Fm	SNDS = Sandstone							

Unique No. 00227064	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection
	103	18	W	36	CCDADD

Well Depth 578 ft. **Depth Completed** 578 ft. **Date Well Completed** 1956/00/00

Well Name AUSTIN 3

WELL #3
8TH AVE. NE
AUSTIN MN

Drilling Method

Drilling Fluid

Well Hydrofractured? ☐ Yes ☐ No
From ft. to ft.

Use Community Supply

Casing Drive Shoe? ☐ Yes ☐ N

Hole Diameter

Casing Diameter **Weight(lbs/ft)**
24 in. t 97 ft
16 in. t 140 ft

Screen N
Make Type

Open Hole From 140 ft. to 578 ft.

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO
FILL			0	5
SAND & GRAVEL			5	9
SAND & CLAY			9	21
SANDY CLAY			21	28
ROTTEN LIMESTONE			28	56
LIMEROCK		HARD	56	75
LIMEROCK	YELLO	HARD	75	97
SHALE			97	99
LIMEROCK	GRAY		99	120
LIMEROCK & SHALESTREA			120	260
LIMEROCK	GRAY		260	387
SHALE	BLUE		387	455
LIMEROCK			455	472
SHALE	GREE		472	490
SHALE & SANDSTONE	GRAY		490	525
SHALE & SANDSTONE	GREE	HARD	525	570
CAVING SHALE	GRAY		570	578

Static Water Level 8 ft. from Land surface Date /19/56

PUMPING LEVEL (below land surface)
152 ft. after hrs. pumping 1040 g.p.m.

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

Grouting Information Well grouted? ☐ Yes ☐ No

Nearest Known Source of Contamination
ft. direction type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed Y
Mfr nam
Model HP 0 Volts
Drop Pipe Length ft. Capacity g.p.m
Type T

Any not in use and not sealed well(s) on property? ☐ Yes ☐ No

Was a variance granted from the MDH for this Well? ☐ Yes ☐ No

REMARKS, ELEVATION, SOURCE OF DATA, etc.

OH TOP - OMAQ

USGS Quad Elevation 1209
Aquifer: MTPL Alt Id: 81-5043

Well CONTRACTOR CERTIFICATION Lic. Or Reg. No. 27022
License Business Name
Name of Driller

Report Copy

HE-01205-06 (Rev. 9/96)

Unique No. 00227064	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	103	18	W	36	CCDADD	578 ft.	578 ft.	1956/00/00

Well Name AUSTIN 3 **Lic. Or Reg. No.** 27022 **Name of Driller**

USGS Quad **Elevation** 1209 **Aquifer** MTPL **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
FILL			0	5	RMMF	FILL		
RMMF = man-made fill	FILL = Fill							
SAND & GRAVEL			5	9	QHUU	SAND	GRVL	
QHUU = sand +larger	SAND = Sand		GRVL = Gravel					
SAND & CLAY			9	21	QLUU	SAND	CLAY	
QLUU = clay+sand	SAND = Sand		CLAY = Clay					
SANDY CLAY			21	28	QLUU	CLAY	SAND	
QLUU = clay+sand	CLAY = Clay		SAND = Sand					
ROTTEN LIMESTONE			28	56	DWPR	DLMT		
DWPR = Wapsipinicon/Pinicon Ridge	DLMT = Dolomite							
LIMEROCK		HARD	56	75	DSPL	DLMT		
DSPL = Wapsipinicon/Spillville Fm	DLMT = Dolomite							
LIMEROCK	YELLOW	HARD	75	97	DSPL	DLMT		
DSPL = Wapsipinicon/Spillville Fm	DLMT = Dolomite							
SHALE			97	99	OMAQ	SHLE	LMSN	
OMAQ = Maquoketa Formation	SHLE = Shale		LMSN = Limestone					
LIMEROCK	GRAY		99	120	OMAQ	LMSN		
OMAQ = Maquoketa Formation	LMSN = Limestone							
LIMEROCK & SHALESTREAKS			120	260	OMQG	LMSN	SHLE	
OMQG = Maquoketa-Galena	LMSN = Limestone		SHLE = Shale					
LIMEROCK	GRAY		260	387	OGAL	LMSN		
OGAL = Galena Grp	LMSN = Limestone							
SHALE	BLUE		387	455	ODCR	SHLE		
ODCR = Decorah Shale	SHLE = Shale							
LIMEROCK			455	472	OPVL	LMSN		
OPVL = Platteville Formation	LMSN = Limestone							
SHALE	GREEN		472	490	OPGW	SHLE	LMSN	
OPGW = Platteville-Glenwood	SHLE = Shale		LMSN = Limestone					

Unique No. 00227064	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	103	18	W	36	CCDADD	578 ft.	578 ft.	1956/00/00

Well Name AUSTIN 3 **Lic. Or Reg. No.** 27022 **Name of Driller**

USGS Quad **Elevation** 1209 **Aquifer** MTPL **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
SHALE & SANDSTONE	GRAY		490	525	OSTP	SNDS	SHLE	
OSTP = St.Peter Sandstone	SNDS = Sandstone		SHLE = Shale					
SHALE & SANDSTONE	GREEN	HARD	525	570	OSTP	SNDS	SHLE	
OSTP = St.Peter Sandstone	SNDS = Sandstone		SHLE = Shale					
CAVING SHALE	GRAY		570	578	OSTP	SHLE		
OSTP = St.Peter Sandstone	SHLE = Shale							

Unique No. 00226631	MINNESOTA DEPARTMENT OF HEALTH	**Update Date** 2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	**Entry Date** 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection
	103	17	W	31	CCADDB

Well Name AUSTIN 4

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO
FINE SAND			0	14
DECOMPOSED LIMEROCK			14	46
LIMEROCK & SHALE	GRAY		46	108
LIMEROCK	BROW		108	122
CREVICED LIMEROCK			122	132

REMARKS, ELEVATION, SOURCE OF DATA, etc.

GWQ-235

USGS Quad Elevation 1209

Aquifer: DSPL Alt Id: 81-5043

Report Copy

Well Depth 132 ft. **Depth Completed** 132 ft. **Date Well Completed** 1949/00/00

Drilling Method

Drilling Fluid Well Hydrofractured? ☐ Yes ☐ No From ft. to ft.

Use Community Supply

Casing **Drive Shoe?** ☐ Yes ☐ N **Hole Diameter**

Casing Diameter **Weight(lbs/ft)**

20 in. t 120 ft

Screen N **Open Hole** From 120 ft. to 132 ft.

Make Type

Static Water Level 29 ft. from Land surface Date 1949/00/00

PUMPING LEVEL (below land surface)

19 ft. after hrs. pumping 2200 g.p.m.

Well Head Completion

Pitless adapter mfr Model

Casing Protection ☐ 12 in. above grade

☐ At-grade(Environmental Wells and Borings ONLY)

Grouting Information Well grouted? ☐ Yes ☐ No

Nearest Known Source of Contamination

ft. direction type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed Y

Mfr nam

Model HP 0 Volts

Drop Pipe Length ft. Capacity Ξ+03 g.p.m

Type T

Any not in use and not sealed well(s) on property? ☐ Yes ☐ No

Was a variance granted from the MDH for this Well? ☐ Yes ☐ No

Well CONTRACTOR CERTIFICATION Lic. Or Reg. No. 27022

License Business Name

Name of Driller

HE-01205-06 (Rev. 9/96)

Unique No. 00226631	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	103	17	W	31	CCADDB	132 ft.	132 ft.	1949/00/00

Well Name AUSTIN 4 **Lic. Or Reg. No.** 27022 **Name of Driller**

USGS Quad **Elevation** 1209 **Aquifer** DSPL **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
FINE SAND			0	14	QFUU	SAND		
QFUU = sand	SAND = Sand							
DECOMPOSED LIMEROCK			14	46	DCVL	DLMT		
DCVL = Lower Cedar Valley	DLMT = Dolomite							
LIMEROCK & SHALE	GRAY		46	108	DCLP	DLMT	SHLE	
DCLP = L.Cedar Valley-Pinicon Ridg	DLMT = Dolomite		SHLE = Shale					
LIMEROCK	BROWN		108	122	DSPL	DLMT		
DSPL = Wapsipinicon/Spillville Fm	DLMT = Dolomite							
CREVICED LIMEROCK			122	132	DSPL	LMSN		
DSPL = Wapsipinicon/Spillville Fm	LMSN = Limestone							

Unique No. 00223359 **County Name** Mower	**MINNESOTA DEPARTMENT OF HEALTH** **WELL AND BORING RECORD** ***Minnesota Statutes Chapter 1031***	**Update Date** 2012/02/06 **Entry Date** 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection
	102	18	W	1	CBCDDB

Well Depth 1010 ft. **Depth Completed** 1010 ft. **Date Well Completed** 1954/00/00

Well Name AUSTIN 6

WELL #6
4TH AVE. SE
AUSTIN MN

Drilling Method

Drilling Fluid

Well Hydrofractured? ☐ Yes ☐ No
From ft. to ft.

Use Community Supply

Casing **Drive Shoe?** ☐ Yes ☐ N

Hole Diameter

Casing Diameter		Weight(lbs/ft)
24 in. t	90 ft	
16 in. t	626 ft	

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO
LIMESTONE	TAN		0	25
LIMESTONE	TAN		25	49
SHALE & LIMESTONE	BLU/G		49	64
LIMESTONE		V.HARD	64	128
ROCK & SHALE	LT. GR		128	135
SHALE		SOFT	135	141
LIMESTONE		SOFT	141	153
LIMESTONE MUDDY			153	168
LIMESTONE	GRAY	HARD	168	188
MAQUOKETA FORMATION			188	201
LIMESTONE	LT. GR		201	245
LIMESTONE		SOFT	245	268
LIMESTONE	GRAY	HARD	268	363
LIMESTONE MIXED WITH S		HARD	363	375
DIRTY SHALE & LIMESTON			375	377
LIME		HARD	377	430
SHALE			430	470
LIMEROCK			470	525
SANDY SHALE CAVES IN			525	579
LIMEROCK SHALE SANDRO			579	606
LIMEROCK			606	776
LIMEROCK CREVICE			776	806
LIMEROCK			806	857
LIMEROCK CREVICE			857	895
LIMEROCK			895	907
SANDROCK			907	980
LIMEROCK			980	995
SHALE	GREE		995	1010

Screen N **Open Hole** From 626 ft. to 1010 ft.
Make Type

Static Water Level 216 ft. from Land surface Date 1954/00/00

PUMPING LEVEL (below land surface)
268 ft. after hrs. pumping 0 g.p.m.

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

Grouting Information Well grouted? ☐ Yes ☐ No

Nearest Known Source of Contamination
ft. direction type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed Y
Mfr nam
Model HP 0 Volts

Drop Pipe Length ft. Capacity E+03 g.p.m
Type T

Any not in use and not sealed well(s) on property? ☐ Yes ☐ No

Was a variance granted from the MDH for this Well? ☐ Yes ☐ No

REMARKS, ELEVATION, SOURCE OF DATA, etc.

M.G.S. NO. 130.

DRILLED 07/1954-MCCARTHY, REDRILLED 1965-MUELLER

USGS Quad Elevation 1214

USGS Quad		Elevation	1214
Aquifer:	OPCJ	Alt Id:	81-5043

Report Copy

Well CONTRACTOR CERTIFICATION Lic. Or Reg. No. 27022

License Business Name

Name of Driller

HE-01205-06 (Rev. 9/96)

Unique No. 00223359	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	102	18	W	1	CBCDDB	1010 ft.	1010 ft.	1954/00/00

Well Name AUSTIN 6 **Lic. Or Reg. No.** 27022 **Name of Driller**

USGS Quad **Elevation** 1214 **Aquifer** OPCJ **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
LIMESTONE DCVL = Lower Cedar Valley	TAN DLMT = Dolomite		0	25	DCVL	DLMT		
LIMESTONE DWPR = Wapsipinicon/Pinicon Ridge	TAN DLMT = Dolomite		25	49	DWPR	DLMT		
SHALE & LIMESTONE DSPL = Wapsipinicon/Spillville Fm	BLU/GRY DLMT = Dolomite		49	64 SHLE = Shale	DSPL	DLMT	SHLE	
LIMESTONE DSPL = Wapsipinicon/Spillville Fm	DLMT = Dolomite	V.HARD	64	128	DSPL	DLMT		
ROCK & SHALE OMAQ = Maquoketa Formation	LT. GRY DLMT = Dolomite		128	135 SHLE = Shale	OMAQ	DLMT	SHLE	
SHALE OMAQ = Maquoketa Formation	SHLE = Shale	SOFT	135	141	OMAQ	SHLE		
LIMESTONE OMAQ = Maquoketa Formation	LMSN = Limestone	SOFT	141	153	OMAQ	LMSN		
LIMESTONE MUDDY OMAQ = Maquoketa Formation	LMSN = Limestone		153	168 SHLE = Shale	OMAQ	LMSN	SHLE	
LIMESTONE OMAQ = Maquoketa Formation	GRAY LMSN = Limestone	HARD	168	188	OMAQ	LMSN		
MAQUOKETA FORMATION OMAQ = Maquoketa Formation	LMSN = Limestone		188	201	OMAQ	LMSN		
LIMESTONE ODGL = Dubuque-Stewartville	LT. GRY LMSN = Limestone		201	245	ODGL	LMSN		
LIMESTONE OGAL = Galena Grp	LMSN = Limestone	SOFT	245	268	OGAL	LMSN		
LIMESTONE OGAL = Galena Grp	GRAY LMSN = Limestone	HARD	268	363	OGAL	LMSN		
LIMESTONE MIXED WITH SHALE OGAL = Galena Grp	LMSN = Limestone	HARD	363	375 SHLE = Shale	OGAL	LMSN	SHLE	

Unique No. 00223359	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	102	18	W	1	CBCDDB	1010 ft.	1010 ft.	1954/00/00

Well Name AUSTIN 6 — Lic. Or Reg. No. 27022 — Name of Driller

USGS Quad — Elevation 1214 — Aquifer OPCJ — Alternative Id 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
DIRTY SHALE & LIMESTONE			375	377	OGAL	SHLE	LMSN	
OGAL = Galena Grp	SHLE = Shale	LMSN = Limestone						
LIME		HARD	377	430	OGAL	LMSN		
OGAL = Galena Grp	LMSN = Limestone							
SHALE			430	470	ODCR	SHLE		
ODCR = Decorah Shale	SHLE = Shale							
LIMEROCK			470	525	ODPL	LMSN	SHLE	
ODPL = Decorah-Platteville	LMSN = Limestone	SHLE = Shale						
SANDY SHALE CAVES IN			525	579	OSTP	SNDS	SHLE	
OSTP = St.Peter Sandstone	SNDS = Sandstone	SHLE = Shale						
LIMEROCK SHALE SANDROCK			579	606	OSTP	SNDS	SHLE	DLMT
OSTP = St.Peter Sandstone	SNDS = Sandstone	SHLE = Shale					DLMT = Dolomite	
LIMEROCK			606	776	OPDC	DLMT		
OPDC = Prairie Du Chien Group	DLMT = Dolomite							
LIMEROCK CREVICE			776	806	OPDC	DLMT	CRVC	
OPDC = Prairie Du Chien Group	DLMT = Dolomite	CRVC = Crevice						
LIMEROCK			806	857	OPDC	DLMT		
OPDC = Prairie Du Chien Group	DLMT = Dolomite							
LIMEROCK CREVICE			857	895	OPDC	DLMT	CRVC	
OPDC = Prairie Du Chien Group	DLMT = Dolomite	CRVC = Crevice						
LIMEROCK			895	907	OPDC	DLMT		
OPDC = Prairie Du Chien Group	DLMT = Dolomite							
SANDROCK			907	980	CJDN	SNDS		
CJDN = Jordan Sandstone	SNDS = Sandstone							
LIMEROCK			980	995	CSTL	DLMT		
CSTL = St.Lawrence Formation	DLMT = Dolomite							
SHALE	GREEN		995	1010	CFRN	SHLE		
CFRN = Franconia	SHLE = Shale							

Unique No. 00226364

County Name Mower

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Update Date 2012/02/06

Entry Date 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection
	102	18	W	9	BAAAAC

Well Depth 1017 ft. **Depth Completed** 1017 ft. **Date Well Completed** 1961/10/05

Well Name AUSTIN 8

AUSTIN 8
8TH SW AV
AUSTIN MN

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO
DRIFT			0	24
LIME & SHALE	BROW	SOFT	24	36
LIME & SHALE	BROW	SOFT	36	60
LIME & SHALE	BROW	SOFT	60	75
LIME	GRAY	HARD	75	124
LIME	GRAY	HARD	124	198
LIME	GRAY	HARD	198	228
LIME	GRAY	HARD	228	260
LIME SOME SHALE	BROW		260	295
LIME	GRAY	HARD	295	319
LIME	GRAY	HARD	319	366
LIME	GRAY	HARD	366	436
LIME	GRAY	HARD	436	438
SHALE			438	480
SHALE			480	491
LIMESTONE		HARD	491	500
LIMESTONE		HARD	500	505
LIMESTONE		HARD	505	510
SHALEY SANDSTONE			510	580
VERY SHALEY SANDSTON			580	605
LIMESTONE		HARD	605	735
LIMESTONE & SANDSTONE			735	750
LIMESTONE		HARD	750	760
SANDSTONE			760	810
LIMESTONE		HARD	810	915
SANDY LIMESTONE			915	920
SANDY LIMESTONE			920	925
SANDSTONE			925	950
LIMESTONE & SANDSTONE			950	965
SHALE		HARD	965	980
SHALE & SANDSTONE			980	991
SHALE			991	1017

Drilling Method

Drilling Fluid

Well Hydrofractured? ☐ Yes ☐ No
From ft. to ft.

Use Community Supply

Casing **Drive Shoe?** ☐ Yes ☐ N

Hole Diameter

Casing Diameter **Weight(lbs/ft)**

24 in. t 74 ft

16 in. t 658 ft

Screen N

Open Hole From 658 ft. to 1017 ft.

Make Type

Static Water Level 196 ft. from Land surface Date 1961/10/05

PUMPING LEVEL (below land surface)

ft. after hrs. pumping g.p.m.

Well Head Completion

Pitless adapter mfr Model

Casing Protection ☐ 12 in. above grade

☐ At-grade(Environmental Wells and Borings ONLY)

Grouting Information Well grouted? ☐ Yes ☐ No

Nearest Known Source of Contamination

ft. direction type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed Y

Mfr nam

Model HP 0 Volts

REMARKS, ELEVATION, SOURCE OF DATA, etc.	Drop Pipe Length ft. Capacity Ξ+03 g.p.m Type T
CONTRACTOR: BERGERSON-CASWELL GAMMA LOGGED 6-23-1997.	Any not in use and not sealed well(s) on property? ☐ Yes ☐ No Was a variance granted from the MDH for this Well? ☐ Yes ☐ No
USGS Quad Elevation 1185 Aquifer: OPCJ Alt Id: 81-5043	**Well CONTRACTOR CERTIFICATION** Lic. Or Reg. No. 27058 License Business Name
Report Copy	Name of Driller

HE-01205-06 (Rev. 9/96)

Unique No. 00226364	**MINNESOTA DEPARTMENT OF HEALTH**	**Update Date** 2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	**Entry Date** 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	102	18	W	9	BAAAAC	1017 ft.	1017 ft.	1961/10/05

Well Name AUSTIN 8 **Lic. Or Reg. No.** 27058 **Name of Driller**

USGS Quad **Elevation** 1185 **Aquifer** OPCJ **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
DRIFT			0	24	QUUU	DRFT		
QUUU = Quaternary deposit	DRFT = Drift							
LIME & SHALE	BROWN	SOFT	24	36	DCVL	DLMT	LMSN	SHLE
DCVL = Lower Cedar Valley	DLMT = Dolomite		LMSN = Limestone				SHLE = Shale	
LIME & SHALE	BROWN	SOFT	36	60	DWPR	DLMT	LMSN	SHLE
DWPR = Wapsipinicon/Pinicon Ridge	DLMT = Dolomite		LMSN = Limestone				SHLE = Shale	
LIME & SHALE	BROWN	SOFT	60	75	DSPL	DLMT	LMSN	
DSPL = Wapsipinicon/Spillville Fm	DLMT = Dolomite		LMSN = Limestone					
LIME	GRAY	HARD	75	124	DSPL	DLMT	LMSN	
DSPL = Wapsipinicon/Spillville Fm	DLMT = Dolomite		LMSN = Limestone					
LIME	GRAY	HARD	124	198	OMAQ	LMSN	DLMT	SHLE
OMAQ = Maquoketa Formation	LMSN = Limestone		DLMT = Dolomite				SHLE = Shale	
LIME	GRAY	HARD	198	228	ODUB	LMSN	SHLE	
ODUB = Dubuque Fm	LMSN = Limestone		SHLE = Shale					
LIME	GRAY	HARD	228	260	OGSV	DLMT	LMSN	
OGSV = Galena/Stewartville Fm	DLMT = Dolomite		LMSN = Limestone					
LIME SOME SHALE	BROWN		260	295	OGSV	DLMT	LMSN	
OGSV = Galena/Stewartville Fm	DLMT = Dolomite		LMSN = Limestone					
LIME	GRAY	HARD	295	319	OGSV	DLMT	LMSN	
OGSV = Galena/Stewartville Fm	DLMT = Dolomite		LMSN = Limestone					
LIME	GRAY	HARD	319	366	OGPR	LMSN		
OGPR = Galena/Prosser Fm	LMSN = Limestone							
LIME	GRAY	HARD	366	436	OGCM	LMSN	SHLE	
OGCM = Galena/Cummingsville Fm	LMSN = Limestone		SHLE = Shale					
LIME	GRAY	HARD	436	438	ODCR	SHLE		
ODCR = Decorah Shale	SHLE = Shale							
SHALE			438	480	ODCR	SHLE		
ODCR = Decorah Shale	SHLE = Shale							

Unique No.	00226364	MINNESOTA DEPARTMENT OF HEALTH **WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Update Date	2012/02/06
County Name	Mower		Entry Date	1988/02/05

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	102	18	W	9	BAAAAC	1017 ft.	1017 ft.	1961/10/05

Well Name AUSTIN 8 **Lic. Or Reg. No.** 27058 **Name of Driller**

USGS Quad **Elevation** 1185 **Aquifer** OPCJ **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
SHALE OPVL = Platteville Formation LMSN = Limestone			480	491	OPVL	LMSN		
LIMESTONE OPVL = Platteville Formation LMSN = Limestone		HARD	491	500	OPVL	LMSN		
LIMESTONE OGWD = Glenwood Formation SHLE = Shale		HARD	500	505	OGWD	SHLE		
LIMESTONE OSTP = St.Peter Sandstone SNDS = Sandstone		HARD	505	510	OSTP	SNDS		
SHALEY SANDSTONE OSTP = St.Peter Sandstone SNDS = Sandstone SHLE = Shale			510	580	OSTP	SNDS	SHLE	
VERY SHALEY SANDSTONE OSTP = St.Peter Sandstone SNDS = Sandstone SHLE = Shale			580	605	OSTP	SNDS	SHLE	
LIMESTONE OPDC = Prairie Du Chien Group DLMT = Dolomite		HARD	605	735	OPDC	DLMT		
LIMESTONE & SANDSTONE OPDC = Prairie Du Chien Group DLMT = Dolomite SNDS = Sandstone			735	750	OPDC	DLMT	SNDS	
LIMESTONE OPDC = Prairie Du Chien Group DLMT = Dolomite		HARD	750	760	OPDC	DLMT		
SANDSTONE OPDC = Prairie Du Chien Group SNDS = Sandstone			760	810	OPDC	SNDS		
LIMESTONE OPDC = Prairie Du Chien Group DLMT = Dolomite		HARD	810	915	OPDC	DLMT		
SANDY LIMESTONE OPDC = Prairie Du Chien Group DLMT = Dolomite			915	920	OPDC	DLMT		
SANDY LIMESTONE CJDN = Jordan Sandstone SNDS = Sandstone			920	925	CJDN	SNDS		
SANDSTONE CJDN = Jordan Sandstone SNDS = Sandstone			925	950	CJDN	SNDS		

Unique No. 00226364	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	102	18	W	9	BAAAAC	1017 ft.	1017 ft.	1961/10/05

Well Name AUSTIN 8 **Lic. Or Reg. No.** 27058 **Name of Driller**

USGS Quad **Elevation** 1185 **Aquifer** OPCJ **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
LIMESTONE & SANDSTONE			950	965	CJDN	SNDS	LMSN	
CJDN = Jordan Sandstone	SNDS = Sandstone		LMSN = Limestone					
SHALE		HARD	965	980	CSTL	SHLE		
CSTL = St.Lawrence Formation	SHLE = Shale							
SHALE & SANDSTONE			980	991	CSTL	SHLE	SNDS	
CSTL = St.Lawrence Formation	SHLE = Shale		SNDS = Sandstone					
SHALE			991	1017	CSTL	SHLE		
CSTL = St.Lawrence Formation	SHLE = Shale							

Unique No. 00223360	MINNESOTA DEPARTMENT OF HEALTH	**Update Date**	2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	**Entry Date**	1988/02/05

Township Name	Township	Range	Dir	Section	Subsection
	102	18	W	4	ADBDDD

Well Name AUSTIN 9

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO
TOP SOIL			0	4
SAND & GRAVEL	YELLO		4	10
SAND & GRAVEL	YELLO		10	69
LIMEROCK & SHALE	YELLO		69	74
LIMEROCK & SHALE	GRAY		74	90
SAND & GRAVEL	YEL/R		90	96
LIMEROCK	GRAY		96	140
LIMEROCK	GRAY		140	190
LIMEROCK	GRAY		190	230
LIMEROCK	GRAY		230	386
LIMEROCK & SHALE	GRAY		386	412
LIMEROCK			412	439
SHALE	BROW		439	445
SHALE	BLUE		445	485
SHALE & LIMEROCK			485	507
SHALE	BLUE		507	515
FINE HARD SHALE ROCK			515	544
FINE CAVEY SHALE ROCK			544	575
SHALE	GRY/B		575	673
LIMEROCK	DK. GR		673	925
LIMEROCK	GRAY		925	941
LIMEROCK & SANDROCK			941	950
SHALE ROCK FINE		HARD	950	987
SHALE	GRAY		987	1017
SHALE & LIMEROCK	GRAY		1017	1115
SHALE	GRAY		1115	1248
DIRTY SHALE ROCK	GREE	HARD	1248	1293
SHALE	GREE		1293	1310
SHALE	GRY/G		1310	1367
SANDY LIME	PINK		1367	1371
SHALE			1371	1375
SANDY SHALE	BROW		1375	1389

Well Depth		Depth Completed		Date Well Completed
1500	ft.	1075	ft.	1954/00/00

Drilling Method

Drilling Fluid

Well Hydrofractured? ☐ Yes ☐ No
From ft. to ft.

Use Community Supply

Casing **Drive Shoe?** ☐ Yes ☐ N

Hole Diameter

Casing Diameter		Weight(lbs/ft)	
24	in. t	99	ft
16	in. t	688	ft

Screen N

Open Hole From 688 ft. to 1075 ft.

Make

Type

Static Water Level 210 ft. from Land surface Date 19/87/06

PUMPING LEVEL (below land surface)
263 ft. after hrs. pumping 0 g.p.m.

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

Grouting Information Well grouted? ☐ Yes ☐ No

Nearest Known Source of Contamination
ft. direction type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed Y
Mfr nam
Model HP 0 Volts

SHALE	BROW	1389	1400
SHALE MUDDY	RED	1400	1500

REMARKS, ELEVATION, SOURCE OF DATA, etc.

M.G.S. NO. 138.

USGS Quad

Elevation 1209

Aquifer: OPCJ

Alt Id: 81-5043

Report Copy

Drop Pipe Length ft. Capacity Ξ+03 g.p.m

Type T

Any not in use and not sealed well(s) on property? ☐ Yes ☐ No

Was a variance granted from the MDH for this Well? ☐ Yes ☐ No

Well CONTRACTOR CERTIFICATION Lic. Or Reg. No. 27022

License Business Name

Name of Driller

HE-01205-06 (Rev. 9/96)

Unique No.	00223360	MINNESOTA DEPARTMENT OF HEALTH **WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Update Date	2012/02/06
County Name	Mower		Entry Date	1988/02/05

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	102	18	W	4	ADBDDD	1500 ft.	1075 ft.	1954/00/00

Well Name AUSTIN 9 **Lic. Or Reg. No.** 27022 **Name of Driller**

USGS Quad **Elevation** 1209 **Aquifer** OPCJ **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
TOP SOIL			0	4	RUUU	SOIL		
RUUU = Recent deposit	SOIL = Soil							
SAND & GRAVEL	YELLOW		4	10	QHUY	SAND	GRVL	
QHUY = sand +larger-yellow	SAND = Sand		GRVL = Gravel					
SAND & GRAVEL	YELLOW		10	69	KWND	CNGL		
KWND = Windrow	CNGL = Conglomerate							
LIMEROCK & SHALE	YELLOW		69	74	DSPL	DLMT	SHLE	
DSPL = Wapsipinicon/Spillville Fm	DLMT = Dolomite		SHLE = Shale					
LIMEROCK & SHALE	GRAY		74	90	DSPL	DLMT	SHLE	
DSPL = Wapsipinicon/Spillville Fm	DLMT = Dolomite		SHLE = Shale					
SAND & GRAVEL	YEL/RED		90	96	DSPL	CRVC	FILL	
DSPL = Wapsipinicon/Spillville Fm	CRVC = Crevice		FILL = Fill					
LIMEROCK	GRAY		96	140	DSPL	DLMT	LMSN	SHLE
DSPL = Wapsipinicon/Spillville Fm	DLMT = Dolomite		LMSN = Limestone				SHLE = Shale	
LIMEROCK	GRAY		140	190	OMAQ	DLMT	LMSN	SHLE
OMAQ = Maquoketa Formation	DLMT = Dolomite		LMSN = Limestone				SHLE = Shale	
LIMEROCK	GRAY		190	230	ODUB	LMSN		
ODUB = Dubuque Fm	LMSN = Limestone							
LIMEROCK	GRAY		230	386	OGAL	LMSN		
OGAL = Galena Grp	LMSN = Limestone							
LIMEROCK & SHALE	GRAY		386	412	OGAL	LMSN	SHLE	
OGAL = Galena Grp	LMSN = Limestone		SHLE = Shale					
LIMEROCK			412	439	OGAL	LMSN		
OGAL = Galena Grp	LMSN = Limestone							
SHALE	BROWN		439	445	ODCR	SHLE		
ODCR = Decorah Shale	SHLE = Shale							
SHALE	BLUE		445	485	ODCR	SHLE		
ODCR = Decorah Shale	SHLE = Shale							

Unique No. 00223360	MINNESOTA DEPARTMENT OF HEALTH **WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Update Date 2012/02/06
County Name Mower		Entry Date 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection	Well Depth		Depth Completed		Date Well Completed
	102	18	W	4	ADBDDD	1500	ft.	1075	ft.	1954/00/00

Well Name AUSTIN 9 **Lic. Or Reg. No.** 27022 **Name of Driller**

USGS Quad **Elevation** 1209 **Aquifer** OPCJ **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
SHALE & LIMEROCK			485	507	OPVL	SHLE	LMSN	
OPVL = Platteville Formation	SHLE = Shale		LMSN = Limestone					
SHALE	BLUE		507	515	OGWD	SHLE		
OGWD = Glenwood Formation	SHLE = Shale							
FINE HARD SHALE ROCK			515	544	OSTP	SNDS	SLSN	
OSTP = St.Peter Sandstone	SNDS = Sandstone		SLSN = Siltstone					
FINE CAVEY SHALE ROCK			544	575	OSTP	SNDS	SLSN	
OSTP = St.Peter Sandstone	SNDS = Sandstone		SLSN = Siltstone					
SHALE	GRY/BLU		575	673	OPDC	DLMT	SLSN	
OPDC = Prairie Du Chien Group	DLMT = Dolomite		SLSN = Siltstone					
LIMEROCK	DK. GRY		673	925	OPDC	DLMT		
OPDC = Prairie Du Chien Group	DLMT = Dolomite							
LIMEROCK	GRAY		925	941	CJDN	SNDS		
CJDN = Jordan Sandstone	SNDS = Sandstone							
LIMEROCK & SANDROCK			941	950	CJDN	SNDS	DLMT	
CJDN = Jordan Sandstone	SNDS = Sandstone		DLMT = Dolomite					
SHALE ROCK FINE		HARD	950	987	CJDN	SNDS	SLSN	
CJDN = Jordan Sandstone	SNDS = Sandstone		SLSN = Siltstone					
SHALE	GRAY		987	1017	CSTL	SHLE		
CSTL = St.Lawrence Formation	SHLE = Shale							
SHALE & LIMEROCK	GRAY		1017	1115	CSTL	DLMT	SLSN	SHLE
CSTL = St.Lawrence Formation	DLMT = Dolomite		SLSN = Siltstone				SHLE = Shale	
SHALE	GRAY		1115	1248	CFRN	SHLE	SNDS	DLMT
CFRN = Franconia	SHLE = Shale		SNDS = Sandstone				DLMT = Dolomite	
DIRTY SHALE ROCK	GREEN	HARD	1248	1293	CIGL	SNDS		
CIGL = Ironton-Galesville	SNDS = Sandstone							
SHALE	GREEN		1293	1310	CECR	SHLE		
CECR = Eau Claire Formation	SHLE = Shale							

Unique No. 00223360	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/02/06
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 1988/02/05

Township Name	Township	Range	Dir	Section	Subsection	Well Depth		Depth Completed		Date Well Completed
	102	18	W	4	ADBDDD	1500	ft.	1075	ft.	1954/00/00

Well Name AUSTIN 9 **Lic. Or Reg. No.** 27022 **Name of Driller**

USGS Quad **Elevation** 1209 **Aquifer** OPCJ **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
SHALE	GRY/GRN		1310	1367	CECR	SHLE		
CECR = Eau Claire Formation	SHLE = Shale							
SANDY LIME	PINK		1367	1371	CECR	SNDS		
CECR = Eau Claire Formation	SNDS = Sandstone							
SHALE			1371	1375	CECR	SLSN		
CECR = Eau Claire Formation	SLSN = Siltstone							
SANDY SHALE	BROWN		1375	1389	CECR	SNDS	SHLE	
CECR = Eau Claire Formation	SNDS = Sandstone		SHLE = Shale					
SHALE	BROWN		1389	1400	CECR	SHLE		
CECR = Eau Claire Formation	SHLE = Shale							
SHALE MUDDY	RED		1400	1500	CECR	SHLE		
CECR = Eau Claire Formation	SHLE = Shale							

Unique No. 00127258

County Name Mower

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Update Date 2012/01/11

Entry Date 1989/08/07

Township Name	Township	Range	Dir	Section	Subsection
	103	18	W	27	CDAACA

Well Depth 992 ft. **Depth Completed** 992 ft. **Date Well Completed** 1976/03/00

Well Name AUSTIN 11

Drilling Method Cable Tool

Contact's Name AUSTIN 11

AUSTIN MN 55912

Drilling Fluid

Well Hydrofractured? ☐ Yes ☐ No
From ft. to ft.

Use Community Supply

Casing **Drive Shoe?** ☑ Yes ☐ N

Hole Diameter
0 in. t 214 ft
0 in. t 590 ft

Casing Diameter	**Weight(lbs/ft)**
30 in. t 69 ft	
24 in. t 214 ft	
16 in. t 590 ft	

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO
DIRT	BLACK		0	6
CLAY	YELLO		6	10
SAND	YELLO		10	33
CLAY	BLUE		33	40
SAND & GRAVEL			40	51
SAND & GRAVEL			51	52
LIMESTONE, BROKEN			52	61
LIMESTONE	WHITE	HARD	61	76
LIMESTONE	WHITE	HARD	76	107
LIMESTONE			107	136
SANDSTONE & SHALE			136	154
LIMESTONE	GRAY		154	177
LIMESTONE			177	211
LIMESTONE			211	292
LIMESTONE			292	317
LIMESTONE & SHALE			317	339
SHALE			339	363
SHALE	GRAY		363	401
LIMESTONE	BROW		401	408
SHALE	GRY/G		408	452
LIMESTONE	BROW		452	472
SHALE	GRAY		472	480
SANDSTONE	GRAY		480	573
DOLOMITE	BROW		573	706
SANDY DOLOMITE			706	724
DOLOMITE	GRAY		724	896
SANDROCK			896	942
SANDROCK			942	953
SHALE			953	956
SANDSTONE			956	992

Screen N

Open Hole From 590 ft. to 992 ft.

Make Type

Static Water Level 231 ft. from Land surface Date 1976/02/17

PUMPING LEVEL (below land surface)

297 ft. after hrs. pumping 1500 g.p.m.

Well Head Completion

Pitless adapter mfr Model

Casing Protection ☐ 12 in. above grade

☐ At-grade(Environmental Wells and Borings ONLY)

Grouting Information Well grouted? ☑ Yes ☐ No

Material	From	To (ft.)	Amount(yds/bags)	
G	0	590	0	S

Nearest Known Source of Contamination

2000 ft. direction N type BOW

Well disinfected upon completion? ☑ Yes ☐ No

Pump ☑ Not Installed Date Installed N

Mfr nam

Model HP Volts

Drop Pipe Length ft. Capacity g.p.m

Type

REMARKS, ELEVATION, SOURCE OF DATA, etc.

GAMMA LOGGED 2-4-1988. M.G.S. NO. 1102.

Any not in use and not sealed well(s) on property? ☐ Yes ☐ No

Was a variance granted from the MDH for this Well? ☐ Yes ☐ No

USGS Quad Austin East Elevation 1217

Aquifer: OPCJ Alt Id: 81-5043

Well CONTRACTOR CERTIFICATION Lic. Or Reg. No. 62012

License Business Name

Name of Driller SITTIG, R.

Report Copy

HE-01205-06 (Rev. 9/96)

Unique No. 00127258	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/01/11
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 1989/08/07

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	103	18	W	27	CDAACA	992 ft.	992 ft.	1976/03/00

Well Name AUSTIN 11 **Lic. Or Reg. No.** 62012 **Name of Driller** SITTIG, R.

USGS Quad Austin East **Elevation** 1217 **Aquifer** OPCJ **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
DIRT	BLACK		0	6	RUUK	SOIL	ORGD	
RUUK = Recent deposit-black	SOIL = Soil		ORGD = Organic Deposits					
CLAY	YELLOW		6	10	QCUY	CLAY		
QCUY = clay-yellow	CLAY = Clay							
SAND	YELLOW		10	33	QFUY	SAND		
QFUY = sand-yellow	SAND = Sand							
CLAY	BLUE		33	40	QCUG	CLAY		
QCUG = clay-gray	CLAY = Clay							
SAND & GRAVEL			40	51	QHUU	SAND	GRVL	
QHUU = sand +larger	SAND = Sand		GRVL = Gravel					
SAND & GRAVEL			51	52	DWPR	DLMT	SNDS	
DWPR = Wapsipinicon/Pinicon Ridge	DLMT = Dolomite		SNDS = Sandstone					
LIMESTONE, BROKEN			52	61	DWPR	DLMT	SNDS	
DWPR = Wapsipinicon/Pinicon Ridge	DLMT = Dolomite		SNDS = Sandstone					
LIMESTONE	WHITE	HARD	61	76	DWPR	DLMT	SNDS	
DWPR = Wapsipinicon/Pinicon Ridge	DLMT = Dolomite		SNDS = Sandstone					
LIMESTONE	WHITE	HARD	76	107	DSPL	DLMT	CHRT	
DSPL = Wapsipinicon/Spillville Fm	DLMT = Dolomite		CHRT = Chert					
LIMESTONE			107	136	OMAQ	DLMT	LMSN	
OMAQ = Maquoketa Formation	DLMT = Dolomite		LMSN = Limestone					
SANDSTONE & SHALE			136	154	OMAQ	SNDS	SHLE	
OMAQ = Maquoketa Formation	SNDS = Sandstone		SHLE = Shale					
LIMESTONE	GRAY		154	177	OMAQ	DLMT	LMSN	
OMAQ = Maquoketa Formation	DLMT = Dolomite		LMSN = Limestone					
LIMESTONE			177	211	ODUB	LMSN		
ODUB = Dubuque Fm	LMSN = Limestone							
LIMESTONE			211	292	OGSV	LMSN	DLMT	
OGSV = Galena/Stewartville Fm	LMSN = Limestone		DLMT = Dolomite					

Unique No. 00127258 County Name Mower	MINNESOTA DEPARTMENT OF HEALTH **WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Update Date 2012/01/11 Entry Date 1989/08/07

Township Name	Township	Range	Dir	Section	Subsection	Well Depth		Depth Completed		Date Well Completed
	103	18	W	27	CDAACA	992	ft.	992	ft.	1976/03/00

Well Name AUSTIN 11 **Lic. Or Reg. No.** 62012 **Name of Driller** SITTIG, R.

USGS Quad Austin East **Elevation** 1217 **Aquifer** OPCJ **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
LIMESTONE			292	317	OGPR	LMSN	CHRT	
OGPR = Galena/Prosser Fm	LMSN = Limestone		CHRT = Chert					
LIMESTONE & SHALE			317	339	OGPR	LMSN	CHRT	
OGPR = Galena/Prosser Fm	LMSN = Limestone		CHRT = Chert					
SHALE			339	363	OGCM	LMSN	SHLE	SLSN
OGCM = Galena/Cummingsville Fm	LMSN = Limestone		SHLE = Shale				SLSN = Siltstone	
SHALE	GRAY		363	401	OGCM	SHLE		
OGCM = Galena/Cummingsville Fm	SHLE = Shale							
LIMESTONE	BROWN		401	408	OGCM	LMSN		
OGCM = Galena/Cummingsville Fm	LMSN = Limestone							
SHALE	GRY/GRN		408	452	ODCR	SHLE		
ODCR = Decorah Shale	SHLE = Shale							
LIMESTONE	BROWN		452	472	OPVL	LMSN		
OPVL = Platteville Formation	LMSN = Limestone							
SHALE	GRAY		472	480	OGWD	SHLE		
OGWD = Glenwood Formation	SHLE = Shale							
SANDSTONE	GRAY		480	573	OSTP	SNDS		
OSTP = St.Peter Sandstone	SNDS = Sandstone							
DOLOMITE	BROWN		573	706	OPSH	DLMT	CHRT	SNDS
OPSH = Pr.du Chien/Shakopee Fm	DLMT = Dolomite		CHRT = Chert				SNDS = Sandstone	
SANDY DOLOMITE			706	724	OPNR	SNDS		
OPNR = Shakopee/New Richmond Mbr	SNDS = Sandstone							
DOLOMITE	GRAY		724	896	OPDC	DLMT		
OPDC = Prairie Du Chien Group	DLMT = Dolomite							
SANDROCK			896	942	CJDN	SNDS		
CJDN = Jordan Sandstone	SNDS = Sandstone							
SANDROCK			942	953	CSTL	SLSN	DLMT	
CSTL = St.Lawrence Formation	SLSN = Siltstone		DLMT = Dolomite					

Unique No. 00127258	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/01/11
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 1989/08/07

Township Name	Township	Range	Dir	Section	Subsection	Well Depth		Depth Completed		Date Well Completed
	103	18	W	27	CDAACA	992	ft.	992	ft.	1976/03/00

Well Name AUSTIN 11 **Lic. Or Reg. No.** 62012 **Name of Driller** SITTIG, R.

USGS Quad Austin East **Elevation** 1217 **Aquifer** OPCJ **Alternative Id** 81-5043

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
SHALE			953	956	CSTL	SLSN	DLMT	
CSTL = St.Lawrence Formation	SLSN = Siltstone		DLMT = Dolomite					
SANDSTONE			956	992	CSTL	SLSN	DLMT	
CSTL = St.Lawrence Formation	SLSN = Siltstone		DLMT = Dolomite					

Unique No. 00788722

County Name Mower

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING RECORD

Minnesota Statutes Chapter 1031

Update Date 2012/08/20

Entry Date 2012/02/22

Township Name	Township	Range	Dir	Section	Subsection
	103	18	W	35	AACDCB

Well Name AUSTIN 12

Well Owner's Name AUSTIN 12
1908 14TH NE ST
AUSTIN MN 55912

Contact's Name CITY OF AUSTIN
400 FOURTH NE ST
AUSTIN MN 55912

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO
SAND (FILL)	BROW	SOFT	0	3
SANDY CLAY	GRAY	SOFT	3	7
CLAY	YELLO	SOFT	7	15
CLAY RED GRY PURPLE	VARIE	SOFT	15	25
CLAY	GRAY	SOFT	25	32
BROKEN LIMESTONE	BROW	SOFT	32	33
CLAY	YEL/BL	SOFT	33	40
DECOMPOSED LIMESTONE	YELLO	MEDIUM	40	88
LIMESTONE (W/CRACKS)	TAN/Y	MEDIUM	88	110
LIMESTONE (W/CRACKS)	YEL/B	MEDIUM	110	115
LIMESTONE (W/CRACKS)	GRY/B	MEDIUM	115	130
LIMESTONE & SHALE (W/LA	GRAY	MEDIUM	130	185
LIMESTONE & SHALE (W/LA	BROW	MEDIUM	185	213
LIMESTONE W/ CRUMBLES	GRY/B	HARD	213	220
LIMESTONE W/ CRUMLBES	GRY/B	HARD	220	225
LIMESTONE	GRAY	HARD	225	302
LIMESTONE	GRAY	HARD	302	346
LIMESTONE	GRAY	HARD	346	367
SHALE	GREE	MEDIUM	367	369
LIMESTONE	BRN/W	HARD	369	377
SHALE	GREE	MED-HRD	377	378
LIMESTONE	GRAY	HARD	378	383
LIMESTONE & SHALE LAYE	GRY/G	MED-HRD	383	390
LIMESTONE	GRAY	MED-HRD	390	415
LIMESTONE	GRAY	MED-HRD	415	422
STICKY SHALE	GRY/G	MEDIUM	422	458
LIMESTONE	GRY/B	MEDIUM	458	465
LIMESTONE	GRY/B	MEDIUM	465	479
LIMESTONE	BRN/B	MEDIUM	479	481
SHALE	GRN/G	MEDIUM	481	487
SANDSTONE & PYRITE	GRAY	MEDIUM	487	488
SANDSTONE & SHALE LAY	GRY/G	MEDIUM	488	500

Well Depth 990 ft. **Depth Completed** 960 ft. **Date Well Completed** 2012/03/12

Drilling Method Dual Rotary

Drilling Fluid Water

Well Hydrofractured? ☐ Yes ☑ No
From ft. to ft.

Use Community Supply

Casing **Drive Shoe?** ☑ Yes ☐ N

Casing Diameter				Weight(lbs/ft)
24	in. t	94	ft	94.62
18	in. t	584	ft	70.59

Hole Diameter

	in. t	94	ft
	in. t	586	ft
	in. t	960	ft

Screen N

Open Hole From 586 ft. to 960 ft.

Make

Type

Static Water Level 240 ft. from Land surface Date 2012/03/10

PUMPING LEVEL (below land surface)
244 ft. after 6 hrs. pumping 400 g.p.m.

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

Grouting Information Well grouted? ☑ Yes ☐ No

Material	From	To (ft.)	Amount(yds/bags)
G	586	36.5	Y

Nearest Known Source of Contamination
200 ft. direction NW type SDF
Well disinfected upon completion? ☑ Yes ☐ No

Pump ☑ Not Installed Date Installed N
Mfr nam
Model HP Volts

SANDSTONE	GRAY	SFT-MED	500	573
LIMESTONE	BRN/G	MEDIUM	573	575
LIMESTONE	BROW	MEDIUM	575	584
SHALE	GREE	SOFT	584	585
LIMESTONE SANDSTONE S	VARIE	MEDIUM	585	650
LIMESTONE	TAN	HARD	650	700
LIMESTONE & SHALE TAN	VARIE	HARD	700	735
LIMESTONE	GRAY	HARD	735	860
LIMESTONE	GRY/T	HARD	860	900
LIMESTONE	DK. GR	HARD	900	918
SANDSTONE	GRAY	MEDIUM	918	930
LIMESTONE & SANDSTONE	GRAY	MEDIUM	930	966
SHALE	BROW	MEDIUM	966	971
LIMESTONE & SHALE	GRY/G	MED-HRD	971	978
LIMESTONE & SHALE	GRAY	MED-HRD	978	990

REMARKS, ELEVATION, SOURCE OF DATA, etc.

WELL GROUTED UPT OT 960 FT FROM 990 FT. 1.5 YARDS ON 3-10-2012.

GAMMA LOGGED 2-21-2012. M.G.S. NO. 5209. LOGGED BY JIM TRAEN.

USGS Quad | Elevation 1221

Aquifer: OPCJ | Alt Id: 5209

Drop Pipe Length ft. Capacity g.p.m

Type

Any not in use and not sealed well(s) on property? ☐ Yes ☑ No

Was a variance granted from the MDH for this Well? ☐ Yes ☑ No

Well CONTRACTOR CERTIFICATION Lic. Or Reg. No. 1404

License Business Name

Name of Driller TONY/DAN

Report Copy

HE-01205-06 (Rev. 9/96)

Unique No. 00788722	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/08/20
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 2012/02/22

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	103	18	W	35	AACDCB	990 ft.	960 ft.	2012/03/12

Well Name AUSTIN 12 **Lic. Or Reg. No.** 1404 **Name of Driller** TONY/DAN

USGS Quad **Elevation** 1221 **Aquifer** OPCJ **Alternative Id** 5209

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
SAND (FILL)	BROWN	SOFT	0	3	QFUB	SAND		
QFUB = sand-brown	SAND = Sand							
SANDY CLAY	GRAY	SOFT	3	7	QLUG	CLAY	SAND	
QLUG = clay+sand-gray	CLAY = Clay		SAND = Sand					
CLAY	YELLOW	SOFT	7	15	QCUY	CLAY		
QCUY = clay-yellow	CLAY = Clay							
CLAY RED GRY PURPLE	VARIED	SOFT	15	25	QCUU	CLAY		
QCUU = clay	CLAY = Clay							
CLAY	GRAY	SOFT	25	32	QCUG	CLAY		
QCUG = clay-gray	CLAY = Clay							
BROKEN LIMESTONE	BROWN	SOFT	32	33	QBUB	BLDR		
QBUB = boulder or boulders-brown	BLDR = Boulder							
CLAY	YEL/BLU	SOFT	33	40	QCUU	CLAY		
QCUU = clay	CLAY = Clay							
DECOMPOSED LIMESTONE	YELLOW	MEDIUM	40	88	DCLP	DLMT	LMSN	SHLE
DCLP = L.Cedar Valley-Pinicon Ridg	DLMT = Dolomite		LMSN = Limestone				SHLE = Shale	
LIMESTONE (W/CRACKS)	TAN/YEL	MEDIUM	88	110	DCLP	DLMT	LMSN	SHLE
DCLP = L.Cedar Valley-Pinicon Ridg	DLMT = Dolomite		LMSN = Limestone				SHLE = Shale	
LIMESTONE (W/CRACKS)	YEL/BRN	MEDIUM	110	115	DEVO	DLMT	LMSN	SHLE
DEVO = Devonian, undifferentiated	DLMT = Dolomite		LMSN = Limestone				SHLE = Shale	
LIMESTONE (W/CRACKS)	GRY/BRN	MEDIUM	115	130	OMQD	LMSN	DLMT	SHLE
OMQD = Maquoketa-Dubuque	LMSN = Limestone		DLMT = Dolomite				SHLE = Shale	
LIMESTONE & SHALE (W/LARGE CRACKS)	GRAY	MEDIUM	130	185	OMQD	LMSN	DLMT	SHLE
OMQD = Maquoketa-Dubuque	LMSN = Limestone		DLMT = Dolomite				SHLE = Shale	
LIMESTONE & SHALE (W/LARGE CRACKS)	BROWN	MEDIUM	185	213	OMQD	LMSN	DLMT	SHLE
OMQD = Maquoketa-Dubuque	LMSN = Limestone		DLMT = Dolomite				SHLE = Shale	
LIMESTONE W/ CRUMBLES (POCKETS)	GRY/BRN	HARD	213	220	OMQD	LMSN	DLMT	SHLE
OMQD = Maquoketa-Dubuque	LMSN = Limestone		DLMT = Dolomite				SHLE = Shale	

Unique No. 00788722	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/08/20
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 2012/02/22

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	103	18	W	35	AACDCB	990 ft.	960 ft.	2012/03/12

Well Name AUSTIN 12 **Lic. Or Reg. No.** 1404 **Name of Driller** TONY/DAN

USGS Quad **Elevation** 1221 **Aquifer** OPCJ **Alternative Id** 5209

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
LIMESTONE W/ CRUMLBES (POCKETS)	GRY/BRN	HARD	220	225	OGSV	DLMT	LMSN	SHLE
OGSV = Galena/Stewartville Fm	DLMT = Dolomite		LMSN = Limestone			SHLE = Shale		
LIMESTONE	GRAY	HARD	225	302	OGSV	DLMT	LMSN	SHLE
OGSV = Galena/Stewartville Fm	DLMT = Dolomite		LMSN = Limestone			SHLE = Shale		
LIMESTONE	GRAY	HARD	302	346	OGPR	LMSN		
OGPR = Galena/Prosser Fm	LMSN = Limestone							
LIMESTONE	GRAY	HARD	346	367	OGCM	LMSN	SHLE	
OGCM = Galena/Cummingsville Fm	LMSN = Limestone		SHLE = Shale					
SHALE	GREEN	MEDIUM	367	369	OGCM	SHLE		
OGCM = Galena/Cummingsville Fm	SHLE = Shale							
LIMESTONE	BRN/WHT	HARD	369	377	OGCM	LMSN	SHLE	
OGCM = Galena/Cummingsville Fm	LMSN = Limestone		SHLE = Shale					
SHALE	GREEN	MED-HRD	377	378	OGCM	SHLE		
OGCM = Galena/Cummingsville Fm	SHLE = Shale							
LIMESTONE	GRAY	HARD	378	383	OGCM	LMSN		
OGCM = Galena/Cummingsville Fm	LMSN = Limestone							
LIMESTONE & SHALE LAYERS	GRY/GRN	MED-HRD	383	390	OGCM	LMSN	SHLE	
OGCM = Galena/Cummingsville Fm	LMSN = Limestone		SHLE = Shale					
LIMESTONE	GRAY	MED-HRD	390	415	OGCM	LMSN	SHLE	
OGCM = Galena/Cummingsville Fm	LMSN = Limestone		SHLE = Shale					
LIMESTONE	GRAY	MED-HRD	415	422	ODCR	SHLE		
ODCR = Decorah Shale	SHLE = Shale							
STICKY SHALE	GRY/GRN	MEDIUM	422	458	ODCR	SHLE		
ODCR = Decorah Shale	SHLE = Shale							
LIMESTONE	GRY/BRN	MEDIUM	458	465	ODCR	SHLE		
ODCR = Decorah Shale	SHLE = Shale							
LIMESTONE	GRY/BRN	MEDIUM	465	479	OPVL	LMSN		
OPVL = Platteville Formation	LMSN = Limestone							

Unique No. 00788722	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/08/20
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 2012/02/22

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	103	18	W	35	AACDCB	990 ft.	960 ft.	2012/03/12

Well Name AUSTIN 12 **Lic. Or Reg. No.** 1404 **Name of Driller** TONY/DAN

USGS Quad **Elevation** 1221 **Aquifer** OPCJ **Alternative Id** 5209

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
LIMESTONE	BRN/BLU	MEDIUM	479	481	OGWD	SHLE		
OGWD = Glenwood Formation	SHLE = Shale							
SHALE	GRN/GRY	MEDIUM	481	487	OGWD	SHLE		
OGWD = Glenwood Formation	SHLE = Shale							
SANDSTONE & PYRITE	GRAY	MEDIUM	487	488	OGWD	SHLE		
OGWD = Glenwood Formation	SHLE = Shale							
SANDSTONE & SHALE LAYERS	GRY/GRN	MEDIUM	488	500	OSTP	SNDS		
OSTP = St.Peter Sandstone	SNDS = Sandstone							
SANDSTONE	GRAY	SFT-MED	500	573	OSTP	SNDS		
OSTP = St.Peter Sandstone	SNDS = Sandstone							
LIMESTONE	BRN/GRY	MEDIUM	573	575	OPDC	DLMT		
OPDC = Prairie Du Chien Group	DLMT = Dolomite							
LIMESTONE	BROWN	MEDIUM	575	584	OPDC	DLMT		
OPDC = Prairie Du Chien Group	DLMT = Dolomite							
SHALE	GREEN	SOFT	584	585	OPDC	SHLE		
OPDC = Prairie Du Chien Group	SHLE = Shale							
LIMESTONE SANDSTONE SHALE LAYERS	VARIED	MEDIUM	585	650	OPDC	DLMT	SNDS	SHLE
OPDC = Prairie Du Chien Group	DLMT = Dolomite		SNDS = Sandstone				SHLE = Shale	
LIMESTONE	TAN	HARD	650	700	OPDC	DLMT		
OPDC = Prairie Du Chien Group	DLMT = Dolomite							
LIMESTONE & SHALE TAN BRN WHTE GR	VARIED	HARD	700	735	OPDC	DLMT	SHLE	
OPDC = Prairie Du Chien Group	DLMT = Dolomite		SHLE = Shale					
LIMESTONE	GRAY	HARD	735	860	OPDC	DLMT		
OPDC = Prairie Du Chien Group	DLMT = Dolomite							
LIMESTONE	GRY/TAN	HARD	860	900	OPDC	DLMT		
OPDC = Prairie Du Chien Group	DLMT = Dolomite							
LIMESTONE	DK. GRY	HARD	900	918	OPDC	DLMT		
OPDC = Prairie Du Chien Group	DLMT = Dolomite							

Unique No. 00788722	MINNESOTA DEPARTMENT OF HEALTH	Update Date 2012/08/20
County Name Mower	**WELL AND BORING RECORD** *Minnesota Statutes Chapter 1031*	Entry Date 2012/02/22

Township Name	Township	Range	Dir	Section	Subsection	Well Depth	Depth Completed	Date Well Completed
	103	18	W	35	AACDCB	990 ft.	960 ft.	2012/03/12

Well Name AUSTIN 12 **Lic. Or Reg. No.** 1404 **Name of Driller** TONY/DAN

USGS Quad **Elevation** 1221 **Aquifer** OPCJ **Alternative Id** 5209

GEOLOGICAL MATERIAL	COLOR	HARDNESS	FROM	TO	STRAT	LITH PRIM	LITH SEC	LITH MINOR
SANDSTONE	GRAY	MEDIUM	918	930	CJDN	SNDS		
CJDN = Jordan Sandstone	SNDS = Sandstone							
LIMESTONE & SANDSTONE 2' LAYERS	GRAY	MEDIUM	930	966	CJDN	SNDS	DLMT	
CJDN = Jordan Sandstone	SNDS = Sandstone		DLMT = Dolomite					
SHALE	BROWN	MEDIUM	966	971	CSTL	SLSN	SHLE	
CSTL = St.Lawrence Formation	SLSN = Siltstone		SHLE = Shale					
LIMESTONE & SHALE	GRY/GRN	MED-HRD	971	978	CSTL	DLMT	SLSN	
CSTL = St.Lawrence Formation	DLMT = Dolomite		SLSN = Siltstone					
LIMESTONE & SHALE	GRAY	MED-HRD	978	990	CSLT	DLMT	SLSN	
CSLT = St.Lawrence-Tunnel City	DLMT = Dolomite		SLSN = Siltstone					

APPENDIX B

WELL VULNERABILITY ASSESSMENT WORKSHEETS

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

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

PWSID: 1500002
SYSTEM NAME: Austin Utilities
WELL NAME: Well #11

TIER: 2
WHP RANK:
UNIQUE WELL #: 00127258

COUNTY: Mower | TOWNSHIP NUMBER: 103 | RANGE: 18 W | SECTION: 27 | QUARTERS: CDAA

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Prairie Du Chien-Jordan	
DNR Geologic Sensitivity Rating	:	Very low	10
L Score	:	9	
Geologic Data From	:	Well Record	
Year Constructed	:	1976	
Construction Method	:	Cable Tool/Bored	0
Casing Depth	:	590	0
Well Depth	:	992	
Casing grouted into borehole?		Yes	0
Cement grout between casings?		Yes	0
All casings extend to land surface?		Yes	0
Gravel - packed casings?		No	0
Wood or masonry casing?		No	0
Holes or cracks in casing?		Unknown	0
Isolation distance violations?			0
Pumping Rate	:	1000	10
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	<.4 08/01/1978	0
Maximum tritium detected	:	Unknown	0
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		20
Wellhead Protection Vulnerability Rating	:		NOT VULNERABLE
Vulnerability Overridden	:		

COMMENTS
L SCORE FROM 90 FEET OF DECORAH SHALE. 5' OF GLENWOOD IS ALSO PRESENT.

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

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

PWSID: 1500002 TIER: 2

SYSTEM NAME: Austin Utilities WHP RANK:

WELL NAME: Well #12 Entry Point UNIQUE WELL #: 00788722

COUNTY: Mower TOWNSHIP NUMBER: RANGE: SECTION: QUARTERS:

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Prairie Du Chien-Jordan	
DNR Geologic Sensitivity Rating	:	Very low	15
L Score	:	5	
Geologic Data From	:	Well Record	
Year Constructed	:	2012	
Construction Method	:	Rotary/Drilled	0
Casing Depth	:	586	0
Well Depth	:	960	
Casing grouted into borehole?		Yes	0
Cement grout between casings?		Yes	0
All casings extend to land surface?		Yes	0
Gravel - packed casings?		No	0
Wood or masonry casing?		No	0
Holes or cracks in casing?		No	0
Isolation distance violations?			0
Pumping Rate	:	1500	20
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	<.05 08/26/2013	0
Maximum tritium detected	:	Unknown	0
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		35
Wellhead Protection Vulnerability Rating	:		NOT VULNERABLE
Vulnerability Overridden	:		

COMMENTS

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

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

PWSID: 1500002 TIER: 2
SYSTEM NAME: Austin Utilities WHP RANK:
WELL NAME: Well #2 UNIQUE WELL #: 00227063

COUNTY: Mower TOWNSHIP NUMBER: 103 RANGE: 18 W SECTION: 26 QUARTERS: CDDA

CRITERIA		DESCRIPTION		POINTS
Aquifer Name(s)	:	Wapsipinicon/Spillville Fm		
DNR Geologic Sensitivity Rating	:	Low		20
L Score	:	2		
Geologic Data From	:	Other		
Year Constructed	:	1947		
Construction Method	:	Cable Tool/Bored		0
Casing Depth	:	72		10
Well Depth	:	110		
Casing grouted into borehole?		No		0
Cement grout between casings?		Not applicable		0
All casings extend to land surface?		Yes		0
Gravel - packed casings?		No		0
Wood or masonry casing?		No		0
Holes or cracks in casing?		Unknown		0
Isolation distance violations?				0
Pumping Rate	:	1600		20
Pathogen Detected?				0
Surface Water Characteristics?				0
Maximum nitrate detected	:	1.6 04/30/2012		10
Maximum tritium detected	:	4.5 03/20/2012		VULNERABLE
Non-THMS VOCs detected?		Toluene	04/13/1991	VULNERABLE
Pesticides detected?				0
Carbon 14 age	:	Unknown		0
Wellhead Protection Score	:			60
Wellhead Protection Vulnerability Rating	:			VULNERABLE
Vulnerability Overridden	:			

COMMENTS
TOLUENE 0.3

MINNESOTA MDH DEPARTMENT OF HEALTH

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

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

Drinking Water Protection

PWSID: 1500002 | TIER: 2

SYSTEM NAME: Austin Utilities | WHP RANK:

WELL NAME: Well #3 | UNIQUE WELL #: 00227064

COUNTY: Mower | TOWNSHIP NUMBER: 103 | RANGE: 18 W | SECTION: 3 | QUARTERS: CCDD

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Multiple Aquifer	
DNR Geologic Sensitivity Rating	:	Very high	VULNERABLE
L Score	:	0	
Geologic Data From	:	Other	
Year Constructed	:	1956	
Construction Method	:	Cable Tool/Bored	0
Casing Depth	:	140	10
Well Depth	:	578	
Casing grouted into borehole?		No	0
Cement grout between casings?		Unknown	5
All casings extend to land surface?		Yes	0
Gravel - packed casings?		No	0
Wood or masonry casing?		No	0
Holes or cracks in casing?		Unknown	0
Isolation distance violations?			0
Pumping Rate	:	1010	20
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	<1 03/01/1974	0
Maximum tritium detected	:	Unknown	0
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		35
Wellhead Protection Vulnerability Rating	:		VULNERABLE
Vulnerability Overridden	:		

COMMENTS

AQUIFER(S) OGAL-OSTP FROM CWI. NO L SCORE GIVEN FOR DECORAH BECAUSE CASING STOPS IN THE OGAL

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

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

PWSID: 1500002
SYSTEM NAME: Austin Utilities
WELL NAME: Well #4

TIER: 2
WHP RANK:
UNIQUE WELL #: 00226631

COUNTY: Mower | TOWNSHIP NUMBER: 103 | RANGE: 17 W | SECTION: 31 | QUARTERS: CCAD

CRITERIA		DESCRIPTION		POINTS
Aquifer Name(s)	:	Wapsipinicon/Spillville Fm		
DNR Geologic Sensitivity Rating	:	Very high		0
L Score	:	0		
Geologic Data From	:	Other		
Year Constructed	:	1949		
Construction Method	:	Cable Tool/Bored		0
Casing Depth	:	120		10
Well Depth	:	132		
Casing grouted into borehole?		No		0
Cement grout between casings?		Not applicable		0
All casings extend to land surface?		Yes		0
Gravel - packed casings?		No		0
Wood or masonry casing?		No		0
Holes or cracks in casing?		Unknown		0
Isolation distance violations?				0
Pumping Rate	:	1000		10
Pathogen Detected?				0
Surface Water Characteristics?				0
Maximum nitrate detected	:	3 08/01/2011		10
Maximum tritium detected	:	3.9 03/20/2012		VULNERABLE
Non-THMS VOCs detected?				0
Pesticides detected?		Atrazine	06/06/1991	VULNERABLE
Carbon 14 age	:	Unknown		0
Wellhead Protection Score	:			30
Wellhead Protection Vulnerability Rating	:			VULNERABLE
Vulnerability Overridden	:			

COMMENTS

ATRAZINE 0.02

NITRATE DATA FROM PWSD 1989, 3/74 SAMPLE

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

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

PWSID: 1500002	TIER: 2
SYSTEM NAME: Austin Utilities	WHP RANK:
WELL NAME: Well #6	UNIQUE WELL #: 00223359

COUNTY: Mower   TOWNSHIP NUMBER: 102   RANGE: 18 W   SECTION: 1   QUARTERS: CBCD

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Prairie Du Chien-Jordan	
DNR Geologic Sensitivity Rating	:	Very low	0
L Score	:	0	
Geologic Data From	:	Other	
Year Constructed	:	1954	
Construction Method	:	Cable Tool/Bored	0
Casing Depth	:	626	0
Well Depth	:	1010	
Casing grouted into borehole?		No	0
Cement grout between casings?		Unknown	5
All casings extend to land surface?		Yes	0
Gravel - packed casings?		No	0
Wood or masonry casing?		No	0
Holes or cracks in casing?		Unknown	0
Isolation distance violations?			0
Pumping Rate	:	1100	20
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	.25 04/30/2012	0
Maximum tritium detected	:	Unknown	0
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		25
Wellhead Protection Vulnerability Rating	:		NOT VULNERABLE
Vulnerability Overridden	:		

COMMENTS

VL SENSITIVITY RATING BECAUSE OF 2 BEDROCK CONFINING UNITS DECORAH AND GLENWOOD, ALTHOUGH ONLY L-4 COULD BE DETERMINED AQUIFERS USED OPDC-CFRN FROM CWI

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

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

PWSID: 1500002
SYSTEM NAME: Austin Utilities
WELL NAME: Well #8

TIER: 2
WHP RANK:
UNIQUE WELL #: 00226364

COUNTY: Mower   TOWNSHIP NUMBER: 102   RANGE: 18 W   SECTION: 9   QUARTERS: BAAA

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Prairie Du Chien-Jordan	
DNR Geologic Sensitivity Rating	:	Very low	15
L Score	:	7	
Geologic Data From	:	Other	
Year Constructed	:	1961	
Construction Method	:	Cable Tool/Bored	0
Casing Depth	:	658	0
Well Depth	:	1017	
Casing grouted into borehole?		No	0
Cement grout between casings?		Unknown	5
All casings extend to land surface?		Yes	0
Gravel - packed casings?		No	0
Wood or masonry casing?		No	0
Holes or cracks in casing?		Unknown	0
Isolation distance violations?			0
Pumping Rate	:	900	10
Pathogen Detected?			NOT VULNERABLE
Surface Water Characteristics?			NOT VULNERABLE
Maximum nitrate detected	:	<1 07/01/1969	NOT VULNERABLE
Maximum tritium detected	:	<.8 03/24/2000	NOT VULNERABLE
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		30
Wellhead Protection Vulnerability Rating	:		NOT VULNERABLE
Vulnerability Overridden	:		

COMMENTS

UNSURE OF FORMATION CONTACTS. L SCORE IS PROBABLY CONSERV -ATIVE (COULDN'T PICK OUT GLENWOOD).

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

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

PWSID: 1500002
SYSTEM NAME: Austin Utilities
WELL NAME: Well #9

TIER: 2
WHP RANK:
UNIQUE WELL #: 00223360

COUNTY: Mower | TOWNSHIP NUMBER: 102 | RANGE: 18 W | SECTION: 4 | QUARTERS: ADCA

CRITERIA		DESCRIPTION	POINTS
Aquifer Name(s)	:	Prairie Du Chien-Jordan	
DNR Geologic Sensitivity Rating	:	Very low	10
L Score	:	9	
Geologic Data From	:	Other	
Year Constructed	:	1956	
Construction Method	:	Cable Tool/Bored	0
Casing Depth	:	688	0
Well Depth	:	1075	
Casing grouted into borehole?		No	0
Cement grout between casings?		Unknown	5
All casings extend to land surface?		Yes	0
Gravel - packed casings?		No	0
Wood or masonry casing?		No	0
Holes or cracks in casing?		Unknown	0
Isolation distance violations?			0
Pumping Rate	:	1170	20
Pathogen Detected?			0
Surface Water Characteristics?			0
Maximum nitrate detected	:	.18 04/08/2013	0
Maximum tritium detected	:	Unknown	0
Non-THMS VOCs detected?			0
Pesticides detected?			0
Carbon 14 age	:	Unknown	0
Wellhead Protection Score	:		35
Wellhead Protection Vulnerability Rating	:		NOT VULNERABLE
Vulnerability Overridden	:		

COMMENTS

AQUIFERS = OPDC-CFRN (FROM CWI)

L SCORE IS PROBABLY CONSERVATIVE, GLENWOOD NOT QUANTIFIED

APPENDIX C

ASSESSMENT OF DATA ELEMENTS

Assessment of the Data Elements

This table presents the assessment of these data elements relative to the present and future implications of planning items that are specified in Minnesota Rules, part 4720.5210.

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

Data Element	Present and Future Implications				Data Source
	Use of the Well s	Delineation Criteria	Quality and Quantity of Well Water	Land and Groundwater Use in DWSMA	
Permitted withdrawals	L	L	L	L	DNR
Protected levels/flows	L	L	L	L	DNR
Water use conflicts	L	L	L	L	DNR
Groundwater Quantity					
Permitted withdrawals	H	H	H	H	DNR, Austin
Groundwater use conflicts	L	L	L	L	DNR
Water levels	H	H	H	H	CWI, MDH, Austin

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

Definitions Used for Assessing Data Elements:

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

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

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

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

Acronyms used in this report are listed on page ii, after the "Glossary of Terms."

APPENDIX D

AQUIFER TEST PLANS

(NOT INCLUDED IN THIS DRAFT)

APPENDIX E

WATER CHEMISTRY MEMO 2017

Memo

Minnesota Department of Health

Date: April 6, 2017

To: Austin Public Utility WHP Project File (PWSID: 1500002)

From: Justin Blum

Subject: Analysis of Water Chemistry Data from Austin and Hormel Water Supply Wells for Groundwater Residence Time and Possible Human Impacts - to Inform the Vulnerability Assessments for the Austin Wellhead Protection Plan

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Introduction

Public water supply (PWS) wells in Austin and selected surface water locations were sampled for a variety of chemical and physical characteristics. This sampling is a small part of an overall effort to better understand the groundwater flow system and to support the delineation of Austin's Wellhead Protection Area (WHPA). The following compilation of all water quality information on-file is in support of the Vulnerability Assessment required for the Wellhead Protection Plan.

Indicators of Vulnerability

Several water quality parameters: tritium, nitrate-nitrite-ammonia, sulfate, chloride and bromide are currently used to assess the vulnerability of public water supplies to contamination. [Minnesota Department of Health, 2011] In addition to these analytes, water samples were measured for the relative abundance of stable isotopes of: oxygen (18O/16O) and hydrogen (2H/H [deuterium/protium]).

The general criteria used to determine the degree of vulnerability (low, moderate, and high) of the groundwater source are shown below.

Table 1. Vulnerability Assessment Criteria and Ranking

Vulnerability Indicator	Low	Moderate	High
Tritium [TU]	<0.8 (ND)	=>0.9 and <3.9	>3.9
Nitrogen (nitrate-nitrite-ammonia) [mg/L]	Nitrate =< 1 or ammonia => 0.05	Nitrate =< 3	Nitrate => 4
Chloride [mg/L]	<=3.0	>3.0 and <=10.0	>10.0
Chloride/Bromide	<=250	>250 and <=500	>500
Seasonal Variation in Stable Isotopes	Small to Medium - cold water dominated		High- warm season and evaporative signature

Tritium provides a rough indication of groundwater age. This is more accurately described as an indication of the residence-time of water in the flow path between the recharge area and the wellbore. Between about 1950 and 1963, surface atomic tests caused a world-wide spike of tritium in the atmosphere to levels greater than 2000 TU.

As the half-life of tritium is approximately 12.3 years, there has been a significant decline in tritium concentration over the last fifty years. The current average abundance of tritium in the precipitation for the middle latitudes is between 10 and 15 TU. Therefore, if tritium is detected in a water sample above

0.8 TU, some component of that groundwater infiltrated after about 1950. Wells showing a tritium concentration in the range of 5 to 8 TU can be thought to have a residence time of the groundwater of approximately ten to twenty years – assuming a single source for the water.

Nitrogen is commonly found in groundwater that has been in contact with agricultural fertilizer, animal manure and/or infiltration from septic systems. The oxidized form of nitrogen, nitrate, is converted to a series of other compounds; nitrite, and then to ammonia, as groundwater becomes chemically reduced. The loss of oxygen in the groundwater is associated with an increasing residence time in the flow path. Any form of nitrogen in the groundwater can indicate human influence. But, if nitrate is not present and ammonia is detectable then the residence time of water is probably long, years to decades.

Sulfate is an indicator of combustion of coal for power generation. It is present in groundwater that was recharged after the widespread use of coal for electrical generation. After the implementation of the clean air act controls on sulfur emissions from power plants, the concentration of sulfate has declined but is still present in precipitation. The presence of sulfate also is an indicator of the oxidation-reduction conditions in the aquifer as strongly reduced conditions will not contain sulfate, all sulfur would be converted to hydrogen sulfide.

Chloride and bromide are an uncommon component of atmospheric dust and aerosols in the mid-continent area. Therefore, the background concentrations of chloride and bromide in groundwater in Minnesota is determined by minerals with which the groundwater has been in contact. For the shallow bedrock aquifer flow system in Austin the background concentration of chloride is about 1 mg/L and bromide is about 0.01 mg/L. Elevated concentrations of chloride and bromide in groundwater are associated with widespread and commonly occurring sources such as: road salt, agricultural fertilizer (KCl), waste water disposal, and water softener salt. In addition, the concentration of bromide varies with the different sources of salt and potentially the chloride/bromide ratio is a means to distinguish these different sources.

Stable isotopes of water can help distinguish the various sources of water to the flow system. The relative abundance of the stable isotopes of water vary because of two fractionation processes related to evaporation. The primary variation in the stable isotopes of water is the result of the temperature at which water entered the atmosphere before falling out as precipitation.

Precipitation in colder months, such as snow, has a distinctly different isotopic ratio from that occurring as rain in the warmer months. This seasonal variation in isotopic ratio forms the distribution of isotopic composition of water termed the 'meteoric water line.' The second effect is the concentration of heavier isotopes by the preferential removal of the lighter isotopic fraction in surface water (evaporation) and/or shallow groundwater (evapotranspiration by plants). The signature of the evaporative process is a displacement of the isotopic ratio from the meteoric water line towards heavier components.

Water Quality Analyses

The attached tables contain results of water quality and isotopic analyses analyzed by the MDH Public Health and contract laboratories from 2002 to-date. The samples were taken for both routine compliance and investigative purposes from the Cedar River and high capacity wells used for public water supply (PWS) in order to determine, to the extent practicable, the degree of interconnection between surface and groundwaters. Data from the Hormel PWS wells are included as they were considered to be vulnerable to contamination and were also sampled as a part of this effort - prior to the water supply agreement between Austin and Hormel. The Hormel wells are no longer actively used.

Data presented here are from selected PWS wells that had shown historical detections of nitrate-nitrogen or other indicators of rapid recharge. These wells generally lack geologic protection and/or have other factors that increase the rate of groundwater flow. Austin 2 and 4 are constructed as shallow bedrock wells near tributaries of the Cedar River. The Hormel N and S wells are located adjacent to the Cedar River and constructed to intercept underflow in the alluvial sediments. Hormel 6 well is located at one of the main meat processing facilities in an area with multiple deep bedrock wells that are unused-unsealed.

The primary indicators of vulnerability to contamination from human activities at the land surface is nitrate and tritium. Austin wells 2, 4, and Hormel 6 have multiple detections of tritium in the range of 3 to 7 TU. Nitrate is consistently detected in Austin wells 2 and 4, at concentrations between 1 and 3 mg/L. This is a level at which the vulnerability of the well is clearly established but is not at a level that causes a concern that the drinking water limit of 10 mg/L would be exceeded.

Sulfate and chloride are found in all the samples from the river and these wells. Hormel 6 shows distinctly higher concentrations relative to the other wells that perhaps is related to its location in an industrial facility parking lot. The ratio of bromide to chloride helps to distinguish the source of the salt. Bromide being found in very low concentrations in natural – undisturbed groundwater, any elevation of the bromide concentration is strongly linked to human sources of salt; road de-icing, water softener effluent, or fertilizer. Chloride/bromide ratio of 300 or less is considered to have a minimal human impact. Larger ratios indicate a progressively larger degree of human impact.

The presentation of tabular data often is not particularly informative when comparing different locations and determining trends. Graphical representation of the stable isotope data are presented in Figures 1 and 2. Trends of nitrate-nitrogen are shown in Figure 3.

Figure 1

Shows the distribution of isotopic ratios from water samples taken at various times of year in the Austin - in relation to the trend of the average of all surface water samples in the upper Midwest, the meteoric water line. A very rough yearly cycle is outlined; caused by the melt of cool season precipitation (snow) and cooler spring rain followed by progressively warmer points through September and a cooling trend into fall and winter.

Figure 2

Shows the isotopic ratios of water samples in relation to the trend of the average of all surface water samples in the upper Midwest, the meteoric water line. A possible evaporative trend line is shown in the samples from the Cedar River and samples from Hormel 6, and Austin Wells 2 and 4. Hormel 6 seems to follow the evaporative trend line most strongly, followed by Wells 2 and 4.

Figure 3

The largest nitrate concentration is found in Well 4 but is still lower than the concentration that would place it in the highly vulnerable category [nitrate].

Water Quality Indications of Vulnerability

The wells draw in groundwater that:

- has a short residence-time in the subsurface [tritium],
- is influenced by human activities [chloride, Cl/Br, and Nitrate], and
- there is a component of surface water in the well water [evaporative signature].

The relative strength of these indicators are consistently in the moderate to high category according to the assessment ranking, Table 1. None of the parameters indicate a source of water from a low vulnerability setting.

Selected References

Minnesota Department of Health (2011), Assessment Monitoring Pilot Study, Unpublished Report, Minnesota Department of Health, St. Paul, Minnesota.

Data Tables

Water Quality Sampling Results from PWS Wells and the Cedar River*

Nitrate+Nitrite as Nitrogen [mg/L]

Sample Date	Cedar River SWS-303	Austin 2 (227063)	Austin 4 (226631)	Hormel N (249369)	Hormel S (249371)	Hormel 6 (242116)
2/4/2010		1.5	3			
4/27/2011		1.3	3			
1/24/2012		1.5	2.8	0.16	0.88	0.26
2/2/2012	0.42					
4/30/2012		1.6	3			
4/8/2013		1.1	3			
4/1/2014		1.1	3.2			
4/14/2015		1	2.9			
3/8/2016			3.4			
4/20/2016		1				
5/24/2016			3			
6/6/2016			3.1			
9/13/2016			3.2			
12/14/2016			2.9			

Tritium [TU]

Sample Date	Cedar River SWS-303	Austin 2 (227063)	Austin 4 (226631)	Hormel N (249369)	Hormel S (249371)	Hormel 6 (242116)
11/26/2002	--	--	--	--	--	7.7
8/12/2004	--	--	--	4.2	5.1	5.4
1/24/2012	--	3.9	3.9	3.6	3.3	3.5
3/20/2012	--	4.5	--	--	--	--

Sulfate [mg/L]

Sample Date	Cedar River SWS-303	Austin 2 (227063)	Austin 4 (226631)	Hormel N (249369)	Hormel S (249371)	Hormel 6 (242116)
1/24/2012		29.6	23.1			
2/2/2012	25.7					
3/20/2012		27.6	22.4	29	29.9	39.4
5/8/2012				28.4	29.3	38.9
9/24/2012		28.9	22.5	28.2	29	37.9
3/25/2013		31.7	22.7			

Chloride [mg/L]

Sample Date	Cedar River SWS-303	Austin 2 (227063)	Austin 4 (226631)	Hormel N (249369)	Hormel S (249371)	Hormel 6 (242116)
2/4/2010		8.69	9.18			
1/24/2012		9.04	9.58	8.39	9.85	47.5
2/2/2012	18					
3/20/2012		9.06	9.74			
5/8/2012				9.63	10.5	47.7
9/24/2012		9.31	9.93	9.45	10.4	48.4
6/20/2013		9.56	10			
2/23/2015		10	10.5			

Bromide [mg/L]

Sample Date	Cedar River SWS-303	Austin 2 (227063)	Austin 4 (226631)	Hormel N (249369)	Hormel S (249371)	Hormel 6 (242116)
2/4/2010		0.0242	0.0258			
1/24/2012		0.0255	0.0254	0.0069	0.0157	0.0469
2/2/2012	0.0317					
3/20/2012		0.0254	0.0282			
5/8/2012				< 0.01	< 0.01	0.0496
9/24/2012		0.0254	0.0187	< 0.005	< 0.005	0.0466
6/20/2013		0.0259	0.0264			
2/23/2015		0.0242	0.0248			

Cl/Br Ratio**

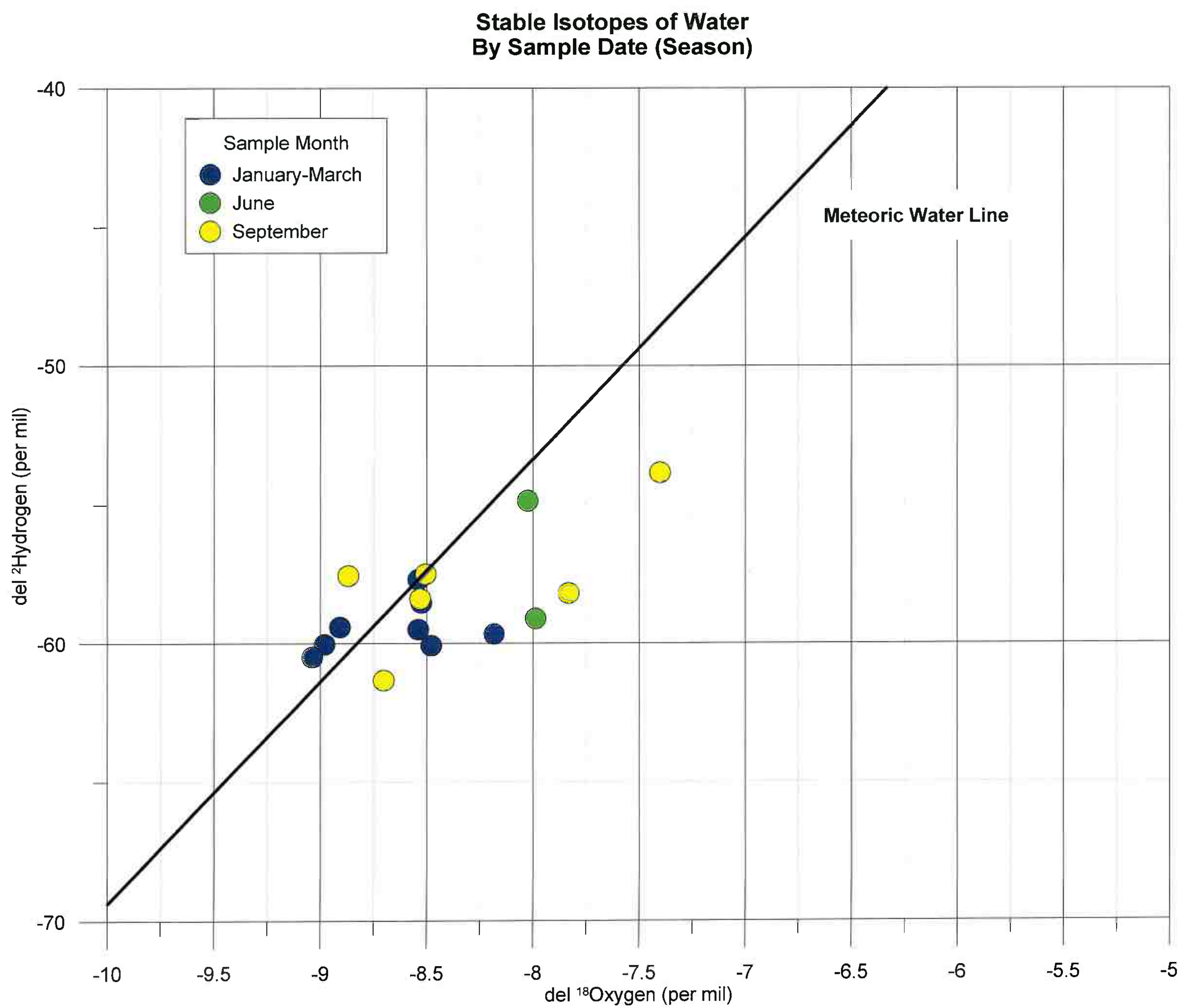
Sample Date	Cedar River SWS-303	Austin 2 (227063)	Austin 4 (226631)	Hormel N (249369)	Hormel S (249371)	Hormel 6 (242116)
2/4/2010		359.1	355.8			
1/24/2012		354.5	377.2	1215.9	627.4	1012.8
2/2/2012	567.8					
3/20/2012		356.7	345.4			
5/8/2012				> 963.0	> 1050.0	961.7
6/4/2012		366.5	531.0	> 1890.0	> 2080.0	1038.6
9/24/2012		369.1	378.8			
2/23/2015		413.2	423.4			

Stable Isotopes of Water

Location	month	date	del-OXYGEN 18O	del-DEUTERIUM
2 (227063)	1	1/24/2012	-8.18403	-59.65857
North (249369)	1	1/24/2012	-8.52472899	-58.5222215
South (249371)	1	1/24/2012	-8.98	-60.02211661
H6 (242116)	1	1/24/2012	-8.478995935	-60.06535336
Cedar River	2	2/2/2012	-8.53927015	-59.49147325
Cedar River	3	3/20/2012	-8.53927015	-57.68527782
2 (227063)	3	3/20/2012	-9.03799	-60.48375
4 (226631)	3	3/20/2012	-8.90781119	-59.40410534
Cedar River	6	6/4/2012	-8.02455937	-54.85777232
4 (226631)	6	6/4/2012	-7.986969115	-59.10041676
Cedar River	9	9/24/2012	-7.400908651	-53.84856702
2 (227063)	9	9/24/2012	-8.70165	-61.32254
4 (226631)	9	9/24/2012	-8.504436807	-57.49160658
North (249369)	9	9/24/2012	-8.867873839	-57.54918543
South (249371)	9	9/24/2012	-8.530537839	-58.38321838
H6 (242116)	9	9/24/2012	-7.831445852	-58.18499176

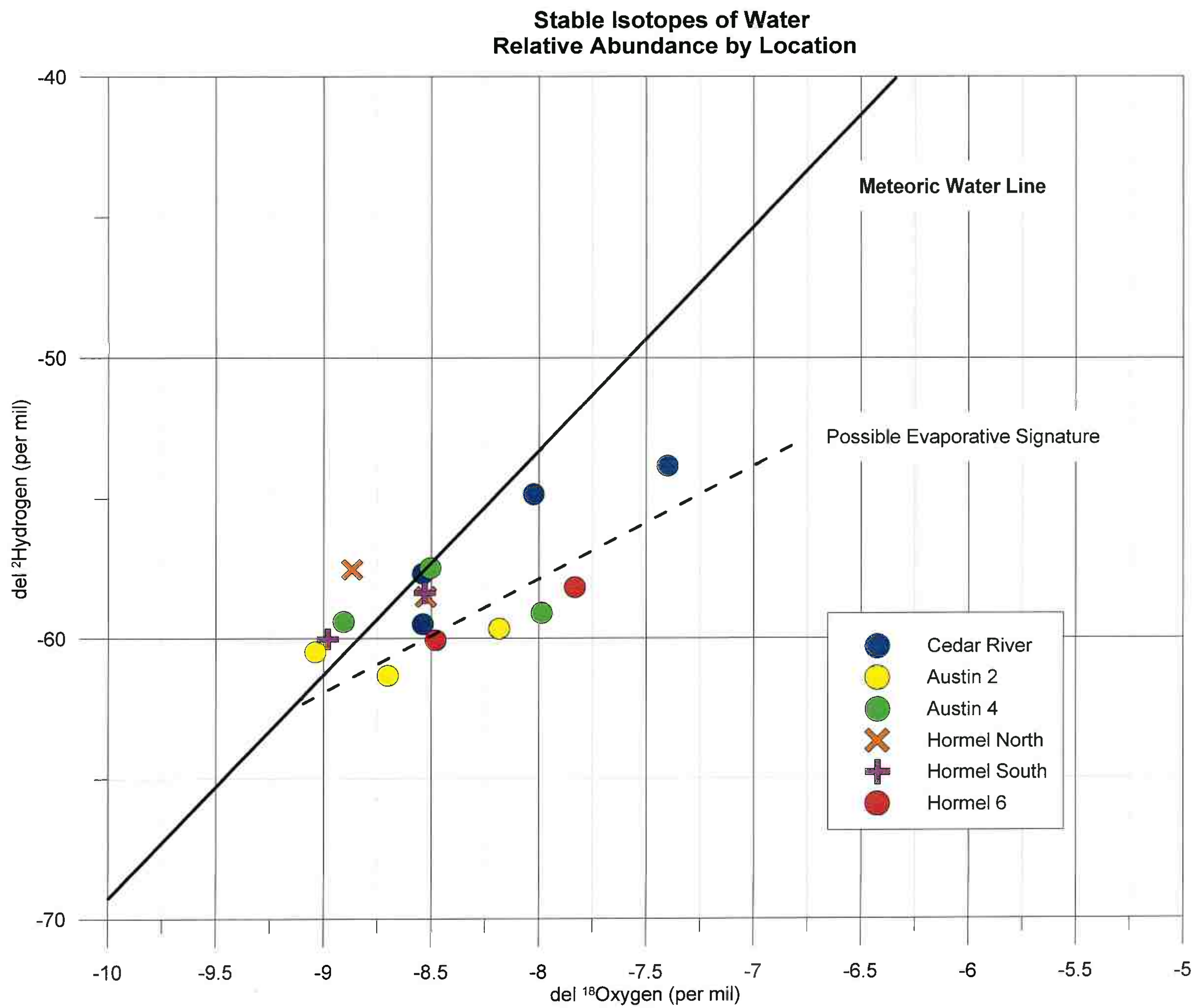
* From data on file at the MDH, Source Water Protection Unit. Samples taken by MDH and Austin and Hormel Public Water Supplier staff. General chemistry analyses by the MDH Public Health Laboratory, isotope analyses by contract laboratory.

** Chloride/Bromide ratios of other deep Austin PWS wells are consistently less than 100.



MDH, 2017

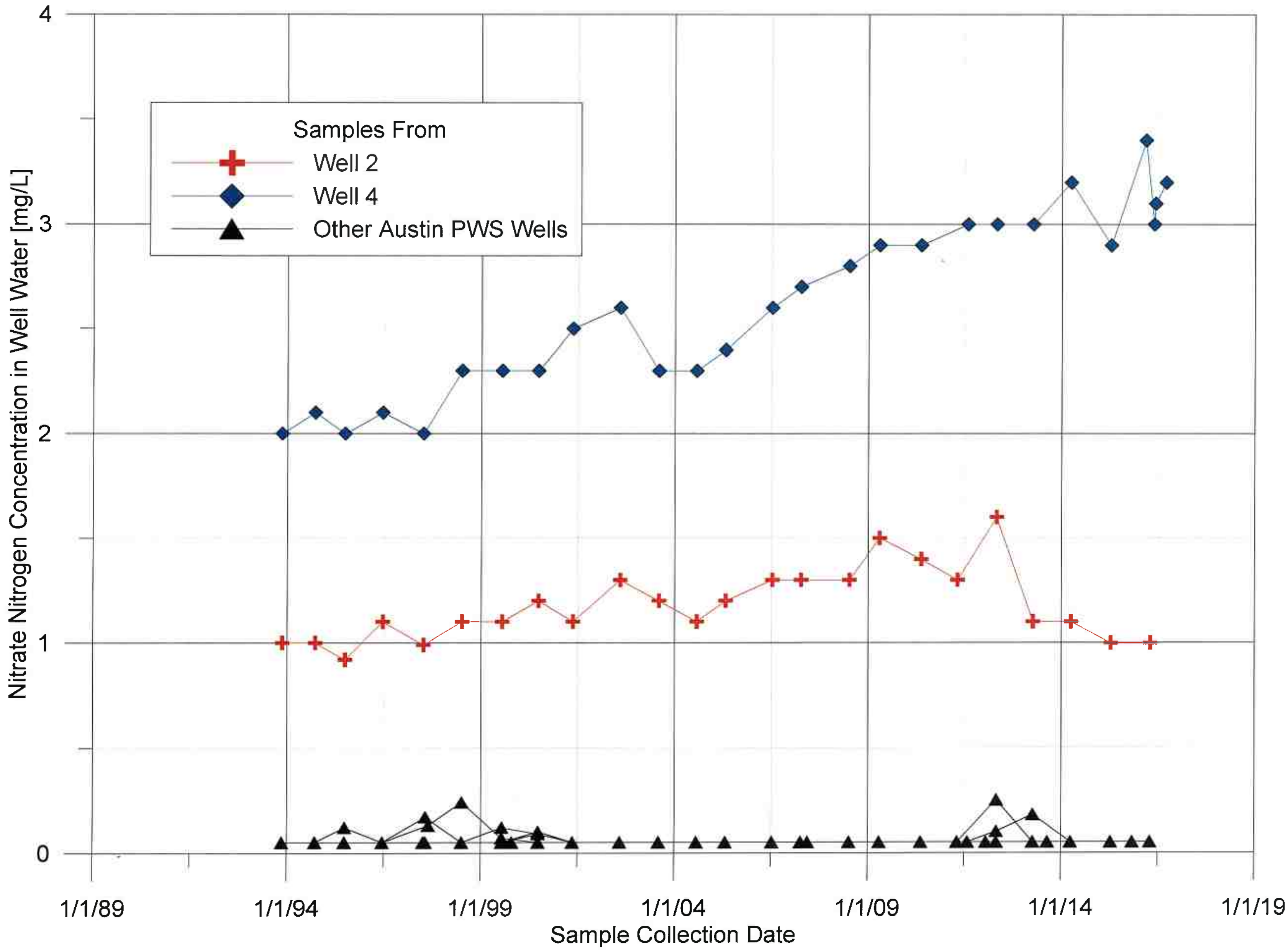
Figure 1.



MDH, 2017

Figure 2.

Nitrate-Nitrogen Concentration with Time



MDH, 2017

Figure 3.

Appendix C
Potential Contaminant Source Inventory
for Austin Utilities

Exhibits

Potential Contaminant Source List

Potential Contaminant Source Maps

Figures

1. **Wells**
2. **Feedlots**
3. **Waste Water**
   - **Subsurface Sewage Treatment Systems, stormwater basins and other types of waste water facilities**
4. **Hazardous Waste Generators**
5. **Above Ground and Underground Storage Tanks**
6. **Solid Waste Related Facilities**
7. **Contaminated Sites**
   - **Brownfields, superfund sites, etc.**
8. **Leaking Underground Storage Tanks & Spills**
9. **Transport Crossings Over Water Bodies**
   - **Roads, rail, pipelines**
10. **Miscellaneous Potential Contaminant Sources**
    - **Sand and gravel pits, graveyards, sinkholes**

Austin Utilities: Verifed PCSI

Date: March 2019

PCSI	PIN	Facility Name	Address	City	Zip Code	PCS	Status	Mat_C	Program ID	Total	Comments	Location
1	348900002	City Of Austin	500 4TH AVE NE	Austin	55912	WEL	A		227063	1	AUSTIN 2	ERA
2	349100168	City Of Austin	500 4TH AVE NE	Austin	55912	WEL	A		227064	1	AUSTIN 3	ERA
3	341570010	Austin Country Club	PO BOX 474	Austin	55912	WEL	A		226631	1	AUSTIN 4	ERA
4	344800281	City Of Austin	500 4TH AVE NE	Austin	55912	WEL	A		223359	1	AUSTIN 6	ERA
5	342350010	Austin Utilities	1908 14TH ST NE	Austin	55912	WEL	A		127258	1	AUSTIN 11	ERA
6	349050180	Austin Utilities	1908 14TH ST NE	Austin	55912	WEL	A		788722	1	AUSTIN 12	ERA
7	348860010	City Of Austin	500 4TH AVE NE	Austin	55912	WEL	U		244224	1	CITY OF AUSTIN	SWCA
8	200070090	City Of Austin	500 4TH AVE NE	Austin	55912	WEL	U		556312	1	BELLIKKA, JOHN	SWCA
9	200070030	Kirchhoff Adam J	56625 205TH ST	Austin	55912	WEL	U		751008	1	HOTEK, JOHN	SWCA
10	200070040	Lorraine And Lowell Byam Revocable Trust	2016 16TH ST SE	Austin	55912	WEL	U		134864	1	NELSON, ELMER	SWCA
11	200040060	Ingvaldson Darrell B & Diane D	58145 220TH ST	Austin	55912	WEL	U		797317	1	INGVALSON, DARRELL	SWCA
12	160430010	Heimermann Ricky D & Trudy M	57932 220TH ST	Austin	55912	WEL	U		577752	1	HEIMERMANN, RICK	SWCA
13	160320063	Long Danny L	57832 220TH ST	Austin	55912	WEL	U		226394	1	FERGUSON, BERTIE	SWCA
14	160320060	Tamke Mark A & Joy P	57758 220TH ST	Austin	55912	WEL	U		561415	1	MOEN, EVELYN	SWCA
15	160320010	MPCA Attn Don Abrams	520 LAFAYETTE RD	St Paul	55155	WEL	U		501726	1	RED ROCK SANITARY LDF	SWCA
16	160320010	MPCA Attn Don Abrams	520 LAFAYETTE RD	St Paul	55155	WEL	U		561672	1	MW-4C	SWCA
17	160320010	MPCA Attn Don Abrams	520 LAFAYETTE RD	St Paul	55155	WEL	U		561671	1	MW-11C	SWCA
18	160320010	MPCA Attn Don Abrams	520 LAFAYETTE RD	St Paul	55155	WEL	U		561673	1	MW-8C	SWCA
19	160300042	Jax Dennis W	23535 570TH AVE	Austin	55912	WEL	U		101447	1	LUX, AUSTIN B.	SWCA
20	160190030	Oots Thomas E	56217 245TH ST	Austin	55912	WEL	U		562696	1	OOTS, TOM	High
21	080240080	Akkerman, Dale	55947 245TH ST	Austin	55912	WEL	U		459960	1	DALE & ILA AKKERMAN JOINT REVOCABLE TRUST	High
22	080240010	Soiney Kevin C & Nancy	55860 245TH ST	Austin	55912	WEL	U		188853	1	JURGENSEN, CRAIG	SWCA
23	080140055	Grinstead Properties	25238 540TH AVE	Austin	55912	WEL	U		135605	1		High
24	080140055	Grinstead Properties	25238 540TH AVE	Austin	55912	WEL	U		576886	1	TNC - MEADOW GREENS GOLF CLUB	SWCA
25	080150290	Eggum Lyal J & Carol	25021 540TH AVE	Austin	55912	WEL	U		577747	1	EGGUM, LYAL	SWCA
26	080140070	Swoboda David A	25010 540TH AVE	Austin	55912	WEL	U		236513	1	SWOBODA, DAVID	SWCA
27	080230033	Grinstead Properties LLC	25238 540TH AVE	Austin	55912	WEL	U		675451	1	RAMSEY GOLF COURSE	SWCA
28	080230030	Ramsey Golf Club Inc	5784 MCGOWAN RD	Brainerd	56401	WEL	U		751012	1	RIVER OAKS GOLF CLUB 1	SWCA
29	080230031	Mower County	201 1ST ST NE STE 7	Austin	55912	WEL	U		446372	1	MARICLE, ARNOLD	SWCA
30	080230041	Vacura Rosie J	PO BOX 163	Austin	55912	WEL	U		413949	1	BREZICKA, DON	SWCA
31	080230030	Ramsey Golf Club Inc	5784 MCGOWAN RD	Brainerd	56401	WEL	U		255997	1	RAMSEY GOLF COURSE	SWCA
32	348390010	Bennett Jacob J	601 38TH AVE NE	Austin	55912	WEL	U		459916	1	GEMMEL, KENNETH	SWCA
33	080150020	Cedar Valley Conservation Club	25026 US HWY 218	Austin	55912	WEL	U		413912	1	RYTHER, HAROLD	SWCA
34	080220020	Orning Judith Ann	4515 KIMBERLY CT N	Plymouth	55446	WEL	U		141047	1	BARNUM, LAWRENCE	SWCA
35	080220020	Orning Judith Ann	4515 KIMBERLY CT N	Plymouth	55446	WEL	U		132698	1	CLARK	SWCA
36	080220040	Kiker Properties LLC	602 30TH AVE NE	Austin	55912	WEL	U		763180	1	BUSTAD, WALLACE	SWCA
37	080570010	Sheely Dean S & Barbara	53131 241ST ST	Austin	55912	WEL	U		459864	1		SWCA
39	080210070	Wci Austin Landfill LLC	1235 N LOOP W SUITE 205	Houston	77008	WEL	U		785082	1	MW-3R	High
40	080210070	Wci Austin Landfill LLC	1235 N LOOP W SUITE 205	Houston	77008	WEL	U		705527	1	MW#108	High
41	080210110	Delaney Brett W & Melissa C	24969 US HWY 218	Austin	55912	WEL	U		600178	1	BUSTAD, WALLACE	High
42	080210105	R & S Farms LLC	25863 650TH AVE	Dexter	55926	WEL	U		707796	1	PZ-GP-10	High

Austin Utilities: Verifed PCSI

Date: March 2019

PCSI	PIN	Facility Name	Address	City	Zip Code	PCS	Status	Mat_C	Program ID	Total	Comments	Location
43	349050112	Hormel Foundation	329 N MAIN ST STE 102L	Austin	55912	WEL	U		793745	1	HORMEL INSTITUTE	SWCA
44	341200010	Convenience Store Investments	1626 OAK ST	Lacrosse	54603	WEL	U		656981	1	CONOCO INC.	SWCA
45	341200010	Convenience Store Investments	1626 OAK ST	Lacrosse	54603	WEL	U		656986	1	CONOCO INC. RF-2	SWCA
46	349000230	Rottinghaus Real Estate LLC	510 GILLETTE ST	Lacrosse	54603	WEL	U		454096	1	AMOCO OIL CO. MW-6	SWCA
47	347900370	Kyi Myo	610 11TH AVE NW	Austin	55912	WEL	U		675467	1	SCHMIT, TRACY	SWCA
48	347900630	Cruz-Gastelum Juan E	1106 5TH ST NW	Austin	55912	WEL	U		446360	1	GUYETTE, GERALD	SWCA
49	343150001	St Olaf Hospital Association	1000 1ST DR NW	Austin	55912	WEL	U		764844	1	MAYO HEALTH SYSTEMS	SWCA
50	340011440	City Of Austin	500 4TH AVE NE	Austin	55912	WEL	U		226366	1	AUSTIN CITY STANDBY	SWCA
51	342240010	Oakland-Austin Limited Ptship	1504 VINTON ST	Omaha	68108	WEL	U		787579	1		SWCA
52	342240010	Oakland-Austin Limited Ptship	1504 VINTON ST	Omaha	68108	WEL	U		581399	1		SWCA
53	342240010	Oakland-Austin Limited Ptship	1504 VINTON ST	Omaha	68108	WEL	U		787577	1		SWCA
54	342240010	Oakland-Austin Limited Ptship	1504 VINTON ST	Omaha	68108	WEL	U		805060	1		SWCA
55	342240020	Sanco Properties LLC	1951 OLD HWY 8	Saint Paul	55112	WEL	U		787578	1		SWCA
56	342240020	Sanco Properties LLC	1951 OLD HWY 8	Saint Paul	55112	WEL	U		787580	1		SWCA
57	342240040	Hanson Lawrence Martin	22405 570TH AVE	Austin	55912	WEL	U		787589	1		SWCA
58	344470020	Chicago Milwaukee RR.	301 11TH ST NE	Austin	55912	WEL	U		244223	1	LAKESIDE PROPERTIES	SWCA
59	344100120	Austin Coca Cola Co	60092 265TH ST	Brownsdale	55918	WEL	U		226603	1	MAURICE P & RENEE HARTY LIVING TRUST	SWCA
60	342240010	Oakland-Austin Limited Ptship	1504 VINTON ST	Omaha	68108	WEL	U		805061	1		SWCA
61	343150001	St Olaf Hospital Association	1000 1ST DR NW	Austin	55912	WEL	U		764843	1	MAYO HEALTH SYSTEMS	SWCA
62	343150001	St Olaf Hospital Association	1000 1ST DR NW	Austin	55912	WEL	U		764845	1	MAYO HEALTH SYSTEMS	SWCA
63	080210070	WCI Austin Landfill LLC	1235 N LOOP W SUITE 205	Houston	77008	WEL	U		785083	1	MW-2RD	High
64	080210070	WCI Austin Landfill LLC	1235 N LOOP W SUITE 205	Houston	77008	WEL	U		705525	1	MW# 106	High
65	080210070	WCI Austin Landfill LLC	1235 N LOOP W SUITE 205	Houston	77008	WEL	U		705523	1	MW#104	High
66	080210070	WCI Austin Landfill LLC	1235 N LOOP W SUITE 205	Houston	77008	WEL	U		705528	1	MW# 4R	High
67	080210105	R & S Farms LLC	25863 650TH AVE	Dexter	55926	WEL	U		707797	1	PZ-GP11	High
68	080210105	R & S Farms LLC	25863 650TH AVE	Dexter	55926	WEL	U		707798	1	PZ-GP-14	High
69	160320010	Mpca Attn Don Abrams	520 LAFAYETTE RD	St Paul	55155	WEL	U		762560	1	MW-13	SWCA
70	160320010	Mpca Attn Don Abrams	520 LAFAYETTE RD	St Paul	55155	WEL	U		762561	1	MW-14	SWCA
71	160320010	Mpca Attn Don Abrams	520 LAFAYETTE RD	St Paul	55155	WEL	U		762562	1	MW-15	SWCA
72	280010640	Waltz, Vickie Wilcox	90555 State Hwy 251	Austin	55912	WEL	I			1	Shallow hand pump well	SWCA
73	280020011	Mapleview Well #1	204 Broadway Ave	Austin	55912	WEL	A		240060	1	City of Mapleview Municipal Well	ERA
74	342350580	Draayer, Mary	605 21st Ave NW	Austin	55912	WEL	U			1	Domestic well	SWCA
75	080270130	Johnsen, Nicholas	2416 4th St NW	Austin	55912	WEL	A		226392	1	Domestic Well, 148 ft. deep	ERA
76	340650011	City Of Austin	500 4TH AVE NE	Austin	55912	WEL	A		223360	1	AUSTIN 9	ERA

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77	346950220	Young Richard B & Carol	1502 4TH AVE SW	Austin	55912	WEL	U		152800	1	MAYER, JOHN JR.	Low
78	345230580	City Of Austin	500 4TH AVE NE	Austin	55912	WEL	A		226364	1	AUSTIN 8	ERA
79	348870120	The Old Mill, Inc. - Forland David D & Ann K	3507 11TH PLACE NE	Austin	55912	WEL	A		5500037	1	TNC	SWCA
80	080220080	Dune Acquisitions LLC	508 W OAKLAND AVE	Austin	55912	WEL	A		1500021	1	COMM - City Limits	SWCA
81	080430010	Austin Ready Mix	Highway 218 N	Austin	55912	WEL	A		5500065	1	TNC	SWCA
82	080520010	Morem Danny L & Melodee	3504 4TH ST NW	Austin	55912	WEL	A		5500131	1	TNC - Damel Corporation	SWCA
83	080260100	Qualey Lawrence A	2511 11TH ST NE	Austin	55912	WEL	A		5500049	1	TNC - Windrift Lounge	ERA
84	200060141	St. Peter'S Lutheran Church	56937 220TH ST	Austin	55912	WEL	A		5500132		TNC	SWCA
85	200040130	Austin Mobile Park - CSW	21990 582nd Ave	Austin	55912	WEL	A		1500003	1	COMM	SWCA
200	200060183	Patricia J Morse Revocable Living Trust	307 28TH ST SE	Austin	55912	AFL	A		100408	1	David F Morse Farm	SWCA
201	200060190	Morse George F & Kathryn	56283 215TH ST	Austin	55912	AFL	I		74710	1	George Morse Farm	SWCA
202	200060140	Amick Lloyd A & Lori	56915 220TH ST	Austin	55912	AFL	I		78864	1	Lloyd Amick Farm	SWCA
203	200080010	Felten Mark & Sheri	21060 575TH AVE	Austin	55912	AFL	A		79131	1	Mark Felten Farm	SWCA
204	160330010	Wradislavsky Ronald & Lynette	58234 220TH ST	Austin	55912	AFL	I		77325	1	Ron Wradislavsky Farm	SWCA
205	160290070	Ellis Keith & Cynthia	23151 580TH AVE	Austin	55912	AFL	A		74556	1	Keith Ellis Farm	High
206	160290040	Ellis Jeffrey M	23343 580TH AVE	Austin	55912	AFL	A		74557	1	Jeff Ellis Farm	High
207	160310010	Finnegan Thomas C & Kimber L	22955 570TH AVE	Austin	55912	AFL	A		79126	1	Thomas Finnegan Farm	SWCA
208	160290082	Bartelt Steve & Kendra	23064 570TH AVE	Austin	55912	AFL	A		78785	1	Steven Bartelt Farm	SWCA
209	160300010	Kathleen T Finnegan Revocable Family Trust	23335 570TH AVE	Austin	55912	AFL	A		79127	1	George Finnegan Farm	SWCA
210	160300040	Jax Richard	23975 570TH AVE	Austin	55912	AFL	A		77937	1	Dennis Jax Farm	SWCA
211	160300075	Jax Richard	23975 570TH AVE	Austin	55912	AFL	A		77934	1	Richard Jax Farm	SWCA
212	160190020	Dale & Ila Akkerman Joint Revocable Trust	55947 245TH ST	Austin	55912	AFL	A		79005	1	Dale Akkerman Farm	SWCA
213	080240040	Akkerman John E	55743 245TH ST	Austin	55912	AFL	A		79003	1	John Akkerman Farm	SWCA
214	080240120	Akkerman Jack D & Rhonda	55461 245TH ST	Austin	55912	AFL	A		79004	1	Jack Akkerman Farm	SWCA
215	080240130	Freese Karen A	24211 555TH AVE	Austin	55912	AFL	A		104504	1	Karen Freese Farm	SWCA
216	080250010	Burger Edwin E & Rhoda	23864 555TH AVE	Austin	55912	AFL	I		78619	1	Edwin Burger Farm	SWCA
217	080250071	Wagenaar Gary A	23173 555TH AVE	Austin	55912	AFL	A		77352	1	Gary Wagenaar Farm	SWCA
218	080270010	Wehner Herbert F & Sarah J	53670 236TH ST	Austin	55912	AFL	A		81125	1	Herb Wehner Farm	SWCA
219	080520010	Morem Danny L & Melodee	3504 4TH ST NW	Austin	55912	AFL	I		78376	1	Danny Morem Farm	SWCA
220	080210020	Byam Perry B & Nancy	52901 243RD ST	Austin	55912	AFL	I		78616	1	Perry Byam Farm	High
221	080210120	Ryther William H	24593 US HWY 218	Austin	55912	AFL	A		77265	1	William Ryther Farm	High
222	080230241	Wangen Omer M & Geraldine	1507 39TH AVE NE	Austin	55912	AFL	A		77349	1	Omer Wangen Farm	SWCA
223	080150300	Andersen Andrew J & Stacy A	25349 540TH AVE	Austin	55912	AFL	A		78857	1	Jill Anderson Farm	SWCA

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224	200060183	Patricia J Morse Revocable Living Trust	307 28TH ST SE	Austin	55912	AFL	A		100359	1	David F Morse - Sec 6	SWCA
225	200060183	Patricia J Morse Revocable Living Trust	307 28TH ST SE	Austin	55912	AFL	A		100358	1	David F Morse Farm - Sec 7	SWCA
226	160290073	Ellis Keith & Cynthia	23151 580TH AVE	Austin	55912	AFL	A		74558	1	Keith Ellis Farm	High
227	349050120	Hormel Foods Corp - Austin Plant	500 14th Ave NE	Austin	55912	AFL	A		3926	1	Feedlots	SWCA
300	080220050	LN Real Estate LLC	801 2ND AVE STE 1300	Seattle	98104	SSTS	A			1	Compliant, 06/18/2003	SWCA
301	080460080	Busker Daryl L & Mary P	24051 540TH AVE	Austin	55912	SSTS	A			1	Compliant, 07/17/1998	SWCA
302	080460060	Clark Thomas L	24087 540TH AVE	Austin	55912	SSTS	A			1	Compliant, 08/16/1999	SWCA
303	080460050	Grant Helga	24109 540TH AVE	Austin	55912	SSTS	A			1	Compliant, 08/18/1999	SWCA
304	160190030	Oots Thomas E	56217 245TH ST	Austin	55912	SSTS	A			1	Compliant, 09/13/2017	SWCA
305	160330010	Wradislavsky Ronald & Lynette	58234 220TH ST	Austin	55912	SSTS	A			1	Compliant, 07/11/2017	SWCA
306	200380090	Schneider Thomas	56447 220TH ST	Austin	55912	SSTS	A			1	Compliant, 06/05/2015	ERA
307	200370030	Kvam Rodney B	56387 220TH ST	Austin	55912	SSTS	A			1	Abandoned, 11/14/2014	ERA
308	200370070	Crews Dustin Etal & Christine Rumsey	56351 220TH ST	Austin	55912	SSTS	A			1	Compliant, 08/27/1999	ERA
309	200370120	Dority Lee M	56235 220TH ST	Austin	55912	SSTS	A			1	Compliant, 11/08/2007	ERA
310	020090080	Maly Loddy J Iii	1805 19TH AVE SE	Austin	55912	SSTS	A			1	Compliant, 08/15/2012	High
311	080150360	Bustad Wallace	118 1ST AVE NE	Faribault	55021	SSTS	A			1	Compliant, 10/13/1999	SWCA
312	080150366	Burbank Company LLC	326 NORTH MAIN	Austin	55912	SSTS	A			1	Compliant, 10/20/2014	SWCA
313	080150367	Boyd Richard D & Tina L	53112 255TH ST	Austin	55912	SSTS	A			1	Compliant, 08/03/2016	SWCA
314	080150361	Akkerman Charles D	53248 255TH ST	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
315	080150370	Sikkink Daniel P	53040 255TH ST	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	High
316	080150300	Andersen Andrew J & Stacy A	25349 540TH AVE	Austin	55912	SSTS	A			1	Compliant, 06/04/2014	SWCA
317	080150270	Wagner Brandon James	53465 255TH ST	Austin	55912	SSTS	A			1	Compliant, 01/11/2012	SWCA
318	080150275	Rodney Anderson Farms LLC	4599 85TH AVE NW	Owatonna	55060	SSTS	A			1	Noncompliant, 06/30/1999, Failing to Protect Ground Water, Failing to Protect Ground Water	SWCA
319	080150230	Waller Lillian M	53211 255TH ST	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
320	080150220	Madison Donald A & Susan	53191 255TH ST	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
321	080150210	Mortensen Duane A & Gwendolyn	53169 255TH ST	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
322	080150200	Long Deborah	53153 255TH ST	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
323	080150190	Riskedahl Jacob D & Jamie M	53139 225TH ST	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
324	080150180	Learn Michelle A	53107 255TH ST	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
325	080150160	Winkels Linda J & George P	14850 690TH AVE	Adams	55909	SSTS	A			1	Compliant, 12/31/2012	SWCA
326	080150130	Norris Roger A & Mary	53063 255TH ST	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
327	080150110	Morgan Robert	53047 255TH ST	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	High
328	080150090	Jlm Properties LLC	2715 5TH ST NE	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	High
329	080150250	Stuhr Ted & Mary L	4001 13TH ST NE	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA

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330	080150170	Kanne David J	53068 254TH ST	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
331	080150120	Tischer Michael Duane	53034 254TH ST	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
332	080150080	Knutson Nicholas N	25384 US HWY 218	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	High
333	080150060	Holgate Thomas J	25370 US HWY 218	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	High
334	080150070	Steele-Gabel Dareen G & Troy Gabel	25362 US HWY 218 N	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	High
335	080150050	Lee Raymond E	25312 US HWY 218	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
336	080140050	Grinstead Lawrence & Barbara	25238 540TH AVE	Austin	55912	SSTS	A			1	Compliant, 10/23/2002	SWCA
337	080150040	Wytaske Mark A & Annette L	25246 US HWY 218	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
338	080130050	Watkins David A & Sharry	25134 555TH AVE	Austin	55912	SSTS	A			1	Compliant, 09/28/1999	SWCA
339	080130020	Sucha Duane W & Marilyn A	25091 555TH AVE	Austin	55912	SSTS	A			1	Compliant, 07/21/2010	SWCA
340	080150281	Sensenig Daniel R	25123 540TH AVE	Austin	55912	SSTS	A			1	Compliant, 10/09/2006	SWCA
341	080150282	Solberg Rentals LLC	10874 CRESCENT DR	Nisswa	56468	SSTS	A			1	Compliant, 06/29/2005	SWCA
342	080140070	Swoboda David A	25010 540TH AVE	Austin	55912	SSTS	A			1	Compliant, 08/12/1996	SWCA
343	080150290	Eggum Lyal J & Carol	25021 540TH AVE	Austin	55912	SSTS	A			1	Compliant, 08/29/1997	SWCA
344	080230030	Ramsey Golf Club Inc	5784 MCGOWAN RD	Brainerd	56401	SSTS	A			1	Noncompliant, 08/06/2003, Failing to Protect Ground Water, Failing to Protect Ground Water	SWCA
345	080210110	Delaney Brett W & Melissa C	24969 US HWY 218	Austin	55912	SSTS	A			1	Compliant, 07/08/2016	High
346	080240030	Freese Karen A	24211 555TH AVE	Austin	55912	SSTS	A			1	Compliant, 10/28/2009	SWCA
347	348870190	Hessenius Mark S	1501 39TH AVE NE	Austin	55912	SSTS	U			1	Abandoned, 07/22/2014	SWCA
348	080230050	Besel Paul W & Rhonda M	24608 540TH AVE	Austin	55912	SSTS	A			1	Compliant, 12/31/2004	SWCA
349	080240080	Dale & Ila Akkerman Joint Revocable Trust	55947 245TH ST	Austin	55912	SSTS	A			1	Compliant, 11/13/2001	SWCA
350	080240050	Geike Fritz G	24448 555TH AVE	Austin	55912	SSTS	A			1	Compliant, 05/14/2013	SWCA
351	080240120	Akkerman Jack D & Rhonda	55461 245TH ST	Austin	55912	SSTS	A			1	Compliant, 11/12/1999	SWCA
352	080240100	Christianson Aaron N	50323 320TH ST	Blooming Prairie	55917	SSTS	A			1	Noncompliant, 02/06/1998, Failing to Protect Ground Water, Failing to Protect Ground Water	SWCA
353	349170190	Stephenson Julie	3905 14TH ST NE	Austin	55912	SSTS	U			1	Adandoned, 11/24/2010	SWCA
354	080210070	Wci Austin Landfill LLC	1235 N LOOP W SUITE 205	Houston	77008	SSTS	A			1	Compliant, 11/08/2016	High
355	348390130	Osland Dean T	3806 4TH ST NE	Austin	55912	SSTS	U			1	Abandoned, 10/09/2014	SWCA
356	348390120	Unverzagt David H	604 38TH AVE NE	Austin	55912	SSTS	U			1	Abandoned, 07/08/2015	SWCA
357	080240100	Christianson Aaron N	50323 320TH ST	Blooming Prairie	55917	SSTS	A			1	Noncompliant, 02/06/1998, Failing to Protect Ground Water, Failing to Protect Ground Water	SWCA
358	349170280	Dube Cynthia M	3800 13TH ST NE	Austin	55912	SSTS	U			1	Abandoned, 07/31/2014	SWCA

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359	080240100	Christianson Aaron N	50323 320TH ST	Blooming Prairie	55917	SSTS	A			1	Noncompliant, 02/06/1998, Failing to Protect Ground Water, Failing to Protect Ground Water	SWCA
360	080230041	Vacura Rosie J	PO BOX 163	Austin	55912	SSTS	A			1	Compliant, 05/30/2003	SWCA
361	080230260	Tighe Matthew L	24188 548TH AVE NE	Austin	55912	SSTS	A			1	Compliant, 07/12/2011	SWCA
362	349170300	Strouf Monte L & Diane K	1311 34TH DR NE	Austin	55912	SSTS	U			1	ABANDONED, 06/18/2015	SWCA
363	344360010	Forland David D & Ann K	54439 244TH ST	Austin	55912	SSTS	A			1	Compliant, 10/15/2009	SWCA
364	348870130	Thomas Larry J	1305 34TH DR NE	Austin	55912	SSTS	U			1	Adandoned, 06/10/2011	SWCA
366	080220060	Fullerton Cynthia K	24216 4TH ST NW	Austin	55912	SSTS	A			1	Compliant, 09/21/2017	SWCA
367	080240100	Christianson Aaron N	50323 320TH ST	Blooming Prairie	55917	SSTS	A			1	Noncompliant, 02/06/1998, Failing to Protect Ground Water, Failing to Protect Ground Water	SWCA
368	080220090	Nicol Troy E	24223 534TH AVE	Austin	55912	SSTS	A			1	Compliant, 09/05/2003	SWCA
369	080570020	Winsky Catherine	24080 534TH AVE	Austin	55912	SSTS	A			1	Compliant, 08/07/2012	SWCA
370	080460020	Westrick James E & Sharlene K	24167 540TH AVE	Austin	55912	SSTS	A			1	Pumped, 04/09/2018	SWCA
371	080560260	Raygor Daniel	6670 LUCIA LN NE APT 12	Fridley	55432	SSTS	A			1	Noncompliant, 08/30/2016, Holding Tank is Overflowing to ground, Imminent Threat to Public Health & Safety	SWCA
372	080460030	Tapp Annette M & Steven	24153 540TH AVE	Austin	55912	SSTS	A			1	Compliant, 05/08/1997	SWCA
373	160300075	Jax Richard	23975 570TH AVE	Austin	55912	SSTS	A			1	Compliant, 06/09/1999	SWCA
374	080250010	Burger Edwin E & Rhoda	23864 555TH AVE	Austin	55912	SSTS	A			1	Compliant, 10/05/1999	SWCA
375	345070030	Vadeer Sara & Brock	502 32ND AVE NE	Austin	55912	SSTS	U			1	Abandoned, 06/19/2015	SWCA
376	080520010	Morem Danny L & Melodee	3504 4TH ST NW	Austin	55912	SSTS	A			1	Compliant, 10/05/1999	SWCA
377	080270060	Ln Real Estate LLC	801 2ND AVE STE 1300	Seattle	98104	SSTS	A			1	Compliant, 09/30/2014	SWCA
378	345060030	Watkins Troy D & Tammy M	505 30TH AVE NE	Austin	55912	SSTS	U			1	Abandoned, 11/12/2014	SWCA
379	345060010	Miller Terry L & Theresa A	3104 4TH ST NE	Austin	55912	SSTS	U			1	ABANDONED, 07/25/2015	SWCA
380	345060020	Christenson Richard W	501 30TH AVE NE	Austin	55912	SSTS	U			1	Abandoned, 08/12/2014	SWCA
381	080260040	Morrison Roger A & Inasue S	2900 14TH ST NE	Austin	55912	SSTS	A			1	Compliant, 06/01/2012	SWCA
382	341370010	Crowley Max D	3004 7TH ST NE	Austin	55912	SSTS	U			1	Abandoned, 07/24/2014	SWCA
383	080520020	Morem Properties Of Austin	3608 4TH ST NW	Austin	55912	SSTS	U			1	Abandoned, 12/09/2015	SWCA
384	341370060	Berndt Michael H	3005 7TH ST NE	Austin	55912	SSTS	A			1	Pumped, 11/15/2016	SWCA
385	341370110	Veldman Christine	1330 W MENK DR	Saint Peter	56082	SSTS	U			1	Abandoned, 11/22/2013	SWCA
386	341370170	Sheimo Daniel A & Rose	501 29TH AVE NE	Austin	55912	SSTS	U			1	Abandoned, 09/29/2014	SWCA
387	160290101	Huinker Craig A & Diane	23782 570TH AVE	Austin	55912	SSTS	A			1	Compliant, 11/10/2004	SWCA
388	349160040	Hinton Samantha & Sean	2904 11TH ST NE	Austin	55912	SSTS	U			1	ABANDONED, 07/27/2015	SWCA
389	160300042	Jax Dennis W	23535 570TH AVE	Austin	55912	SSTS	A			1	Compliant, 06/04/1999	SWCA

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390	160300060	Anderson Ryan L & Sherry L	56503 235TH ST	Austin	55912	SSTS	A			1	Compliant, 11/07/2005	SWCA
391	160300054	City Of Austin	500 4TH AVE NE	Austin	55912	SSTS	U			1	Abandoned, 05/02/2016	SWCA
392	160300050	City Of Austin	500 4TH AVE NE	Austin	55912	SSTS	U			1	Abandoned, 05/02/2016	SWCA
393	160290090	Gabrielson Gayle Diane	23264 570TH AVE	Austin	55912	SSTS	A			1	Compliant, 10/02/2000	SWCA
394	348900001	City Of Austin	500 4TH AVE NE	Austin	55912	SSTS	A			1	Compliant, 12/15/1998	ERA
395	080270130	Johnsen Nicholas E	2416 4TH ST NW	Austin	55912	SSTS	A			1	Compliant, 07/08/2011	ERA
396	160290082	Bartelt Steve & Kendra	23064 570TH AVE	Austin	55912	SSTS	A			1	Compliant, 11/08/1999	SWCA
397	280020120	Bodensteiner William L	311 TAYLOR AVE	Austin	55912	SSTS	A			1	Compliant, 09/06/2007	SWCA
398	080360055	Diane Persinger Revocable Living Trust	23083 555TH AVE	Austin	55912	SSTS	A			1	Compliant, 10/16/2002	SWCA
399	349050135	Hormel Foods Corporation	1 HORMEL PL	Austin	55912	SSTS	U			1	Abandoned, 05/22/2012	ERA
400	160550610	Martinez Danielle J & Martin Jr	22785 572 AVE	Austin	55912	SSTS	A			1	Compliant, 06/16/2017	SWCA
401	160320030	Hodgman Properties LLC	61446 251ST AVE	Mantorville	55955	SSTS	A			1	Compliant, 06/06/2014	SWCA
402	160550250	Haase Michael J & Lisa A	57578 227TH ST	Austin	55912	SSTS	A			1	Compliant, 05/20/2011	SWCA
403	160600040	Michael H Nelson Revocable Living Trust	57198 227TH ST	Austin	55912	SSTS	A			1	Compliant, 10/05/2015	SWCA
404	160600030	Case Kimberly F & Christian M	57154 227TH ST	Austin	55912	SSTS	A			1	Compliant, 10/10/2006	SWCA
405	160600020	Kittridge Crystal & William Jr	57088 227TH ST NE	Austin	55912	SSTS	A			1	Compliant, 05/25/2000	SWCA
406	160600010	Krueger James R & Angela R	57030 227TH ST	Austin	55912	SSTS	A			1	Compliant, 07/13/2000	SWCA
407	160550300	Heim Mark W & Jan M	57497 227TH ST	Austin	55912	SSTS	A			1	Compliant, 05/20/2011	SWCA
408	160550310	Bumgarner Robert B & Kim L	57407 227TH ST	Austin	55912	SSTS	A			1	Compliant, 05/20/2011	SWCA
409	160550320	Finnestad Leann M & Anthony	57369 227TH ST	Austin	55912	SSTS	A			1	Compliant, 05/20/2011	SWCA
410	160550270	Beeman Bradley F	57545 227TH ST	Austin	55912	SSTS	A			1	Compliant, 05/20/2011	SWCA
411	160550330	Compton Thomas P & Jennifer L	57331 227TH ST NE	Austin	55912	SSTS	A			1	Compliant, 05/20/2011	SWCA
412	160550260	Roche Kendall W & Roxanne	57567 227TH ST	Austin	55912	SSTS	A			1	Compliant, 05/20/2011	SWCA
413	160550340	Jenkins Paul J	57285 227TH ST	Austin	55912	SSTS	A			1	Compliant, 05/20/2011	SWCA
414	160600090	Leger Janet	57073 227TH ST	Austin	55912	SSTS	A			1	Compliant, 10/22/1999	SWCA
415	160600080	Christopherson Randel & Nancy	57151 227TH ST	Austin	55912	SSTS	A			1	Compliant, 06/30/2000	SWCA
416	160600060	Kroneman Timothy A	57197 227TH ST NE	Austin	55912	SSTS	A			1	Compliant, 08/02/2013	SWCA
417	160600070	Garnatz Daniel	57179 227TH ST	Austin	55912	SSTS	A			1	Compliant, 10/26/1999	SWCA
418	160420020	Brossoit Jason M	57196 225TH ST	Austin	55912	SSTS	A			1	Compliant, 09/21/2017	SWCA
419	160310100	Sahr Craig R	22507 570TH AVE	Austin	55912	SSTS	A			1	Compliant, 08/12/2013	SWCA
420	160400020	Vossler Ryan E	1417 28TH ST NE	Austin	55912	SSTS	A			1	Compliant, 07/03/2014	ERA
421	160400030	Dryden Karen & Forest & Trustees	1509 28TH ST NE	Austin	55912	SSTS	A			1	Compliant, 07/16/2001	ERA
422	160310110	Johnson Joel E & Teri L	22477 570TH AVE	Austin	55912	SSTS	A			1	Compliant, 06/20/2012	SWCA
423	160310090	Hanson Lawrence Martin	22405 570TH AVE	Austin	55912	SSTS	A			1	Compliant, 08/23/2016	SWCA

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424	160310050	Johnson Barry R	22385 570TH AVE	Austin	55912	SSTS	A			1	Compliant, 07/03/2014	SWCA
425	160310080	Hillman Leslie E & Glenda	22361 570TH AVE	Austin	55912	SSTS	A			1	Compliant, 12/03/2009	SWCA
426	160310070	Karlen Jeffrey W	22341 570TH AVE	Austin	55912	SSTS	A			1	Compliant, 12/03/2009	SWCA
427	160420070	Stencel Terry & Kathleen	57242 222ND ST	Austin	55912	SSTS	A			1	Compliant, 08/20/1998	SWCA
428	160310060	Best Jon W & Nina J	22305 570TH AVE	Austin	55912	SSTS	A			1	Compliant, 08/17/2001	SWCA
429	160420140	Demro Joel D & Marty A	57151 222ND ST	Austin	55912	SSTS	A			1	Compliant, 04/08/2012	SWCA
430	160420090	Lewis Wayne A & Tina M	57102 222ND ST	Austin	55912	SSTS	A			1	Compliant, 06/28/2006	SWCA
431	160420150	Schloegel Daniel F	57081 222ND ST NE	Austin	55912	SSTS	A			1	Compliant, 06/13/2014	SWCA
432	160420180	Distad Chad	22061 572ND AVE	Austin	55912	SSTS	A			1	Compliant, 11/07/2005	SWCA
433	160330090	Winsky Kelly Lynn	58484 220TH ST	Austin	55912	SSTS	A			1	Compliant, 04/01/2015	High
434	160420160	Schweihs Andrew J	57027 222ND ST NE	Austin	55912	SSTS	A			1	Compliant, 10/06/2014	SWCA
435	160390060	Stevens Terry L & Wendy L	58354 220TH ST	Austin	55912	SSTS	A			1	Compliant, 10/06/2006	High
436	160390040	Penrod Miranda I & John	17550 US HWY 218	Austin	55912	SSTS	A			1	Noncompliant, 07/05/2017, Soil Separation, Failing to Protect Ground Water	SWCA
437	160390020	Nagele David	58268 220TH ST	Austin	55912	SSTS	A			1	Compliant, 06/16/2017	SWCA
438	160500030	Wadding Kelly B	22071 565TH AVE	Austin	55912	SSTS	A			1	Compliant, 05/19/2014	ERA
439	160410110	Wollenburg Wayne E & Linda G	22064 565TH AVE	Austin	55912	SSTS	A			1	Compliant, 08/03/2005	ERA
440	160500020	Thomas Danny Lewis	22067 565TH AVE	Austin	55912	SSTS	A			1	Compliant, 05/13/2013	ERA
441	160310031	Wiste James A	56674 220TH ST	Austin	55912	SSTS	A			1	Compliant, 10/03/2006	ERA
442	160420170	Mcgaffey Douglas & Joanne	22025 572ND AVE	Austin	55912	SSTS	A			1	Noncompliant, 05/10/2017, Soil Separation, Failing to Protect Ground Water	SWCA
443	160320051	Rma, LLC	57804 220TH ST	Austin	55912	SSTS	A			1	Compliant, 09/14/2010	SWCA
444	160410030	Nicol Neal W Jr Etux	100 11TH AVE NW	Austin	55912	SSTS	A			1	Compliant, 10/29/1997	ERA
446	160410080	Juenger James B	22026 565TH AVE	Austin	55912	SSTS	A			1	Compliant, 09/14/2017	ERA
447	200040060	Ingvaldson Darrell B & Diane D	58145 220TH ST	Austin	55912	SSTS	A			1	Compliant, 01/18/2001	SWCA
448	200040130	Austin Mobile Home Park LLC	2728 GRANDVIEW ST	San Diego	55912	SSTS	A			1	Compliant, 09/28/2015	SWCA
449	200050140	Bustad Wallace	118 1ST AVE NE	Faribault	55912	SSTS	A			1	Compliant, 10/24/2007	SWCA
450	200050110	Bultman Scott T & Christine	21990 571ST AVE	Austin	55912	SSTS	A			1	Compliant, 09/07/2004	SWCA
451	200050160	Iveson Kristina Marie	57039 220TH ST	Austin	55912	SSTS	A			1	Compliant, 05/21/2002	SWCA
452	200050150	Blair Larry V & Kari J	57015 220TH ST	Austin	55912	SSTS	A			1	Compliant, 10/31/2001	SWCA
453	200060140	Amick Lloyd A & Lori	56915 220TH ST	Austin	55912	SSTS	A			1	Compliant, 09/26/2016	SWCA
454	200060120	Ladlie Melissa J	56815 220TH ST	Austin	55912	SSTS	A			1	Pumped, 11/15/2016	SWCA
455	200060110	Griebel Grace E	56757 220TH ST PO BOX 651	Austin	55912	SSTS	A			1	Compliant, 08/02/2000	SWCA
456	200060060	Ross Ruth E	56571 220TH ST	Austin	55912	SSTS	A			1	Compliant, 05/24/2002	ERA
457	200050180	Kellner Paul A	57149 220TH ST	Austin	55912	SSTS	A			1	Compliant, 04/14/2015	SWCA

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458	200420010	Lukowski Elzbieta	56655 220TH ST	Austin	55912	SSTS	A			1	Noncompliant, 11/02/2001, Failing to Protect Ground Water, Failing to Protect Ground Water	ERA
459	200370080	Kroneman Sherry	56325 220TH ST	Austin	55912	SSTS	A			1	Noncompliant, 05/03/2017, Soil Separation, Failing to Protect Ground Water	ERA
460	200380080	Smalley Jeremy Lee	21945 565TH AVE	Austin	55912	SSTS	A			1	Compliant, 10/16/2002	ERA
461	200370170	Mittelsted Gehl W & Renea	702 28TH ST NE	Austin	55912	SSTS	A			1	Compliant, 08/22/2013	ERA
462	200380050	Vermilyea Brian D	21904 565TH AVE	Austin	55912	SSTS	A			1	Compliant, 10/06/2011	ERA
463	200370200	Schweisthal Timothy M	56063 219TH ST	Austin	55912	SSTS	A			1	Compliant, 08/23/2013	ERA
464	200370180	Adamson Joseph R	56031 219TH ST	Austin	55912	SSTS	A			1	Compliant, 08/23/2013	ERA
465	200050220	Smit Nathan R	57234 215TH ST	Austin	55912	SSTS	A			1	Compliant, 07/24/2015	SWCA
466	200050010	Sauke Charles	57608 215TH ST	Austin	55912	SSTS	A			1	Compliant, 11/01/2006	SWCA
467	200050120	Mentel Mike A & Betsy	56540 215TH ST	Austin	55912	SSTS	A			1	Compliant, 11/13/2009	SWCA
468	200050230	Mentel Robert & Alyssa	57330 215TH ST	Austin	55912	SSTS	A			1	Compliant, 10/24/2005	SWCA
469	200050250	Tigner Troy M	57057 215TH ST	Austin	55912	SSTS	A			1	Compliant, 08/07/2015	SWCA
470	200070051	Hemingway Rande G Jr	56288 205TH ST	Austin	55912	SSTS	A			1	Compliant, 08/23/2014	SWCA
472	200080050	Roach Michael P & Crystal L	57414 205TH ST	Austin	55912	SSTS	A			1	Compliant, 10/17/2016	SWCA
473	200070010	Janet Mary Adams Revocable Family Trust	8341 Lyndale Aave S Apt 108	Bloomington	55420	SSTS	A			1	Compliant, 07/31/2007	High
474	200070030	Kirchhoff Adam J	56625 205TH ST	Austin	55912	SSTS	A			1	Compliant, 02/03/2013	SWCA
475	200070020	Owens Richard	56537 205TH ST	Austin	55912	SSTS	A			1	Compliant, 09/09/2014	SWCA
476	020440120	Nygren Jill E	10848 HWY 60 BLVD	Wanamingo	55983	SSTS	A			1	Compliant, 10/19/2017	SWCA
477	020440090	Wencl Darrin E	2404 16TH AVE SE	Austin	55912	SSTS	A			1	Compliant, 09/19/2014	SWCA
478	020440080	Muilenburg Kirby J & Rebecca A	2318 16TH AVE SE	Austin	55912	SSTS	A			1	Compliant, 08/19/2015	SWCA
479	020440070	Allen Mary & Keith Hughes	2306 16TH AVE SE	Austin	55912	SSTS	A			1	Compliant, 08/12/2003	SWCA
480	020440040	Bartz Ralph	2208 16TH AVE SE	Austin	55912	SSTS	A			1	Compliant, 10/12/2010	SWCA
482	020440020	Blom Joy A & Sheila	1717 21ST ST SE	Austin	55912	SSTS	A			1	Compliant, 05/26/2016	SWCA
483	080270121	Starman William S & Sharman L	600 27TH AVE NE	Austin	55912	SSTS	A			1	Compliant, 05/09/2005	ERA
484	080150030	Wytaske Mark A & Annette L	25246 US HWY 218	Austin	55912	SSTS	A			1	Compliant, 12/31/2012	SWCA
485	080150350	Clark Debra K	25801 540TH AVE	Austin	55912	SSTS	A			1	Compliant, 09/09/2014	SWCA
601	340090100	Helfrich Properties LLC	1805 14th St NE St B	Austin	55912	HWG	A		147734	1	Hazardous Waste	ERA
604	349050013	State Special Waste Facility	1111 8th Ave NE	Austin	55912	HWG	A		38019	1	Hazardous Waste	SWCA
607	280010220	R W Johnson Co	2208 4th St NW	Austin	55912	HWG	I		47218	1	Hazardous Waste	SWCA
613	344600110	Williams Plumbing & Htng Co	303 5th Pl NW	Austin	55912	HWG	I		43129	1	Hazardous Waste	SWCA
614	346003080	Harty Mechanical Inc	1015 2nd Ave NE	Austin	55912	HWG	I		46145	1	Hazardous Waste	High
618	341902980	Joe Wehner Body Shop	1914 5th Ave NE	Austin	55912	HWG	I		46977	1	Hazardous Waste	ERA

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625	340090015	MN Freezer Warehouse	1907 14th St NE	Austin	55912	HWG	I		45395	1	Hazardous Waste	ERA
631	346400600	Alms Auto Service	1203 1/2 Oakland Pl SE	Austin	55912	HWG	I		50200	1	Hazardous Waste	SWCA
633	344450500	Holder Tectonics	2014 5th Ave SE	Austin	55912	HWG	I		41845	1	Hazardous Waste	SWCA
638	280010200	Exhaust Pros Of Austin	140 Broadway	Austin	55912	HWG	I		46766	1	Hazardous Waste	SWCA
640	280020132	Mapleview/Lyle Public Safety	101 Maple Ave	Austin	55912	HWG	I		46325	1	Hazardous Waste	ERA
642	349050112	Natural Biologics	801 16th Ave NE Site B	Austin	55912	HWG	I		46657	1	Hazardous Waste	SWCA
652	349100020	Dons Woodworking Repr	2003 10th Pl NE	Austin	55912	HWG	I		48648	1	Hazardous Waste	ERA
665	342100020	Austin Printing	404 6th St NE	Austin	55912	HWG	I		37327	1	Hazardous Waste	SWCA
669	346400620	Davis Tv Service	100 11th St SE	Austin	55912	HWG	I		47853	1	Hazardous Waste	SWCA
670	345310020	Bo De Travel Trailers	703 20th St SE	Austin	55912	HWG	I		49330	1	Hazardous Waste	SWCA
683	344601030	Cedars Of Austin	700 1st Dr NW	Austin	55912	HWG	I		42505	1	Hazardous Waste	SWCA
697	345940030	Super Value Demo	104 11th Ave NW	Austin	55912	HWG	A		33149	1	Hazardous Waste	SWCA
698	349050012	County Highway Dept	1105 8th Ave NE	Austin	55912	HWG	A		37716	1	Hazardous Waste, Minimal quantity generator	SWCA
700	344600460	Nelson Dental PLLC	205 6th Pl NW	Austin	55912	HWG	A		46668	1	Hazardous Waste, Minimal quantity generator	SWCA
701	344600490	Potach & Mitchell Dental Clinic Pa	607 1st Dr NW	Austin	55912	HWG	A		46498	1	Hazardous Waste, Minimal quantity generator	SWCA
703	341850321	ISD 492 Wescott Field House	301 3rd St NW	Austin	55912	HWG	A		44679	1	Hazardous Waste, Minimal quantity generator	High
704	348550112	Austin Tacc	800 21st St NE	Austin	55912	HWG	A		41944	1	Hazardous Waste, Minimal quantity generator	SWCA
705	349050112	U of M - Hormel	801 16th Ave NE	Austin	55912	HWG	A		43089	1	Hazardous Waste, Minimal quantity generator	SWCA
707	342880010	Good Samaritan Society Comforcare	1201 17th St NE	Austin	55912	HWG	A		150044	1	Hazardous Waste, Minimal quantity generator	ERA
712	342350440	Mountain Oaks Cabinetry Inc	2205 4th St NW	Austin	55912	HWG	A	S000	46135	1	Paints, thinners, 5 gallons	ERA
717	345930010	Hanson Tire Of Austin	1200 N Main St	Austin	55912	HWG	A		45676	1	Hazardous Waste, Minimal quantity generator	SWCA
722	340090011	Joseph Co	2003 14th St NE Ste 106	Austin	55912	HWG	A		123742	1	Hazardous Waste, Minimal quantity generator	ERA
731	349100061	Jc Hormel Nature Center	1304 21st St NE Ste 673	Austin	55912	HWG	A		49498	1	Hazardous Waste, Minimal quantity generator	SWCA
732	345780020	Sema Equipment - Austin	2001 4th St NW	Austin	55912	HWG	A		47903	1	Hazardous Waste, Very small quantity generator	SWCA
736	348910020	Letendre, Gary	2409 4th St NW	Austin	55912	HWG	A	S000	47467	1	Parts washer solvent, 55 gallons; Midwest Diesel Sales & Service LLP	ERA
744	348100720	Palmer Bus Service - Site 1	103 10th St SE	Austin	55912	HWG	I		3037	1	Hazardous Waste	High
745	346001065	Austin Sanitation Inc	610 7th St NE	Austin	55912	HWG	I		45653	1	Hazardous Waste	SWCA
746	348550111	Austin Municipal Airport	710 21st St NE	Austin	55912	HWG	A		3028	1	Hazardous Waste	SWCA
747	341904160	Hallidays Interstate Service	709 21st St NE	Austin	55912	HWG	A		45662	1	Hazardous Waste	ERA
748	349050190	Kaal Television	1701 10th Pl NE	Austin	55912	HWG	A		45937	1	Hazardous Waste, Minimal quantity generator	SWCA

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749	349050040	Kwik Trip #250	1509 10th Pl NE	Austin	55912	HWG	A		45644	1	Hazardous Waste	SWCA
750	342250440	Hormel Foods Corp	1816 9th St NE	Austin	55912	HWG	I		37001	1	Hazardous Waste, Small quantity generator	ERA
751	349050135	Hormel R&D Labs	2107 8th Dr NE	Austin	55912	HWG	A		214378	1	Hazardous Waste, Small quantity generator	ERA
752	349050170	International Paper - Austin	1900 8th St NE	Austin	55912	HWG	A		1261	1	Hazardous Waste, Very small quantity generator	ERA
753	349000110	Brown-Wilbert Vault Co - Austin	704 18th Ave NW	Austin	55912	HWG	A		2475	1	Hazardous Waste, Minimal quantity generator	SWCA
754	348900072	Carney Auto Inc	2700 11th St NE	Austin	55912	HWG	A		3289	1	Hazardous Waste	ERA
755	349050110	Hormel R&D Labs	2 Hormel Pl	Austin	55912	HWG	A		84839	1	Hazardous Waste, Small quantity generator	SWCA
756	349050120	Hormel Foods Corp - Austin Plant	500 14th Ave NE	Austin	55912	HWG	A		3926	1	Hazardous Waste, Small quantity generator	SWCA
757	345920010	Walmart Supercenter 4257	1000 18th Ave NW	Austin	55912	HWG	A		117420	1	Hazardous Waste, Very small quantity generator	SWCA
758	348600521	ISD 492 Ellis Middle School	1700 4th Ave SE	Austin	55912	HWG	A		45866	1	Hazardous Waste, Minimal quantity generator	ERA
759	349050020	Quality Carriers Fmr Mont Tank	909 NE 11 Dr	Austin	55912	HWG	I		4678	1	Hazardous Waste	SWCA
760	080270080	W Bustad Crane Service Inc	24000 US Highway 218	Austin	55912	HWG	A		45358	1	Hazardous Waste	SWCA
761	349000230	Kraus Petroleum Inc	1309 4th St NW	Austin	55912	HWG	A		46011	1	Hazardous Waste	SWCA
762	347250001	ISD 492 Neveln Elementary School	1918 E Oakland Ave	Austin	55912	HWG	A		41812	1	Hazardous Waste, Minimal quantity generator	SWCA
763	348550040	Glo Dry Cleaners	1810 E Oakland Ave	Austin	55912	HWG	I		48285	1	Hazardous Waste	SWCA
764	341050341	ISD 492 Sumner Elementary School	805 8th Ave NW	Austin	55912	HWG	A		47186	1	Hazardous Waste, Minimal quantity generator	SWCA
765	349000010	Austin Medical Center	300 8th Ave NW	Austin	55912	HWG	A		45649	1	Hazardous Waste, Small quantity generator	SWCA
766	341850321	ISD 492 Austin Public Schools	301 3rd St NW	Austin	55912	HWG	A		45651	1	Hazardous Waste, Very small quantity generator	High
767	347950801	Pacelli Catholic Schools	311 4th St NW	Austin	55912	HWG	A		50909	1	Hazardous Waste	SWCA
768	347955670	Saint Augustin Catholic Church	405 4th St NW	Austin	55912	HWG	I		106578	1	Hazardous Waste, Very small quantity generator	SWCA
769	345940040	Nicol'S Auto Repair	100 11th Ave NW	Austin	55912	HWG	A		47122	1	Hazardous Waste, Minimal quantity generator	SWCA
770	349050070	Smyth Companies LLC - Austin	1503 14th St NE	Austin	55912	HWG	A		1532	1	Hazardous Waste, Small quantity generator	SWCA
771	349000270	Austin Auto Service	1406 4th St NW	Austin	55912	HWG	A		45643	1	Hazardous Waste	SWCA
772	342050010	Kmart Store 7215	1101 N Main St	Austin	55912	HWG	I		45995	1	Hazardous Waste	SWCA
773	020400140	Dan Jennings Co	1200 8th Ave SE	Austin	55912	HWG	A		46943	1	Hazardous Waste, Minimal quantity generator	High
774	348900040	Austin Utilities - Northeast Power Plant	3511 11th St NE	Austin	55912	HWG	A		4841	1	Hazardous Waste	SWCA
775	160320010	Red Rock Sanitary Landfill	57652 220th St	Austin	55912	HWG	A		3182	1	Hazardous Waste	SWCA
776	080270061	Damel Corp Inc	3608 4th St NW	Austin	55912	HWG	A		45421	1	Hazardous Waste, Minimal quantity generator	SWCA

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900	349000351	Oakwood Cemetery	1800 4th St NW	Austin	55912	GRV	A		102954	1	Cemetery	SWCA
950	080150090	Southwest Sales, Inc.	25446 US-218 N	Austin	55912	CVMVW	U		MN-099-NOT5-0010	1	NOT5 / Not Drilled	High
951	348550111	City Of Austin (Austin Transfer Station)	500 4TH AVE NE	Austin	55912	CVMVW	A		MN-099-NOT5-0011	1	NOT5 / Not Drilled	SWCA
952	080220080	Dune Acquisitions LLC	508 W OAKLAND AVE	Austin	55912	CVWWD	A		MN-099-5W32-0014	1	5W32 / Noncompliant, 04/21/2015, Mound is leaking into a ditch, Imminent Threat to Public Health & Safety	SWCA
1001	349050120	Quality Pork Processors	711 Hormel Century Pkwy	Austin	55912	AST	A		102968	1	Above Ground Storage Tanks	SWCA
1002	349000351	Oakwood Cemetery	1800 4th St NW	Austin	55912	AST	A		102954	1	Above Ground Storage Tanks	SWCA
1003	349050110	Geo A Hormel & Co	2 Hormel Pl	Austin	55912	AST	A		106559	1	Above Ground Storage Tanks	SWCA
1004	340090141	Holleurd Oil Company	1601 13th St NE	Austin	55912	AST	A		146646	1	Above Ground Storage Tanks	SWCA
1006	340090149	City Of Austin Public Works	1601 11th Dr NE	Austin	55912	AST	A		120354	1	Above Ground Storage Tanks	SWCA
1007	080220091	Ferrellgas	24185 534th Ave	Austin	55912	AST	I		106561	1	Above Ground Storage Tanks	SWCA
1008	349050180	Elk River Concrete Products	1908 14th St NE	Austin	55912	AST	A		4074	1	Aboveground Tanks	ERA
1009	340090040	Hollerud Oil Co	2001 14th St NE	Austin	55912	AST	A		105730	1	Aboveground Tanks	ERA
1010	349050120	Hormel Foods Corp - Austin Plant	500 14th Ave NE	Austin	55912	AST	A		3926	1	Aboveground Tanks	SWCA
1011	341570010	Austin Country Club	1202 28TH ST NE	Austin	55912	AST	A		106228	1	Aboveground Tanks	ERA
1012	341851040	Us West Communications	206 3rd Ave NW	Austin	55912	AST	A		106571	1	Aboveground Tanks	SWCA
1013	342250440	Hormel Foods Corp -Austin Plant	1816 9th St NE	Austin	55912	AST	A		97908	1	Aboveground Tanks	ERA
1014	348900040	Austin Utilities - Northeast Power Plant	3511 11th St NE	Austin	55912	AST	A		4841	1	Aboveground Tanks	SWCA
1015	080270061	Damel Corp Inc	3608 4th St NW	Austin	55912	AST	A		45421	1	Aboveground Tanks	SWCA
1016	080430010	Austin Ready Mix	Highway 218 N	Austin	55912	AST	A		2092	1	Aboveground Tanks	SWCA
1106	342240010	Palleton Co	805 11th St NE	Austin	55912	UST	I		147675	1	Underground Tanks	SWCA
1107	280010200	Halliday Exhaust Pros	140 Broadway St N	Austin	55912	UST	A		134249	1	Underground Tanks	SWCA
1108	349050112	University Of Mn Hormel Institute	801 NE 16th Ave	Austin	55912	UST	A		111722	1	Underground Tanks	SWCA
1109	345770020	Persingers Equipment Inc	2001 4th St NW	Austin	55912	UST	A	S000	102958	1	Underground Tanks	SWCA
1110	346400610	Ankeny Mini Mart #1	1205 Oakland Place SE	Austin	55912	UST	A		111723	1	Underground Tanks	SWCA
1113	342240020	Waste System Corp	709 11th St NE	Austin	55912	UST	I		111725	1	Underground Tanks	SWCA
1114	345390010	Hy-Vee Gas	901 18th Ave NW	Austin	55912	UST	A		102965	1	Underground Tanks	SWCA
1115	344601040	Austin Ymca	704 1st Dr NW	Austin	55912	UST	A		106562	1	Underground Tanks	SWCA
1117	341100090	Burr Oak Apartments	400 10th Ave NW	Austin	55912	UST	A		102978	1	Underground Tanks	SWCA
1120	349050110	Geo A Hormel & Co Corp Office	1 Hormel Pl	Austin	55912	UST	A		102957	1	Underground Tanks	SWCA
1123	348100720	Palmer Bus Service Site 1	103 10th St SE	Austin	55912	UST	A		106226	1	Underground Tanks	High

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1124	346400580	Austin Cp Rail Depot	101 11th St NE	Austin	55912	UST	I		106569	1	Underground Tanks	SWCA
1125	346001990	Reeds 4Th Ave Food & Fuel	901 4th Ave NE	Austin	55912	UST	A		106565	1	Underground Tanks	SWCA
1127	341904160	Hallidays Interstate Service	709 21st St NE	Austin	55912	UST	A		45662	1	Underground Tanks	ERA
1128	349100061	Austin Park & Rec/ Hormel Nature Center	1304 21st St NE	Austin	55912	UST	I		102971	1	Underground Tanks	SWCA
1129	349050190	Kaal Television	1701 10th Pl NE	Austin	55912	UST	A		45937	1	Underground Tanks	SWCA
1130	349050040	Kwik Trip #250	1509 10th Pl NE	Austin	55912	UST	A		45644	1	Underground Tanks	SWCA
1131	349050180	Elk River Concrete Products	1908 14th St NE	Austin	55912	UST	A		4074	1	Underground Tanks	ERA
1132	349050170	International Paper - Austin	1900 8th St NE	Austin	55912	UST	A		1261	1	Underground Tanks	ERA
1133	349000110	Brown-Wilbert Vault Co - Austin	704 18th Ave NW	Austin	55912	UST	A		2475	1	Underground Tanks	SWCA
1134	349050110	Research & Development	2 Hormel Pl	Austin	55912	UST	I		106572	1	Underground Tanks	SWCA
1135	341570010	Austin Country Club	1202 28TH ST NE	Austin	55912	UST	A		106228	1	Underground Tanks	ERA
1136	345220025	Former Little Dukes	1300 NW 18th Ave	Austin	55912	UST	A		111726	1	Underground Tanks	SWCA
1137	348600521	ISD 492 Ellis Middle School	1700 4th Ave SE	Austin	55912	UST	A		45866	1	Underground Tanks	ERA
1138	348500010	Hormel Building 134	1107 NE 8th Ave	Austin	55912	UST	I		103000	1	Underground Tanks	SWCA
1139	349050012	Mower County Hwy Deptartment	1105 1/2 8th Ave NE	Austin	55912	UST	I		102969	1	Underground Tanks	SWCA
1140	349050012	Mower County Highway Dept	1105 8th Ave NE	Austin	55912	UST	A		102974	1	Underground Tanks	SWCA
1141	349000230	Kraus Petroleum Inc	1309 4th St NW	Austin	55912	UST	A		46011	1	Underground Tanks	SWCA
1142	347250001	ISD 492 Neveln Elementary School	1918 E Oakland Ave	Austin	55912	UST	A		41812	1	Underground Tanks	SWCA
1143	341050341	ISD 492 Sumner Elementary School	805 8th Ave NW	Austin	55912	UST	A		47186	1	Underground Tanks	SWCA
1144	349000010	Austin Medical Center	300 8th Ave NW	Austin	55912	UST	A		45649	1	Underground Tanks	SWCA
1145	341850321	ISD 492 Austin Public Schools	301 3rd St NW	Austin	55912	UST	A		45651	1	Underground Tanks	High
1146	347950801	Pacelli Catholic Schools	311 4th St NW	Austin	55912	UST	A		50909	1	Underground Tanks	SWCA
1147	347955670	Saint Augustin Catholic Church	405 4th St NW	Austin	55912	UST	I		106578	1	Underground Tanks	SWCA
1148	341850741	Saint Olaf Lutheran Church	306 2nd St NW	Austin	55912	UST	A		120904	1	Underground Tanks	SWCA
1149	341851040	Us West Communications	206 3rd Ave NW	Austin	55912	UST	A		106571	1	Underground Tanks	SWCA
1150	345940040	Nicol'S Auto Repair	100 11th Ave NW	Austin	55912	UST	A		47122	1	Underground Tanks	SWCA
1151	345930010	Goodyear Asc	1200 N Main	Austin	55912	UST	I		102972	1	Underground Tanks	SWCA
1152	342250440	Hormel Foods Corp -Austin Plant	1816 9th St NE	Austin	55912	UST	A		97908	1	Underground Tanks	ERA
1153	341200010	Kwik Trip #445	1401 4th St NW	Austin	55912	UST	A		106566	1	Underground Tanks	SWCA
1154	349000270	Austin Auto Service	1406 4th St NW	Austin	55912	UST	A		45643	1	Underground Tanks	SWCA
1155	342050010	Kmart Store 7215	1101 N Main St	Austin	55912	UST	I		45995	1	Underground Tanks	SWCA
1156	342050090	Former Sinclair Retail	900 N Main St	Austin	55912	UST	A		105731	1	Underground Tanks	SWCA
1157	348550103	Complete Automotive	2206b Oakland Ave	Austin	55912	UST	I		106568	1	Underground Tanks	SWCA

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PCSI	PIN	Facility Name	Address	City	Zip Code	PCS	Status	Mat_C	Program ID	Total	Comments	Location
1158	080430010	Austin Ready Mix	Highway 218 N	Austin	55912	UST	A		2092	1	Underground Tanks	SWCA
1201	348900041	Austin Utilities Industrial Landfill	1908 14TH ST NE	Austin	55912	SWMS	I		865	1	Solid Waste, Closed Landfill privately managed, Permitted Solid Waste Facility	SWCA
1202	080220040	Veit Disposal Systems Austin Transfer Station	24036 534th Ave	Austin	55912	SWMS	A		148833	1	Solid Waste, Permit by Rule	SWCA
1206	340010900	Austin Vacant Lot	113 2nd Ave NE	Austin	55912	DMP	A		127200	1	Solid Waste, Unpermitted Solid Waste	SWCA
1209	344600081	Hormel Historic Home	208 4th Ave NW	Austin	55912	DMP	A		137997	1	Solid Waste, Unpermitted Solid Waste	SWCA
1212	160300054	Estate Of Delmar Ellis	56223 235th St	Austin	55912	DMP	A		144469	1	Solid Waste, Unpermitted Solid Waste	SWCA
1213	340010790	Thirsty's	200 3rd Ave NE	Austin	55912	DMP	A		121219	1	Solid Waste, Unpermitted Solid Waste	SWCA
1214	349050112	Micro Building	801 16th Ave NE	Austin	55912	DMP	A		120029	1	Solid Waste, Unpermitted Solid Waste	SWCA
1215	340090120	Waste Management Inc - Austin	1200 21st Ave NE	Austin	55912	SWMS	A		6791	1	Solid Waste, Permit by Rule	ERA
1216	349050013	Mower County Recycling Center	1111 8th Ave NE	Austin	55912	SWMS	A		95478	1	Solid Waste, Permit by Rule	SWCA
1217	080270080	W Bustad Crane Service Inc	24000 US Highway 218	Austin	55912	SWMS	A		45358	1	Solid Waste, Permit by Rule	SWCA
1218	080270080	W Bustad Crane Service Inc	24000 US Highway 218	Austin	55912	DMP	A		45358	1	Solid Waste, Unpermitted Solid Waste	SWCA
1219	080210071	Wci Austin Landfill LLC	24477 US Highway 218	Austin	55912	SWMS	A		8906	1	Solid Waste, Permitted Solid Waste Facility	High
1220	348550111	City Of Austin (Austin Transfer Station)	500 4TH AVE NE	Austin	55912	SWMS	A		858	1	Solid Waste, Permitted Solid Waste Facility	SWCA
1221	200040130	Austin Mobile Park - CSW	21990 582nd Ave	Austin	55912	DMP	A		126202	1	Solid Waste, Unpermitted Solid Waste	SWCA
1222	160320010	Red Rock Sanitary Landfill	57652 220th St	Austin	55912	SWMS	A		3182	1	Solid Waste, Closed Landfill managed by MPCA	SWCA
1250	342240070	G&R Truck Wash	501 11th St NE	Austin	55912	WWDS	A		134937	1	Wastewater	SWCA
1251	342050080	Bellisio Foods Inc	1118 N Main St	Austin	55912	WWDS	A		55356	1	Wastewater	SWCA
1252	349050120	Hormel Foods Corp - Type IV	500 14th Ave NE	Austin	55912	SDS	I		152606	1	Wastewater, Industrial SDS Permit	SWCA
1253	340011431	Austin Utilities - Downtown Plant	419 4th Ave NE	Austin	55912	NDPES	A		1840	1	Wastewater, Industrial NPDES/SDS Permit	SWCA
1254	349050170	International Paper - Austin	1900 8th St NE	Austin	55912	WWDS	A		1261	1	Wastewater	ERA
1255	349050120	Hormel Foods Corp - Austin Plant	500 14th Ave NE	Austin	55912	SDS	A		3926	1	Industrial SDS Permit	SWCA
1256	349050120	Hormel Foods Corp - Austin Plant	500 14th Ave NE	Austin	55912	NDPES	A		3926	1	Industrial NPDES Permit	SWCA
1257	348900040	Austin Utilities - Northeast Power Plant	3511 11th St NE	Austin	55912	SDS	A		4841	1	Industrial SDS Permit	SWCA

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1258	348900040	Austin Utilities - Northeast Power Plant	3511 11th St NE	Austin	55912	NDPES	A		4841	1	Industrial NPDES Permit	SWCA
1300	348500010	Hormel Building 134	1103 8th Ave NE	Austin	55912	SWB	A		134130	1	Industrial Stormwater	SWCA
1301	349050012	Mower Cty Hwy Dept Leroy Shop - SW	1105 8th Ave NE	Austin	55912	SWB	I		95479	1	Industrial Stormwater	SWCA
1304	349050012	Mower Cty Hwy Dept Dexter Shop - SW	1105 - 8th Ave NE	Dexter	55926	SWB	I		95480	1	Industrial Stormwater	SWCA
1306	340090120	Austin Baling Facility	1200 21st Ave NE	Austin	55912	SWB	I		132848	1	Industrial Stormwater	ERA
1307	080220040	Viet Disposal Austin Transfer Facility	24036 534th Ave	Austin	55912	SWB	A		151392	1	Industrial Stormwater	SWCA
1308	340090146	Mcfarland Truck Lines Inc - Austin Terminal	1304 16th Ave NE	Austin	55912	SWB	A		132578	1	Industrial Stormwater	SWCA
1309	349050110	Hormel Foods Corp Corporate Office North	1 Hormel Pl	Austin	55912	SWB	A		130268	1	Industrial Stormwater	SWCA
1310	340090100	Corporate Graphics	1805 14th St NE	Austin	55912	SWB	I		808	1	Industrial Stormwater	ERA
1311	348100720	Palmer Bus Service - Site 1	103 10th St SE	Austin	55912	SWB	I		3037	1	Industrial Stormwater	High
1312	340011431	Austin Utilities - Downtown Plant	419 4th Ave NE	Austin	55912	SWB	A		1840	1	Industrial Stormwater	SWCA
1313	348550111	Austin Municipal Airport	710 21st St NE	Austin	55912	SWB	A		3028	1	Industrial Stormwater	SWCA
1314	349050180	Elk River Concrete Products	1908 14th St NE	Austin	55912	SWB	A		4074	1	Industrial Stormwater	ERA
1315	349050135	Hormel R&D Labs	2107 8th Dr NE	Austin	55912	SWB	A		214378	1	Industrial Stormwater	ERA
1316	349050170	International Paper - Austin	1900 8th St NE	Austin	55912	SWB	A		1261	1	Industrial Stormwater	ERA
1317	349000110	Brown-Wilbert Vault Co - Austin	704 18th Ave NW	Austin	55912	SWB	A		2475	1	Industrial Stormwater	SWCA
1318	348900072	Carney Auto Inc	2700 11th St NE	Austin	55912	SWB	A		3289	1	Industrial Stormwater	ERA
1319	340090120	Waste Management Inc - Austin	1200 21st Ave NE	Austin	55912	SWB	A		6791	1	Industrial Stormwater	ERA
1320	349050110	Hormel R&D Labs	2 Hormel Pl	Austin	55912	SWB	A		84839	1	Industrial Stormwater	SWCA
1321	349050020	Quality Carriers Fmr Mont Tank	909 NE 11 Dr	Austin	55912	SWB	I		4678	1	Industrial Stormwater	SWCA
1322	349050013	Mower County Recycling Center	1111 8th Ave NE	Austin	55912	SWB	A		95478	1	Industrial Stormwater	SWCA
1323	342250440	Hormel Foods Corp -Austin Plant	1816 9th St NE	Austin	55912	SWB	A		97908	1	Industrial Stormwater	ERA
1324	349050070	Smyth Companies LLC - Austin	1503 14th St NE	Austin	55912	SWB	A		1532	1	Industrial Stormwater	SWCA
1325	020400140	Dan Jennings Co	1200 8th Ave SE	Austin	55912	SWB	A		46943	1	Industrial Stormwater	High
1326	080210071	Wci Austin Landfill LLC	24477 US Highway 218	Austin	55912	SWB	A		8906	1	Industrial Stormwater	High
1327	348550111	City Of Austin (Austin Transfer Station)	500 4TH AVE NE	Austin	55912	SWB	A		858	1	Industrial Stormwater	SWCA
1328	348900040	Austin Utilities - Northeast Power Plant	3511 11th St NE	Austin	55912	SWB	A		4841	1	Industrial Stormwater	SWCA
1329	160320010	Red Rock Sanitary Landfill	57652 220th St	Austin	55912	SWB	A		3182	1	Industrial Stormwater	SWCA
1330	080430010	Austin Ready Mix	Highway 218 N	Austin	55912	SWB	A		2092	1	Industrial Stormwater	SWCA
1400	080220010	Soucek James F	505 30TH ST NW	Austin	55912	PIT	A		50114	1	Source - MNDOT	SWCA

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1401	080150283	Bell Michael D & Cheryl A	25181 540TH AVE	Austin	55912	PIT	A		50114	1	Source - MNDOT; Same pit as 1402 (different parcel); Run by Soucek?	SWCA
1402	080220101	Sheedy Leo W	2406 16TH AVE SW	Austin	55912	PIT	A		50114	1	Source - MNDOT; Same pit as 1401 (different parcel); Run by Soucek?	SWCA
1403	080150341	Koch Inc	10361 STATE HWY 56	Le Roy	55951	PIT	A			1	Source - MNDOT	SWCA
2001	349050012	Mower County Site	1105 1/2 8th Ave NE	Austin	55912	VIC	A		189793	1	Brownfields, Voluntary Investigation and Cleanup	SWCA
2004	348600531	Austin Power Plant Demolition	501 4th Avenue NE	Austin	55912	BMS	A	F000	221929	1	Brownfields, Petroleum Brownfield	SWCA
2005	348600531	Austin Power Plant Demolition	501 4th Avenue NE	Austin	55912	PCS	A		221929	1	Integrated Remediation	SWCA
2006	348600531	Austin Power Plant Demolition	501 4th Avenue NE	Austin	55912	NPL	A		221929	1	Superfund, Superfund Program Non-listed Sites	SWCA
2007	349050040	Kwik Trip #250	1509 10th Pl NE	Austin	55912	BMS	A		45644	1	Brownfields, Petroleum Brownfield	SWCA
2008	349050040	Kwik Trip #250	1509 10th Pl NE	Austin	55912	PCS	A		45644	1	Emergency Management	SWCA
2009	349050180	Elk River Concrete Products	1908 14th St NE	Austin	55912	SAS	A		4074	1	Site Assessment	ERA
2010	342250440	Hormel Foods Corp	1816 9th St NE	Austin	55912	VIC	I		37001	1	Brownfields, Voluntary Investigation and Cleanup	ERA
2012	348900072	Carney Auto Inc	2700 11th St NE	Austin	55912	BMS	A	F000	3289	1	Brownfields, Petroleum Brownfield	ERA
2013	348900072	Carney Auto Inc	2700 11th St NE	Austin	55912	VIC	A		3289	1	Brownfields, Voluntary Investigation and Cleanup	ERA
2014	348900072	Carney Auto Inc	2700 11th St NE	Austin	55912	SAS	A		3289	1	Site Assessment	ERA
2015	348900072	Carney Auto Inc	2700 11th St NE	Austin	55912	NPL	A		3289	1	Superfund, Superfund Program Non-listed Sites	ERA
2016	349050120	Hormel Foods Corp - Austin Plant	500 14th Ave NE	Austin	55912	PCS	A		3926	1	Toxics Reduction	SWCA
2017	348500010	Hormel Building 134	1107 NE 8th Ave	Austin	55912	VIC	I		103000	1	Brownfields, Voluntary Investigation and Cleanup	SWCA
2018	349050012	Mower County Highway Dept	1105 8th Ave NE	Austin	55912	SAS	A		102974	1	Site Assessment	SWCA
2019	349000270	Austin Auto Service	1406 4th St NW	Austin	55912	BMS	A	F000	45643	1	Brownfields, Petroleum Brownfield	SWCA
2020	349000270	Austin Auto Service	1406 4th St NW	Austin	55912	VIC	A		45643	1	Brownfields, Voluntary Investigation and Cleanup	SWCA
2021	342050090	Former Sinclair Retail	900 N Main St	Austin	55912	BMS	A	F000	105731	1	Brownfields, Petroleum Brownfield	SWCA
2022	348550111	City Of Austin (Austin Transfer Station)	500 4TH AVE NE	Austin	55912	SAS	A		858	1	Site Assessment	SWCA
2023	160320010	Red Rock Sanitary Landfill	57652 220th St	Austin	55912	NPL	A		3182	1	CERCLIS Site	SWCA
2024	160320010	Red Rock Sanitary Landfill	57652 220th St	Austin	55912	SAS	A		3182	1	Site Assessment	SWCA
2025	160320010	Red Rock Sanitary Landfill	57652 220th St	Austin	55912	PLP	A		3182	1	Superfund, State Superfund project	SWCA

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2100	342350540	Hastings, Kristin	511 21st Ave NW	Austin	55912	SPL	C	F000	190811	1	Fuel Oil Spill, Ohl Residence (former owner); Closed 2002	SWCA
2104	280010200	Pejic, Vedrana	140 N Broadway	Austin	55912	SPL	C	F000	191003	1	Used oil; former Kenneth Halliday property; site closed 2011	SWCA
2105	345700009	Armstrong Oil Co	1104 1198 8th Ave NE	Austin	55912	LUST	I	F000	102963	1	Petroleum Remediation, Leak Site	SWCA
2107	348100720	Palmer Bus Service Site 1	103 10th St SE	Austin	55912	LUST	A	F000	106226	1	Petroleum Remediation, Leak Site	High
2108	346400580	Austin Cp Rail Depot	101 11th St NE	Austin	55912	LUST	I	F000	106569	1	Petroleum Remediation, Leak Site	SWCA
2109	346001990	Reeds 4th Ave Food & Fuel	901 4th Ave NE	Austin	55912	LUST	A	F000	106565	1	Petroleum Remediation, Leak Site	SWCA
2110	346001065	Austin Sanitation Inc	610 7th St NE	Austin	55912	LUST	I	F000	45653	1	Petroleum Remediation, Leak Site	SWCA
2111	341904160	Hallidays Interstate Service	709 21st St NE	Austin	55912	LUST	A	F000	45662	1	Petroleum Remediation, Leak Site	ERA
2112	349100061	Austin Park & Rec/ Hormel Nature Center	1304 21st St NE	Austin	55912	LUST	I	F000	102971	1	Petroleum Remediation, Leak Site	SWCA
2113	349050190	Kaal Television	1701 10th Pl NE	Austin	55912	LUST	A	F000	45937	1	Petroleum Remediation, Leak Site	SWCA
2114	349050040	Kwik Trip #250	1509 10th Pl NE	Austin	55912	LUST	A	F000	45644	1	Petroleum Remediation, Leak Site	SWCA
2115	349050180	Elk River Concrete Products	1908 14th St NE	Austin	55912	LUST	A	F000	4074	1	Petroleum Remediation, Leak Site	ERA
2116	340090040	Hollerud Oil Co	2001 14th St NE	Austin	55912	LUST	A	F000	105730	1	Petroleum Remediation, Leak Site	ERA
2117	349050170	International Paper - Austin	1900 8th St NE	Austin	55912	LUST	A	F000	1261	1	Petroleum Remediation, Leak Site	ERA
2118	349000110	Brown-Wilbert Vault Co - Austin	704 18th Ave NW	Austin	55912	LUST	A	F000	2475	1	Petroleum Remediation, Leak Site	SWCA
2119	348900072	Carney Auto Inc	2700 11th St NE	Austin	55912	LUST	A	F000	3289	1	Petroleum Remediation, Leak Site	ERA
2120	349050112	Hormel Institute-Addition & Remodeling	801 16th Ave NE	Austin	55912	LUST	I	F000	109825	1	Petroleum Remediation, Leak Site	SWCA
2121	349050110	Research & Development	2 Hormel Pl	Austin	55912	LUST	I	F000	106572	1	Petroleum Remediation, Leak Site	SWCA
2122	349050120	Hormel Foods Corp - Austin Plant	500 14th Ave NE	Austin	55912	LUST	A	F000	3926	1	Petroleum Remediation, Leak Site	SWCA
2123	345220025	Former Little Dukes	1300 NW 18th Ave	Austin	55912	LUST	A	F000	111726	1	Petroleum Remediation, Leak Site	SWCA
2124	340011440	Pike Transportation	315 1 2 NE 4th Ave	Austin	55912	LUST	A	F000	188705	1	Petroleum Remediation, Leak Site	SWCA
2125	349000100	The Beer Depot	504 12th Ave NW	Austin	55912	LUST	A	F000	197081	1	Petroleum Remediation, Leak Site	SWCA
2126	342240050	Cmc - Engel Oil	613 11th St NE	Austin	55912	LUST	A	F000	188095	1	Petroleum Remediation, Leak Site	SWCA

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2127	342240050	Engel Distrubutor	613 11th St NE	Austin	55912	LUST	A	F000	195113	1	Petroleum Remediation, Leak Site	SWCA
2128	348600521	ISD 492 Ellis Middle School	1700 4th Ave SE	Austin	55912	LUST	A	F000	45866	1	Petroleum Remediation, Leak Site	ERA
2129	348500010	Hormel Building 134	1107 NE 8th Ave	Austin	55912	LUST	I	F000	103000	1	Petroleum Remediation, Leak Site	SWCA
2130	349050012	Mower County Hwy Deptartment	1105 1/2 8th Ave NE	Austin	55912	LUST	I	F000	102969	1	Petroleum Remediation, Leak Site	SWCA
2131	349050012	Mower County Highway Dept	1105 8th Ave NE	Austin	55912	LUST	A	F000	102974	1	Petroleum Remediation, Leak Site	SWCA
2133	080270080	W Bustad Crane Service Inc	24000 US Highway 218	Austin	55912	LUST	A	F000	45358	1	Petroleum Remediation, Leak Site	SWCA
2134	349000230	Kraus Petroleum Inc	1309 4th St NW	Austin	55912	LUST	A	F000	46011	1	Petroleum Remediation, Leak Site	SWCA
2135	347250001	ISD 492 Neveln Elementary School	1918 E Oakland Ave	Austin	55912	LUST	A	F000	41812	1	Petroleum Remediation, Leak Site	SWCA
2136	348550040	Glo Dry Cleaners	1810 E Oakland Ave	Austin	55912	LUST	I	F000	48285	1	Petroleum Remediation, Leak Site	SWCA
2137	349000010	Austin Medical Center	300 8th Ave NW	Austin	55912	LUST	A	F000	45649	1	Petroleum Remediation, Leak Site	SWCA
2138	341850321	ISD 492 Austin Public Schools	301 3rd St NW	Austin	55912	LUST	A	F000	45651	1	Petroleum Remediation, Leak Site	High
2139	347950801	Pacelli Catholic Schools	311 4th St NW	Austin	55912	LUST	A	F000	50909	1	Petroleum Remediation, Leak Site	SWCA
2140	341850741	Saint Olaf Lutheran Church	306 2nd St NW	Austin	55912	LUST	A	F000	120904	1	Petroleum Remediation, Leak Site	SWCA
2141	345930010	Goodyear Asc	1200 N Main	Austin	55912	LUST	I	F000	102972	1	Petroleum Remediation, Leak Site	SWCA
2142	342250440	Hormel Foods Corp -Austin Plant	1816 9th St NE	Austin	55912	LUST	A	F000	97908	1	Petroleum Remediation, Leak Site	ERA
2143	341200010	Kwik Trip #445	1401 4th St NW	Austin	55912	LUST	A	F000	106566	1	Petroleum Remediation, Leak Site	SWCA
2144	349000270	Austin Auto Service	1406 4th St NW	Austin	55912	LUST	A	F000	45643	1	Petroleum Remediation, Leak Site	SWCA
2145	342050010	Kmart Store 7215	1101 N Main St	Austin	55912	LUST	I	F000	45995	1	Petroleum Remediation, Leak Site	SWCA
2146	342050090	Former Sinclair Retail	900 N Main St	Austin	55912	LUST	A	F000	105731	1	Petroleum Remediation, Leak Site	SWCA
2147	348550103	Complete Automotive	2206b Oakland Ave	Austin	55912	LUST	I	F000	106568	1	Petroleum Remediation, Leak Site	SWCA
2148	160320010	Red Rock Sanitary Landfill	57652 220th St	Austin	55912	LUST	A	F000	3182	1	Petroleum Remediation, Leak Site	SWCA
2300	344650413	Nature Ridge Properties Of Austin Co	300 1ST AVE NW	Austin	55912	SINK	U		50D0000243	1	From MNDNR Karst Data	SWCA
2301	080360040	Patricia J Morse Revocable Living Trust	307 28TH ST SE	Austin	55912	SINK	U		50D0000241	1	From MNDNR Karst Data	ERA
2302	080360055	Diane Persinger Revocable Living Trust	23083 555TH AVE	Austin	55912	SINK	U		50D0000242	1	From MNDNR Karst Data	SWCA

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2303	080250071	Wagenaar Gary A	23173 555TH AVE	Austin	55912	SINK	U		50D0000166	1	From MNDNR Karst Data	SWCA
2350		Oakland PL SE Bridge		Austin	55912	ROADX	A			1	Bridge Over Dobbin's Creek (Source: Google Maps)	SWCA
2351		12th St SE Bridge		Austin	55912	ROADX	A			1	Bridge Over Dobbin's Creek (Source: Google Maps)	SWCA
2352		220th St Box Culvert		Austin	55912	ROADX	A			1	Box Culvert For Unknown Creek (Source: Google Maps)	SWCA
2353		580th Ave Box Culvert		Austin	55912	ROADX	A			1	Box Culvert For Unknown Creek (Source: Google Maps)	SWCA
2354		570th Ave Box Culvert		Austin	55912	ROADX	A			1	Box Culvert For Unknown Creek (Source: Google Maps)	SWCA
2355		220th St Bridge		Austin	55912	ROADX	A			1	Bridge Over Unknown Creek (Source: Google Maps)	SWCA
2356		220th St Bridge		Austin	55912	ROADX	A			1	Bridge Over Unknown Creek (Source: Google Maps)	ERA
2357		220th St Box Culvert		Austin	55912	ROADX	A			1	Box Culvert For Unknown Creek (Source: Google Maps)	ERA
2358		570th Ave Box Culvert		Austin	55912	ROADX	A			1	Box Culvert For Dobbin's Creek (Source: Google Maps)	SWCA
2359		12st Ave NE Bridge		Austin	55912	ROADX	A			1	Bridge Over Dobbin's Creek (Source: Google Maps)	ERA
2360		I-90 Box Culvert		Austin	55912	ROADX	A			1	Box Culvert For Dobbin's Creek (Source: Google Maps)	ERA
2361		555th Ave Culvert		Austin	55912	ROADX	A			1	Culvert For Wolf Creek (Source: Google Maps)	SWCA
2362		245th St Box Culvert		Austin	55912	ROADX	A			1	Box Culvert For Wolf Creek (Source: Google Maps)	SWCA
2363		11th St NE Bridge		Austin	55912	ROADX	A			1	Bridge Over Wolf Creek (Source: Google Maps)	ERA
2364	349500020	Iowa Chicago & Eastern RR Bridge	120 S 6TH ST 7TH FLOOR	Minneapolis	55402	RAILX	A			1	Railroad Bridge Over Wolf Creek	ERA
2365		4th Ave NE Bridge		Austin	55912	ROADX	A			1	Bridge Over Cedar River	SWCA
2366		4th St NE Bridge		Austin	55912	ROADX	A			1	Bridge Over Cedar River	SWCA
2367		Main St N Bridge		Austin	55912	ROADX	A			1	Bridge Over Cedar River	SWCA
2368		I-90 Bridge - Eastbound		Austin	55912	ROADX	A			1	Bridge Over Cedar River	SWCA
2369		I-90 Bridge - Westbound		Austin	55912	ROADX	A			1	Bridge Over Cedar River	SWCA
2370		16th Ave NE Bridge		Austin	55912	ROADX	A			1	Bridge Over Cedar River	SWCA
2371	349500020	Iowa Chicago & Eastern RR Bridge	120 S 6TH ST 7TH FLOOR	Minneapolis	55402	RAILX	A			1	Railroad Bridge Over Cedar River	SWCA
2372		11th Pl NE Bridge		Austin	55912	ROADX	A			1	Bridge Over Cedar River	SWCA

Austin Utilities: Verifed PCSI

Date: March 2019

PCSI	PIN	Facility Name	Address	City	Zip Code	PCS	Status	Mat_C	Program ID	Total	Comments	Location
2373	349500020	Iowa Chicago & Eastern RR Bridge	120 S 6TH ST 7TH FLOOR	Minneapolis	55402	RAILX	A			1	Railroad Bridge Over Unknown Creek (Source: Google Maps)	SWCA
2374		540th Ave Box Culvert		Austin	55912	ROADX	A			1	Box Culvert For Unknown Creek (Source: Google Maps)	SWCA
2375		255th St Bridge		Austin	55912	ROADX	A			1	Bridge Over JD5 (Source: Google Maps)	SWCA
2376	089500010	Iowa Chicago & Eastern RR Bridge	120 S 6TH ST 7TH FLOOR	Minneapolis	55402	RAILX	A			1	Railroad Bridge Over Murphy Creek (Source: Google Maps)	SWCA
2377		US 218 Box Culvert		Austin	55912	ROADX	A			1	Box Culvert For Murphy Creek (Source: Google Maps)	SWCA
2378		4th St NW Box Culvert		Austin	55912	ROADX	A			1	Box Culvert For Murphy Creek (Source: Google Maps)	SWCA
2379		21st Ave NW Culvert		Austin	55912	ROADX	A			1	Culvert For Murphy Creek (Source: Google Maps)	SWCA

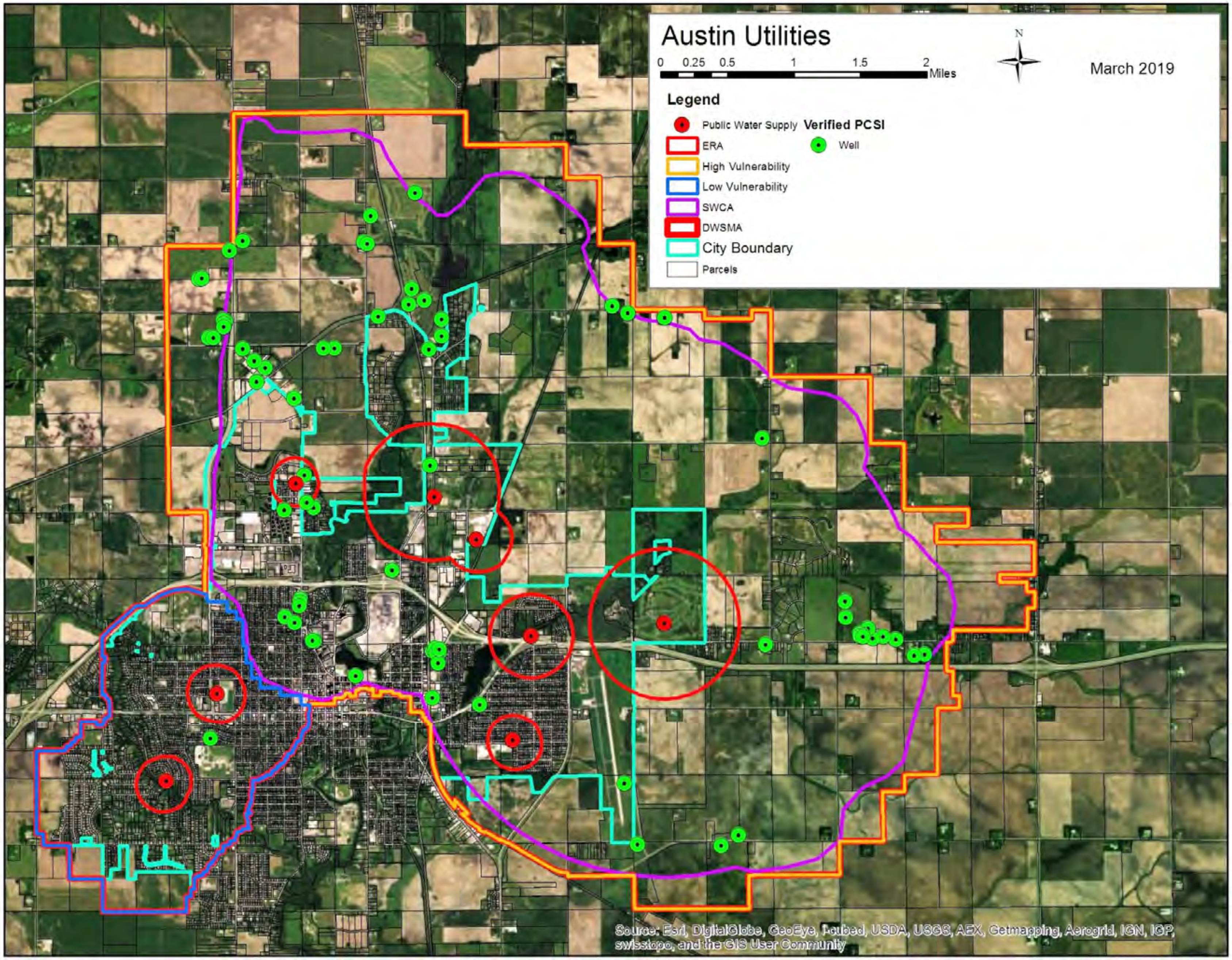

Figure 1 – Wells

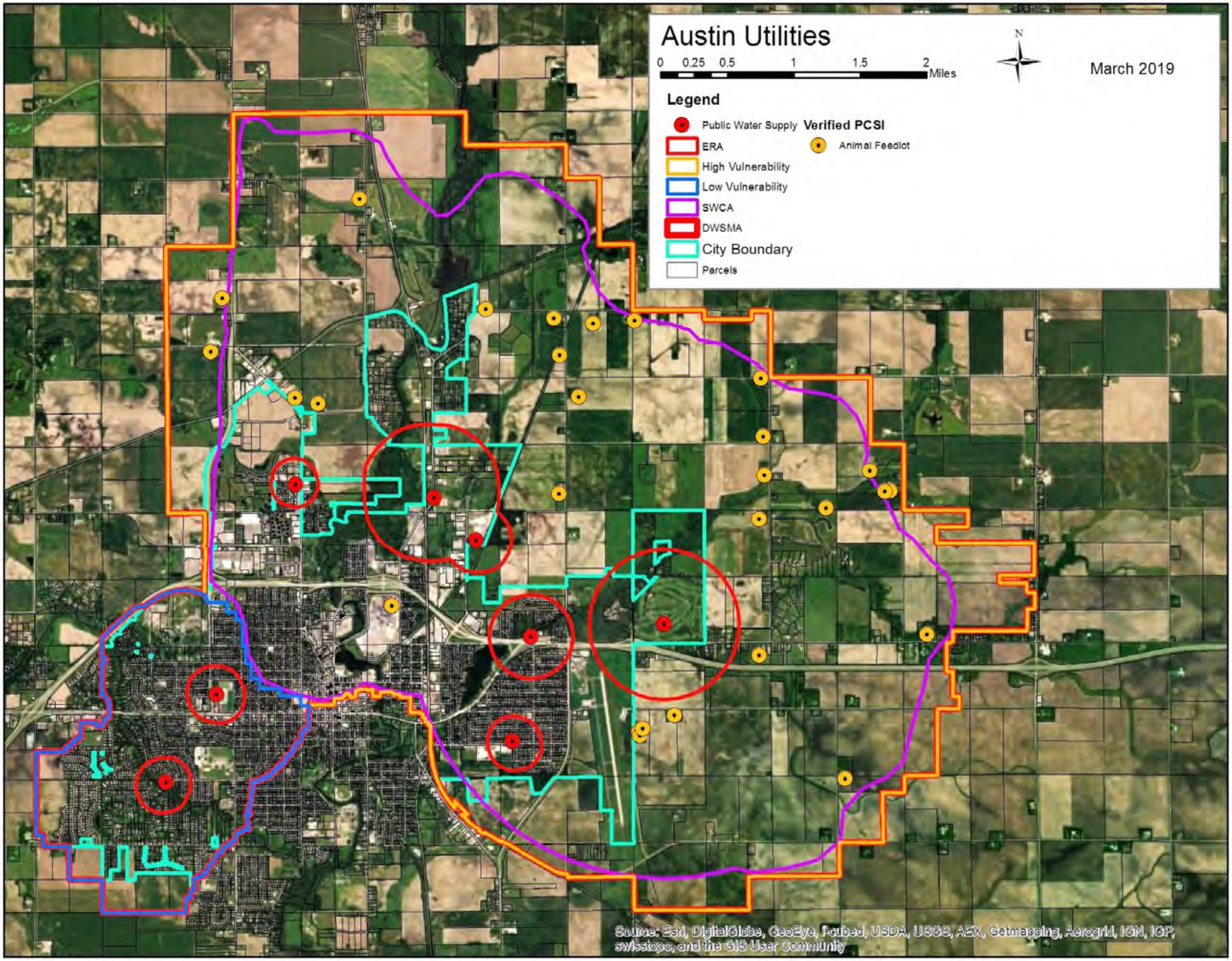

Figure 2 – Animal Feedlots

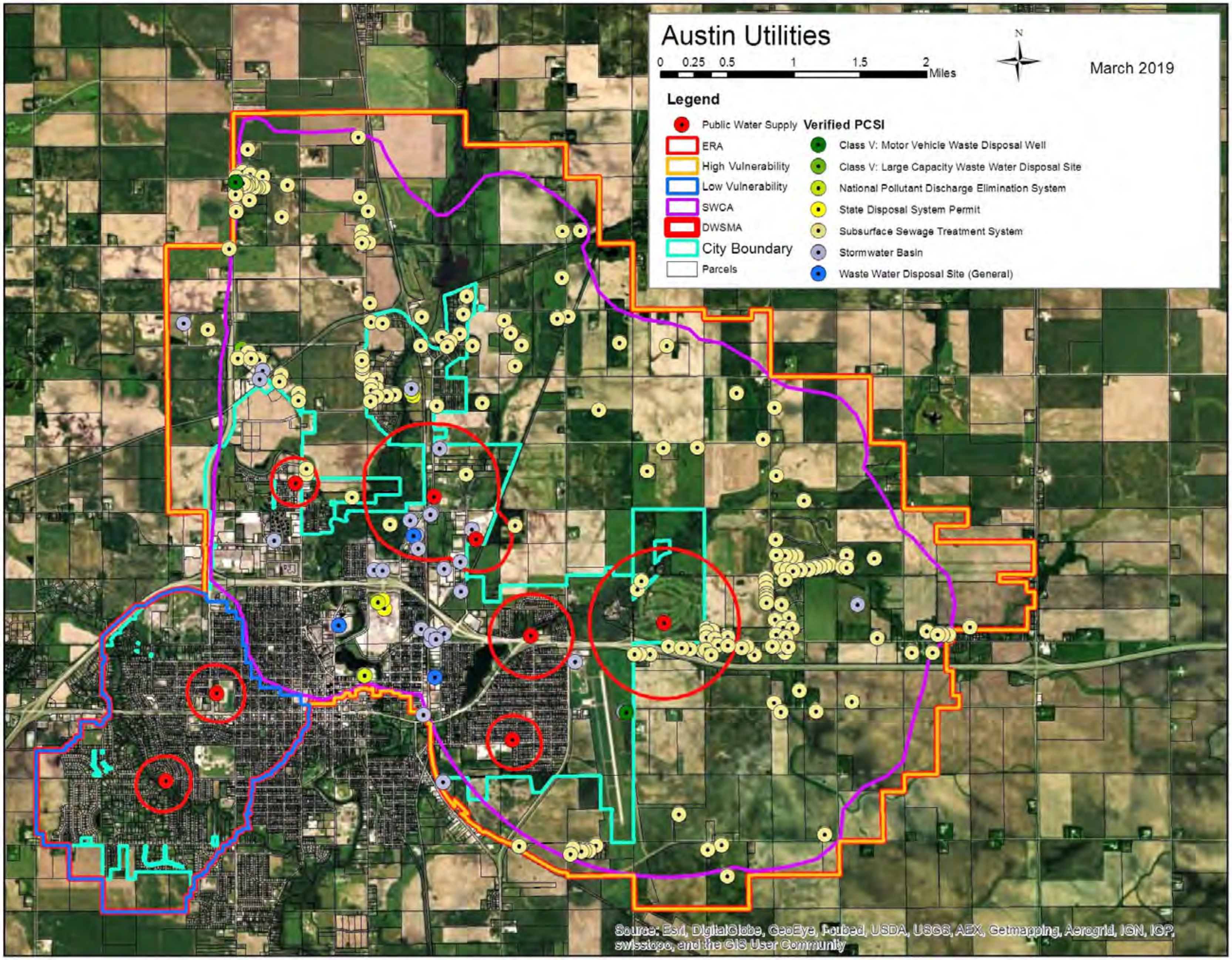

Figure 3 – Waste Water

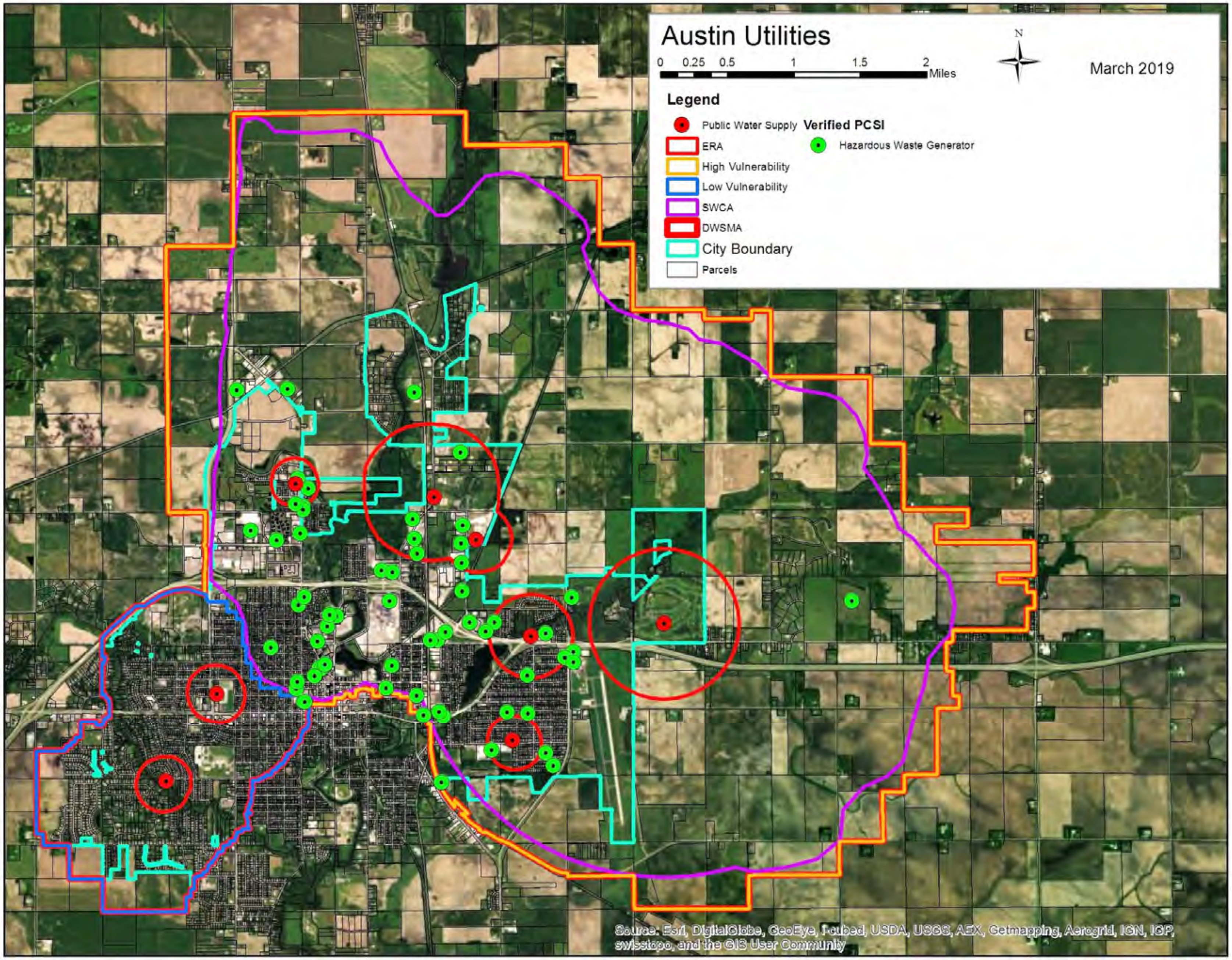

Figure 4 – Hazardous Waste Generators

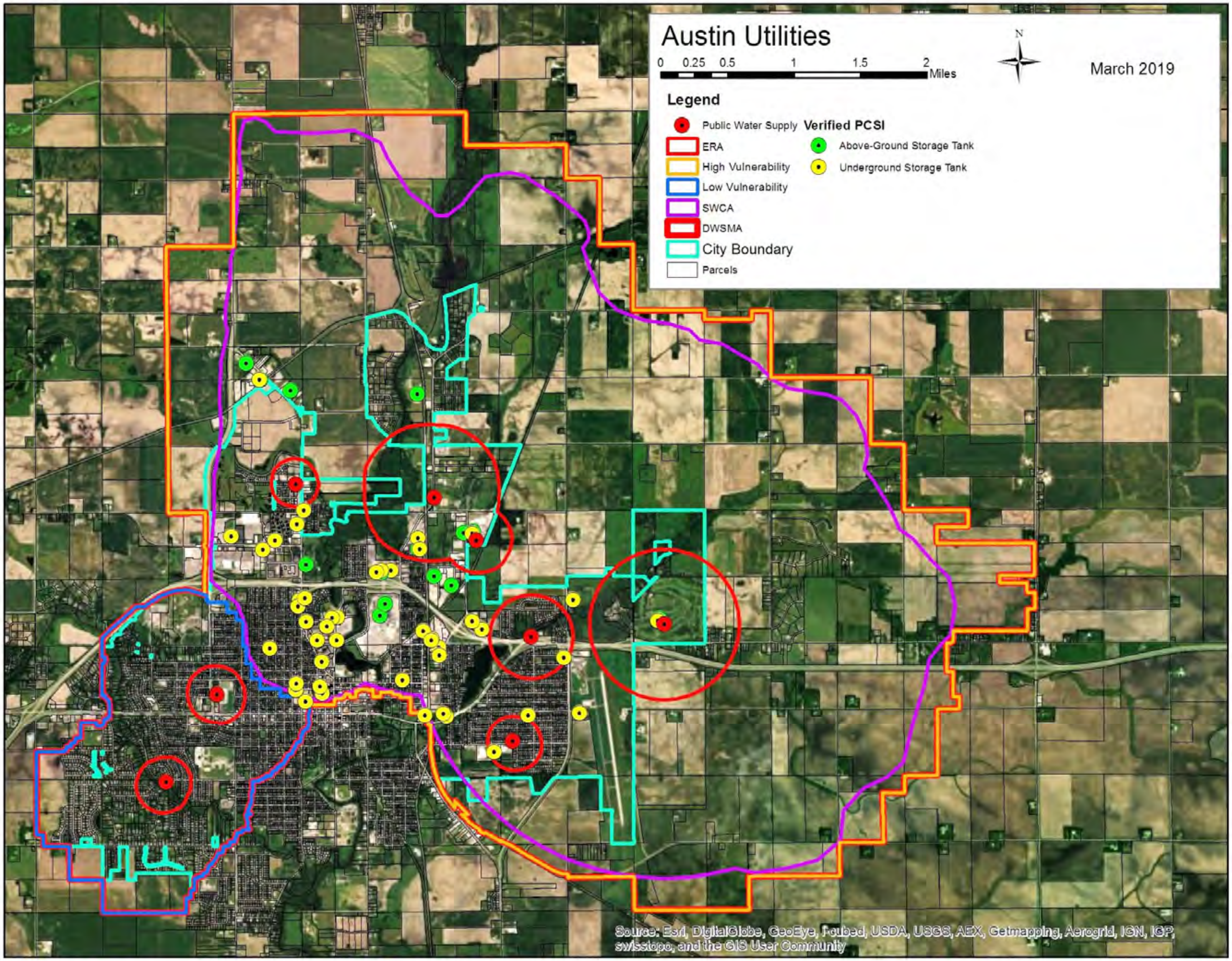

Figure 5 – Above Ground and Underground Storage Tanks

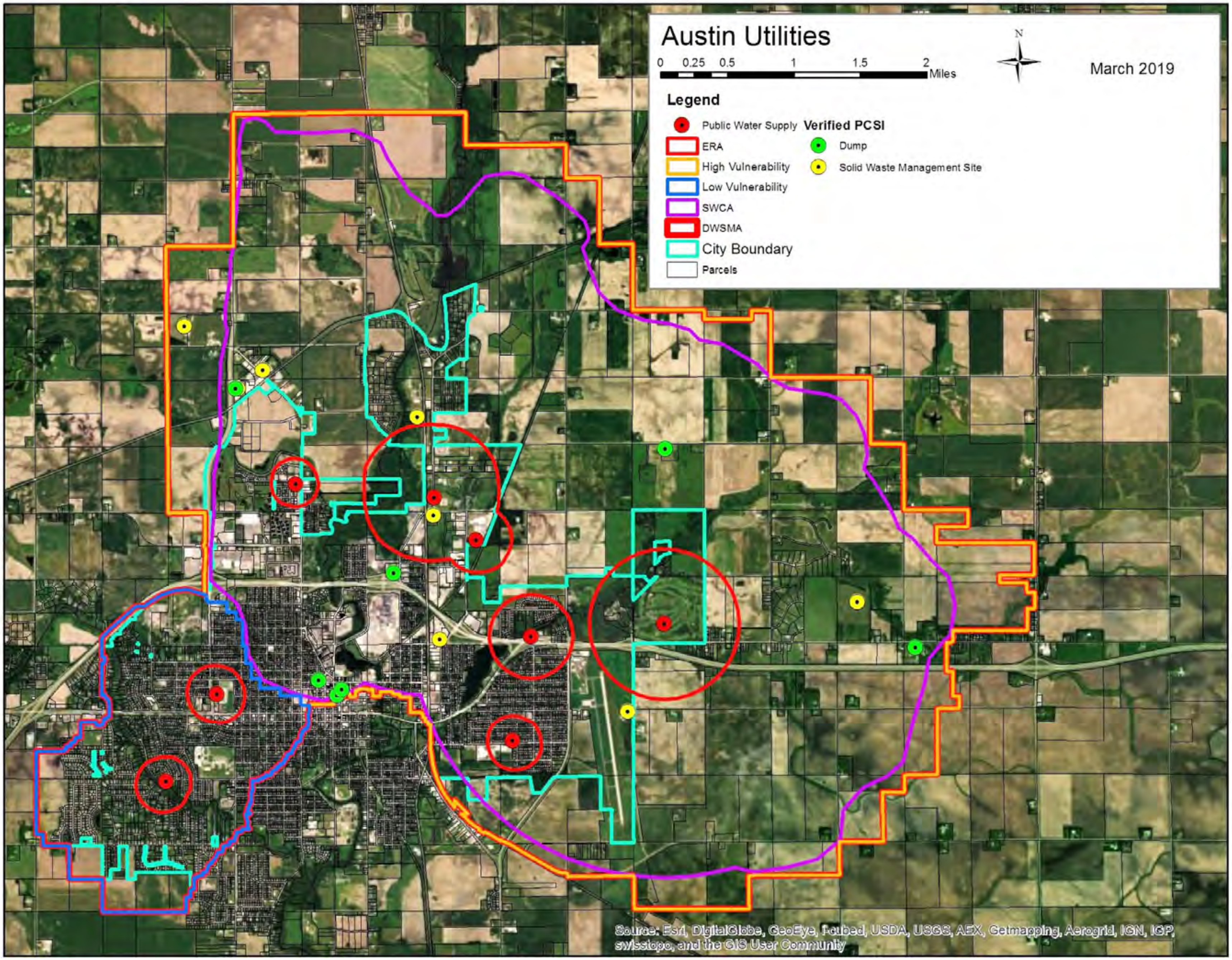

Figure 6 – Solid Waste Facilities

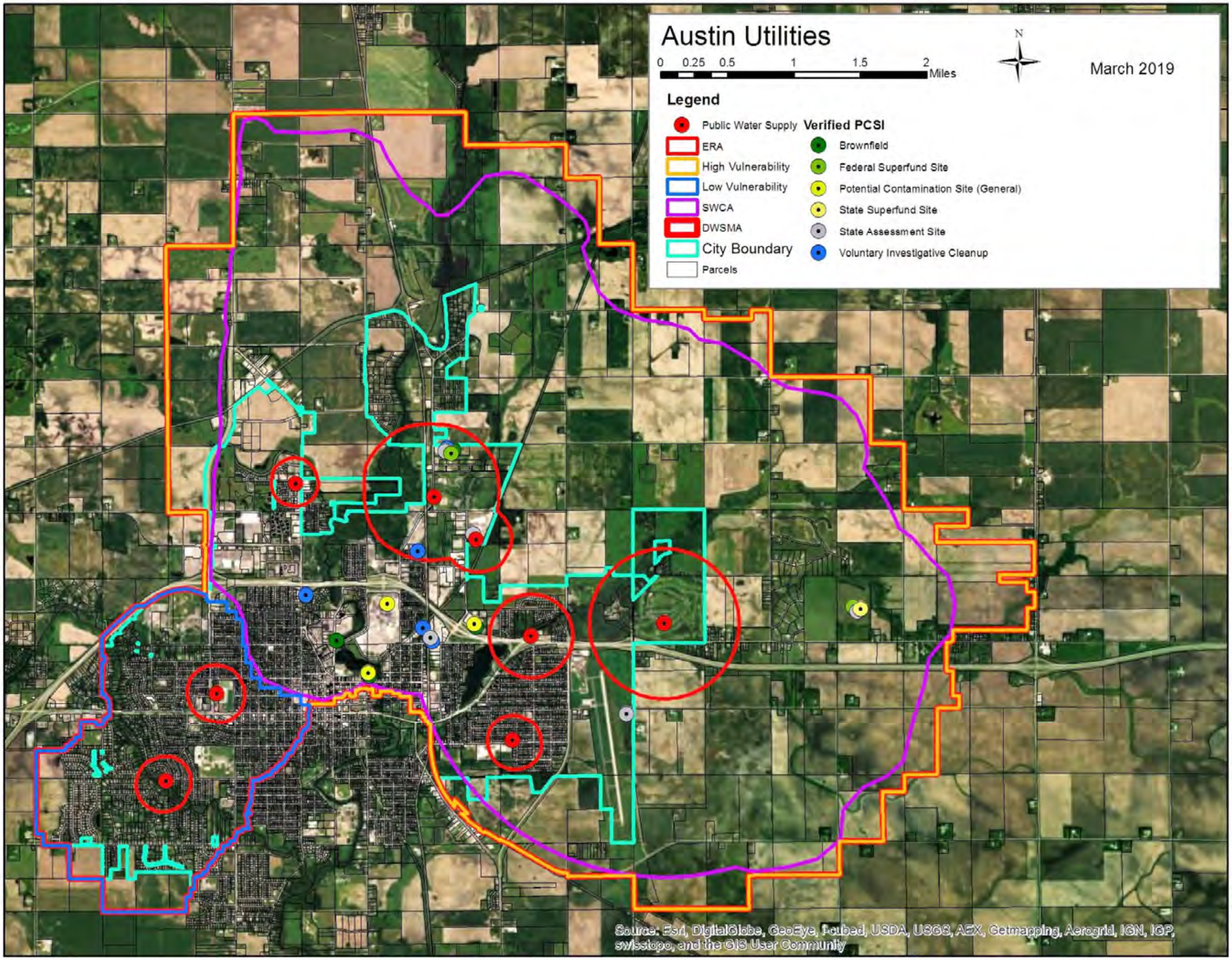

Figure 7 – Contaminated Sites

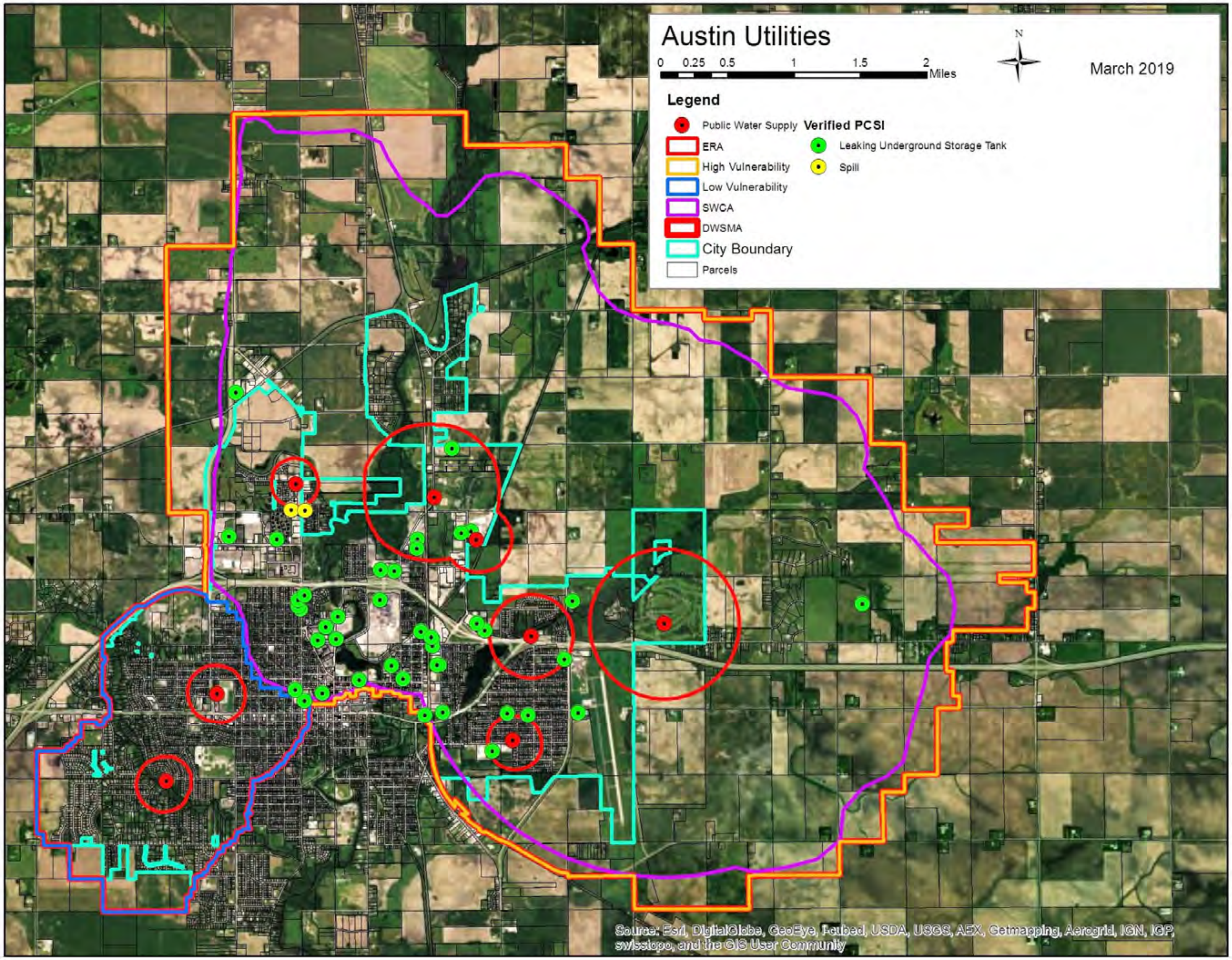

Figure 8 – Leaking Underground Storage Tanks and Spill Sites

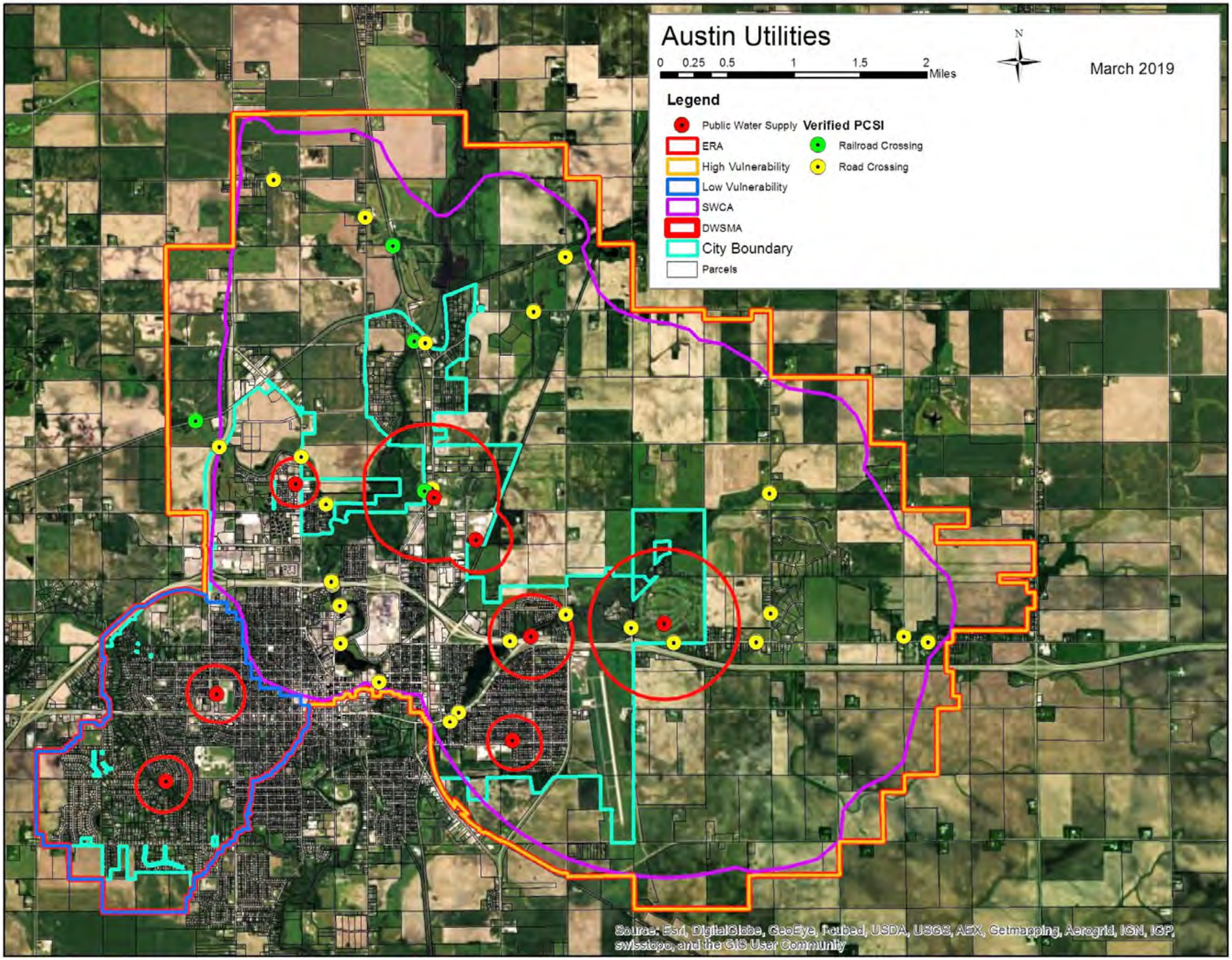

Figure 9 – Transport Crossings over Water Bodies

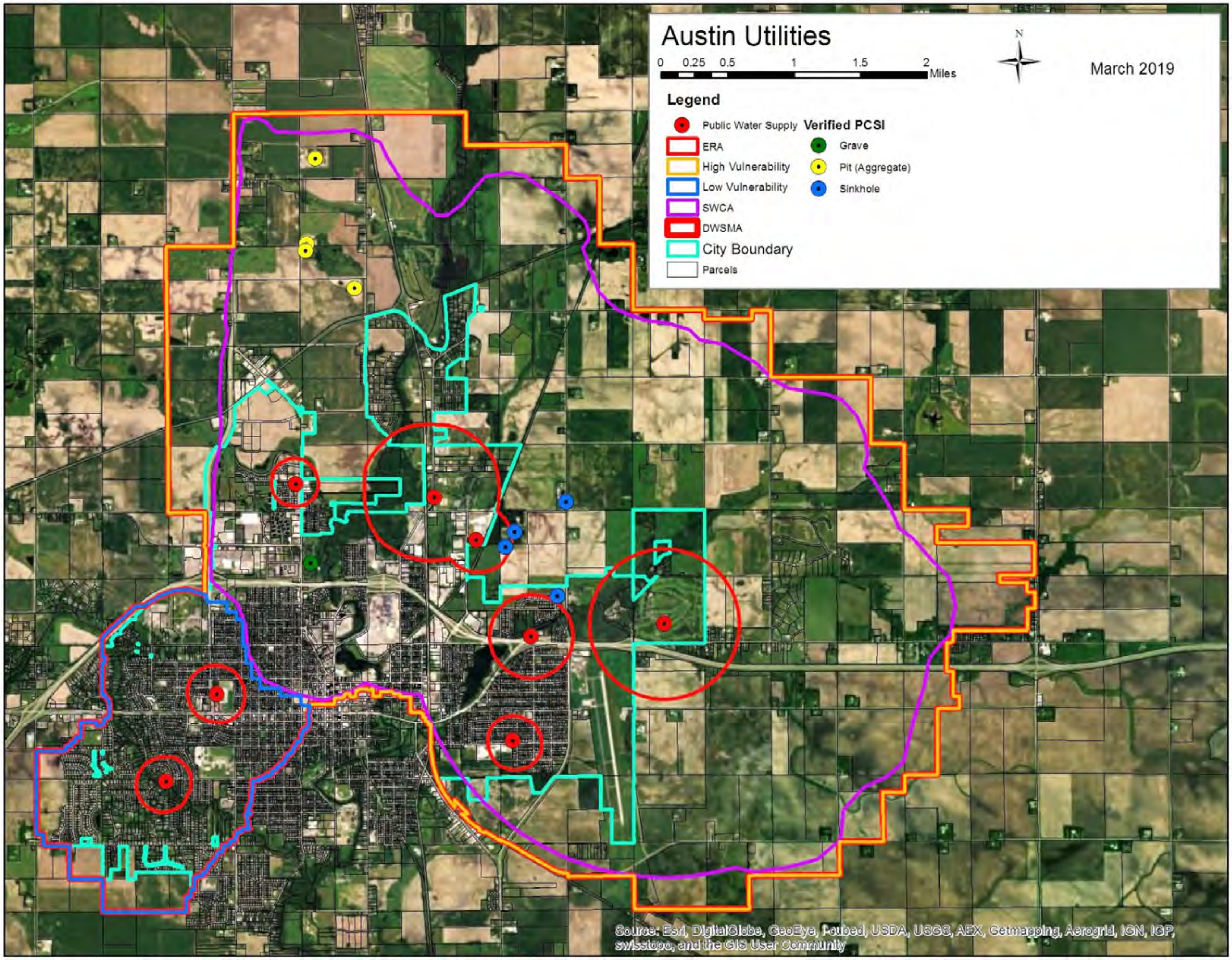

Figure 10 – Miscellaneous Potential Contaminant Sources

Appendix D

WHP Plan Implementation Measures

For

Austin Utilities DWSMA

Table of Contents

Appendix D

WHP Implementation Measures

Introduction

Appendix D contains specific management strategies (measures) which address the issues, concerns and opportunities identified in Chapter 6 of the AU WHP plan. As discussed in Chapters 8 and 9 of the WHP plan, the AU WHP team has identified short and long-term goals and objectives for the this wellhead protection plan. Implementation of the measures contained in this appendix are the approaches to achieving the stated goals and objectives.

Priorities

Nitrate nitrogen has not historically been the contaminant of concern for the public water supply wells in the AU DWSMA. However, low levels of nitrates are present in two of the public wells that draw source water from the highly vulnerable upper carbonate aquifers (Spillville and Makquoketa). About 56 percent of the land cover in the vulnerable portion of the DWSMA is cultivated crops and there are more than 180 onsite sewage treatment systems in this area. Therefore, management strategies that focus on reducing nitrate impacts on groundwater in the SWCA should be a primary focus. Also of concern is the large number of hazardous waste generators, storage tanks, storm water facilities and other categories of potential contaminants associated with urban areas that are located in the SWCA. Abandoned or unused wells also pose a potential hazard to any of the aquifers used by AU. About 89 percent of the entire DWSMA has a high vulnerability ranking. Consequently, assigning a high priority to addressing the various categories of potential contaminants inventoried in the SWCA is prudent.

Objectives

Each table of measures identifies which objectives of this WHP plan the measure applies to. The objectives are listed as follows:

1. Create public awareness and general knowledge about the importance of WHP for ensuring an adequate and safe drinking water supply;
2. Expand nitrogen-reducing best management practices within the SWCA;
3. Identify county and state agency partners to better define the surface water/groundwater properties within the DWSMA;
4. Manage wells that are owned and operated by AU;
5. Provide guidance to property owners regarding management of potential contaminant sources;
6. Collect additional information needed to support management of potential contamination sources, assessment of the adequacy of management measures, and future update of the wellhead protection plan;
7. Develop partnerships with LGUs and state agencies in the management of potential contaminant sources within the DWSMA.

Measure Tables

The following categories are used to further clarify the focus that each WHP measure provides, in addition to helping organize the measures listed in the action plan:

Table A - Education and Outreach
Table B - Potential Contaminant Source Management
- B-1 Point Source Contaminant Management
- B-2 Non-Point Source Contaminant Management
- B-3 AU Public Wells

Table C - Water Resource Planning
Table D - WHP Coordination, Evaluation and Reporting
Table E - Monitoring, Data Collection and Assessment
Table F - Contingency Planning

The tables for each of the above categories lists each measure that will be implemented over the 10-year period that AU's WHP plan is in effect, including the priority assigned to each measure. Unless otherwise specified, all efforts to implement identified measures listed in Appendix D must be summarized by the eighth year after WHP approval to coincide with the beginning of the formal process to amend this current version of the WHP plan.

Many of the measures applicable to nitrate-nitrogen management or groundwater monitoring plans will rely on collaboration between state and federal agency staff, local resource management professionals and citizens. Therefore, it will fall upon the interested groups to determine which nitrogen-specific BMP and associated costs to implement for a specific site. Likewise, the development and implementation of a comprehensive monitoring plan to measure water quality and quantity goals will require multiple agency resource staff collaboration and unknown costs at this time. Therefore, specific programs, technical personnel assistance and costs will be determined by local and state resource staff and the AU wellhead manager; collaborators and costs are noted as "TBD" (To Be Determined) in some measures.

Dates noted in the tables are a target date to implement the WHP measure and may be modified to fit the schedule of AU. The cost for each action is an estimate and could vary significantly from what is indicated; an asterisk (*) associated with a measure indicates implementation of this measure is dependent on grant availability or other financial resources. The notation 'Staff Time' means that AU is already conducting a related activity and the action is carried out as an item already budgeted through normal AU activity (an in-kind cost).

The WHP Manager is the lead responsible party for implementing all measures and tracking such actions. AU fully intends to implement all actions listed in Appendix D, however, completion of the action items are subject to the availability of resources sufficient to complete them.

Local Governmental Units and State Agency Support

Austin Utilities does not have the official controls or programs in place to implement all of the measures listed in Appendix D. Therefore, AU must depend upon appropriate working relationships with neighboring local governmental units and state agencies that have the authority and/or resources to assist AU in successfully implementing this wellhead protection plan.

Primary local partners are the City of Austin, Mower County, Mower Soil and Water Conservation District and the Cedar River Watershed District. The City of Mapleview and Lansing Township are also a public water supplier currently implementing their own wellhead protection plans. AU will coordinate with the City of Mapleview and Lansing Township in implementing measures that bring benefit to both public water suppliers. AU will maintain communications with surrounding township governments (Austin, Lansing, Red Rock and Windom) within the DWSMA regarding the aquifers used by residents in the area.

State agencies also provide WHP implementation assistance to AU. Technical assistance from the MDH and DNR in structuring a comprehensive study to better understand the groundwater and surface water relationship in the DWSMA is an example. MDH also provides financial support for the implementation of a public water supplier's WHP plan. MDA works with the SWCD and other interests in promoting nitrogen management strategies with local producers and agricultural businesses. BWSR works closely with SWCD and CRWD in providing financial support for many of the soil and water conservation projects local agencies and landowners are engaged in. The MPCA provides regulatory, technical and financial support to address the management of many of the potential contaminant sources inventoried in the DWSMA (tanks, hazardous wastes, solid wastes, etc.) and assists in water quality restoration projects.

Other entities involved in providing educational and outreach to residents are nonprofit organizations such as the Minnesota Rural Water Association and the Cedar River Watershed Partnership. On the federal level, the USDA's Farm Security Agency and Natural Resource Conservation Service provide a multitude of conservation programs with financial and technical assistance to landowners. The NRCS works closely with the SWCD and CRWD in a support role.

To successfully achieve the goals and objectives of this wellhead protection plan, Austin Utilities will need to meet with the various local and state entities described above to discuss potential partnership opportunities.

The following table provides an overview of the role cooperating state and local agencies play in assisting AU in implementing WHP measures.

Acronyms Used in Measure Tables and Implementation Partners

AU	Austin Utilities
BWSR	Minnesota Board of Water and Soil Resources
CRWD	Cedar River Watershed District
DNR	Minnesota Department of Natural Resources
LGU	Local Governmental Unit
MDA	Minnesota Department of Agriculture
MDH	Minnesota Department of Health
MRWA	Minnesota Rural Water Association
NRCS	Natural Resource Conservation Service
SWCD	Mower Soil and Water Conservation District
TBD	To Be Determined

Table D-1
Cooperators and Associated Measures

Cooperating Agency	Education & Outreach	Potential Contaminant Source Management	Water Resource Planning	WHP Coordination, Evaluation and Reporting	Monitoring, Data Collection and Assessment	Contingency Planning
LGU: Mower County; cites of Austin & Mapleview; Austin, Lansing, Red Rock & Windom Townships	Table A	Tables B-1 & B-2	Table C	Table D	Table E	-
AU	Table A	Tables B-1, B-2, B-3	Table C	Table D	Table E	Table F
BWSR	-	Table B-2	-	-	-	-
DNR	-	-	-	-	Table E	-
MDA	-	Table B-2	-	-	-	-
MDH	Table A	Tables B-1 & B-3	-	-	Table E	-
MPCA	-	-	-	-	Table E	-
MRWA	Table A	Table B-3	-	-	-	-
SWCD	-	Table B-2	Table C	-	-	-
CRWD	-	Table B-2	Table C	-	Table E	-
NRCS		Table B-2	-	-	-	-
TBD	-	Table B-1	-	Table D	Table E	-

Note: In the following tables, an asterisk (*) indicates implementation of this measure is dependent on grant funding availability.

Table A

Education and Outreach: Austin DWSMA

Education and Outreach - Austin DWSMA															
Action	Priority	Description	Objective Addressed	Cooperators	Cost ($)	Implementation Time Frame									
						2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Action 1	High	**Measure:** Provide information to public utilizing the AU and Mower county websites regarding wells and options for managing wells by 1) properly sealing unused wells or, 2) return unused wells to operating condition.		AU, LGUs	$250	•				•				•	
Action 2	Medium	**Measure:** Post the WHP plan on AU's website and request the city of Austin's website create a link to the WHP plan.	1, 7	AU	Staff	•									
Action 3	High	**Measure:** Post information on water conservation practices on AU's website, or other means to reach customers (i.e. billings, CCR, etc.)	1,4	AU	Staff	On Going									
Action 4	Low	**Measure:** Distribute DWSMA and aquifer information to the public via appropriate media sources and/or regional events.	1, 3, 7	AU, LGUs, MRWA				•					•		

Table B-1

Point Source Contaminant Management: Austin DWSMA

Point Source Contaminant Management Measures – Austin DWSMA															
Action	Priority	Description	Objective Addressed	Cooperators	Cost ($)	Implementation Time Frame									
						2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Action 1	High	**Measure:** Request Mower County enforce upgrade of noncompliant SSTS located in vulnerable portion of DWSMA.	1,7	LGU	Staff			•							
Action 2	High	**Measure:** Request assistance from LGUs and state agencies to identify and verify location of any unused, unsealed or improperly sealed wells within the DWSMA.	1,7	AU, LGU, MDH, TBD	Staff Time	•							•		
Action 3	Medium	**Measure:** Implement storm water best management practices on AU owned property.	1,2	AU	Staff TBD					•					
Action 4	High	**Measure:** Apply for MDH grants to seal unused, unsealed or improperly sealed private and/or public wells located within the DWSMA deemed to be a risk to the aquifers used by AU.*	4,5,7	AU, MDH	Staff Time	On An As-Needed Basis									
Action 5	High	**Measure:** Sponsor a pesticide and/or a household hazardous wastes drop off day in cooperation with Mower County Public Works.	1,5,7	AU, LGU	Staff Time	Coordinate with Mower County Hazardous Waste event schedule									
Action 6	High	**Measure:** Notify the MDH source water protection planner for your area if a Class V injection wells is identified in the DWSMA.	1,5,7	AU, MDH	TBD	On An As-Needed Basis									
Action 7	Medium	**Measure:** Inspect and monitor all above ground or underground storage tanks managed by AU for leaks, spills and secondary confinement.	1,5,7	AU	Staff	On Going									

Table B-2
Nonpoint Source Contaminant Management: Austin DWSMA

Nonpoint Source Contaminant Management Measures: Austin DWSMA						Implementation Time Frame									
Action	Priority	Description	Objective Addressed	Cooperators	Cost ($)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Action 1	High	**Measure:** Request Mower County SWCD and MDA to provide information to agricultural producers about nitrogen management practices.	1,2,5, 7	SWCD, MDA	Staff	●				●				●	
Action 2	High	**Measure:** Be a sponsor for an agricultural nutrient management field day conducted by Mower SWCD or other specified resource professionals.*			Staff				●				●		
Action 3	High	**Measure:** Request Mower SWCD, CRWD, BWSR and NRCS to provide information to landowners in the highly vulnerable portion of the DWSMA about specific conservation programs and services such as EQIP, CRP, RIM, cover crops, etc.	2, 5, 7	SWCD, CRWD, BWSR, NRCS	Staff	On Going									
Action 4	High	**Measure:** Work cooperatively with the cities of Austin and Mapleview to adopt nutrient best management practices on lands owned by either city or AU.	2, 4, 6	AU, LGUs	TBD			●	●						

Table B-3
Public Well Management

AU Public Well Management Measures															
Action	Priority	Description	Objective Addressed	Cooperators	Cost	Implementation Time Frame									
						2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Action 1	High	**Measure:** Assist MDH/MRWA staff in completing or updating the Inner Wellhead Management Zone (IWMZ) survey form for each public water supply well.	4	AU, MDH	Staff					•					•
Action 2	High	**Measure:** Maintain required setbacks for any new potential contaminant sources placed within the Inner Wellhead Management Zone (IWMZ) for each public water supply well.	4	AU	Staff	On Going									
Action 3	High	**Measure:** Prior to siting a new public water supply well conduct a thorough review and evaluation of the PCSI to determine if the proposed new well site has a history of contamination from leaks, spills, hazardous wastes or other potential contaminant sources.	4	AU, MDH	TBD	On an As Needed basis									
Action 4	High	**Measure:** Conduct a thorough review of the MDH Public Water Supply Sources Report for AU to determine accurate location of all AU-owned wells and identify which need to be sealed. Request MDH staff to assist in locating unused public wells.	4	AU, MDH	Staff		•	•	•	•					
Action 5	High	**Measure:** Seal unused or abandoned public wells when location and status information is accurately known and funding secured. Use MDH SWP or Well Management grant funds to conduct well sealing.*	4	AU, MDH	TBD	On an As Needed basis									
Action 6	Low	**Measure:** Monitor surface water levels and flood-proof well #3 when circumstances dictate.	4	AU	Staff	On an As Needed basis									
Action 7	Low	**Measure:** Work with MDH to assess construction of well #3 and determine if any revision of casing is necessary.	4	AU, MDH	Staff TBD	Year 5 or when opportunity arises due to maintenance									
Action 8	High	**Measure:** Implement any wellhead protection measures identified in the MDH Inner Wellhead Management Zone (IWMZ) inventories and recommendations identified in the Sanitary Survey reports.	4	AU, MDH	TBD	On an As Needed basis									

Table C
Water Resource Planning: Austin DWSMA

Water Resource Planning Measures for Austin DWSMA															
Action	**Priority**	**Description**	**Objective Addressed**	**Cooperators**	**Cost**	**Implementation Time Frame**									
						2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Action 1	Medium	**Measure:** Request the inclusion of the AU DWSMA map and identified WHP goals and objectives in the Mower county water management plan and city and county comprehensive land use plans when revised.	1,7	LGUs	Staff	●									
Action 2	Medium	**Measure:** Provide the AU DWSMA map and identified WHP goals and objectives to the CRWD and request this material be incorporated into the One Watershed One Plan.				●									
Action 3	Medium	**Measure**: Request all local jurisdictions with planning and zoning authority to notify AU of 1) any proposed land use permits or zoning changes within the DWSMA, and 2) consider AU comments on environmental review or permitting for existing and/or future land use activities (ex: mining, feedlots, residential subdivision, etc.) in the DWSMA.				●									
Action 5	Medium	**Measure:** Request that the city of Austin and Mower County consider incorporating an overlay wellhead protection district in their zoning ordinances.					●								
Action 6	Medium	**Measure:** AU will seek partnership opportunities with LGU staff responsible for implementing the Cedar River comprehensive watershed plan on activities common to both plans.	7	AU, SWCD, CRWD	Staff	●	●	●							
Action 7	Medium	**Measure:** Participate in local LGU-sponsored meetings related to water resource planning as may apply to the DWSMA.	7	AU, LGUs	Staff	On Going									

Table D
WHP Coordination, Evaluation and Reporting: Austin DWSMA

WHP Coordination, Evaluation and Reporting - Austin DWSMA														
Action	Priority	Description	Objective Addressed	Cooperators	Cost	Implementation Time Frame								
						2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Action 1	Medium	**Measure:** Maintain a “WHP folder” that contains date and documentation of WHP activities you have completed.	6	AU	Staff	On Going									
Action 2	High	**Measure:** Develop a GIS-based tracking system to record and share outcomes of WHP implementation measures with WHP partners.*	6	AU	Staff	•	•	•	•	•					
Action 3	High	**Measure:** Complete an Evaluation Report every 2.5 years that evaluates the “progress of plan of action and the impact of any contaminant release on the aquifer supplying the public water supply well” MN WHP Rule 4720.5270.	6	AU	Staff			•			•			•	
Action 4	Medium	**Measure:** Consider a joint meeting with the City of Mapleview, Lansing Township, and key partners every 2.5 years to discuss current topics of interest to public water suppliers and complete required public water supplier WHP evaluations all at the same time.	6	AU, LGUs, TBD	Staff		•		•		•		•		•

Table E
Monitoring, Data Collection and Assessment: Austin DWSMA

Monitoring, Data Collection and Assessment - Austin DWSMA															
Action	Priority	Description	Objective Addressed	Cooperators	Cost	Implementation Time Frame									
						2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Action 1	High	**Measure:** Complete potential contaminant source inventory (PCSI) in first year of implementation.	5,6	AU	TBD	•									
Action 2	High	**Measure:** Review and update the PCSI (spreadsheet and map) as needed.	5,6	AU, MDH, MPCA	Staff			•			•			•	
Action 3	High	**Measure**: Better define aquifer transmissivity in the SWCA area, particularly when (and if) new high capacity wells are constructed in the future or if existing public wells rehabilitated and test-pumped. Pump test procedures should be documented for future model adjustments with results shared with MDH and DNR.	4,6	AU, MDH, DNR, TBD	TBD	As the opportunity arises.									
Action 4	Medium	**Measure:** Accurately located any wells with well that are within one mile of the DWSMA boundary. This action provides valuable geological information for future delineations.	6	AU, LGUs	Staff				•				•		
Action 5	Medium	**Measure:** Request assistance from the MDH and/or professional groundwater experts to develop a request for proposal to conduct a hydrological study of the surface/groundwater interconnections in the AU DWSMA.*	6	AU, TBD	Staff, TBD			•							
Action 6	Medium	**Measure:** Contract with a qualified consulting firm to conduct a hydrological study of the surface/groundwater interconnections in the AU DWSMA.*	6	AU, TBD	Staff, TBD				•						
Action 7	Medium	**Measure:** Work with MDH to evaluate current pumping data to determine if data collection software needs upgrading.	4,6	AU, MDH				•							
Action 8	Medium	**Measure:** Re-sample the public supply wells during year five of plan implementation for vulnerability parameters determined in consultation with MDH. This is contingent on funding assistance from MDH for sampling and analysis.*	4	AU, MDH	Staff TBD					•					
Action 9	Low	**Measure:** Request state and LGU partners to establish a comprehensive stream and spring flow monitoring network in the SWCA to better define water budget.	6	MDH, DNR, LGUs	TBD		•	•							

Table F
Contingency Planning: Austin DWSMA

Contingency Planning – Austin DWSMA															
Action	Priority	Description	Objective Addressed	Cooperator(s)	Cost	Implementation Time Frame									
						2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Action 1	Medium	**Measure:** Inform local fire departments, county emergency managers, county and state highway departments, railroad and pipeline companies with infrastructure within the DWSMA about the location and characteristics of the DWSMA and the importance of spill response. Provide these entities with a DWSMA map.	6	AU	Staff			•							

Appendix E

Supporting Documents

Exhibits

A Excerpt from Austin Utilities Water Rules

B DNR Water Conservation Plan Approval Letter

Excerpt from Austin Utilities Water Rules

AUSTIN UTILITIES		WATER DEPARTMENT

WATER RULES

APR. BY: AUB DATE: 12-31-92	REV. NO. 7 DATE: 1/7/2016	PAGE 1

101.5 CROSS CONNECTION

No cross connection between City water supply and any other water supply will be permitted.

101.6 BACKFLOW PREVENTION

All future or existing commercial or industrial customers served water by the Austin Utilities, whose operations are determined by the Austin Utilities to constitute a potential for a cross connection or backflow, shall install and maintain an appropriate backflow preventer assembly at the owner's cost. The backflow preventer assembly shall be installed immediately downline from the meter. Owner shall provide written proof to the Austin Utilities of the installation and annual inspection of the backflow preventer assembly by a licensed plumber certified in installing, testing and maintaining backflow preventers, by the Minnesota Department of Health.

An appropriate backflow preventer shall be a reduced pressure zone backflow preventer or other types as specified by the Austin Utilities, properly sized and meeting the requirements of AWWA C510 & C511 latest revision, and laboratory and field tested per

Foundation for Cross Connection Control and Hydraulic Research (FCCCHR) – University of Southern California specifications.

The Austin Utilities is authorized to discontinue water services to any property, or take such other precautionary measures as necessary to eliminate any damages of contamination to the public water system.

Contact Austin Utililites to examine the Water Rules in full.

DEPARTMENT OF NATURAL RESOURCES

Minnesota Department of Natural Resources
Southern Region
21371 State Hwy 15
New Ulm, MN 56073
507-359-6000

12/5/2017

Todd Jorgenson
1908 14th St. NE.
Austin, Mn 55912

RE: Water Supply Plan Approval, Austin Utilities

Todd,

Our office has completed the review of your Water Supply Plan for public water supply authorized under DNR Water Appropriation Permit #1981-5043. 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/utility suppliers to complete the attached "Certification of Adoption" form. Please upload the form to MPARS-Water Supply Plan tab as soon as the city/utility supplier 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 Austin Utilities 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 Todd Piepho at 507-362-8868.

Sincerely,

Todd Kolander
EWR South District Manager

Ec: Carmelita Nelson, DNR
Todd Piepho, DNR Area Hydrologist

CERTIFICATION OF ADOPTION
WATER SUPPLY PLAN

City or Water System Name: Austin Utilities

Name of Person Authorized to Sign
Certification on Behalf of the System: Jeanne Sheehan

Title: President - Board of Commissioners

Address: 1908 14TH St. NE, Austin, MN. 55912

Telephone: 507-433-8886 Fax: 507-433-5045

E-mail: Jsheehan1445@gmail.com

I certify that the Water Supply Plan approved by the Department of Natural Resources has been adopted by the city council or utility board that has authority over water supply services.

Signed: Jeanne J. Sheehan Date: 12-12-17

Return this certification to:

Todd Piepho
DNR Area Hydrologist
50507 Sakatah Lake State Park
Waterville, Mn 56096
507-362-8868
todd.piepho@state.mn.us