Wellhead and Source Water Protection – Part 2: Wellhead Protection Plan Amendment

Prepared for

February 2020

4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435
Phone: 952.832.2600

Wellhead and Source Water Protection – Part 2: Wellhead Protection Plan Amendment

February 2020

Contents

List of Tables

List of Figures

List of Appendices

Public Water Supply Profile

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

Public Water Supply Contact

Cary Johnson
Manager of Maintenance & Construction - Water
Rochester Public Utilities
4000 East River Road NE
Rochester, Minnesota 55906-2813
Telephone: 507-280-1507
Email: cjohnson@rpu.org

Wellhead Protection Manager

Todd Osweiler
Environmental and Regulatory Affairs Coordinator
Rochester Public Utilities
4000 East River Road NE
Rochester, Minnesota 55906-2813
Telephone: 507-280-1589
Email: tosweiler@rpu.org

Wellhead Protection Consultant

John Greer, PG
Barr Engineering Company
4300 MarketPointe Drive
Suite 200
Minneapolis, Minnesota 55435
Telephone: 952-832-2600
Fax: 952-832-2601
Email: jgreer@barr.com

General Information

UNIQUE WELL NUMBER(S) 220666, 220833, 222525, 222528, 220822, 222527, 220681, 220662, 220625, 220818, 220660, 220819, 220675, 147451, 224212, 180567, 161425, 239761, 434041, 506819, 220627, 463536, 601335, 601336, 676687, 698933, 733087, 773386, 796431, 220628, 220629

SIZE OF POPULATION SERVED 118,500 (2019 estimate)

COUNTY Olmsted

Documentation List

Step	Date Performed
Scoping Meeting 2 Held (4720.5340, subp. 1)	June 26, 2018
Scoping 2 Decision Notice Received (4720.5340, subp. 2)	July 6, 2018
Remaining Portion of Plan Submitted to Local Units of Government (LUGs) (4720.5350)	July 22, 2019
Review Received From Local Units of Government (4720.5350, subp. 2)	July 23, 2019 to September 22, 2019
Review Comments Considered (4720.5350, subp. 3)	July 23, 2019 to September 23, 2019
Public Hearing Conducted (4720.5350, subp.4)	October 29, 2019
Remaining Portion WHP Plan Submitted (4720.5360, subp. 1)	February 28, 2020
Final WHP Plan Review Received (4720.5360, subp. 4)	

Plan prepared by:

John C Greer

Digitally signed by John C Greer
Date: 2020.02.27 14:46:09 -06'00'

2/27/2020

John C. Greer, PG (Barr Engineering Co.)
PG #: 30347

Date

Todd Osweiler (Rochester Public Utilities)

2/27/2020

Date

Acronyms

Acronym	Description
DWSMA	Drinking Water Supply Management Area
GWCA	Groundwater Catchment Area
MGD	Million Gallons per Day
MGY	Million Gallons per Year
MDH	Minnesota Department of Health
MDNR	Minnesota Department of Natural Resources
MGS	Minnesota Geological Survey
MnOPS	Minnesota Office of Pipeline Safety
MPCA	Minnesota Pollution Control Agency
PCSI	Potential Contaminant Source Inventory
SWCA	Surface Water Catchment Area
WHPA	Wellhead Protection Area
WHPP	Wellhead Protection Plan

Executive Summary

The Wellhead and Source Water Protection Plan (the Plan) for Rochester Public Utilities (RPU) addresses the 31 municipal water supply wells operated by RPU. RPU's previous Wellhead Protection Plan was approved by the Minnesota Department of Health in 2007. This Plan amendment was prepared in accordance with the applicable portions of the State of Minnesota Wellhead Protection Rules (Minnesota Rules 4720.5100 through 4720.5590) due to the age of the Plan.

RPU's municipal water supply system includes 31 primary water supply wells and no seasonal or emergency water supply wells. In total, these wells pump from the following five different aquifers: Shakopee Formation, Jordan Sandstone, Tunnel City Group, Wonewoc Sandstone, and Mt. Simon Sandstone. The vulnerability classifications of the RPU water supply wells range from low to high.

This Plan amendment consists of two parts. In Part 1 of the Plan amendment, wellhead protection areas (WHPAs) for RPU's water supply wells were delineated as were the associated drinking water supply management areas (DWSMAs). The DWSMAs encompass the WHPAs and are defined by geographically identifiable boundaries including roads, parcel boundaries, and quarter-quarter section lines. Seven DWSMAs were delineated for the RPU wells (see Figure 1).

- Northwestern DWSMA extends beyond the Rochester city limits into Cascade and Kalmar Townships.
- Central DWSMA extends beyond the Rochester city limits into Cascade, Haverhill, Marion, and Rochester Townships.
- Southeastern DWSMA extends beyond the Rochester city limits into Marion Township.
- Well 24 DWSMA is entirely within the Rochester city limits.
- Well 72 and Well 77 DWSMAs are entirely within Marion Township.
- Well 73 DWSMA extends beyond the Rochester city limits into Rochester Township.

It should be noted that in the interim between the completion of the DWSMA delineations and the completion of this Plan that Well 73 was sealed.

In Part 1 of this Plan amendment, assessment of geologic conditions in and around RPU's DWSMAs and available water quality data for RPU's wells was done to determine the vulnerability to contamination of the uppermost source water aquifer. The aquifer vulnerability in approximately 82 percent of the area encompassed by the DWSMAs is classified as High. Aquifer vulnerability in approximately 13 percent of the area in the DWSMAs is classified as Moderate. Approximately 5 percent of the area in the DWSMAs has an aquifer vulnerability classification of Low.

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

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

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

Within the one-year groundwater time of travel zone (aka, Emergency Response Zone or ERZ) around each RPU water supply well the standard PCSI process relying on public database information to identify potential contaminant source locations was followed. Outside of the ERZs, the MDH allowed RPU to develop and use an alternative PCSI approach. The alternative PCSI approach included combining Olmsted County land use data with Standard Industrial Classification (SIC) and North American Industrial Classification System (NAICS) codes to compile a preliminary list of potential contaminant source properties in the DWSMAs. Data from public databases traditionally used to conduct a PCSI was then compared to the preliminary list to develop a final list of potential contaminant source properties in the DWSMAs and classify the potential risk to the water supply wells represented by the potential contaminant source properties.

RPU's historical water quality monitoring results indicate that detections of any contaminants in water samples from the RPU wells have been very low and have not exceeded applicable drinking water quality standards. In addition, no contaminants have been reported in recent water samples from RPU's wells at concentrations that exceed applicable Federal health-related drinking water standards and no trends toward increasing concentrations have been identified to date. Groundwater pumped from the source water aquifers by RPU wells is also currently free of pathogens and disease-causing organisms.

The goals and objectives of this WHPP will focus on reducing the potential contaminant pathways to the source water aquifers that may be provided by private wells and educating property owners and water supply users to ensure proper management of the portions of the DWSMAs.

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

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

Actions identified to accomplish these goals include the following:

- Wells
    - Promoting proper management of existing active wells in the DWSMAs
    - Encouraging the proper sealing of all unused wells within the DWSMAs
    - Identification of new high capacity wells in or near the DWSMAs
    - Maintaining current IWMZ potential contaminant source inventories for RPU's water supply wells
- Potential contaminant source properties
    - Encouraging proper handling of chemicals/wastes
    - Encouraging proper operation and maintenance of storage tanks
    - Periodically obtaining updated information on potential contaminant sources in the DWSMAs from the regulating agencies to maintain an up-to-date potential contaminant source database for the DWSMAs and allow timely recognition of potential issues that could affect RPU municipal water supply or DWSMAs.
- Public education
    - Distribution of RPU Annual Water Quality Report for the water supply system,
    - Direct mailing of RPU's monthly newsletter *RPU Plugged In*
    - Posting Wellhead Protection Program information on the RPU website at https://www.rpu.org/education-environment/water-quality.php
    - Using RPU's social media outlets and other means of distribution to distribute information related to wellhead protection
    - Communicate with city of Rochester and Olmsted County Planning Departments to encourage inclusion of wellhead and source water protection in their planning processes
    - Gaging the interest of Cascade, Haverhill, Kalmar, Marion, and Rochester Townships and Olmsted County regarding creation of a source water protection coordinating committee to provide a vehicle for collaboration on activities that will protect the source water aquifers
- Continued data collection
    - Monitoring static and pumping water levels in RPU wells
    - Upgrade of RPU's water quality data management system
    - Sampling of RPU wells and nearby surface water bodies for indicator parameters to assess potential connection between water supply wells and surface water
    - Continued sampling of RPU water supply wells per regulatory requirements
    - Collection of additional local geologic and hydrogeologic data as it becomes available from public sources or from RPU-sponsored projects
    - Periodically updating the potential contaminant source database
    - Sampling RPU's municipal wells for tritium

Implementation of the management actions will be prioritized based on the risk to the RPU water supply wells posed by the potential contaminant source properties (including their locations relative to the water supply wells). An implementation schedule is shown in Table 5.

1.0 Introduction

1.1 Background

Rochester Public Utilities (RPU) currently has 31 municipal water supply wells. All the wells are classified as primary water supply wells. In total, these wells pump from the following five different aquifers: Shakopee Formation, Jordan Sandstone, Tunnel City Group, Wonewoc Sandstone, and Mt. Simon Sandstone. Minnesota unique well number along with well construction, well status, aquifer(s), and well vulnerability classification for each of RPU's municipal water supply wells is presented in Table 1. Well locations, RPU Drinking Water Supply Management Areas (DWSMAs), are shown on Figure 1. Minnesota Department of Health (MDH) well records for all RPU water supply wells are presented in Appendix A.

The previous RPU Wellhead Protection Plan (WHPP) Parts 1 and 2 were prepared in 2004-2007. The MDH issued final approval of the previous Part 2 WHPP in 2007. In accordance with the Minnesota Wellhead Protection Rules (Minnesota Rules 4720.5100 through 4720.5590), amendment of RPU's WHPP was initiated based on the age of the Plan. The Part 1 WHPP amendment (Barr, 2017) was approved by the Minnesota Department of Health (MDH) in September 2017 (MDH, 2017). A public information meeting on the Part 1 WHPP amendment was held on November 14, 2017.

In the Part 1 WHPP amendment, seven separate DWSMAs were delineated for RPU that encompass the wellhead protection areas (WHPAs) delineated for RPU water supply wells. In addition to the delineation of the WHPAs and DWSMAs, Part 1 of the WHPP amendment includes an assessment of the vulnerability to contamination of RPU municipal wells and the source water aquifers in the associated DWSMAs. As shown in Table 1, the vulnerability classifications for RPU wells range from Low to High. Seven of the wells have a well vulnerability classification of High. Sixteen of the wells have a well vulnerability classification of Medium. Eight of the wells have a vulnerability classification of Low. In the Part 1 amendment report, the vulnerability to contamination of the uppermost source water aquifer within the DWSMAs was identified as ranging from Low to High (Barr, 2017). Figure 1 shows the aquifer vulnerability zones in the RPU DWSMAs. The RPU Part 1 WHPP amendment is presented in Appendix B.

1.2 Description of the Public Water Supply System

RPU is located in Olmsted County. RPU currently has 31 primary water supply wells in the municipal water supply and distribution system for Public Water Supply #1550010. Locations of the wells are shown on Figure 1 and general construction details for RPU municipal wells are summarized in Table 1. Copies of the MDH well records for RPU municipal wells are presented in Appendix A.

The 2010 census counted 106,769 people in Rochester. The U.S. Census Bureau estimated the 2017 population of Rochester to be 115,733. The city of Rochester is anticipating significant population growth (up to approximately 40 percent by 2040) due to development associated with the Mayo Destination Medical Center project. The Rochester population is projected to reach 121,000 in 2020, 143,000 in 2030, and 165,000 in 2040 (Barr, 2018).

Under Minnesota Department of Natural Resources (MDNR) Appropriation Permit 1979-5076, RPU's municipal water supply wells have a maximum operating capacity of 25,280 gpm (36.4 MGD). The maximum permitted annual pumping volume for the water supply system is 5.7 billion gallons. The daily average water demand for the time period 2014-2018 was 12.1 MGD (approximately 8,400 gpm). Maximum day demand (the largest daily water use in a given year) ranged from 19.8 MGD to 23.7 MGD in the period 2014-2018. As shown in RPU's draft Water Supply Plan (Barr, 2018), the projected 2030 average day water demand is approximately 15.7 MGD (approximately 10,900 gpm). RPU's projected 2030 maximum day demand is approximately 33.8 MGD (approximately 23,500 gpm) (Barr, 2018). RPU anticipates that additional water supply wells will need to be constructed to meet projected future water demand.

RPU treats the source water at each well house by adding polyphosphate, fluoride, and chlorine.

RPU currently has 20 water storage facilities consisting of 8 on the main level and 13 on the high level system. These facilities have a combined storage capacity of 16.95 million gallons.

As discussed by Barr (2017), pumping information from RPU for the period 2009 through 2013 and RPU water demand projections were used to develop pumping rate projections for use in delineating the WHPAs. Annual volume of water pumped by each of RPU's current municipal water supply wells during the period 2009 through 2013 is shown in Table 2

1.3 DWSMA

The DWSMAs delineated in the Part 1 WHPP amendment (Barr, 2017) encompass the 10-year groundwater time of travel WHPAs around RPU's wells. The DWSMAs overlap all or parts of multiple public land survey (PLS) townships, ranges, and sections as shown in Attachment C-4 of Appendix C. As shown on Figure 1, the Northwestern DWSMA extends beyond the Rochester city limits into Cascade and Kalmar Townships. The Central DWSMA extends beyond the Rochester city limits into Cascade, Haverhill, Marion, and Rochester Townships (Figure 1). The Southeastern DWSMA extends beyond the Rochester city limits into Marion Township (Figure 1). The Well 24 DWSMA is entirely within the Rochester city limits (Figure 1). The Well 72 and Well 77 DWSMAs are entirely within Marion Township (Figure 1). The Well 73 DWSMA extends beyond the Rochester city limits into Rochester Township (Figure 1). It should be noted that in the interim between the completion of the DWSMA delineations and the completion of this Plan that Well 73 was sealed. The RPU DWSMAs do not overlaps any other DWSMAs.

As discussed in Barr (2017) the DWSMA delineations did not include a surface water contribution area, unlike the previous (2004) DWSMA delineations (see Osweiler and Blum, 2004). In addition, a 10-year groundwater time of travel was used by Barr (2017) rather than the 50-year groundwater time of travel that was used in the previous delineation. Comparison of the extent of the DWSMAs delineated in the 2017 Part 1 WHPP amendment to the 2004 delineation shows that the 2004 delineation extended farther east into Eyota and Viola Townships.

As discussed in the Part 1 amendment report (Barr, 2017), the Prairie du Chien Group (composed of the Shakopee Formation and Oneota Dolomite) are fractured/karsted in southeastern Minnesota, including in

the Rochester area. As a result, there is uncertainty in the groundwater flow directions and velocities in the Shakopee aquifer, particularly in areas where the Shakopee Formation is the uppermost bedrock unit. Therefore, after discussions with MDH staff, it was determined that an approach that is more conservative than the standard approach to classifying aquifer vulnerability within RPU DWSMAs was warranted in order to be more protective of the source water aquifers. The more conservative approach places less weight on the water chemistry of samples from individual wells. As shown on Figure 1, the more conservative approach resulted in an aquifer vulnerability classification of High in the vast majority of the areas within RPU DWSMAs.

2.0 Identification and Assessment of Data Elements

The Minnesota Wellhead Protection Rules specify data elements that must be addressed in wellhead protection plans. For the WHPP amendment, MDH staff met with RPU staff on two occasions to discuss the data elements that are specified in the Minnesota Rules 4720.5400. Results of these scoping meetings were transmitted to RPU via two Scoping Decisions dated October 27, 2014 (MDH, 2014) and July 2, 2018 (MDH, 2018).

The first Scoping Meeting was held on October 27, 2014. At this meeting, the data elements related to delineation of the WHPAs and DWSMAs and assessment of well and aquifer vulnerability were discussed. The second Scoping Meeting was held on June 26, 2018. At this meeting, the data elements required to support development of Part 2 of the WHPP amendment (this document) which identifies potential contaminant sources within the DWSMAs and identifies management strategies to help safeguard the municipal water supply from identified potential contaminants were discussed. An assessment of these data elements, as required by the Minnesota Wellhead Protection Rules, is presented in Appendix C.

3.0 Inventory of Potential Contaminant Sources

In Part 1 of this WHPP amendment, the WHPAs and DWSMAs for RPU's wells were delineated. The DWSMAs encompass the WHPAs around RPU's water supply wells (Barr, 2017). As discussed above and shown on Figure 1, some of RPU DWSMAs extend beyond the Rochester city limits into surrounding townships.

Current land use in the DWSMAs is shown on Figure 2 and in Appendix C. Numerous land uses are found within the DWSMAs including residential, commercial, industrial, institutional, agricultural, and recreational land uses.

At Scoping Meeting No. 2, the types of potential contaminant sources that must be inventoried in the RPU DWSMAs were discussed. The types of potential contaminant sources that must be inventoried vary by vulnerability classification. As discussed in the Part 1 WHPP amendment (Barr, 2017), the aquifer vulnerability in the DWSMAs includes the following classifications: Low, Moderate, and High. The aquifer vulnerability in approximately 82 percent of the area encompassed by the DWSMAs is classified as High. Aquifer vulnerability in approximately 13 percent of the area in the DWSMAs is classified as Moderate. Approximately 5 percent of the area in the DWSMAs has an aquifer vulnerability classification of Low. Since the vast majority of the area in the DWSMAs has an aquifer vulnerability classification of High, RPU opted to inventory all potential contaminant source types required for high vulnerability DWSMAs throughout the DWSMAs. The MDH allowed RPU to develop an alternative approach to conducting the PCSI (Greer and Osweiler, 2018) and to pilot the alternative approach for this WHPP.

3.1 Inventory Process

An inventory to determine if there are any potential contaminant sources in the Inner Wellhead Management Zone (IWMZ) around each of RPU wells was performed. The IWMZ is defined as the area within a 200-foot radius of a municipal well. The most recent IWMZ inventory for each of RPU municipal wells is presented in Appendix C.

Within the one-year groundwater time of travel zone (aka, Emergency Response Zone or ERZ) around each RPU water supply well the standard PCSI process relying on public database information to identify potential contaminant source locations was followed. Outside of the ERZs, the MDH allowed RPU to develop and use an alternative PCSI approach. The alternative PCSI approach included combining Olmsted County land use data with Standard Industrial Classification (SIC) and North American Industrial Classification System (NAICS) codes to compile a preliminary list of potential contaminant source properties in the DWSMAs. Data from public databases traditionally used to conduct a PCSI was then compared to the preliminary list to develop a final list of potential contaminant source properties in the DWSMAs. See Appendix E for a detailed discussion of the alternative PCSI approach, a summary of the implementation of the alternative approach, and recommendations related to future applications of the alternative PCSI approach.

As indicated in Table 3, the PCSI work included an assessment of risk posed by the potential contaminant sources to RPU water supply wells. In general terms, the approach used for evaluation of risk related to a potential contaminant source type is based on the locations of potential contaminant sources of that type. The reader is referred to Greer and Osweiler (2018), available from RPU upon request, for a detailed discussion of the approach to the risk evaluation. Higher priority for implementation of wellhead protection strategies will be placed on those potential contaminant sources that would pose the highest risk to the municipal water supply should a contaminant release occur.

3.2 Inventory Results

A more detailed discussion of the potential contaminant sources within the DWSMAs is presented in Appendix C. The inventory results are summarized in Table 3.

The old RPU DWSMAs extend beyond the boundaries of the new DWSMAs. During the preparation of this Plan amendment, potential contaminant source locations were verified, to the extent possible according to the alternative PCSI process developed by RPU and approved by the MDH. New information developed on potential contaminant source locations in the future will be verified as they are discovered as part of the WHPP implementation.

4.0 Impact of Changes to the Public Water Supply Wells

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

4.1 Potential Changes Identified

As noted above in Section 1, significant population growth and development is anticipated to occur in Rochester in the coming years as a result of the Mayo Destination Medical Center (DMC) project. The DMC project is the largest economic development initiative in Minnesota's history. The project includes $5 billion in private development and $585 million in public infrastructure.

4.1.1 Physical Environment

RPU expects to install additional wells to meet projected future water demand resulting from the anticipated development in Rochester. RPU's draft Water Supply Plan (Barr, 2018) anticipates the addition of up to four additional wells (Wells 42-45) in the next 10 years to meet projected future water demand. RPU has an ongoing program to assess groundwater source sustainability for the water supply wells. Assessing the potential effects on groundwater source sustainability resulting from the addition of new wells is currently part of RPU's ongoing program and will continue during the life of this Plan. In addition, the effect that the installation of additional water supply wells may have on the DWSMA boundaries will need to be assessed in the future.

RPU expects to complete a new Comprehensive Water System Plan in 2020 to replace the current plan that was prepared in 2010.

As discussed in the Part 1 WHPP amendment (Barr, 2017) and noted in Section 1 above, some of the RPU DWSMAs extend beyond the Rochester city limits into surrounding townships. The townships into which the DWSMAs extend include Cascade, Haverhill, Kalmar, Marion, and Rochester Townships (see Figure 1).

4.1.2 Land Use

Projected population growth is expected to be accompanied by changes in land use. As noted above, a variety of land uses are currently present in RPU's DWSMAs. Projected future land uses within the DWSMAs are anticipated to include many of the land uses currently present within the DWSMAs. A current land use map and a projected future land use map are shown on Figure 2 and Figure 3, respectively. Comparison of the current land use with the projected future land use indicates that the currently undeveloped properties within the RPU DWSMAs are projected to be developed in the future.

Land uses anticipated during the next ten years in the DWSMAs are currently present in the areas covered by this WHPP Therefore, adjustments in the land use within the DWSMAs such as those shown on the projected future land use map (Figure 3) are expected to be adequately addressed by the management

strategies put forth in this WHPP. If, during the life of this WHPP, land uses not addressed by the management strategies in this Plan are adopted RPU will assess what, if any, effect the new land use(s) may have on the management strategies for the DWSMAs.

4.1.3 Surface Water

There are surface water bodies and wetlands within RPU DWSMAs. The results of an evaluation of groundwater chemistry data performed by the MDH (Blum, 2016a) did not identify a direct link between surface water and any of the RPU water supply wells. However, the evaluation results did indicate evidence for the influence of human activities, seasonal differences, or possibly a relatively short groundwater residence time on groundwater quality. This assessment is consistent with the aquifer vulnerability classifications in the DWSMAs.

RPU maintains the Silver Lake Dam on the Zumbro River. Plans are in place to remove the dam in the next few years. Other than operation of the dam, management of surface water in Rochester is the responsibility of the city of Rochester Public Works (RPW). As such, RPU will rely on RPW for management of surface water in the portion of the DWSMAs that lie within the Rochester city limits. However, RPU is sensitive to surface water issues. Initial results from RPU's ongoing water source sustainability evaluation suggest that currently projected future pumping may affect baseflow in some streams that cross the DWSMAs. RPU is committed to refining the evaluation to better assess potential impacts to surface water from future pumping.

Other than the proposed removal of the Silver Lake Dam, RPU is not aware of any plans to alter the course or location of any surface water bodies currently present within the DWSMAs in the next ten years.

4.1.4 Groundwater

Significant population growth is anticipated to occur in Rochester. By 2030 the population of Rochester is projected to increase approximately 23 percent to 143,000. Along with this projected population increase, RPU projects that water demand will increase approximately 30 percent by 2030. As indicated in RPU's draft Water Supply Plan (Barr, 2018), it is anticipated that up to four additional water supply wells will be added to the RPU system by 2030 to meet projected future demand.

The water provided to RPU's customers meets applicable drinking water standards. Historically, there have been some detections of low concentrations of a small number of regulated contaminants in some samples from RPU water supply wells. The low concentrations detected did not exceed applicable drinking water quality standards. To date, no trends toward increasing concentrations of regulated contaminants have been identified for any of RPU's water supply wells. RPU anticipates that future land uses in the DWSMAs will not adversely impact the quality of water pumped from RPU's water supply wells.

RPU staff inspect the municipal water supply wells regularly. The MDH monitors all the wells annually. The MDH monitoring includes sampling of the wells to ensure they comply with applicable regulatory standards. In addition, RPU uses a SCADA system to measure the volume of water pumped from a well, the instantaneous pumping rate for each well, and the water level (static or pumping) in each well.

RPU currently has 10 monitoring wells in and around the city of Rochester. Locations of the wells are shown on Figure 5. These wells are used to monitor the Galena, St. Peter, Shakopee, and Jordan aquifers along with the Platteville Formation (an aquitard). Groundwater elevation data from the monitoring wells informs RPU's ongoing water source sustainability evaluation. In addition, groundwater elevation data from the Galena, St. Peter, Shakopee, and Jordan aquifers as well as the Platteville Formation are recorded in the MDNR's observation well database. RPU continues to explore locations for new wells to expand the monitoring well network. Well nests are also being evaluated so RPU can begin to collect data from the aquifers below the Jordan. Groundwater elevation data from the monitoring well network indicates that potentiometric levels in the aquifers fluctuate seasonally. In addition, the data show a general increasing trend in potentiometric levels over the last 10 years.

RPU supports water conservation. RPU's water conservation program includes a three-tiered water rate structure, rebates on purchases of water-efficient appliances and rain barrels, a leak detection program, and a robust public education and community outreach program.

In the next ten years it is possible that new business developments in or near the RPU DWSMAs may seek to construct privately-owned high capacity wells completed in one of RPU's source water aquifers. Such wells could potentially affect the DWSMA boundaries, depending on their location(s) and pumping rate(s). RPU receives notifications from the MDNR MPARS system when the Department receives a request for a new or increased groundwater appropriation in Olmsted County. At the time this Plan was prepared, RPU was not aware of any proposed developments with plans for privately-owned high capacity wells within or near the DWSMAs.

Available information from the MPARS database indicates that there are 38 high capacity wells within a zone that includes RPU DWSMAs and extends one mile beyond the DWSMA boundaries (this number does not include the 31 RPU municipal water supply wells). High capacity wells are defined as wells that pump more than 1,000,000 gallons per year or more than 10,000 gallons per day. Owners of these wells are required to obtain a groundwater appropriation permit from the MDNR. High capacity wells outside of the DWSMAs were identified because changes in operation of these wells could, potentially, affect the DWSMA boundaries. Uses of these 38 non-municipal water supply wells include agriculture/food processing (5), commercial/institutional building AC (1), commercial/institutional water supply (3), construction dewatering (3), golf course irrigation (5), groundwater dewatering (1), industrial process cooling-once through (1), other power generation (2), pollution containment (9), private water supply (1), and thermoelectric power cooling-recirculating (3) (Table 4). Additional information on these wells can be found in Appendix C.

4.2 Impact of Changes

4.2.1 Water Use

RPU's water distribution system is currently supplied with water from 31 wells with a maximum operating capacity of 25,280 gpm (36.4 MGD). The daily average water demand for the time period 2014-2018 was 12.1 MGD (approximately 8,400 gpm). Maximum day demand ranged from 19.8 MGD to 23.7 MGD in the period 2014-2018. The projected 2030 daily water demand is approximately 15.7 MGD (approximately

10,900 gpm) (Barr, 2018). RPU's projected 2030 maximum day demand is approximately 33.8 MGD (approximately 23,500 gpm) (Barr, 2018).

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

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

4.2.2 Influence of Existing Water and Land Government Programs and Regulations

RPU provides water conservation information to customers via its website and mailing of a monthly newsletter to over 50,000 RPU customers, offers water use reduction-related rebates, and has a tiered billing structure for water use. These programs are designed to assist residents and businesses with water conservation strategies through incentives and educational information.

The city of Rochester manages storm water as specified in their MS4 permit. The goals of the storm water management program include maintaining or improving water quality in surface water bodies in Rochester. RPU believes that the City's current program is sufficient to meet the objectives of this WHPP.

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

In addition to these rules and programs discussed above, RPU is aware of and supports the Olmsted Soil and Water Conservation District (SWCD) and Natural Resources Conservation Service (NRCS) programs to

assist with well sealing costs. RPU also has a well sealing cost-share program that can be used to assist well owners with the cost of sealing of private wells within RPU's service area.

Land use control and land disturbing activities outside of the RPU DWSMAs will be governed by the local unit of government with jurisdiction in a particular area. This WHPP has been developed to protect the interests of RPU and, to the extent practicable, to have no adverse effect on the plans and strategies developed for adjacent areas. Governmental units whose jurisdictions overlap the RPU DWSMAs include Olmsted County and Cascade, Haverhill, Kalmar, Marion, and Rochester Townships. This Plan will be provided to these other governmental units as a resource for future land development planning. Local ordinances and plans related to land use will be relied upon for the management of the portion of RPU's DWSMAs that extend beyond the Rochester city limits. The Wellhead Protection Manager will, to the extent feasible and practicable, communicate the goals and objectives of this Plan to the other local governmental units whose jurisdictions overlap the RPU DWSMAs.

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

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

4.2.3 Administrative, Technical, and Financial Considerations

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

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

RPU believes that the current plans and studies related to the water supply system are sufficient to ensure that projected future water demands in Rochester can be met sustainably. RPU has an ongoing

maintenance program to ensure that the water supply system will continue to operate properly and be able to meet water demand in the future.

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

5.0 Issues, Problems, and Opportunities

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

5.1 Land Use Issues, Problems, and Opportunities

As noted earlier in this Plan, the delineation of the 2004 DWSMAs for the RPU wells included a 50-year groundwater time of travel and surface water contribution areas. Therefore, the 2004 DWSMAs covered a much larger area than the DWSMAs delineated in the 2017 Part 1 WHPP amendment. Management actions presented in the 2007 Part 2 WHPP (Osweiler and Hill, 2007) were intended to address source water protection in the 2004 DWSMAs. Public education and community outreach actions undertaken as part of the 2007 WHPP implementation were successful in providing a broad cross section of the community with information about RPU's water supply system and the importance of wellhead and source water protection. The size of the DWSMAs and limited RPU staff resources made it difficult to successfully implement many of the other management actions presented in the 2007 Part 2 WHPP.

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

5.1.1 Source Water Aquifers

As shown on Figure 1, the aquifer vulnerability classification in RPU's DWSMAs ranges from Low to High. Approximately 82 percent of the area encompassed by the DWSMAs is classified as High. Aquifer vulnerability in approximately 13 percent of the area in the DWSMAs is classified as Moderate. Approximately 5 percent of the area in the DWSMAs has an aquifer vulnerability classification of Low.

RPU currently has 31 water supply wells (Table 1). The well vulnerability classification for each of RPU's municipal water supply wells is presented in Table 1.

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

As discussed elsewhere in this Plan amendment, potential sources of contamination that could affect the source water aquifers were identified during the PCSI. These potential contaminant sources include wells, storage tanks, properties where Class V wells may be or may have been present, chemical storage locations, wastewater treatment and disposal sites, locations where contaminants were spilled, SSTS,

potential contaminant source sites, hazardous waste generators, solid waste management sites, storm water basin locations, suspected contaminant of concern locations, animal feed lot locations, land application sites, and transportation corridor water crossings. Table 3 summarizes the results of the PCSI. As part of the PCSI, the risk to the RPU water supply wells posed by the identified potential contaminant source properties was assessed (see Appendix E for a description of the process used for assessing risk). The risk classifications applied to the potential contaminant source properties is shown on Table 3.

Available records indicate the presence of several old municipal water supply wells in Rochester. At the time this WHPP was prepared, RPU was in the process of locating and sealing these old municipal wells. RPU intends to continue the process until all the wells are sealed. Sealing of the old wells will eliminate potential pathways for contaminants to reach the source water aquifers.

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

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

5.1.2 Groundwater Quantity and Quality

5.1.2.1 Groundwater Quantity

RPU has been investigating their groundwater source for 30 years. RPU has partnered with the Minnesota Geological Survey (MGS), United States Geological Survey (USGS), MDNR, and MDH in the course of these investigations. While the understanding of the groundwater system in the Rochester area was significantly improved by the studies supported by RPU, the high growth projections have resulted in the question of whether the source water aquifers can sustainably meet projected future water demand is still to be answered.

In late 2013, RPU embarked on a water source sustainability evaluation. The objectives of the evaluation are to assess whether pumping from the source water aquifers to meet projected future water demand can be done in a manner consistent the sustainability standard (Minnesota Statutes 103G.287 subd. 5). The ongoing sustainability evaluation provides RPU with the opportunity to partner with others (e.g., Olmsted County, MDNR, MDH) to obtain the data necessary to complete the sustainability evaluation and identify any measures necessary to ensure a sustainable water supply in the future.

5.1.2.2 Groundwater Quality

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

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

Currently, RPU manually enters laboratory results for samples from the water supply wells into a database system that was developed by now-retired RPU staff. There is no current in-house technical support for the database system. In addition, data evaluation (including quality assurance/quality control review of data packages and assessment of water quality trends) and reporting is currently a manual process. At the time this WHPP was prepared, RPU was in the initial stages of planning to upgrade their management of water quality data. The objectives of the upgrade will be to eliminate manual entry of water quality data into the database, improve the process for quality assurance/quality control review of laboratory data packages, improve the process for data evaluation and assessment of any trends, and streamline reporting of water quality results out of the database.

Current system operations ensure that the water RPU supplies to its customers meets or exceeds the water quality requirements of the Federal Safe Drinking Water Act as documented in RPU's annual Consumer Confidence Reports (aka, Water Quality Reports). The 2018 Consumer Confidence Report is presented in Appendix D. A link to the current Consumer Confidence Report can be found on RPU's website at https://www.rpu.org/education-environment/water-quality.php.

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

5.1.3 DWSMAs

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

As indicated in Table 1 and discussed in the Part 1 WHPP amendment (Barr, 2017), RPU water supply wells have been classified as vulnerable to contamination.

This WHPP amendment identifies actions for managing the source water aquifers within the DWSMAs. These management actions are influenced by the land uses within the DWSMAs. Since the DWSMAs extend beyond the Rochester city limits and the RPU service area into Cascade, Haverhill, Kalmar, Marion, and Rochester Townships it is logical that RPU would work with these townships and Olmsted County, to the extent possible, to protect the source water aquifers in the townships. The townships and Olmsted County should have a shared interest in protecting the source water aquifers because private wells in the townships pump from some of the same source water aquifers as the RPU wells. A source water protection coordinating committee that includes representatives from the Township Boards, Rochester Planning Department, and Olmsted County would provide RPU with a vehicle for working with these governmental units on source water protection and issues associated with land uses in the DWSMAs.

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

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

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

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

At the beginning of this wellhead protection planning process, RPU sent a notification to surrounding local units of government of its intention to initiate work on an amendment to its wellhead and source water protection plan. After approval of the Part 1 WHPP amendment by the MDH in September 2017 (MDH, 2017), RPU sent information on the WHPAs, DWSMAs, and aquifer and well vulnerability to the local units of government whose jurisdictions overlay some portion of the RPU DWSMAs.

RPU held a public information meeting on November 14, 2017 to receive comments from the general public regarding Part 1 of the WHPP amendment. The local units of government whose jurisdictions overlay the DWSMAs were notified of the public information meeting. No comments on the Part 1

Wellhead Protection Plan were received from the local units of government or the general public at the Public Information Meeting.

As required by the Wellhead Protection Rules, RPU provided local units of government whose jurisdictions overlap the DWSMAs with a copy of the draft Part 2 Wellhead Protection Plan amendment for their review and comment. No written comments on the draft Part 2 Plan amendment were received from the local units of government.

RPU held a Public Hearing on the WHPP amendment on October 29, 2019. The local units of government whose jurisdictions overlap the DWSMAs were notified of the Public Hearing date, time, and location. No comments on the WHPP amendment were received at the public hearing.

5.3 Issues, Problems, and Opportunities Related to the Data Elements

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

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

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

6.0 Wellhead Protection Goals

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

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

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

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

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

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

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

7.0 Objectives and Plans of Action

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

7.1 Establishing Priorities

As discussed throughout this Plan, the vulnerability to contamination of the source water aquifers within the DWSMAs ranges from Low to High (Barr, 2017). The July 2, 2018 Scoping 2 Decision Notice from the MDH required RPU to perform a PCSI to evaluate the types of potential contaminant sources present in the DWSMAs. As discussed above in Section 3, the PCSI was performed following an alternate approach developed by RPU and approved by the MDH. The results of the PCSI are summarized in Table 3.

RPU has identified the objectives and corresponding actions described in the following sections for accomplishing the wellhead and source water protection goals discussed above in Section 6. These goals for RPU's Wellhead and Source Water Protection Program will be achieved through the following existing and planned programs:

- Wells
    - Promoting proper management of existing active wells in the DWSMAs
    - Encouraging the proper sealing of all unused wells within the DWSMAs
    - Identification of new high capacity wells in or near the DWSMAs
    - Maintaining current IWMZ potential contaminant source inventories for RPU's water supply wells
- Potential contaminant source properties
    - Encouraging proper handling of chemicals/wastes
    - Encouraging proper operation and maintenance of storage tanks
    - Periodically obtaining updated information on potential contaminant sources in the DWSMAs from the regulating agencies to maintain an up-to-date potential contaminant source database for the DWSMAs and allow timely recognition of potential issues that could affect RPU municipal water supply or DWSMAs
- Public education
    - Distribution of RPU Annual Water Quality Report for the water supply system,
    - Direct mailing of RPU's monthly newsletter *RPU Plugged In*
    - Posting Wellhead Protection Program information on the RPU website at https://www.rpu.org/education-environment/water-quality.php
    - Using RPU's social media outlets and other means of distribution to distribute information related to wellhead protection
    - Communicate with city of Rochester and Olmsted County Planning Departments to encourage inclusion of wellhead and source water protection in their planning processes

    - Gaging the interest of Cascade, Haverhill, Kalmar, Marion, and Rochester Townships and Olmsted County regarding creation of a source water protection coordinating committee to provide a vehicle for collaboration on activities that will protect the source water aquifers
- Continued data collection
    - Monitoring static and pumping water levels in RPU wells
    - Upgrade of RPU's water quality data management system
    - Sampling of RPU wells and nearby surface water bodies for indicator parameters to assess potential connection between water supply wells and surface water
    - Continued sampling of RPU water supply wells per regulatory requirements
    - Collection of additional local geologic and hydrogeologic data as it becomes available from public sources or from RPU-sponsored projects.
    - Periodically updating the potential contaminant source database
    - Sampling RPU's municipal wells for tritium

7.2 Well Management

The well management objectives outlined in this section consist of promoting the proper sealing of any unused, unmaintained, damaged, or abandoned wells, promoting proper management of active wells within the DWSMAs, and identification of new high capacity wells in or near the DWSMAs.

7.2.1 Distribution of Well Operation and Maintenance Information

The MDH has developed a handbook of information on proper well construction, operation, and maintenance titled "Well Owner's Handbook – A Consumer's Guide to Water Wells in Minnesota". This handbook is available at http://www.health.state.mn.us/divs/eh/wells/construction/handbook.pdf. A link to the MDH website page where the handbook can be found will be added to RPU website. RPU will notify well owners within the DWSMAs via mail and/or via RPU's community outreach vehicles that the information is available through RPU's website. RPU staff will track the number of well owners whom they notify regarding the Well Owner's Handbook.

7.2.1.1 Source of Action

RPU staff will obtain the website information for the handbook from the MDH. RPU staff will then include a link to the MDH website on RPU website, distribute a notification about the website information to well owners within the DWSMAs, and have a copy of the handbook available in a publicly accessible location in RPU offices.

7.2.1.2 Cooperators

None.

7.2.1.3 Time Frame

Distribution of the information to well owners of will be done within one year after approval of this WHPP.

7.2.1.4 Estimated Cost

Approximately $1,500 - $2,500. Costs will include RPU staff time, mailer printing and postage costs, and handbook printing costs.

7.2.1.5 Goals Achieved

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

Success criterion: Notification of well owners in the DWSMAs by mail and/or via RPU's community education vehicles that information on the proper operation and maintenance of private wells is available through RPU's website will be completed within one year of MDH approval of the WHPP. The number of well owners to whom the notification is sent will be tracked.

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

RPU staff will promote the proper sealing of unused, privately owned wells within the DWSMAs. The highest priority will be placed on those wells that are completed in or penetrate one of the source water aquifers from which RPU municipal wells pump.

Proper sealing of unused wells can be promoted by periodically mailing a reminder to owners of wells that unused wells should be properly sealed, by posting a reminder on RPU's website, distributing reminders via RPU's community education vehicles, and by offering cost-share grants for sealing of wells. The well sealing reminder will include a notification of RPU's well sealing cost-share program. The cost-share program will provide a 50 percent reimbursement up to $500 to RPU customers (up to $1,000 if located within one of RPU's DWSMAs). RPU staff will also work with staff from the city of Rochester and Olmsted County Planning Departments to promote proper sealing of unused wells at properties that are being redeveloped as part of the development approval process.

7.2.2.1 Source of Action

RPU

7.2.2.2 Cooperators

City of Rochester Planning Department, Olmsted County Planning Department

7.2.2.3 Time Frame

The first reminders to owners of wells identified as high priority will occur within two years of approval of this Plan. RPU Wellhead Protection Manager will meeting with staff from the city of Rochester and Olmsted County Planning Departments to discuss ways to promote well sealing within one year of approval of this Plan.

7.2.2.4 Estimated Cost

Approximately $1,500-$2,500 for each well sealing reminder mailing event. RPU staff time and costs for preparing and mailing reminders to well owners, preparing reminders to be included on RPU's website, and for meeting with city of Rochester and Olmsted County planning staff. The cost of the well sealing cost-share program will vary from year to year depending on the number of grant applications received. It is estimated that the annual cost of the well sealing cost-share grant program will be $5,000 to $10,000

7.2.2.5 Goals Achieved

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

Success criteria: The first reminder distributed to well owners in the DWSMAs within two years of MDH approval of this WHPP and subsequent reminders distributed every three years thereafter for the life of the Plan and tracking of the number of reminders distributed. Meeting with staff from the city of Rochester and Olmsted County Planning Departments within one year of approval of this Plan. Offering of well sealing cost-share grants each year.

7.2.3 Seal Old Municipal Wells

As noted earlier in this Plan, at the time this Plan was prepared RPU was in the process of identifying, locating, and sealing old municipal wells. RPU intends to continue this process until the old wells have been located and sealed. As needed, RPU will request assistance from MDH staff for identifying and locating old municipal wells. RPU anticipates accessing available grant programs, to the extent possible, to help cover the contractor costs associated with locating and sealing the old wells.

7.2.3.1 Source of Action

RPU

7.2.3.2 Cooperators

MDH

7.2.3.3 Time Frame

RPU hopes to complete the sealing of old municipal wells within approximately two years of approval of this Plan.

7.2.3.4 Estimated Cost

Locating and sealing old municipal wells may require an excavation contractor to uncover wells in addition to the licensed well driller required for sealing the well. Actual cost for sealing an old municipal well will depend on the effort required to uncover the well, the condition of the well (e.g., the well is partially filled with material that must be removed prior to sealing, the casing is not fully grouted and must be perforated prior to sealing, etc.), the well depth, and the well diameter. A typical cost range for sealing an old municipal well is $40,000 to $80,000.

7.2.3.5 Goals Achieved

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

Success criteria: Sealing of all the old municipal wells that can be located.

7.2.4 Identify New High Capacity Wells Within or Near the DWSMAs

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

7.2.4.1 Source of Action

RPU receives notifications from the MDNR's MPARS system when the MDNR receives an application for a new high capacity well or an appropriations increase for an existing well in Olmsted County. RPU staff will request, or direct the Wellhead Protection Consultant to request, from the MDH information on any newly proposed/constructed high capacity wells within or near the DWSMAs. RPU staff will also request assistance from the Wellhead Protection Consultant and the MDH to evaluate whether identified proposed pumping (or changes to pumping) will change the boundaries of the DWSMAs delineated for RPU's wells.

7.2.4.2 Cooperators

MDH, MDNR, and the Wellhead Protection Consultant.

7.2.4.3 Time Frame

Receive notifications from the MPARS system on an ongoing basis and request information from the MDH at least every five years; evaluation of potential changes to the DWSMA boundaries as needed.

7.2.4.4 Estimated Cost

Approximately $3,000-$12,000 for each event of identifying new wells or changes to existing appropriations permits and evaluating how the changes may affect the DWSMA boundaries. RPU staff time and, potentially, Wellhead Protection Consultant time. Actual costs will depend on the number of proposed/new high capacity wells and changes to existing appropriations permits that are identified.

7.2.4.5 Goals Achieved

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

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

7.3 Potential Contaminant Source Properties

The management objectives outlined in this section consist of providing to information to potential contaminant source property owners, promoting proper operation of storage tanks, maintaining an up-to-date database of storage tank properties in the DWSMAs, promoting proper handling of chemicals and wastes, and maintaining the Inner Wellhead Management Zone (IWMZ) around each well so that potential contaminants are prevented from entering the IWMZs.

7.3.1 Information for Registered Storage Tank Owners

RPU, possibly with the assistance of the Wellhead Protection Consultant, will prepare and send a letter to owners of storage tank properties within the DWSMAs. The letter will not be sent to owners of properties for which available information indicates that the storage tanks have been removed. This letter will direct recipients to MPCA publications and guidance on proper operation and maintenance of storage tanks and include information on RPU's Wellhead and Source Water Protection Program (the Program). Information in the letter will also be posted on RPU's website.

7.3.1.1 Source of Action

RPU staff, possibly with the assistance of the Wellhead Protection Consultant, will prepare the letter to owners of targeted storage tank properties. RPU staff will also post information contained in the letter to RPU's website.

7.3.1.2 Cooperators

Wellhead Protection Consultant, if needed

7.3.1.3 Time Frame

The letter will be sent to owners of storage tank properties within two years of approval of this Plan. In addition, letters will be sent to property owners as new storage tank properties are identified in the DWSMAs. A reminder letter will be sent to all targeted storage tank property owners in year seven of Plan implementation.

7.3.1.4 Estimated Cost

Approximately $1,200-$2,200. Estimated costs include RPU staff time, letter production and postage costs, and Wellhead Protection Consultant costs (as necessary).

7.3.1.5 Goals Achieved

Storage tank property owners will be educated concerning the Wellhead and Source Water Protection program, on where to find information on proper operation and maintenance of storage tanks, and the requirements necessary to maintain a safe and secure system. Property owners will be encouraged to use

best management practices regarding their storage tanks, and report any releases of contaminants to RPU in addition to any other actions required by applicable regulations. Planned distribution of this letter provides RPU the opportunity to heighten the awareness of wellhead and source water protection with these property owners.

Success criterion: Distribution of the letter to owners of storage tank properties completed according to the schedule outlined in section 7.3.1.3 and tracking of the number of letters distributed.

7.3.2 Tracking of Registered Storage Tanks

In year five of Plan implementation, RPU will request from the MPCA, or direct the Wellhead Protection Consultant to request on behalf of RPU, information on the status of registered storage tanks in RPU DWSMAs. This information will allow the Rochester Public Utilities to update the PCSI database and maintain current information regarding these potential contaminant sources in the DWSMAs. This activity should also identify new registered storage tanks in the DWSMAs.

The Wellhead Protection Manager will also request that the city of Rochester's Community Development Director notify the Wellhead Protection Manager when new projects that will include storage tanks are proposed in RPU's DWSMAs.

7.3.2.1 Source of Action

RPU staff, or the Wellhead Protection Consultant on behalf of RPU, will contact MPCA staff to obtain the information on the status of registered storage tanks. The Wellhead Protection Manager will contact RPU's Community Development Director.

7.3.2.2 Cooperators

MPCA, city of Rochester Community Development Department, and, potentially, the Wellhead Protection Consultant.

7.3.2.3 Time Frame

Information will be requested from the MPCA in year five after approval of this Plan. Notification to the Wellhead Protection Manager of proposed projects that include storage tanks from the city of Rochester's Community Development Director will occur as projects are proposed.

7.3.2.4 Estimated Cost

Approximately $1,000-$2,000 for each review and update. Estimated costs include RPU staff time and Wellhead Protection Consultant time (as necessary). Costs may vary depending upon the number of new registered storage tank locations that must be added to the PCSI database.

7.3.2.5 Goals Achieved

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

before the municipal water supply is compromised. Notifications of proposed projects that include storage tanks will allow the Wellhead Protection Manager to have up to date information regarding potential new storage tanks in the DWSMAs.

Success criterion: Submittal of request to the MPCA for information regarding the status of registered storage tanks in the DWSMA per the schedule in section 7.3.2.3 and completion of any updates to the PCSI database necessitated by the new information.

7.3.3 Information for Chemical Storage and Hazardous Waste Generator Properties

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

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

7.3.3.1 Source of Action

RPU staff, perhaps with the assistance of the Wellhead Protection Consultant, will prepare and distribute the direct mail notice.

7.3.3.2 Cooperators

Potentially, the Wellhead Protection Consultant.

7.3.3.3 Time Frame

Distribution of the direct mail notice will occur within one year of approval of this Plan. In year six of Plan implementation the direct mail notice will be sent to owners of any newly identified properties within the DWSMAs that are associated with chemical storage or hazardous waste generation.

7.3.3.4 Estimated Cost

Approximately $1,500 to $3,000 for each direct mail notification. Costs for the preparation of the direct mail notice will include RPU staff time, printing, postage costs, and, potentially, Wellhead Protection Consultant costs.

7.3.3.5 Goals Achieved

Business owners will become aware of issues related to their chemical storage or waste generation and handling and learn of available assistance for identifying ways to minimize and properly dispose their waste.

Success criterion: Contact of property owners according to the schedule outlined in section 7.3.3.3.

7.3.4 Inner Wellhead Management Zone Management

The IWMZ is defined in the Minnesota Rules as that area within a 200-foot radius of a public water supply well. RPU will monitor setbacks in the IWMZs, possibly with the assistance of the MDH, to ensure that the IWMZ around each RPU municipal well remains free of potential contaminant sources. RPU staff, possibly with the assistance of the MDH, will document each IWMZ inspection and any actions taken to remove potential contaminant sources from an IWMZ.

7.3.4.1 Source of Action

RPU staff.

7.3.4.2 Cooperators

Possibly the MDH

7.3.4.3 Time Frame

The monitoring of setbacks within the IWMZs will be done at least every three years after approval of this Plan.

7.3.4.4 Estimated Cost

Costs for monitoring the IWMZ setbacks include RPU staff time estimated as $2,000.

7.3.4.5 Goals Achieved

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

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

7.3.5 Transportation Corridors, Pipelines, and Emergency Response

Establishing communication and creating awareness among first responders about transportation corridor and pipeline issues that may affect the public water supply and discussing the procedures in place to address spills and prevent released contaminants from entering the environment and, potentially, impacting the municipal water supply. Transportation corridors include Federal, State, and County highways, railroads, and pipelines (e.g., Figure C-23). The Wellhead Protection Manager will meet with the city of Rochester's Police and Fire Chiefs and encourage them to put in place emergency procedures that will protect the municipal water supply as part of the City's emergency response program.

The Wellhead Protection Manager will also provide copies of the WHPP to the Minnesota Pollution Control Agency (MPCA), Minnesota Office of Pipeline Safety (MnOPS), the city of Rochester's Emergency Management Department, and owners of pipelines and railroads that cross the DWSMAs.

7.3.5.1 Source of Action

RPU staff

7.3.5.2 Cooperators

None

7.3.5.3 Time Frame

Meeting with the Police and Fire Chiefs will occur within two years of approval of this Plan. Transmittal of the WHPP to the MPCA, MnOPS, city of Rochester Emergency Management Department, and railroad and pipeline owners will occur within one year after approval of this Plan.

7.3.5.4 Estimated Cost

Costs for this action will include RPU staff time and production costs for WHPP copies. Estimated cost is $2,000 to $2,500.

7.3.5.5 Goals Achieved

Rochester's emergency responders will work with and assist County and State first responders in the handling of spills in transportation corridors or from pipelines to prevent, to the extent possible, released contaminants from entering the environment and, potentially, impacting the municipal water supply.

State agencies, the city Rochester Emergency Management Department, and railroad and pipeline owners will be educated regarding the boundaries of RPU DWSMAs and the management actions that are planned.

Success criterion: Emergency responder and railroad and pipeline owner awareness of RPU's DWSMAs.

7.4 General Public Education

Public education concerning the DWSMAs associated with RPU's municipal wells will include: distribution of the Annual Water Quality Reports to RPU's customers, providing information on the RPU website (https://www.rpu.org/education-environment/water-quality.php), and periodic distribution of Wellhead and Source Water Protection Program information via RPU's monthly newsletter, on RPU's website, and in appropriate presentations to various groups. In addition, RPU will encourage the city of Rochester and Olmsted County planning staff to include wellhead and source water protection in their planning processes.

7.4.1 Wellhead Protection Information

RPU will develop information regarding the Wellhead and Source Water Protection Program that can periodically be distributed via RPU's newsletter and posted on the RPU website.

7.4.1.1 Source of Action

RPU staff will prepare information on wellhead protection for periodic inclusion in RPU's monthly newsletter, *RPU Plugged In*, and posting on RPU's website (https://www.rpu.org/education-environment/water-quality.php). If necessary, the Wellhead Protection Consultant will be contacted for assistance in preparing this information. RPU staff may also draw on the MDH for wellhead and source water protection educational materials.

7.4.1.2 Cooperators

Wellhead Protection Consultant and MDH, if necessary.

7.4.1.3 Time Frame

Beginning within one year after approval of this Plan and then at least one time per year thereafter.

7.4.1.4 Estimated Cost

Approximately $500 - $2,500 each time information is prepared for distribution. Costs will include RPU staff time for preparing the information, and costs for Wellhead Protection Consultant assistance (as needed).

7.4.1.5 Goals Achieved

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

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

7.4.2 Drinking Water Quality Report

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

7.4.2.1 Source of Action

RPU staff.

7.4.2.2 Cooperators

None.

7.4.2.3 Time Frame

Annually as required by Federal regulations.

7.4.2.4 Estimated Cost

Costs include RPU staff time for preparation of the report and posting the report on RPU's website. Estimated annual cost for preparation of the report is $1,000 to $2,000

7.4.2.5 Goals Achieved

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

Success criterion: Annual publication/distribution of the Annual Water Quality Report.

7.4.3 Inclusion of Wellhead and Source Water Protection in the Planning Process within the DWSMAs

Copies of this WHPP amendment will be supplied to the city of Rochester's Community Development Director and the Olmsted County Planning Director so that they have the most current information on RPU's Wellhead Protection Program. In addition, the Wellhead Protection Manager will work to establish regular meetings with the Rochester and Olmsted County staff responsible for land use planning and development to discuss the potential impacts of proposed development on the RPU wells and the municipal water supply.

7.4.3.1 Source of Action

RPU staff.

7.4.3.2 Cooperators

City of Rochester and Olmsted County planning and development staff.

7.4.3.3 Time Frame

Ongoing

7.4.3.4 Estimated Cost

RPU staff time for meeting with city of Rochester and Olmsted County planning and development staff. The costs will vary depending on the number of meetings held each year.

Success criteria: Incorporation of wellhead and source water protection into the planning, development, and zoning processes in the DWSMAs. Regular communication between the Wellhead Protection Manager and city of Rochester and Olmsted County planning and development staff.

7.4.3.5 Goals Achieved

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

7.4.4 Inclusion of Wellhead and Source Water Protection Information in Public Presentations

The Wellhead Protection Manager periodically makes presentations on RPU's water supply system and water quality issues to citizen and school groups. The Wellhead Protection Manager will include information on the wellhead and source water protection program in these presentations, as appropriate.

7.4.4.1 Source of Action

RPU staff.

7.4.4.2 Cooperators

None

7.4.4.3 Time Frame

Periodically

7.4.4.4 Estimated Cost

RPU staff time for preparing for and making presentations to citizen and school groups. The costs will vary depending on the number of presentations each year.

Success criteria: Incorporation of wellhead and source water protection into presentations made to citizen and school groups.

7.4.4.5 Goals Achieved

Residents of Rochester will be educated regarding RPU's wellhead and source water protection program and on how they can help protect the water supply.

7.4.5 Source Water Protection Coordinating Committee

The Wellhead Protection Manager will contact representatives of Cascade, Haverhill, Kalmar, Marion, and Rochester Townships, the Rochester Planning Department, and Olmsted County to gage their interest in participating in a Source Water Protection Coordinating Committee. The source water aquifers extend beyond the boundaries of the RPU DWSMAs and the Rochester city limits. Land use activities outside of the city of Rochester could, potentially, affect RPU's source water aquifers. In areas outside of the RPU service area but within the DWSMAs private wells pump from some of the same aquifers as the RPU wells. The purpose of the committee would be to facilitate coordination of activities that could help protect the source water aquifers in the townships.

7.4.5.1 Source of Action

The Wellhead Protection Manager will contact representatives of Cascade, Haverhill, Kalmar, Marion, and Rochester Townships and Olmsted County.

7.4.5.2 Cooperators

Cascade, Haverhill, Kalmar, Marion, and Rochester Townships, Rochester Planning Department, and Olmsted County

7.4.5.3 Time Frame

The initial contact of the local units of government whose jurisdictions overlay the DWSMAs will be done within 12 months of approval of this Plan.

7.4.5.4 Estimated Cost

RPU staff time, estimated to be approximately 8 hours for the initial contacts. Additional time will be necessary if the surrounding local units of government are interested in forming a Source Water Protection Coordinating Committee.

7.4.5.5 Goals Achieved

The source water aquifers extend beyond the DWSMA boundaries and land use activities outside of the city of Rochester could, potentially, affect RPU's source water aquifers. Since private wells within the DWSMAs and outside of RPU's service area pump from some of the source water aquifers surrounding local units of government should have a shared interest in protecting the source water aquifers. The Coordinating Committee would be a vehicle for collaboration on activities that will protect the source water aquifers. Coordination of activities will help ensure that water quality in the source water aquifers will continue to meet drinking water standards.

7.5 Data Collection

RPU will continue to collect and maintain local geologic and hydrogeologic data as it becomes available in order to improve and augment current information and to provide additional data for future revisions of this WHPP. RPU will also continue to collect and manage water quality data for the water supply wells, and collect information on potential contaminant sources within the DWSMAs.

7.5.1 Monitoring Static and Pumping Levels in RPU Wells

RPU will continue to routinely measure the static and pumping water levels in the municipal water supply wells and in the RPU observation wells. Water levels in the water supply wells will be recorded by the SCADA system. Water levels in observation wells are manually measured on a quarterly basis. Any observation wells constructed by RPU in the future will be added to the observation well network.

7.5.1.1 Source of Action

RPU staff.

7.5.1.2 Cooperators

None.

7.5.1.3 Time Frame

Ongoing.

7.5.1.4 Estimated Cost

Monitoring of water levels in RPU's wells by the SCADA system is part of routine operations. RPU staff time for quarterly monitoring of the observation wells is estimated to cost $800 to $1,500 annually.

7.5.1.5 Goals Achieved

Routine collection of groundwater levels in the RPU wells will provide data for the evaluation of groundwater elevation trends over time.

Success criterion: Compilation of a long term groundwater elevation dataset that can be used to evaluate groundwater elevation trends in the source water aquifers.

7.5.2 Water Quality Database Upgrade

As discussed above in section 5.1.2.2, RPU was in the initial stages of planning to upgrade their management of water quality data at the time this WHPP was prepared. The objectives of the upgrade will be to eliminate manual entry of water quality data into the database, improve the process for quality assurance/quality control review of laboratory data packages, improve the process for data evaluation and assessment of any trends, and streamline reporting of water quality results out of the database. RPU will work with the Wellhead Protection Consultant to identify a scope, approach, and proposed schedule to meet the database upgrade objectives and to implement the identified approach.

7.5.2.1 Source of Action

RPU staff.

7.5.2.2 Cooperators

Wellhead Protection Consultant.

7.5.2.3 Time Frame

The database upgrade scope and approach and the proposed schedule for the upgrade will be developed within 18 months of approval of this Plan. Schedule for implementation of the upgrade scope and approach will be dependent upon RPU Board approval.

7.5.2.4 Estimated Cost

Estimated cost for the development of the database upgrade scope and approach and proposed schedule is approximately $5,000 to $8,000. Cost for the implementation of the identified database upgrade scope and approach will depend upon the scope and approach to be implemented. It is anticipated that the implementation cost will be greater than $10,000.

7.5.2.5 Goals Achieved

Upgrading the data management system will eliminate the need for manual data entry, provide greater flexibility in how water quality data are evaluated, and streamline required reporting of water quality results.

Success criterion: Development of a scope, approach, and schedule for upgrading the water quality database followed by implementation of the scope and approach resulting in operation of a new water quality data management system.

7.5.3 Groundwater and Surface Water Quality Data Collection

As discussed in the Part 1 WHPP amendment (Barr, 2017), groundwater and surface water quality data obtained by the MDH (Blum, 2016) was used to assess the potential connection between surface water bodies and RPU wells. The study did not eliminate uncertainties regarding potential connections between RPU wells and surface water. Therefore, RPU will work with the MDH and the Wellhead Protection Consultant to develop and implement a plan to collect additional water quality data (including stable isotopes of water along with nitrate, nitrite, ammonia, chloride, bromide, and possibly other parameters) with the objective of reducing, or eliminating, uncertainties regarding potential connections between RPU wells and surface water. The data could also be used to improve RPU's groundwater model and to support improved assessments of well vulnerability.

7.5.3.1 Source of Action

RPU staff.

7.5.3.2 Cooperators

MDH and the Wellhead Protection Consultant

7.5.3.3 Time Frame

Within four years of approval of this Plan.

7.5.3.4 Estimated Cost

The cost of the sampling program will depend on the suite of analytical parameters, the number of sampling points, the number of sampling events, and staff assigned to the project and cannot be estimated at this time. It is considered likely that the cost of the program will be greater than $10,000.

7.5.3.5 Goals Achieved

Uncertainties regarding potential connections between RPU wells and surface water will be reduced or eliminated. The data will also support improvements to RPU's groundwater model and improved assessments of well vulnerability.

Success criterion: Development and implementation of the groundwater and surface water quality data collection program.

7.5.4 Sampling of RPU Water Supply Wells

RPU will continue to collect and analyze groundwater samples from the water supply wells as mandated by applicable regulations. Typically, the MDH collects the samples and provides laboratory analytical services for these samples.

7.5.4.1 Source of Action

RPU staff.

7.5.4.2 Cooperators

MDH.

7.5.4.3 Time Frame

Sampling frequency varies by well. Well 11 is currently sampled quarterly while other wells are sampled less frequently; not all wells are sampled every year.

7.5.4.4 Estimated Cost

RPU staff time is required to coordinate the sampling with MDH staff.

7.5.4.5 Goals Achieved

Collection and analysis of groundwater samples from the RPU water supply wells as required by applicable regulations will ensure RPU remains in compliance with the regulations. Data obtained from the analyses of the samples will allow RPU to monitor the water quality in the source water aquifers and identify any trends toward increasing concentrations of regulated contaminants.

Success criterion: Collection and analysis of groundwater samples from the RPU water supply wells on the schedule mandated by applicable regulations.

7.5.5 Other Geologic and Hydrogeologic Data Collection

RPU will attempt to obtain local geologic and hydrogeologic data for the Rochester area as it becomes available from other public sources or through RPU-sponsored projects. RPU will also support, whenever possible, future data collection efforts by other governmental entities (e.g., MGS, MDH, MDA, MDNR, MPCA, Olmsted County Soil & Water Conservation District, and Olmsted County).

7.5.5.1 Source of Action

RPU staff.

7.5.5.2 Cooperators

State and Olmsted County agencies conducting geologic and hydrogeologic studies, well drilling companies, Wellhead Protection Consultant, and others.

7.5.5.3 Time Frame

Ongoing beginning with approval of this WHPP.

7.5.5.4 Estimated Cost

Approximately $1,000 to $1,500 for compiling data from other public sources. Note that the cost could vary (and potentially be higher than estimated) depending on the source and the amount of data and the level of effort needed to put the data into a usable format. Cost for RPU-sponsored projects will depend on the scope of the projects and may vary significantly. It is possible that the costs for some RPU-sponsored projects would be greater than $10,000.

7.5.5.5 Goals Achieved

More accurate hydrogeologic data will be available for use in siting future wells, to support RPU's ongoing water source sustainability evaluation, to update RPU's groundwater model, and for future revisions of the delineated WHPAs and the DWSMAs for RPU's wells. Updated and more accurate vulnerability assessments may be possible as a result of new information.

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

7.5.6 Updating of RPU's Groundwater Model

Any new geologic and hydrogeologic data for the Rochester area obtained by RPU will be periodically reviewed to determine if RPU's groundwater model could be improved by incorporating the new data. In addition, pumping from high capacity wells often changes over time. Changes in pumping from high capacity wells in or near RPU DWSMAs could affect the DWSMA boundaries. Therefore, RPU will work with the Wellhead Protection Consultant to review available information and determine if the RPU groundwater flow model should be updated so that future WHPA/DWSMA delineations will be consistent with available information.

7.5.6.1 Source of Action

RPU staff

7.5.6.2 Cooperators

Wellhead Protection Consultant

7.5.6.3 Time Frame

Five to seven years after approval of this Plan

7.5.6.4 Estimated Cost

Approximately $3,000 to $10,000 depending upon the magnitude of the revisions needed to make the groundwater flow model consistent with the most current available information.

7.5.6.5 Goals Achieved

The RPU groundwater flow model will be consistent with available information. As a result, updating the WHPAs for the RPU wells in the future can be done more efficiently.

Success criterion: An updated groundwater flow model that can be used for future updates to Part 1 of RPU's WHPP, to evaluate the effect of new, non-RPU high capacity wells on the DWSMA boundaries, or to evaluate sites for new municipal wells.

7.5.7 Potential Contaminant Source Database

RPU will periodically update the information on potential contaminant sources within the DWSMAs collected during the development of this WHPP amendment, with the assistance of the Wellhead Protection consultant – if needed. RPU will add information to the potential contaminant source database as additional potential contaminant source sites are identified or as sites are closed through working with the MPCA, the MDH, the MDNR, the U.S. EPA, and Olmsted County. New information for the PCSI database will be obtained by contacting appropriate MPCA, MDH, MDNR, U.S. EPA, and County programs between years four and six of Plan implementation.

7.5.7.1 Source of Action

RPU staff.

7.5.7.2 Cooperators

MPCA, MDH, MDNR, U.S. EPA, Olmsted County staff, and the Wellhead Protection Consultant, if needed.

7.5.7.3 Time Frame

Between years four and six after approval of this Plan.

7.5.7.4 Estimated Cost

Approximately $1,500-$4,000. RPU staff time and, if needed, Wellhead Protection Consultant costs. Actual costs will depend upon the amount of new potential contaminant source location information that must be added to the potential contaminant source database and could be higher than the estimated range shown.

7.5.7.5 Goals Achieved

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

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

7.5.8 Tritium Sampling

Tritium (^{3}H), a radioactive isotope of hydrogen, whose atmospheric concentrations rose in the 1950s and early 1960s due to atmospheric hydrogen bomb testing, has been used extensively to date groundwater. Tritium activities peaked during atmospheric hydrogen bomb testing of the 1950s and 1960s, and values

of ^{3}H in precipitation reached a maximum of approximately 10,000 TU (tritium units) in 1963 (Mazor, 2004). Natural production of ^{3}H in the upper atmosphere introduces approximately 5 TU to precipitation each year (Mazor, 2004). The presence of tritium at concentrations above 1 tritium unit in a groundwater sample indicates the presence of a significant fraction of post-1954 (i.e., recently infiltrated) water in the sample.

The MDH sampled RPU water supply wells for tritium in in 2004, 2005, 2008, 2011, and 2013. Not all wells were sampled in any one year. Most of the wells were sampled in either 2011 or 2013. Sampling of RPU wells for tritium at regular intervals will allow for tracking of tritium concentrations over time. If a tritium concentration in a groundwater sample from a well is significantly higher than the concentration in a previous sample from the same well it could be an indication that there is a pathway such as a breech in the well casing or an unused, unsealed well in the vicinity that allows water to move from the surface to the source water aquifer faster than before the pathway became available. In year four of Plan implementation, RPU will contact the MDH to develop a schedule for sampling of the RPU municipal water supply wells for tritium. Since the MDH already has a program to sample municipal wells for tritium RPU would rely on the MDH for analysis of the samples for tritium.

7.5.8.1 Source of Action

RPU

7.5.8.2 Cooperators

MDH

7.5.8.3 Time Frame

A schedule for tritium sampling will be developed in year four of Plan implementation.

7.5.8.4 Estimated Cost

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

7.5.8.5 Goals Achieved

Tritium sampling will provide data for evaluating if pathways that allow for relatively rapid movement of water from the surface to the source water aquifers are present.

Success criterion: Collection of groundwater samples from RPU's wells and analysis of these samples for tritium on the scheduled developed in conjunction with the MDH.

8.0 Evaluation Program

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

Evaluation activities discussed in this WHPP amendment include the following:

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

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

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

9.0 Alternative Water Supply Contingency Strategy

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

In 2011 the MDNR approved RPU's Water Supply Plan that includes a water supply contingency strategy that would be implemented in the event of a water emergency. RPU adopted the Water Supply Plan on March 29, 2011. Copies of the MDNR approval letter for the 2011 Water Supply Plan and the completed Certificate of Adoption for the Water Supply Plan that RPU filed with the MDNR are presented in Appendix G. A copy of the 2011 Water Supply Plan is available from RPU upon request.

In October 2018 (prior to the time this WHPP amendment was prepared) RPU submitted a new Water Supply Plan to the MDNR that addresses water emergencies and water conservation. Once the new Water Supply Plan is approved by the MDNR and adopted by RPU it will replace the 2011 plan referenced in this section. Since it is not known when the MDNR will complete its review of RPU's new Water Supply Plan, the Emergency Preparedness Procedures and Emergency Telephone List sections of the new Water Supply Plan are included in Appendix G and will be followed in any interim period between expiration of the 2011 Water Supply Plan and approval/adoption of the new Water Supply Plan. RPU will provide documentation of MDNR approval and RPU adoption of the new Water Supply Plan to the MDH when available.

10.0 References

Barr Engineering Co. (Barr), 2017. Rochester Public Utilities Wellhead Protection Plan Amendment – Part 1: Delineation of the Wellhead Protection Area (WHPA), Drinking Water Supply Management Area (DWSMA) and Assessments of Well and DWSMA Vulnerability, prepared for Rochester Public Utilities, July 2017.

Barr Engineering Co. (Barr), 2018. Draft Local Water Supply Plan, prepared for Rochester Public Utilities, Draft submitted to MDNR October 2018.

Blum, J., 2016. Analysis of Water Chemistry Data from Rochester Public Utility (RPU) Wells for Groundwater Residence Time and Possible Human Impacts – to Inform the Vulnerability Assessments for the Rochester Wellhead Protection Plan Amendment, Memo from Justin Blum of Minnesota Department of Health to Rochester Public Utility WHP Project File (PWSID: 1550010), April 8, 2016.

Greer, J. (Barr Engineering Co.) and T. Osweiler (RPU), 2018. Proposed RPU PCSI Pilot Process, memorandum to Jennifer Ronnenberg (MDH) and Robyn Hoerr (MRWA), June 13, 2018.

Mazor, E. 2004. Chemical and Isotopic Groundwater Hydrology, 3rd ed., New York: Marcel Dekker Inc.

Minnesota Department of Health (MDH), 2014. Scoping Decision Notice No. 1 for the Rochester Public Utilities, PWSID 1550010, for Amending the Wellhead Protection Plan, Letter from Justin Blum of the MDH to Rochester Public Utilities, October 27, 2014.

Blum, J., 2016. Analysis of Water Chemistry Data from Rochester Public Utility (RPU) Wells for Groundwater Residence Time and Possible Human Impacts – to Inform the Vulnerability Assessments for the Rochester Wellhead Protection Plan Amendment, Memo from Justin Blum of Minnesota Department of Health to Rochester Public Utility WHP Project File (PWSID: 1550010), April 8, 2016.

Minnesota Department of Health (MDH), 2017. Letter from Justin Blum of the MDH to Todd Osweiler of Rochester Public Utilities approving the Part 1 Wellhead Protection Plan Amendment, dated September 19, 2017.

Minnesota Department of Health (MDH), 2018. Scoping 2 Decision Notice and Meeting Summary – Rochester Public Utilities – PWSID 1550010, Letter from Jennifer Ronnenberg of the MDH to Todd Osweiler of Rochester Public Utilities, July 2, 2018.

Osweiler, T. and J. Blum, 2004. Part 1 of the Wellhead Protection Plan for the City of Rochester, Minnesota – Including: the Wellhead Protection Area Delineation, Drinking Water Supply Management Area Delineation, and Vulnerability Assessment, June 2004.

Osweiler, T. and T. Hill, 2007. Wellhead and Source Water Protection Part 2: Wellhead Protection Plan – City of Rochester, Minnesota, February 2007

Tables

Table 1

Municipal Well Construction Summary
Rochester Public Utilities WHPP Amendment

Unique Number	Local Well ID	Use[1]	Year Completed	Casing Diameter (in)	Casing Depth (ft)	Well Depth (ft)	Aquifer[2]	Well Vulnerability[3]
220666	11	P	1948	20	140	455	OPSH – CJDN	High
220833	12	P	1960	14	307	752	CJDW	High
222525	13	P	1954	24x20	141	442	OPSH – CJDN	High
222528	15	P	1957	30x24	154	432	OPSH – CJDN	High
220822	17	P	1960	24x16	429	904	CJDW	Medium
222527	18	P	1963	30x24	343	806	CJDW	Medium
220681	19	P	1962	30x24	343	881	CJDW	Medium
220662	20	P	1964	30x24	306	912	CJMS	Medium
220625	21	P	1965	30x24	458	981	CJDW	Low
220818	22	P	1966	30x24	344	730	CJDW	Medium
220660	23	P	1967	30x24	326	436	OPSH-CJDN	Low
220819	24	P	1968	24	309	685	CJDW	Low
220675	25	P	1969	30x24	345	850	CJDW	Low
147451	26	P	1978	30x24	364	624	OPSH – CJDN	High
224212	27	P	1979	30x24	345	448	CJDN	Medium
180567	28	P	1981	30x24	305	389	CJDN	High
161425	29	P	1982	30x24	422	519	CJDN	Medium
239761	30	P	1984	36x24	319	402	CJDN	Medium
434041	31	P	1987	36x24	462	530	CJDN	Medium
506819	32	P	1989	36x24	453	540	CJDN	High
220627	33	P	1958	24x16	509	605	CJDN	Medium
463536	34	P	1991	36x24	369	465	CJDN	Medium
601335	35	P	1999	36x30x24	369	457	CJDN	Medium
601336	36	P	2000	30x24	397	478	CJDN	Medium
676687	37	P	2003	30x24	393	501	CJDN	Medium
698933	38	P	2004	30x24	374	467	CJDN	Medium
733087	39	P	2006	30x24	365	458	CJDN	Medium
773386	40	P	2010	30x24	460	640	OPSH – CJDN	Low
796431	41	P	2014	30x24	360	470	CJDN	Low
220628	72	P	1968	10x6	375	460	CJDN	Low
220629	77	P	1964	12x8	369	450	CJDN	Low

[1] P=Primary water supply well

[2] Aquifer codes: CJDN = Jordan; OPSH – CJDN = Shakopee – Jordan;
CJDW = Jordan – Tunnel City – Wonewoc;
CJMS = Jordan – Tunnel City –Wonewoc – Mt. Simon

[3] Well vulnerability from Table 4 in Blum (2016)

Table 2

Annual Volume of Water Pumped
Rochester Public Utilities WHPP Amendment

Unique Number	Well Name	Total Annual Withdrawal (gal/yr)				
		2009	2010	2011	2012	2013
220666	11	191,803,000	167,695,000	165,884,000	229,389,000	111,057,000
220833	12	1,500,000	1,918,000	1,901,000	494,000	257,000
222525	13	203,006,000	201,011,000	135,849,000	102,568,000	114,899,000
222528	15	19,411,000	24,214,000	39,186,000	34,006,000	74,385,000
220822	17	235,986,000	237,476,000	198,307,000	133,904,000	126,352,000
222527	18	157,186,000	127,732,000	61,035,000	142,445,000	120,884,000
220681	19	25,556,000	19,471,000	28,934,000	25,200,000	21,892,000
220662	20	56,239,000	53,947,000	89,395,000	87,096,000	23,170,000
220625	21	93,614,000	86,588,000	92,199,000	92,107,000	101,030,000
220818	22	254,267,000	211,738,000	175,787,000	206,448,000	160,210,000
220660	23	50,425,000	45,303,000	28,863,000	112,629,000	116,310,000
220819	24	43,479,000	33,538,000	29,995,000	28,748,000	25,426,000
220675	25	215,937,000	337,250,000	310,992,000	158,654,000	131,511,000
147451	26	148,058,000	156,300,730	119,257,000	128,100,000	130,258,000
224212	27	444,421,000	390,941,000	388,429,000	284,333,000	296,747,000
180567	28	196,722,000	262,369,000	348,229,000	380,483,000	421,974,000
161425	29	165,073,000	209,563,000	153,846,000	174,710,000	166,656,000
239761	30	350,746,000	199,927,000	259,270,000	446,886,000	319,984,000
434041	31	288,029,000	191,438,000	285,774,000	291,969,000	269,016,000
506819	32	141,846,000	39,827,000	97,629,000	84,281,000	111,078,000
220627	33	11,612,000	11,198,000	9,282,000	19,199,000	9,735,000
463536	34	191,586,000	129,757,000	152,437,000	191,575,000	197,142,000
601335	35	204,753,000	266,288,000	167,348,000	251,162,000	298,979,000
601336	36	457,984,000	564,113,000	548,132,000	486,436,760	503,027,000
676687	37	151,536,000	224,639,000	153,004,000	204,960,000	137,683,000
698933	38	129,221,000	42,242,000	206,240,000	232,607,000	103,065,000
733087	39	183,176,000	156,556,000	120,750,000	174,684,000	294,920,000
773386	40	0	0	33,433,000	101,175,000	79,130,000
796431	41	--	--	--	--	--
220628	Sandy Slopes (72)	3,437,061	3,278,782	3,264,796	3,722,273	3,032,468
220629	Meadowbrook (77)	4,097,200	3,414,000	3,900,000	4,175,400	3,410,900

Source: RPU Pumping Records

Table 3

Summary of Potential Sources of Contaminants and Assigned Risk Classification
Rochester Public Utilities WHPP Amendment

Potential Contaminant Source Category	Total Number in DWSMAs[1]	Number Within IWMZs and Risk Assigned	Number Within ERZs and Risk Assigned	Number Between ERZ Boundaries and 5-Year Time of Travel Limits and Risk Assigned	Number Within Remainder of the DWSMAs and Risk Assigned
Animal Feed Lots	56	0	1 (Mod.)	13 (Low)	42 (Low)
Land Application Locations	40	0	0	8 (Low)	32 (Low)
Potential Contaminant Source Locations (Brownfield and Superfund Sites)	49	1 (Low[3])	1 (Mod.)	29 (Low)	18 (Low)
Solid Waste Management Site	1	0	1	0	0
Spill Locations	244	0	9 (Low[4])	123 (Low)	121 (Low)
Stormwater Basin	139	0	0	35 (Low)	104 (Low)
Subsurface Sewage Treatment System	5,272	0	0	2,131 (Low)	3,141 (Low)
Suspected Contaminant of Concern	7	0	0	5 (Low)	2 (Low)
Transportation Water Crossings	25	0	0	20 (Low)	5 (Low)
Wastewater Disposal Site	22	0	2 (Mod.)	12 (Low)	8 (Low)
Wastewater Treatment Pond	1	1 (Mod.[3])	0	0	0
Chemical Storage Sites					
Agricultural Chemicals	33	0	0	0	33 (Low)
Non-Agricultural Chemicals	420	25 (Mod.[3])	12 (Mod.)	166 (Low)	217 (Low)
Class V Well Locations (CVMVW)	40	0	0	21 (Low)	19 (Low)
Hazardous Waste Generators	976	8 (Mod.[5])	43 (Mod.)	458 (Low)	467 (Low)

Table 3

Summary of Potential Sources of Contaminants and Assigned Management Priority
Rochester Public Utilities WHPP Amendment

Potential Contaminant Source Category	Total Number in DWSMAs[1]	Number Within IWMZs and Risk Assigned	Number Within ERZs and Risk Assigned	Number Between ERZ Boundaries and 5-Year Time of Travel Limits and Risk Assigned	Number Within Remainder of the DWSMAs and Risk Assigned
Storage Tank Sites					
Leaking Tank Sites	150	1 (Low[4])	11 (Low[4])	88 (Low)	50 (Low)
Registered Storage Tank Sites	279	8 (Mod.[3])	29 (10 Mod. & 19 Low)[6]	116 (Low)	126 (Low)
Wells (status = Active, Inactive, or Unknown)					
Completed in or penetrating a source water aquifer[2]	802	5 (High)	13 (High)	219 (High)	565 (High)
Not completed in or penetrating source water aquifer	280	0	5 (Mod.)	121 (Low - 18; Mod. - 103)	154 (Low)

ERZ = Emergency Response Zone; defined as the portion of the WHPA within the 1-year groundwater time of travel area.
IWMZ = Inner Wellhead Management Zone: defined in MR4720.5100 subpart 19 as the area within 200 feet of a public water supply well.
[1]Total number = Number of each PCS type within ERZs + Number of property parcels associated with each PCS type outside of the ERZs.
[2]Total number does not include the 31 RPU water supply wells.
[3]The site in question is the Silver Lake Power Plant property on which RPU Well 12 is located. There are no specific contaminant sources within the Well 12 IWMZ. In addition, RPU maintains control of the property around Well 12. Therefore, the potential risk to the well is considered to be low.
[4]Sites have been closed by MPCA so risk level is classified as low.
[5]All sites are near wells whose vulnerability (see Table 1) is classified as moderate or low.
[6]Active tanks are classified as moderate risk and removed tanks are classified as low risk.

Table 4

High Capacity Wells within One Mile of the DWSMAs
Rochester Public Utilities WHPP Amendment

Permit Number	Unique ID	Status	Permittee	Use	Aquifer	Permitted Volume MGY
1968-1013	220629	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJDN	5
1969-0193	220628	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJDN	9
1971-0311	228150	Active	Kerry Biofunctional Ingredients Inc	Agricultural/Food Processing	OPDC	200
1971-0311	228150	Active	Kerry Biofunctional Ingredients Inc	Industrial Process Cooling - Once Through	OPDC	200
1975-5105	228636	Active	Associated Milk Producers - Rochester	Agricultural/Food Processing	CJDN	436
1975-5105	228635	Active	Associated Milk Producers - Rochester	Agricultural/Food Processing	CJDN	436
1975-5105	233030	Active	Associated Milk Producers - Rochester	Agricultural/Food Processing	OPCJ	436
1975-5133	220817	Active	IBM Corporation	Commercial/Institutional Building AC	CJTC	85
1979-5076	220666	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCS	5700
1979-5076	220833	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJEC	5700
1979-5076	222525	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCS	5700
1979-5076	222528	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCS	5700
1979-5076	220827	Active	Rochester Public Utilities	Municipal/Public Water Supply	CSMS	5700
1979-5076	220822	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCE	5700
1979-5076	222527	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJEC	5700
1979-5076	220681	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJEC	5700
1979-5076	220662	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCM	5700
1979-5076	220625	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJEC	5700
1979-5076	220818	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCE	5700
1979-5076	220660	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCE	5700
1979-5076	220819	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJEC	5700
1979-5076	220675	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCE	5700
1979-5076	147451	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCJ	5700
1979-5076	224212	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCS	5700

Table 4

High Capacity Wells Within One Mile of the DWSMA
Rochester Public Utilities

Permit Number	Unique ID	Status	Permittee	Use	Aquifer	Permitted Volume MGY
1979-5076	180567	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJSL	5700
1979-5076	161425	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCS	5700
1979-5076	239761	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCS	5700
1979-5076	434041	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCJ	5700
1979-5076	506819	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCJ	5700
1979-5076	220627	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJDN	5700
1979-5076	463536	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCS	5700
1979-5076	601335	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCJ	5700
1979-5076	601336	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJDN	5700
1979-5076	676687	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCJ	5700
1979-5076	698933	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJDN	5700
1979-5076	733087	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJDN	5700
1979-5076	773386	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCJ	5700
1979-5076	796431	Active	Rochester Public Utilities	Municipal/Public Water Supply	CJDN	5700
1979-5076	220832	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCS	5700
1979-5076	220831	Active	Rochester Public Utilities	Municipal/Public Water Supply	OPCJ	5700
1979-5076	Not Available	Active	Rochester Public Utilities	Municipal/Public Water Supply	Not Available	5700
1980-5051	233037	Active	Rochester Public Utilities	Thermoelectric Power Cooling - Recirculating	OPDC	220
1980-5051	233038	Active	Rochester Public Utilities	Thermoelectric Power Cooling - Recirculating	OPDC	220
1980-5051	233039	Active	Rochester Public Utilities	Thermoelectric Power Cooling - Recirculating	OPDC	220
1984-5085	242118	Active	Seneca Foods Corp - Rochester	Agricultural/Food Processing	OPDC	125
1989-5160	220664	Active	Mayo Foundation	Other Power Generation	OPCT	300

Table 4

High Capacity Wells Within One Mile of the DWSMA
Rochester Public Utilities

Permit Number	Unique ID	Status	Permittee	Use	Aquifer	Permitted Volume MGY
1989-5160	220665	Active	Mayo Foundation	Other Power Generation	OPCS	300
1990-5003	220786	Active	St Marys Hospital	Commercial/Institutional Water Supply	OPCS	152
1990-5003	231890	Active	St Marys Hospital	Commercial/Institutional Water Supply	CJDN	152
1990-5003	527584	Active	St Marys Hospital	Commercial/Institutional Water Supply	QWTA	152
1990-5053	249071	Active	Rochester Golf and Country Club	Golf Course Irrigation	OSCJ	50
1990-5053	227828	Active	Rochester Golf and Country Club	Golf Course Irrigation	OPDC	50
1990-5060	120022	Active	Willow Creek Golf Course	Golf Course Irrigation	OSPC	20
1992-5083	220811	Active	Zumbro Ridge Estates Mhp	Private Water Supply	CJDN	8.8
2004-4192	675494	Active	Decook, Judith; Decook, Leon	Golf Course Irrigation	OGGP	21
2004-4192	675496	Active	Decook, Judith; Decook, Leon	Golf Course Irrigation	OSTP	21.2
2010-0159	Not Available	Active	city of Rochester	Pollution Containment	Not Available	1
2010-0159	757586	Active	city of Rochester	Pollution Containment	OPDC	1.1
2010-0159	757587	Active	city of Rochester	Pollution Containment	OPDC	1
2010-0159	757588	Active	city of Rochester	Pollution Containment	OPDC	1.1
2010-0159	757589	Active	city of Rochester	Pollution Containment	OPDC	1
2010-0159	757590	Active	city of Rochester	Pollution Containment	OPDC	1.1
2010-0159	757591	Active	city of Rochester	Pollution Containment	OPDC	1
2010-0159	757592	Active	city of Rochester	Pollution Containment	OPDC	1.1
2010-0159	757594	Active	city of Rochester	Pollution Containment	OPDC	1
2016-2137	Not Available	Active	Olmsted County Environmental Resources	Groundwater Dewatering	Not Available	12
2017-0435	Not Available	Active	Rochester Public Utilities	Construction Dewatering	Not Available	3
2017-0435	Not Available	Active	Rochester Public Utilities	Construction Dewatering	Not Available	2.5

Table 4

High Capacity Wells Within One Mile of the DWSMA
Rochester Public Utilities

Permit Number	Unique ID	Status	Permittee	Use	Aquifer	Permitted Volume MGY
2017-1977	Not Available	Active	city of Rochester	Construction Dewatering	Not Available	43

Aquifer/Formation Codes:
CJDN = Jordan Sandstone
CJEC = Jordan Sandstone – Eau Claire Formation
CJSL = Jordan Sandstone – St. Lawrence Formation
CJTC= Jordan Sandstone – Tunnel City Group
CSMS = St. Lawrence Formation – Mt. Simon Sandstone
OPCE = Prairie du Chien Group – Eau Claire Formation
OPCJ = Prairie du Chien Group – Jordan Sandstone
OPCM = Prairie du Chien Group – Mt. Simon Sandstone
OPCS = Prairie du Chien Group – St. Lawrence Formation
OPCT = Prairie du Chien Group – Tunnel City Group
OPDC = Prairie du Chien Group
QWTA = Quaternary water table aquifer
OGGP = Galena Group
OSCJ = St. Peter Sandstone – Jordan Sandstone
OSPC = St. Peter Sandstone – Prairie du Chien Group
OSTP = St. Peter Sandstone

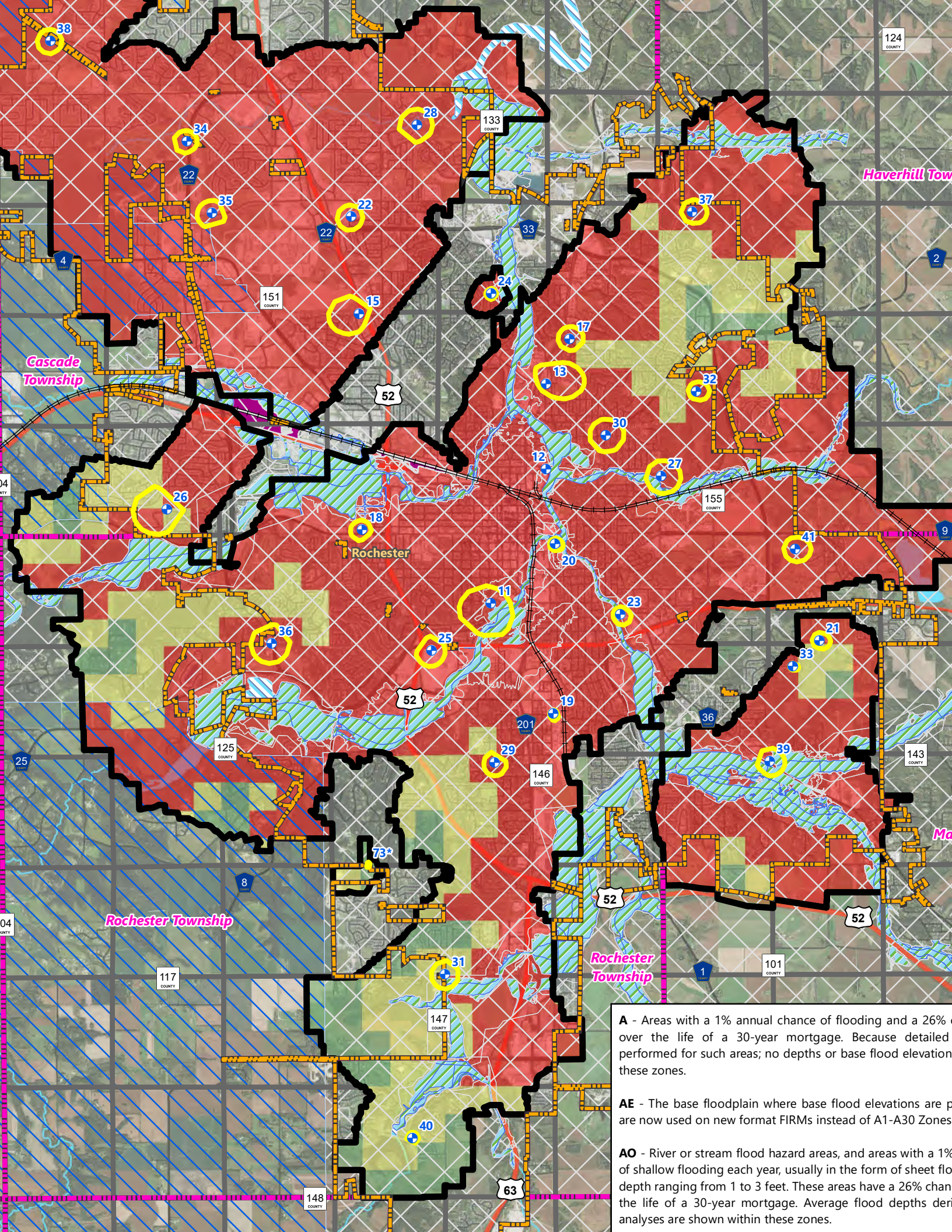
Table 5

Management Action Implementation Schedule
Rochester Public Utilities WHPP Amendment

Management Action		Target Implementation/Completion Year									
		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
7.2 Well Management											
7.2.1	Distribution of Well Operation and Maintenance Information	X									
7.2.2	Promote the Proper Sealing of Unused, Unmaintained, Damaged, or Abandoned Wells within the DWSMAs	X	X								
7.2.3	Seal Old Municipal Wells	X			X						
7.2.4	Identify New High Capacity Wells Within or Near the DWSMAs	X									X
7.3 Potential Contaminant Source Properties											
7.3.1	Information for Registered Storage Tank Owners	X	X					X			
7.3.2	Tracking of Registered Storage Tanks					X					
7.3.3	Information for Chemical Storage and Hazardous Waste Generator Properties	X									
7.3.4	Inner Wellhead Management Zone Management			X			X			X	
7.3.5	Transportation Corridors, Pipelines, and Emergency Response	X	X								
7.4 General Public Education											
7.4.1	Wellhead Protection Information	X									X
7.4.2	Drinking Water Quality Report	X									X
7.4.3	Inclusion of Wellhead and Source Water Protection in the Planning Process within the DWSMAs	X									X
7.4.4	Inclusion of Wellhead and Source Water Protection Information in Public Presentations	X									X
7.4.5	Source Water Protection Coordinating Committee	X									
7.5 Data Collection											
7.5.1	Monitoring Static and Pumping Levels in RPU Wells	X									X
7.5.2	Water Quality Database Upgrade	X	X								
7.5.3	Groundwater and Surface Water Quality Data Collection				X						
7.5.4	Sampling of RPU Water Supply Wells	X									X
7.5.5	Other Geologic and Hydrogeologic Data Collection	X									X
7.5.6	Updating RPU's Groundwater Model					X		X			
7.5.7	Potential Contaminant Source Database				X		X				
7.5.8	Tritium Sampling				X						
8.0	Evaluation Program		X		X		X		X		X

Notes:
Implementation schedule assumes Plan approval in early 2020
X—X Indicates that implementation of the management action will occur periodically or continuously through the indicated timeframe

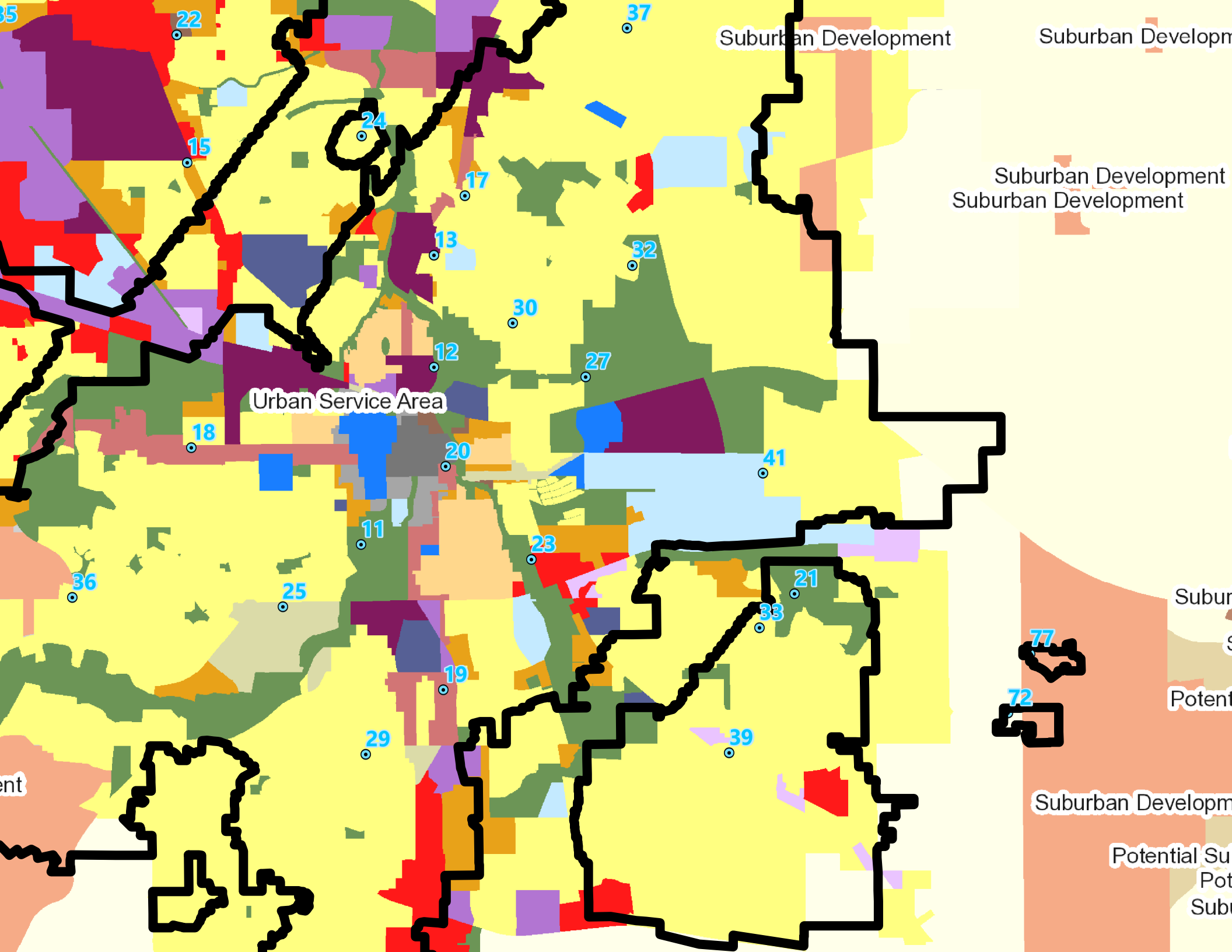
Figures

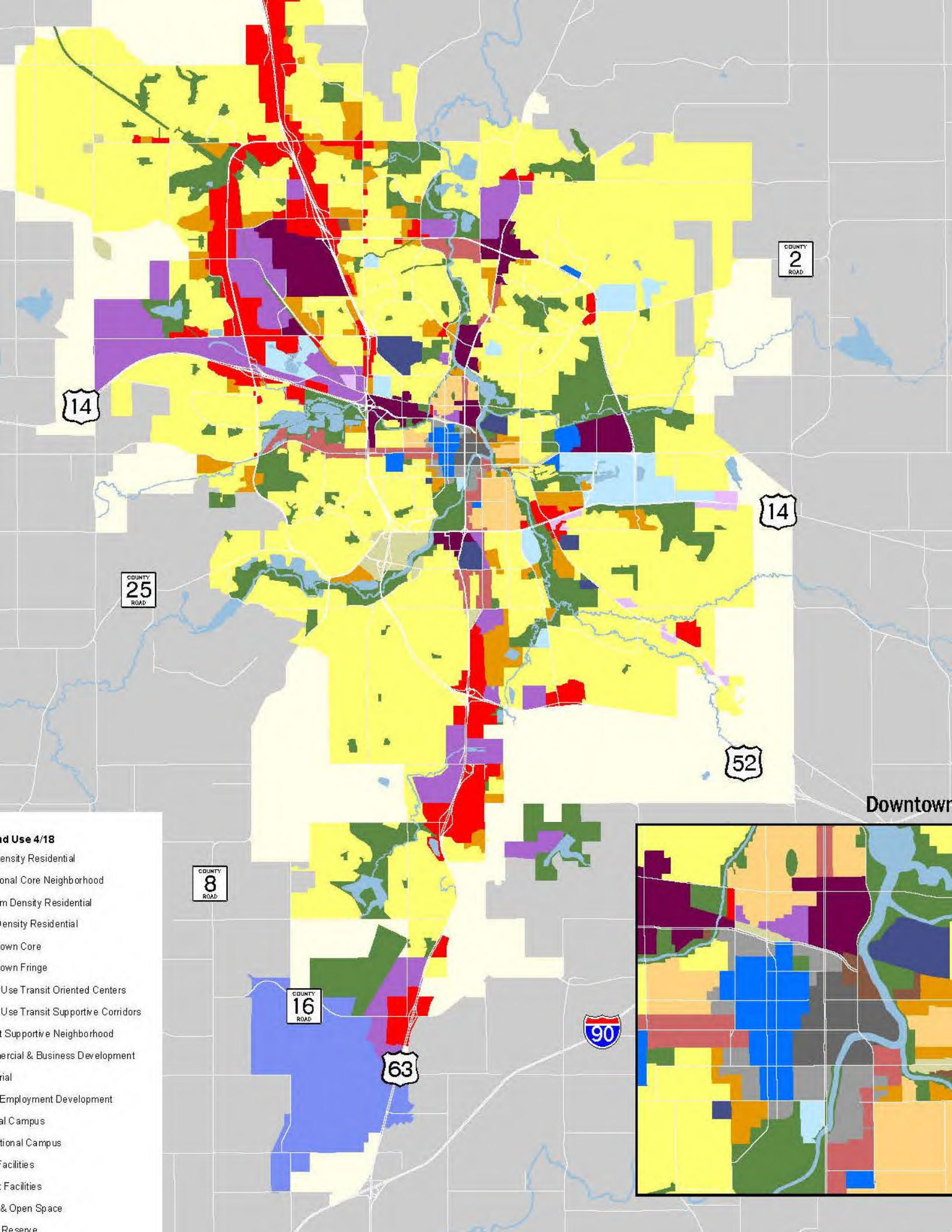


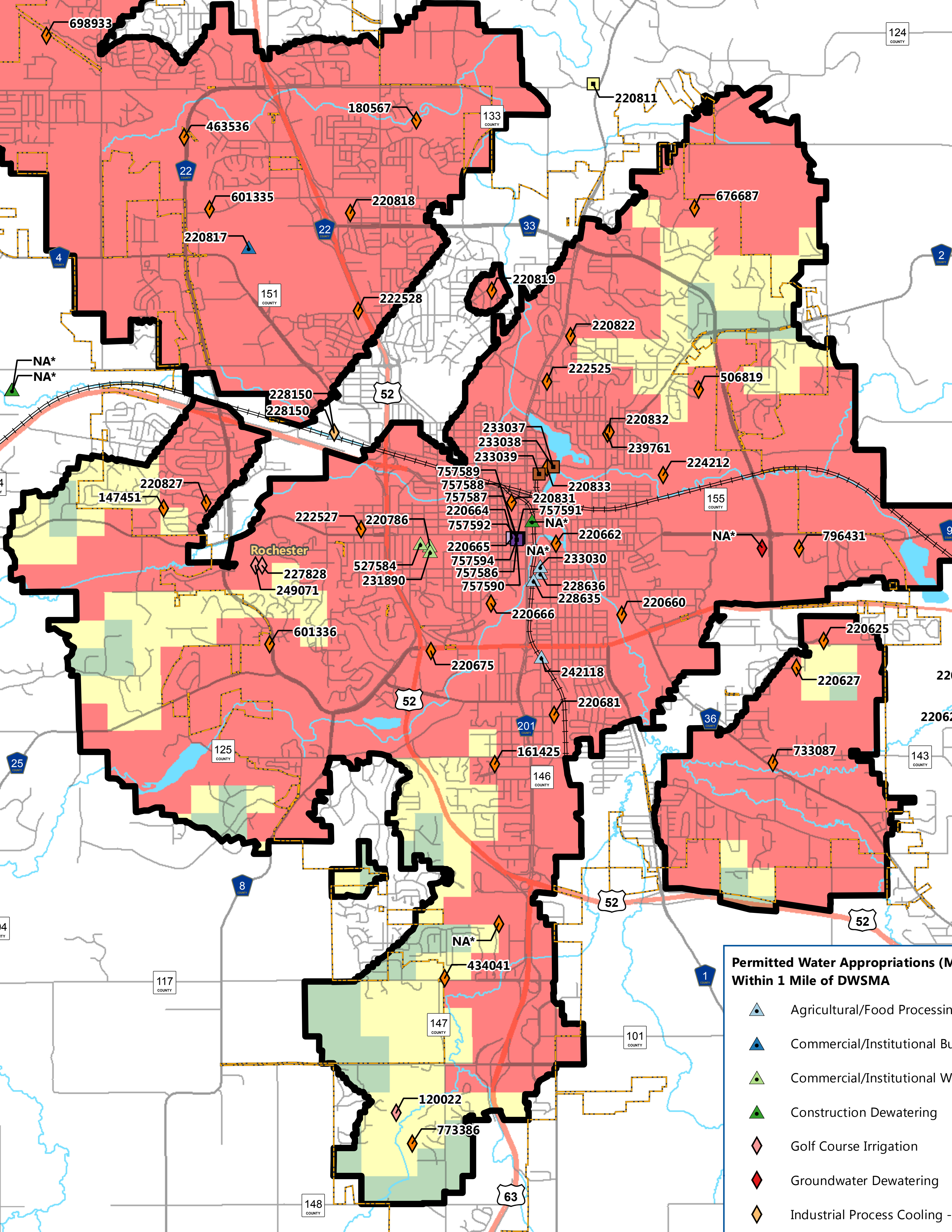
A - Areas with a 1% annual chance of flooding and a 26% c
over the life of a 30-year mortgage. Because detailed
performed for such areas; no depths or base flood elevation
these zones.

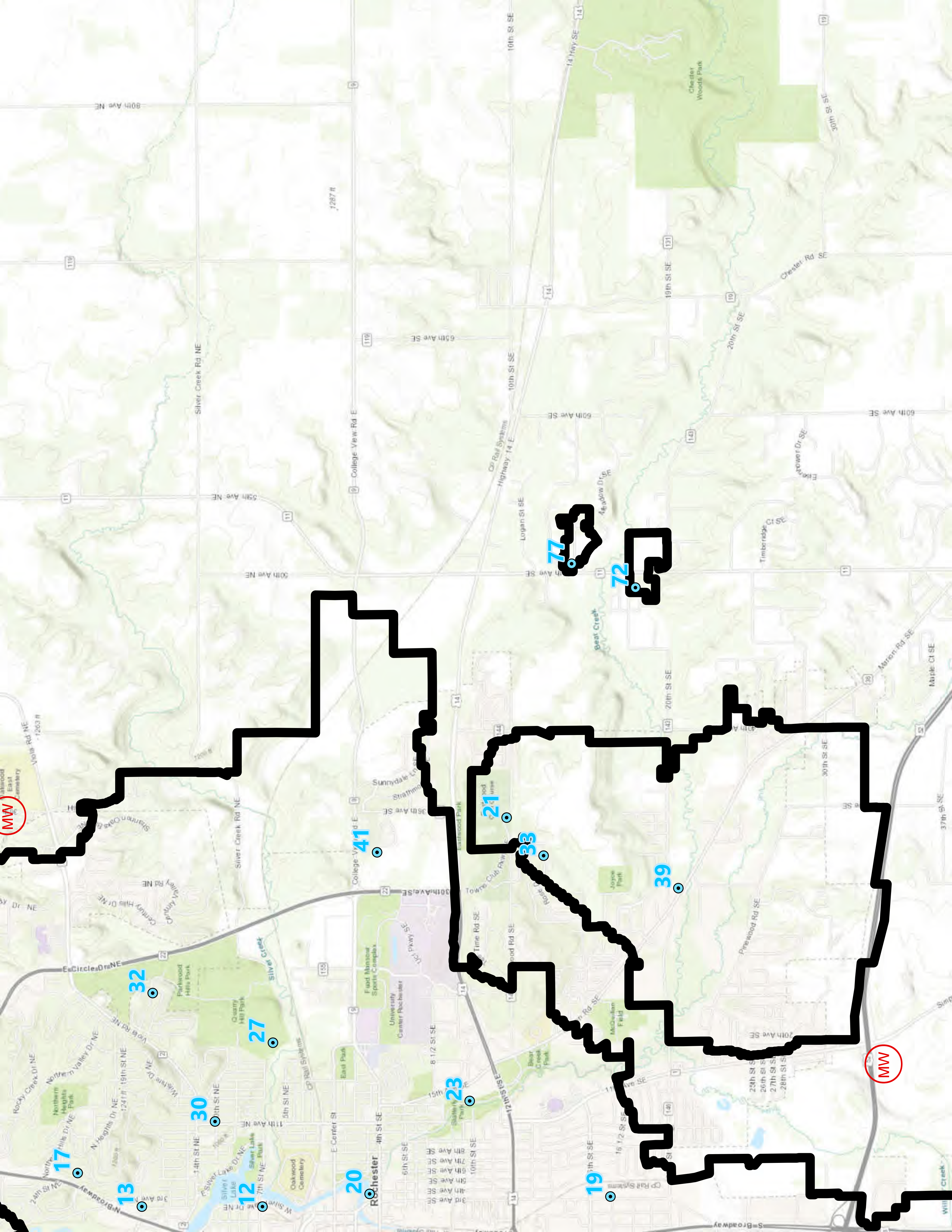
AE - The base floodplain where base flood elevations are p
are now used on new format FIRMs instead of A1-A30 Zones

AO - River or stream flood hazard areas, and areas with a 1%
of shallow flooding each year, usually in the form of sheet flo
depth ranging from 1 to 3 feet. These areas have a 26% chan
the life of a 30-year mortgage. Average flood depths deri
analyses are shown within these zones.


Suburban Development
Suburban Development
Suburban Development
Suburban Development
Urban Service Area
Suburban Development
Potential Su
22
37
24
15
17
13
32
30
12
27
18
20
41
11
23
36
25
21
33
77
72
19
29
39


COUNTY 2 ROAD
14
14
COUNTY 25 ROAD
52
COUNTY 8 ROAD
COUNTY 16 ROAD
63
90
Downtown
nd Use 4/18
ensity Residential
onal Core Neighborhood
m Density Residential
ensity Residential
own Core
own Fringe
Use Transit Oriented Centers
Use Transit Supportive Corridors
t Supportive Neighborhood
ercial & Business Development
rial
Employment Development
al Campus
tional Campus
Facilities
Facilities
& Open Space
Reserve


Permitted Water Appropriations (M
Within 1 Mile of DWSMA
Agricultural/Food Processin
Commercial/Institutional Bu
Commercial/Institutional W
Construction Dewatering
Golf Course Irrigation
Groundwater Dewatering
Industrial Process Cooling -
Rochester
698933
180567
463536
601335
220818
220817
222528
220819
220811
676687
220822
222525
506819
228150
228150
220832
239761
233037
233038
233039
224212
757589
757588
757587
220664
757592
220833
220831
757591
NA*
220662
220665
NA*
757594
757586
757590
233030
228636
228635
220827
147451
222527
220786
527584
231890
227828
249071
601336
220666
220660
220675
242118
220681
161425
NA*
796431
220625
220627
733087
NA*
434041
120022
773386
NA*
NA*
124
133
22
22
33
4
2
151
52
155
52
36
201
125
146
143
25
8
52
52
117
1
147
101
148
63



Chester Woods Park
Chester Rd SE
80th Ave NE
65th Ave SE
60th Ave SE
55th Ave NE
50th Ave NE
Silver Creek Rd NE
College View Rd E
10th St SE
19th St SE
20th St SE
30th St SE
Highway 14 E
CP Rail Systems
Logan St SE
Meadow Dr SE
Bear Creek
Marion Rd SE
Maple Ct SE
Eastwood Park
Joyce Park
Towne Club Pkwy
Pinewood Rd SE
UCR Pkwy SE
Fred Mansour Sports Complex
University Center Rochester
Parkwood Hills Park
Quarry Hill Park
Silver Creek
E Circle Dr NE
Northern Heights Park
Oakwood Cemetery
East Park
Silver Lake Park
Rochester
McQuillan Field
Bear Creek Park
11th Ave NE
20th Ave SE
MW
77
72
21
33
39
41
32
27
30
23
17
13
12
20
19