BOLTON & MENK, INC.

Consulting Engineers & Surveyors

Comprehensive Water System Study
City of Ramsey, Minnesota
May 2012
BMI Project No. R13.104504

City of RAMSEY

COMPREHENSIVE WATER SYSTEM STUDY

FOR

CITY OF RAMSEY, MINNESOTA

MAY 2012

R13.104504

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

Jon D. Peterson

Date: _____ Registration No. 21309

TABLE OF CONTENTS

LIST OF FIGURES

APPENDIX

SECTION 1 - INTRODUCTION

A. PURPOSE

The purpose of this report is to update the City's Comprehensive Water Plan based on current population and land use projections. The intent of this report is to incorporate key components of past studies into one working document for future water utility planning.

B. PLANNING PERIOD

The City of Ramsey is projected to grow substantially over 20 years. For overall planning purposes, population projections and water use estimates will be developed to the end of year 2031. Infrastructure improvement plans will be developed to meet the water utility needs over this planning period.

C. REPORT ORGANIZATION

This report is organized into seven sections as shown below.

Section 1: Introduction.

Section 2: Reviews projected water use demands based on anticipated population trends and historical water use.

Section 3: Evaluates the existing major water system components.

Section 4: Evaluates water supply and treatment alternatives.

Section 5: Analyzes the distribution system and water storage alternatives.

Section 6: Provides an evaluation of Water Utility Fund.

Section 7: Summarizes recommendations and provides an implementation plan.

SECTION 2 - WATER USE PROJECTIONS

A. PURPOSE

Water use projections form the basis of planning for future water infrastructure needs. Water demand projections are based on forecasts of residential, commercial and industrial water demands. Projections are first developed for population growth in commercial and industrial development. Historical water use data is evaluated for average day and maximum day water use. Future water use projections are then developed based on growth forecasts and water use trends.

B. SERVICE AREA

A water service area is established for planning purposes in order to define the infrastructure needed to provide water service for the community.

The 2030 Comprehensive Plan Future Land Use Map (Amendment 11-02) defines the areas where water service will be required during the study period. This land use map is included in Appendix D for reference. In addition, the Comprehensive Plan includes a Special Area Plan for an area along 167th Avenue between TH 47 and CSAH 5 as shown in Appendix D. With the exception of the most westerly 40 acres, this area is not included in the 2030 Metropolitan Urban Service Area (MUSA); however, the City intends to initiate discussions with surrounding property owners to assist in the creation of a master plan for the commercial area and to determine the desires to expand the existing MUSA to include this area.

The Metropolitan Council now considers the City of Ramsey as a "Developing Community" which eliminates the constraints of the MUSA Line.

C. SERVICE AREA POPULATION PROJECTIONS

The population estimates in this report utilize state demographer data, City estimates and Metropolitan Council estimates. Key concepts utilized in developing service area population projections are as follows:

1. The 2011 population being served by the water system is estimated to be 11,434 people.

2. Water service will be provided to an additional 260 customers per year from 2012 through 2031, within the comprehensive planning area.

3. Water service will be provided to an additional 63 customers per year, from 2013-2021 (567 total units) in the development included in the special area plan.

4. From 2012 through 2019, the population per customer is projected to be 2.87.

5. From 2020 through 2031, the population per customer is projected to be 2.70.

Appendix A contains a detailed spreadsheet with projected service area population. Figure 2.1 provides a graphical chart showing the projected service area population through 2031.

D. WATER USE

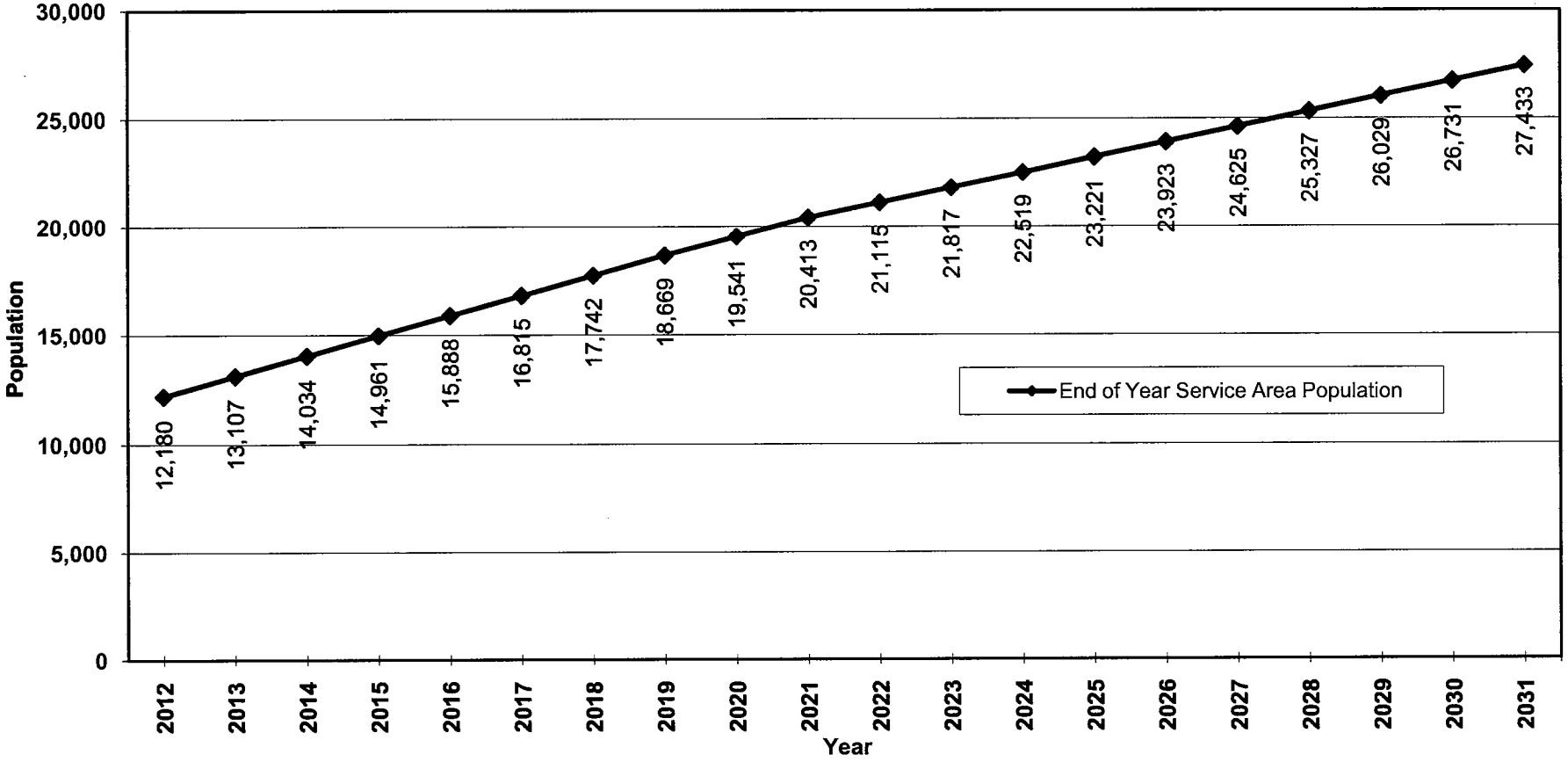
Water use projections are developed based on a combination of historical water use trends and future development projections. For the Ramsey water system, Table 2.1 provides a summary of the total water supplied to the system from 2001 – 2011.

Table 2.1
Historical Water Supply Data
City of Ramsey, Minnesota

Year	Estimated Service Population	Total Gallons Pumped/Year	Maximum Day Demand (Gallons)	Average Daily Demand (gallons)	Per Capita Average Daily Demand (gpcd)	Maximum Day/ Average Day Ratio
2001	6,579	401,100,000	4,050,000	1,098,904	167.0	3.7
2002	6,918	411,600,000	5,030,000	1,127,671	163.0	4.5
2003	7,264	506,125,000	6,200,000	1,386,644	190.9	4.5
2004	7,981	535,092,000	5,579,000	1,462,000	183.2	3.8
2005	8,959	575,605,000	5,200,000	1,577,000	176.0	3.3
2006	9,599	663,570,000	5,604,000	1,818,000	189.4	3.1
2007	10,500	704,837,300	5,189,273	1,931,061	183.9	2.7
2008	10,595	626,872,700	5,161,334	1,717,459	162.1	3.0
2009	10,650	640,257,600	4,666,983	1,754,130	164.7	2.7
2010	11,952	627,782,700	4,124,300	1,719,953	143.9	2.4
2011	11,434	589,977,500	4,644,000	1,616,377	141.4	2.9

Water use can be categorized based on user. Utilizing data from the water utility annual reports submitted to the Minnesota Department of Natural Resources, water use is categorized into three user classes. Categories are summarized in Table 2.2. The residential class includes all residential users. The commercial class includes all

Figure 2.1
Ramsey, Minnesota
Population Projections



commercial and light industrial users on the system. The "other" users category includes government and institutional users. In addition, a certain amount of water in any system is unaccounted for, either through line losses or inaccurate meter reading.

Table 2.2
Water Use By Classification
City of Ramsey, Minnesota

	Average
Residential	60%
Commercial	35%
Other	4%
Unaccounted	1%
Total	**100%**

E. WATER USE PROJECTIONS

Water use projections are typically made on a per capita basis for systems without a significant large water using industry. For the City of Ramsey, future land use development is projected to be similar to existing land use. Thus, historical water use will be utilized to project future water demands.

Key concepts used developing water use projections are as follows:

1. Residential water use will be projected to be 90 gpcd. This will represent 60% of the total water use in the system. Significant conservation measures will need to be implemented to achieve this level of water demand.

2. Commercial water use will be 35% of the total system use. This is equivalent to 53 gpcd.

3. Other water use will be approximately 4% of the total water use. Conservation measures will be implemented to encourage better use of sprinkler systems. This is equivalent to 6 gpcd.

4. Unaccounted water will represent 1% of the total water use. This value is well within the range of acceptable unaccounted water use values according to the American Water Works Association. This is equivalent to 1 gpcd.

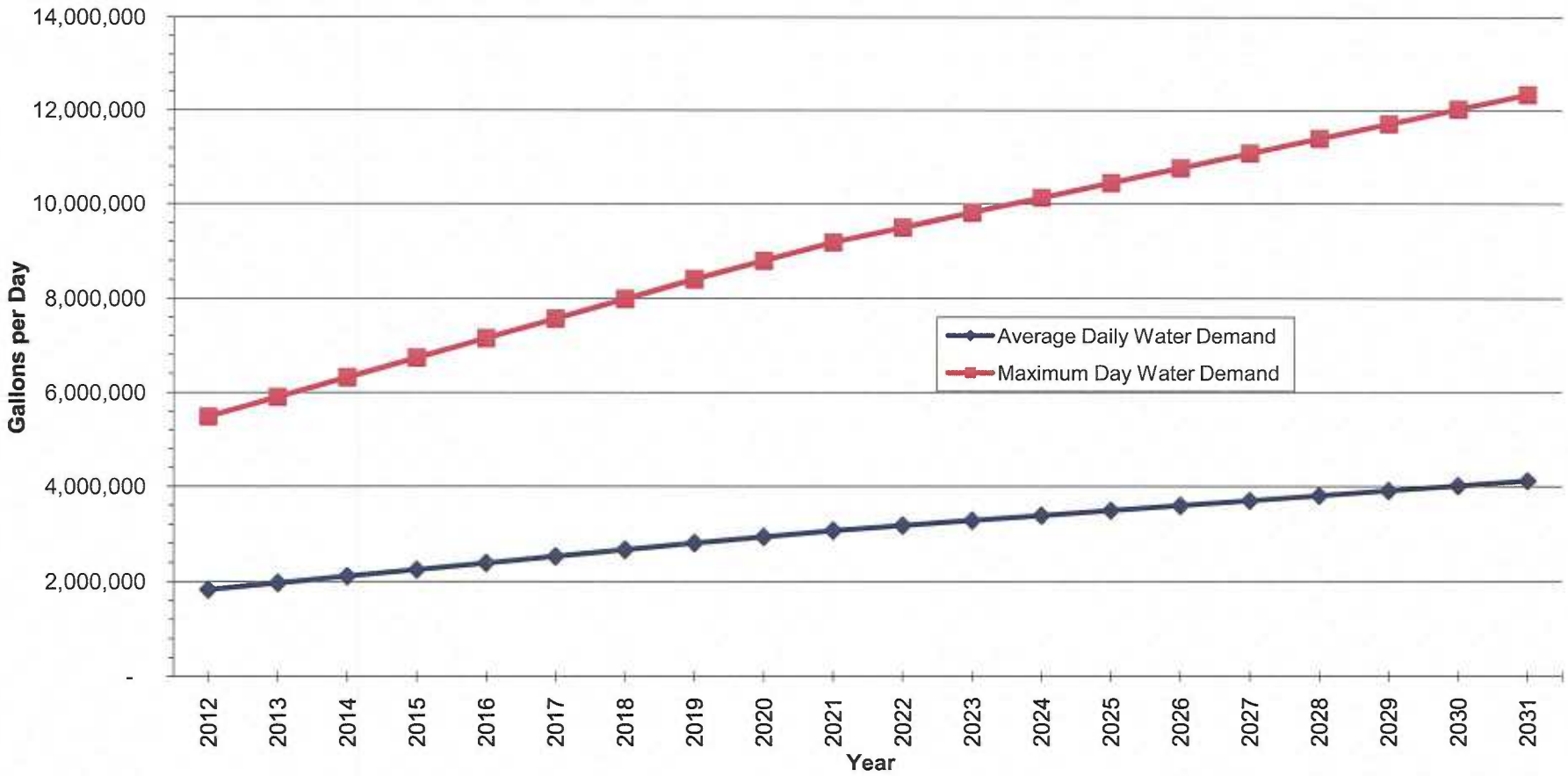
5. Total gross water use is projected to be 150 gpcd.

6. Peaking day water usage is calculated using a peaking factor, which is a ratio of the expected peak day flow over average day flow. Recent history indicates that the peak day to average day ratio has been decreasing over the past 9 years. A peaking factor of 3.0 would typically be utilized for long-term projections of a

system of the size of Ramsey's. This peaking factor is representative of the ratio over the past 4 years, and will be utilized for future projections.

Figure 2.2 provides a summary of the projected average and maximum day water usage for the planning period. Appendix A has a detailed breakdown of projected population and water demand for the study period.

Figure 2.2
City of Ramsey
Projected Water Demand



SECTION 3 – EVALUATION OF EXISTING FACILITIES

A. GENERAL

This Section provides a summary of existing water supply, treatment, storage and distribution facilities for the City of Ramsey. In addition, infrastructure needs will be assessed for each of the facilities.

B. WATER SUPPLY

1. Existing Water Supply Facilities

The City of Ramsey is underlain by two aquifers, the Ironton-Galesville and the Mount Simon-Hinckley formations. The City's wells are currently located in the Ironton-Galesville formation, which is located above the Mount Simon-Hinckley formation. Wells in the Ironton-Galesville formation are currently producing between 210 and 1450 gpm.

A summary of the specific well construction is presented in Table 3.1

Table 3.1
Well Construction Summary
City of Ramsey, Minnesota

City Well No.	1	2	3	4	5	6	7	8
Unique Well No.	161441	416183	580303	580313	593672	706840	743832	743833
Year Installed	1984	1987	1997	1998	2000	2004	2006	2006
Capacity (gpm)	970	220	1450	850	850	1000	1000	1400
Casing (in.)/	14 in/	14 in/	24 in/	24 in/	24 in/	30 in/24 in	30 in/ 24 in	30 in/24 in
Depth(ft.)	243 ft	240 ft	222 ft	191 ft	210 ft	180 ft	230 ft	120 ft
Total Depth	448 ft	320 ft	345 ft	321 ft	316 ft	370 ft	320 ft	310 ft

2. Water Supply Capacity

The Recommended Standards for Water Works (Ten States Standards) recommends that the average day demand be met by the firm well pumping capacity. In addition, the daily well output is calculated based on operating for 20 hours per day to allow 4 hours per day for aquifer recharges. Peak day demands can be met using the total well capacity, also calculated using 20 hours of pumping per day. Based on this, the existing capacity is 9.294 mgd and the firm capacity is 7.554 mgd as shown in Table 3.2.

Table 3.2
Well Capacity
City of Ramsey, Minnesota

Well	Pump Capacity (gpm)	Total Daily Capacity (mgd)*
1	970	1.164
2	220	0.264
3	1,450	1.740
4	855	1.026
5	850	1.020
6	1,000	1.200
7	1,000	1.200
8	1,400	1.680
Subtotal	**7,745**	**9.294**
Minus largest well out-of-service	1,450	1.740
Maximum Firm Capacity of Existing Wells	**6,295**	**7.554**

* Calculated based on 20 hrs. of pumping/day

3. Existing Water Supply Quality

Key issues pertaining to Water Quality are as follows:

1. The existing water supply quality meets all of the current Safe Drinking Water Act (SDWA) maximum contaminant limits (MCL's). These limits are set to protect the public from any health risks that may be found in water supplies.

2. Iron and manganese exceed the SDWA secondary limits in all of the wells. The SDWA contains secondary limits, which recommend water quality parameters, that although not health risks, reduce the quality of water, typical due to staining or taste and odor issues.

3. The hardness of Ramsey's water is classified as hard, based on American Water Works Association (AWWA) water hardness scale. Since the majority of the homeowners have in-home softeners, providing softening at the municipal scale is usually not considered to be cost effective by the municipalities.

4. Arsenic was detected in Well No. 1and Well No. 2. The arsenic levels of 0.0066 and <0.0047 mg/l are well below the current MCL of 0.010 mg/l.

While the arsenic concentration is below regulated limits, if arsenic concentrations in the wells increase, the City of Ramsey may need to address this issue. Compliance alternatives might include abandoning the affected wells and

drilling new wells in an area where arsenic is not present, or constructing a treatment facility capable of removing the arsenic.

Traditional iron and manganese filter facilities are capable of removing arsenic in most waters. Thus, if treatment for arsenic is required, a water filtration facility will remove the arsenic while also removing the nuisance iron and manganese.

4. Water Supply Infrastructure Needs

It is anticipated that the existing Ramsey water supply system will need to be expanded to meet future water demands. If the City continues to plan on utilizing groundwater sources, new wells will be required to meet water demand during the design period. Minnesota Department of Natural Resources staff has indicated that future well construction will need to be coordinated with the overall water use of the area. Consideration of use of surface water sources, such as the Mississippi River, will need to be addressed. This is discussed in further detail in Section 4 - Water Supply and Treatment.

C. Water Treatment

1. Existing Water Treatment Facilities

Water treatment for the City of Ramsey consists of chlorination, fluoridation and polyphosphate addition at each pump house. Chlorine is added as a preventive measure. Chlorine acts as a disinfectant, and works to prevent the growth of harmful bacteria within the distribution system should contamination occur. Fluoride is added for the purpose of reducing tooth decay as prescribed by the State of Minnesota. The addition of polyphosphates accomplishes two things. Primarily, polyphosphates prevent the iron in the water from precipitation causing staining problems. However, they do not remove iron and manganese from the water. Therefore, they are not as effective in preventing iron and manganese staining. Secondary, polyphosphates reduce the corrosion potential of the water, thus prolonging the life of copper pipes in homes.

2. Water Treatment Infrastructure Needs

All current water sources for the City of Ramsey exceed recommended levels for iron and manganese. As the city's population continues to grow, it is anticipated that there will be increasing demand for improved water quality regarding iron and manganese levels.

The current treatment utilizing polyphosphates for sequestering of iron and manganese does mitigate some of the impact of these contaminants on customers; however, sequestering does not remove iron and manganese, and over time, a certain amount of iron and manganese deposits in the distribution system, thus adding to maintenance costs of the system. Due to significant increases in the water supply demands, and the unknown quantity of groundwater that can be pumped from the Ironton-Galesville formation, surface water sources will need to be considered to meet the City's water needs. A water treatment facility would be required to treat surface water sources. Due to the number of wells which would be required to meet the future system supply needs, the current system of multiple chemical feed points may result in water quality inconsistency across the system. Also, multiple feed points will represent a substantial security risk to the system. Construction of a treatment facility will be considered in Section 4 – Water Supply and Treatment.

D. STORAGE

1. Existing Water Storage Facilities

Existing storage facilities in the City of Ramsey consist of three (3) elevated water towers as shown in Table 3.3.

Table 3.3
Existing Storage Facilities
City of Ramsey, Minnesota

	Tower No.1	Tower No. 2	Tower No. 3
Capacity (gallons)	500,000	1,500,000	2,000,000
Year Constructed	1989	2000	2010
High Water Level	1036	1035	1036

The principal purpose of storage is to provide the ability to equalize pumping rates during periods of variable rate of demand. Adequate storage permits a

reduction in the size of the pumps required to supply a community because peak demands are diminished by the reserves provided by the storage. The other reasons for providing storage include:

- Fire protection
- Emergency requirements (pump failures, power failures, etc.)
- To equalize pressure in the distribution system

2. Evaluation of Water Storage Capacity

Storage adequacy can be assessed using the Average Day Criteria or the Maximum Day, Fire Protection and Emergency Storage Criteria. These two sets of criteria are discussed in the following paragraphs.

Average Day Criteria

Generally, the minimum recommended standard, without fire protection, is equal to the average day demand (Recommended Standards for Water Works, 2007 and adopted by the Minnesota Department of Health). By this standard, no storage deficit is projected for the design period.

Maximum Day, Fire Protection and Emergency Storage Criteria

Another approach is to consider the individual storage components needed for equalization, fire demand, and emergency reserve versus the available water supply production facilities. The water production and storage must be considered together, since an increase in production may decrease the amount of water storage required. Utilizing this criteria, no storage deficit is projected for the design period.

3. Water Storage Infrastructure Needs

Based on the evaluation of water storage capacity, no additional storage is required to meet system operation needs. Water treatment options will include clearwell/reservoir capacity to allow for optimization of high service pumping facilities. Maintenance of the existing storage towers will be required over the study period, and cost for these activities will be included in the water utility fund evaluation.

SECTION 4 – WATER SUPPLY AND TREATMENT

A. GENERAL

This section evaluates water supply and treatment alternatives for the City of Ramsey. Two alternatives for water supply were considered: 1) surface water sources utilizing the Mississippi River; and 2) ground water sources as are currently utilized. The following paragraphs will summarize each of these alternatives as well as the treatment required for each alternative.

B. WATER SUPPLY ALTERNATIVES

1. Surface Water Sources

The City of Ramsey is bordered to the south by the Mississippi River. Minneapolis Water Works, St. Paul Regional Water Services, and the City of St. Cloud obtain water for drinking water purposes from the Mississippi River. Typically, smaller communities have not found it cost effective to obtain water from this source due to the treatment requirements of a surface water source compared to the cost of obtaining and treating ground water sources. However, with the increasing demand being placed on local aquifers, and the decreasing costs of advanced membrane technologies, the Mississippi River is a viable option for providing water to the City of Ramsey.

A pilot study for treating water from the Mississippi River was conducted in 2007. Results from this study are summarized in the February 25, 2008 Water Supply and Treatment Evaluation Report prepared by Bolton & Menk, Inc. The 2008 evaluation concluded the following:

1. Water from the Mississippi River can be collected through a direct intake collection system. Attempts at collecting water through a riverbank infiltration system did not provide economically viable quantities of water from the River.

2. Pre-treatment of the water from the Mississippi River will be required to remove grit, sand and organics prior to the filtration process.

3. Conventional treatment with ultra-filtration membranes will provide water which meets State and Federal Drinking Water Standards. Based on the

results of the pilot testing program, treatment of this source will be evaluated, with a groundwater source backup based on the current well system.

Two potential locations have been identified for a surface water intake on the Mississippi River. Locations for these intakes are shown on Figure 1, located in Appendix C. Figure 1 also shows the proposed routing of the 30" raw water transmission main from the intake structure to the water treatment plant site for each option.

2. Ground Water Sources

As discussed in previous sections, the City currently obtains drinking water from the Ironton-Galesville aquifer system. This system is utilized extensively by surrounding communities. Minnesota Department of Natural Resources (MnDNR) staff is currently exploring ways to manage this resource in the region, and have requested that Ramsey look into alternate water sources, specifically surface water sources. In addition, the City Ramsey agreed to establish an aquifer monitoring program in order to collect data regarding the impact of water withdrawal from the Ironton-Galesville aquifer.

Based on historical data, the potential of the Ironton-Galesville aquifer system to provide water to meet future development needs is questionable. In order to determine whether the aquifer would support future development, the City of Ramsey would need to undertake an exploratory hydrogeologic study of the area. This study would include the following:

1. Determine potential sites for additional wells based on land availability, proximity to the existing and planned water utility infrastructure, and potential for developing an economically viable water supply at the proposed site.
2. Construct test wells at the potential sites, and perform pumping tests to determine the viable production at the site and potential impact on other water resources.

The location of the potential well sites and the test well/pumping program would need to be coordinated with MnDNR staff in order to assure that data collected can be utilized in establishing water appropriation permit modifications.

C. WATER TREATMENT ALTERNATIVES

1. General

For alternative comparison, water treatment facilities were evaluated for both the surface water sources and ground water sources. Surface water sources are required to provide filtration treatment in addition to disinfection and fluoride addition. This requirement is required due to the variation in water quality typically experienced in surface water sources and the need to remove potential contaminants from the water prior to distribution and consumption. A central water treatment facility for treatment of surface water was evaluated.

While groundwater sources currently have water quality which meets safety and regulatory standards, the high levels of iron and manganese will continue to provide a source of consumer concerns. In addition, the construction and maintenance of numerous small chemical treatment facilities at each well site requires a substantial investment in capital, operations, and management resources. Storage of chemicals at numerous sites presents a security and safety challenge regarding public safety. For these reasons, a central water treatment facility was evaluated for groundwater treatment.

2. Surface Water Source Treatment

Treatment for surface water sources can be accomplished utilizing either ultra filtration membrane processes, lime softening systems, or granular media filtration. Based on the findings summarized in the 2008 Water Supply and Evaluation Report, the key components of a surface water treatment facility include the following:

- River intake / pumping station
- Raw water transmission main
- Surface water detention basin
- Clarification
- Membrane filtration
- Clearwell / Reservoir storage
- Disinfection
- High service pumping
- Wash water reclamation system

A direct raw water intake structure would be constructed on the bank of the Mississippi River as shown in Appendix C. Raw water would be pumped to the water treatment facility site. Grit, sand and organics in the raw water would be removed in the surface water detention basin. Further settling of solids will be accomplished utilizing clarifiers prior to the membrane filter.

Membrane filters consist of microfiltration (0.1 microns) and ultrafiltration (< 0.1 microns) filters. These filters can be either pressure driven or vacuum driven. Currently, the typical membrane filter contains hollow fibers and the filtration takes place from the outer surface of the fiber to the hollow inner core. Feed liquid passes through the porous wall of the fibers while the solids in the feed stream are retained on the outside fiber wall. The difference in pressure between the outside and the inside of the fibers is known as the transmembrane pressure (TMP). The TMP is the pressure that drives the liquid through the porous walls of the membrane, filtering the liquid in the process. Feed and filtrate pressures are measured by pressure transmitters and the TMP is calculated. As particles build up on the membrane surface during filtration, an increase in TMP is required to maintain a constant flow rate. To restore performance, these particles must be removed periodically by backwashing. Backwashing typically consists of air scouring, chemical scouring and liquid backwashing. Backwash is sent to a backwash tank and eventually pumped to the head of the facility for treatment. Waste solids from the backwash system are routed for disposal to the sanitary sewer. High service pumping from a cleanwell/reservoir tank sends finished water to the distribution system.

Existing groundwater sources will be routed to the treatment facility. These sources will be utilized as a backup supply in the case of a disruption in the surface water supply system.

3. Ground Water Source Treatment

Treatment of groundwater for iron, manganese and other contaminants is typically accomplished utilizing granular media filtration. Granular media filtration is effective in removing arsenic, radionuclides, iron and manganese. Arsenic and

radionuclides are removed through a process known-as co-precipitation with iron and manganese. Iron and manganese is typically removed from water using an oxidation and filtration process. This process uses oxygen (through aeration of the water), or chemical oxidants such as chlorine or potassium permanganate, to oxidize and precipitate the iron and manganese. Once precipitated, the iron and manganese is easily captured and removed using granular media filters. Granular media filters can be either gravity type or pressure type filters. Pressure filtration is not generally utilized for radionuclide contaminant removal due to build up of radon gas in the system.

Key components of a ground water treatment facility include the following:

- Water transmission mains from well sites
- Aeration
- Detention tank
- Granular media filtration
- Clearwell/reservoir storage
- High service pumping
- Disinfection
- Backwash reclaim system

4. Water Treatment Facility Sites

Two potential sites for a water treatment facility have been identified. Figure 1 in Appendix C shows the location of these sites.

Site A is located on Armstrong Boulevard in the vicinity of Fire Station No. 1. This location was selected due to close proximity to the existing water supply wells, water distribution system, and direct route to the proposed surface water intake locations on the Mississippi River.

Site B is located at the intersection of Alpine Drive and Puma Drive. This site is currently owned by the City of Ramsey. Additional water distribution mains and raw water transmission mains would be required for this site compared to Site A.

Cost for these improvements would be offset by savings realized by utilizing a site already owned by the City rather than purchasing property as required at Site A.

Further evaluation of site locations will be required during pre-design phases of the water treatment facility project implementation.

D. ALTERNATIVE COMPARISONS

Cost estimates for two (2) alternatives were developed for implementing the Water Supply and Treatment required to meet the City of Ramsey's water supply demands. For each alternative, the following assumptions were utilized:

1. New water supply and treatment facilities will need to be on-line by 2019.

2. Treatment facilities will be constructed in phases to meet the demand requirements. During final design, a Value Engineering phase should be utilized to determine the most cost effective phasing of the treatment facilities.

3. Provisions will be incorporated into final design for routing of groundwater sources directly to the clearwell high service pumping facilities. With this provision, up to 20 percent of the water demand will be met with ground water. The groundwater supply would by-pass the water treatment facility and would be blended with treated water prior to being pumped to the distribution system. The amount of ground water which can be blended with the treated water is determined based on meeting water quality standards for iron, manganese and hardness. The disadvantage to this system is the impact of the blending water on water quality. This may be mitigated by blending water under all water demand conditions. The advantage of this system is the water treatment facilities can be designed with a lower capacity, thus reducing capital investment. Evaluation of the impact of this process will be conducted during final design.

Alternative 1: Surface Water Supply.

With this alternative, the following key improvements are required.

Phase 1.- Construct a 9.6 mgd surface water treatment facility. Facility will need to be on-line by 2019 to meet community water demands.
Estimated cost: $32,000,000.

Phase 2 - Construct 2.4 mgd surface water treatment facility expansion. Expanded capacity required by 2025 to meet community water demand. Facility includes additional membrane filters, chemical feed and clarification facilities.
Estimated Cost: $4,250,000.

Figure 4.1 shows the timing required to construct the surface water system improvements to meet projected water demand. Total capital investment for this alternative is estimated to be $36,500,000.

Alternative 2: Ground Water Supply.

With this alternative, additional ground water wells, and a ground water treatment facility would be required. Key improvements are as follows:

Phase 1 - Construct 9.6 mgd ground water treatment facility. Facility to be on-line by 2019. Estimated Cost: $24,000,000.

Phase 2 - Construct Well 9. Well to be on-line by 2019. Estimated Cost: $900,000.

Phase 3 - Construct Well 10. Well to be on-line by 2022. Estimated Cost: $900,000.

Phase 4 - Construct 2.4 mgd ground water treatment facility expansion. Facility to be on-line by 2026. Estimated Cost: $4,100,000.

Phase 5 - Construct Well 11. Well to be on-line by 2026. Estimated Cost: $900,000.

Phase 6 - Construct Well 12. Well to be on-line by 2030. Estimated Cost: 900,000.

Figure 4.2 shows the timing required for construction of the wells and treatment facility improvement to meet project water demand. Total capital investment for this alternative is estimated to be $31,700,000.

Figure 4.1- Future Surface Water Treatment Plant
Supply Capacity versus Projected Maximum Day Water Demands
City of Ramsey, Minnesota

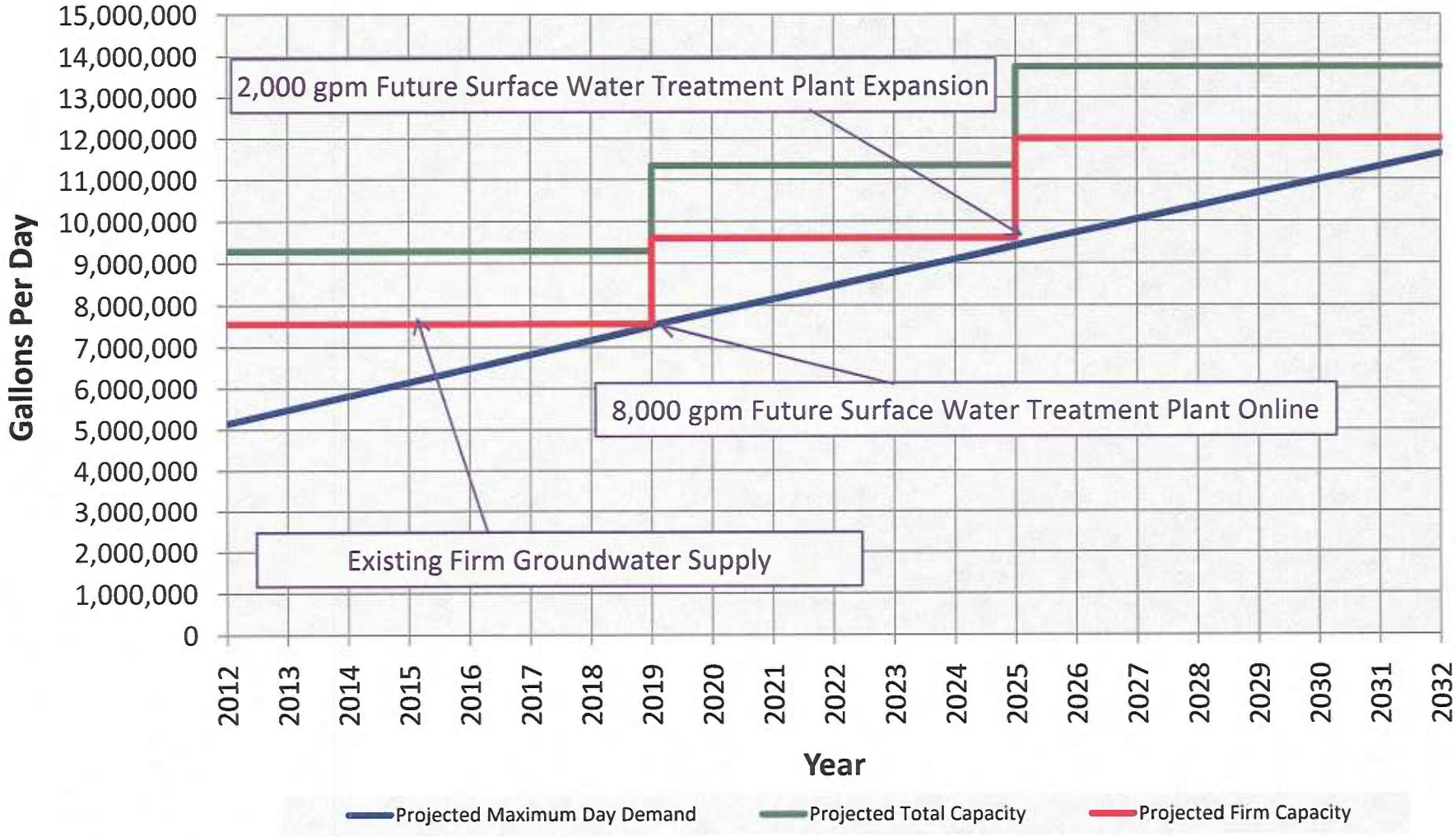
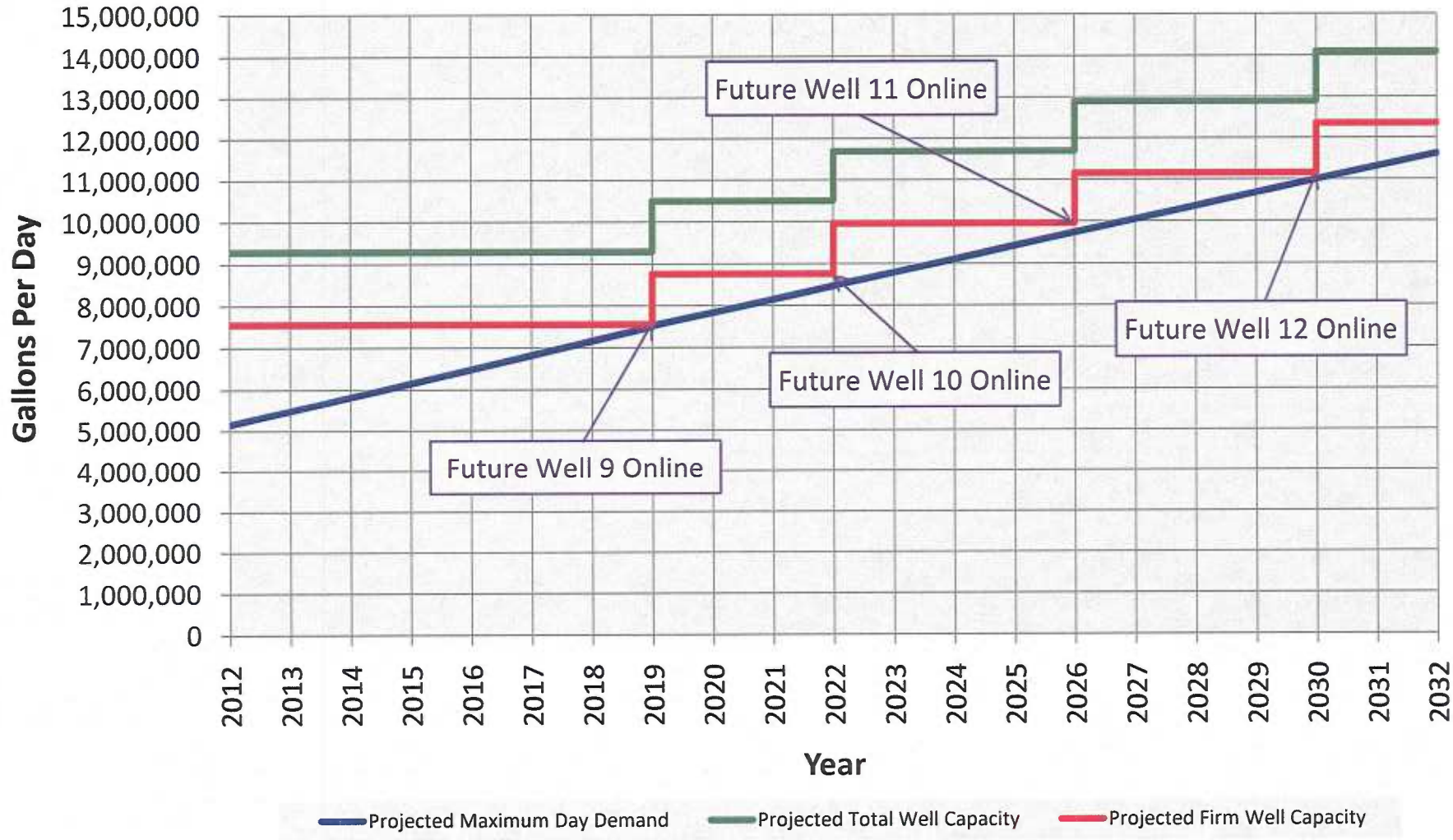


Figure 4.2- Groundwater Wells Only
Groundwater Supply Capacity versus Projected Maximum Day Water Demands
City of Ramsey, Minnesota



SECTION 5 - WATER STORAGE AND DISTRIBUTION SYSTEM

A. PURPOSE

The purpose of this Section is to evaluate water storage and water system distribution improvements needed to ensure adequate pressure and fire flow are available for both current and future conditions.

B. GENERAL

The water distribution system for the City of Ramsey was modeled using the Watercad Hydraulic Network Model. The computer network model is used to analyze steady state flows for pipe distribution systems. The information required by the model includes data such as diameter, length, and Hazen-Williams C Factor (the pipes roughness factor) for each pipe in the system. Other data required include ground elevation of pipe junctions, elevated storage water level and water demand on the system.

C. WATER SYSTEM SIMULATION CRITERIA

In designing and analyzing system simulations, a set of design criteria was established. Recommended Standards for Water Works recommends that a minimum pressure of 20 psi be maintained at all times in the system, with normal working pressure in the 35-70 psi range. Static pressure higher than 100 psi is not recommended as higher pressures increase the frequency of watermain breaks. Fire flow is determined at a minimum residual pressure of 20 psi in order to correlate with the guidelines of the Insurance Services Office (ISO). Fire flows ranges were established between 1500 and 3500 gpm. The water tower levels were established at one-half total capacity during fire flow simulations.

D. WATER STORAGE FACILITY IMPROVEMENTS

As outlined in Section 3, the City of Ramsey has adequate storage for the design period. Capital improvements over the next 20 years will include maintenance and painting of the existing towers.

DISTRUBTION SYSTEM IMPROVEMENTS

Distribution system master planning is "a road-map" to assist the City of Ramsey in determining the optimal size and location for future major water distribution improvements. The purpose is to ensure adequate pressure and flow is maintained throughout the entire distribution system at any given time and at the most economical cost.

The timing of implementation of new water distribution mains will be determined based on development within the City. Figure 1, located in Appendix C, shows the location of the proposed distribution system improvements.

Table 5.1 provides a summary of the proposed water distribution system improvements . These improvements generally can be categorized as follows:

Table 5.1
Distribution System Improvements
2012-2031
City of Ramsey, Minnesota

Project	Estimated Capital Cost
Southwest Loop	$2,160,000
North Central Loop	$2,900,000
County Road 57	$380,000
CSAH 5/153rd Street	$650,000
156th Lane NW	$325,000

In addition to these improvements, on-going maintenance and replacement projects are required throughout the system.

SECTION 6 - WATER UTLITY FUND EVALUATION

A. GENERAL

This section provides an evaluation of the City's current rate system, and provides analysis of the impact the proposed water supply, treatment, distribution and storage improvements may have on the City's Water Utility Fund.

B. CURRENT RATE STRUCTURE

The City currently collects revenue from three sources:

1. Water Use Rates
2. Water Availability Charge (WAC)
3. Trunk Charges

2012 Water Use Rates are $2.38 per 1,000 gallons for the first 15,000 gallons used per quarter. Water use rates include an increasing block rate, with higher rates charged for higher water usage in order to encourage conservation of water by users.

Water Availability Charge (WAC) is set at $1,640 per connection. This charge is applied to new customers when they connect to the system.

Trunk Charges are set at $2,226 per connection, and are collected when new developments are platted.

C. EVALUATION OF UTILITY FUND

The water utility fund was evaluated using the following parameters:

- 260 new customers will be added to the system every year during the planning period from the Comprehensive Plan development areas
- 567 new customers will be added from the special area between 2013 to 2021.
- Implementation of the Surface Water Treatment Facility phased construction approach as outlined in Chapter 4.
- Capital water supply and treatment projects will be financed at a 4% interest rate over a 20-year term.

- Phase I Water Treatment Facility will be 20% grant funded. Assumption based on regional positive impact for implementing surface water supply and treatment facility.
- Distribution system improvements will be implemented as outlined in Chapter 5.
- Distribution system improvements will be funded through Utility Fund reserves.

Based on the parameters outlined, the impact on water rates and charges of the Water Utility Fund are summarized as follows:

- Water rates projected to increase 2.0% annually
  - 2012 rate is $2.38/1000 gallons for the first 15,000 gal/qtr
  - 2.0% increase in water rates to begin in 2014
- Water Availability Charge (WAC) decreases by 30% in 2013 from $1,640 per connection to $1,148 in 2013
- Trunk charge decreases by 30% in 2013 from $2,226 per connection in 2012 to $1,558 in 2013
- WAC and trunk charge to increase 2.5% annually beginning in 2014
- Beginning fund balance in 2012 = $8,346,319
- Fund balance decreases from $16,277,203 in 2018 to $4,305,861 in 2031 as payments are made towards capital improvements
- Projected revenue from new customers will generate 41.6% of total revenue over the planning period
- Cost of developing infrastructure, including water supply and treatment improvements, will account for 41.2 % of fund expenses over the planning period
- New customers will provide adequate revenue to fund development costs
- Operation and maintenance cost of system will be funded through user rate revenue

The recommended water use rates, WAC and trunk charges over the next five years are summarized in Table 6.1.

Table 6.1

Recommended Water Utility Rates and Charges

	2012	2013	2014	2015	2016	2017
Base Water Use Rate (per 1000 gallons)	$2.38	$2.38	$2.43	$2.47	$2.52	$2.57
WAC (per connection)	$1,640	$1,148	$1,177	$1,206	$1,236	$1,267
Trunk Charge (per connection)	$2,226	$1,558	$1,597	$1,637	$1,678	$1,720

The spreadsheet summary of the rate evaluation is included in Appendix B.

SECTION 7 – RECOMMENDATIONS

A. GENERAL

Water utility infrastructure required to service the existing and future customers for the City of Ramsey include supply, treatment, distribution and storage facilities.

The Water Comprehensive Plan provides a guide plan for the implementation of improvements required to serve the water utility customers.

B. RECOMMENDATIONS

The plan outlines the following recommendations:

1. Implement water distribution improvements in the following areas:
   - Southwest Loop
   - North Central Loop
   - County Road 57
   - C.S.A.H. 5/153rd
   - 156th Lane NW
2. Initiate implementation of the surface water supply and treatment facilities.
   - Preliminary Design and Planning - 2013-2014
   - Final Design of Facility – 2015
   - Begin Construction of Facility- 2016
   - Complete Construction of Phase I WTF – 2018
   - Initiate Operation of Phase I WTF - 2019
3. Implement rate structure as outlined in Chapter 6 of this plan to provide adequate funding of the proposed improvements.
4. Appendix C includes Figure 1 which identifies the location of the proposed water system improvements.

APPENDIX A

PROJECTED POPULATION AND WATER DEMANDS

Ramsey, Minnesota							
Population and Water Demand Projections							
2012 Comprehensive Water Plan							
Year	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Service Area Population	11,434	12,180	13,107	14,034	14,961	15,888	16,815
New Residential Customer Accounts	260	323	323	323	323	323	323
People/Household	2.87	2.87	2.87	2.87	2.87	2.87	2.87
Added Population	746	927	927	927	927	927	927
Ending Service Area population	12,180	13,107	14,034	14,961	15,888	16,815	17,742
Average Daily Water Demand	1,827,030	1,966,082	2,105,133	2,244,185	2,383,236	2,522,288	2,661,339
Maximum Day Water Demand	5,481,090	5,898,245	6,315,399	6,732,554	7,149,708	7,566,863	7,984,017
Year	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Service Area Population	17,742	18,669	19,541	20,413	21,115	21,817	22,519
New Residential Customer Accounts	323	323	323	260	260	260	260
People/Household	2.87	2.70	2.70	2.70	2.70	2.70	2.70
Added Population	927	872	872	702	702	702	702
Ending Service Area population	18,669	19,541	20,413	21,115	21,817	22,519	23,221
Average Daily Water Demand	2,800,391	2,931,206	3,062,021	3,167,321	3,272,621	3,377,921	3,483,221
Maximum Day Water Demand	8,401,172	8,793,617	9,186,062	9,501,962	9,817,862	10,133,762	10,449,662
Year	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	
Service Area Population	23,221	23,923	24,625	25,327	26,029	26,731	
New Residential Customer Accounts	260	260	260	260	260	260	
People/Household	2.70	2.70	2.70	2.70	2.70	2.70	
Added Population	702	702	702	702	702	702	
Ending Service Area population	23,923	24,625	25,327	26,029	26,731	27,433	
Average Daily Water Demand	3,588,521	3,693,821	3,799,121	3,904,421	4,009,721	4,115,021	
Maximum Day Water Demand	10,765,562	11,081,462	11,397,362	11,713,262	12,029,162	12,345,062	

APPENDIX B

WATER RATE EVALUATION

City of Ramsey	Unaudited								
Water Utility Finance Summary	2011								
2 Phase Implementation of Water Treatment and Supply Facilities									
17-Apr-12		2012	2013	2014	2015	2016	2017	2018	2019
Water Utility Expenses									
Capital Expenses-Equipment,CIP projects, Maintenenace improvements									
Miscellaneous Capital Expenditures and Equipment									
Utility Truck(2015, 2020, 2025, 2030)					$ (25,000)				
Water Supply & Treatment Improvements									
Renovate Pump House #2 (2016)						$ (49,000)			
Renovate Pump House #3 (2016)						$ (60,000)			
Well house I Improvements (2012)		$ (30,000)							
Well #1 Rehabilitation (2012-2015)		$ (50,000)	$ (58,000)	$ (30,000)	$ (32,000)				
Site Acquisition for Water Treatment Plant			$ (1,000,000)						
Water Meter Replacement	$ (109,665)	$ (249,200)							
Phase 1 - Water Treatment and Supply Facilities									$ (1,883,693)
Phase 2 - Water Treatment and Supply Facility Expansion									
Water Storage Improvements and Maintenance									
Painting of 0.5 MG Water Tower No. 1 (2015)					$ (435,000)				
Painting of 1.5 MG Water Tower No. 2 (2025)									
Distribution System Improvements									
Alpine Drive-CSAH 5 to Germanium St Watermain				$ (100,000)					
Magnesium St Watermain Looping		$ (120,000)							
Fire Station #1 Extension of Water		$ (25,000)							
Southeast Loop								$ (2,160,000)	
North central Loop									
County Rd 57									
CSAH 5/153rd St.									
156th Lane NW									
General Infrastructure Needs		$ (250,000)	$ (250,000)	$ (250,000)	$ (250,000)	$ (250,000)	$ (250,000)	$ (250,000)	$ (250,000)
Distribution System Maintenance Improvements									
Watermain Looping Bunker Lake Blvd (2012)		$ (225,000)							
Watermain Looping Sunfish Lake Blvd (2016)						$ (350,000)			
Watermain Looping Ramsey Blvd Armstrong Blvd (2013)			$ (273,000)						
Subtotal - Capital Expenses	**$ (1,172,660)**	**$ (947,188)**	**$ (1,578,987)**	**$ (397,986)**	**$ (739,985)**	**$ (706,984)**	**$ (247,983)**	**$ (2,407,982)**	**$ (2,131,674)**
Operational Expenses									
Operating Expense-Distribution and Administration	$ (896,061)	$ (922,943)	$ (950,631)	$ (979,150)	$ (1,008,525)	$ (1,038,780)	$ (1,069,944)	$ (1,102,042)	$ (1,135,103)
Operating Expense-Treatment									$ (1,022,000)
Subtotal-Operating Expense	$ (896,061)	$ (922,943)	$ (950,631)	$ (979,150)	$ (1,008,525)	$ (1,038,780)	$ (1,069,944)	$ (1,102,042)	$ (2,157,103)
Total Annual Expenses	$ (2,068,721)	$ (1,870,131)	$ (2,529,618)	$ (1,377,136)	$ (1,748,510)	$ (1,745,764)	$ (1,317,927)	$ (3,510,024)	$ (4,288,777)
Water Utility Revenue									
Customer Revenue									
New Service Connections	900	260	260	260	260	260	260	260	260
NE Expansion Area - New service connections			63	63	63	63	63	63	63
Water Sales- Estimated 2011 base (gallons/year)	975,000,000	725,000,000	725,000,000	725,000,000	725,000,000	725,000,000	725,000,000	725,000,000	725,000,000
Water Sales- New Customers 2013-2019 (gallons/year)		19,500,000	43,725,000	67,950,000	92,175,000	116,400,000	140,625,000	140,625,000	140,625,000
Water Sales - New Customers 2020-2031 (gallons/year)								24,225,000	48,450,000
Water rates ($/1000 gal)	$ 2.27	$ 2.38	$ 2.38	$ 2.43	$ 2.47	$ 2.52	$ 2.57	$ 2.63	$ 2.68
Water Availability Charge (WAC) ($/connection)	$ 1,701	$ 1,640	$ 1,148	$ 1,177	$ 1,206	$ 1,236	$ 1,267	$ 1,299	$ 1,331
Connection/Trunk Charge ($/connection)	$ 2,308	$ 2,226	$ 1,558	$ 1,597	$ 1,637	$ 1,678	$ 1,720	$ 1,763	$ 1,807
Water rate revenue from 2012 customer base	$ 1,670,430	$ 1,670,430	$ 1,670,430	$ 1,703,839	$ 1,737,915	$ 1,772,674	$ 1,808,127	$ 1,844,290	$ 1,881,175
Water rate revenue from 2013-2019 customers		$ 34,789	$ 104,009	$ 164,866	$ 228,115	$ 293,828	$ 362,079	$ 369,321	$ 376,707
Water rate revenue from 2019-2031 customers			$ -	$ -	$ -	$ -	$ -	$ 63,622	$ 129,788
WAC Revenue(Service Connections x WAC)	$ 83,349	$ 83,349	$ 370,804	$ 380,074	$ 389,576	$ 399,315	$ 409,298	$ 419,531	$ 430,019
Connection/Trunk Charge Revenue (Service Connections when platted x Connection Charge)	$ -	$ -	$ 503,299	$ 515,881	$ 528,778	$ 541,998	$ 555,547	$ 569,436	$ 583,672
Interest Earnings	$ 173,674	$ 120,123	$ 126,992	$ 133,400	$ 158,932	$ 181,073	$ 205,439	$ 239,997	$ 244,158
Total Customer Revenue	$ 1,927,453	$ 1,908,690	$ 2,775,533	$ 2,898,059	$ 3,043,317	$ 3,188,888	$ 3,340,491	$ 3,506,195	$ 3,645,520
Finance Adjustments									
Trunk Charges returned per John Peterson's Agreement		$ (300,000)	$ (200,000)	$ (200,000)	$ (200,000)	$ (200,000)	$ (100,000)	$ (100,000)	$ (100,000)
Internal Loan to offset Muni Center Debt beginning year 2009-2029 2% Paid off in 2011	$ 956,762								
PW Land/Building-Internal Loan 2009-2029 @2%	$ 59,527	$ 59,527	$ 59,527	$ 59,527	$ 59,527	$ 59,527	$ 59,527	$ 59,527	$ 59,527
Internal Loan to offset Muni Center Debt beginning year 2011-2030 @2%	$ 61,853	$ 61,853	$ 61,853	$ 61,853	$ 61,853	$ 61,853	$ 61,853	$ 61,853	$ 61,853
Internal Loan for COR Land Purchase-10 Year @ 2% When Land Sold		$ 259,880	$ 259,880	$ 259,880	$ 259,880	$ 259,880	$ 259,880	$ 259,880	$ 259,880
Total Finance Adjustments		$ 81,260	$ 181,260	$ 181,260	$ 181,260	$ 181,260	$ 281,260	$ 281,260	$ 281,260
Water Utility Working Capital Balance									
Total Annual Expenses	$ (2,068,721)	$ (1,870,131)	$ (2,529,618)	$ (1,377,136)	$ (1,748,510)	$ (1,745,764)	$ (1,317,927)	$ (3,510,024)	$ (4,288,777)
Total Customer Revenue	$ 3,005,595	$ 1,908,690	$ 2,775,533	$ 2,898,059	$ 3,043,317	$ 3,188,888	$ 3,340,491	$ 3,506,195	$ 3,645,520
Finance Adjustments		$ 81,260	$ 181,260	$ 181,260	$ 181,260	$ 181,260	$ 281,260	$ 281,260	$ 281,260
Net Income(Loss)	$ 936,874	$ 119,819	$ 427,175	$ 1,702,183	$ 1,476,067	$ 1,624,384	$ 2,303,824	$ 277,431	$ (361,997)
Beginning Water Utility Working Capital Balance	$ 7,071,302	$ 8,346,319	$ 8,466,138	$ 8,893,314	$ 10,595,496	$ 12,071,563	$ 13,695,947	$ 15,999,772	$ 16,277,203
Ending Water Utility Working Capital Balance	$ 8,008,176	$ 8,466,138	$ 8,893,314	$ 10,595,496	$ 12,071,563	$ 13,695,947	$ 15,999,772	$ 16,277,203	$ 15,915,206

City of Ramsey

Water Utility Finance Summary

2 Phase Implementation of Water Treatment and Supply Facilities

17-Apr-12	2020	2021	2022	2023	2024	2025	2026	2027	2028
Water Utility Expenses									
Capital Expenses-Equipment,CIP projects, Maintenenace Improvements									
Miscellaneous Capital Expenditures and Equipment									
Utility Truck(2015, 2020, 2025, 2030)	$ (25,000)					($25,000.00)			
Water Supply & Treatment Improvements									
Renovate Pump House #2 (2016)									
Renovate Pump House #3 (2016)									
Well house I Improvements (2012)									
Well #1 Rehabilitation (2012-2015)									
Site Acquisition for Water Treatment Plant									
Water Meter Replacement									
Phase 1 - Water Treatment and Supply Facilities	$ (1,883,693)	$ (1,883,693)	$ (1,883,693)	$ (1,883,693)	$ (1,883,693)	$ (1,883,693)	$ (1,883,693)	$ (1,883,693)	$ (1,883,693)
Phase 2 - Water Treatment and Supply Facility Expansion						$ (312,722)	$ (312,722)	$ (312,722)	$ (312,722)
Water Storage Improvements and Maintenance									
Painting of 0.5 MG Water Tower No. 1 (2015)									
Painting of 1.5 MG Water Tower No. 2 (2025)						$ (885,000)			
Distribution System Improvements									
Alpine Drive-CSAH 5 to Germanium St Watermain									
Magnesium St Watermain Looping									
Fire Station #1 Extension of Water									
Southeast Loop									
North central Loop									
County Rd 57			$ (380,000)						
CSAH 5/153rd St.						$ (650,000)			
156th Lane NW	$ (325,000)								
General Infrastructure Needs	$ (250,000)	$ (250,000)	$ (250,000)	$ (250,000)	$ (250,000)	$ (250,000)	$ (250,000)	$ (250,000)	$ (250,000)
Distribution System Maintenance Improvements									
Watermain Looping Bunker Lake Blvd (2012)									
Watermain Looping Sunfish Lake Blvd (2016)									
Watermain Looping Ramsey Blvd Armstrong Blvd (2013)									
Subtotal - Capital Expenses	**$ (2,481,673)**	**$ (2,131,672)**	**$ (2,511,671)**	**$ (2,131,670)**	**$ (2,131,669)**	**$ (4,004,390)**	**$ (2,444,389)**	**$ (2,444,388)**	**$ (2,444,387)**
Operational Expenses									
Operating Expense-Distribution and Administration	$ (1,169,157)	$ (1,204,231)	$ (1,240,358)	$ (1,277,569)	$ (1,315,896)	$ (1,355,373)	$ (1,396,034)	$ (1,437,915)	$ (1,481,053)
Operating Expense-Treatment	$ (1,052,660)	$ (1,084,240)	$ (1,116,767)	$ (1,150,270)	$ (1,184,778)	$ (1,220,321)	$ (1,256,931)	$ (1,294,639)	$ (1,333,478)
Subtotal-Operating Expense	$ (2,221,817)	$ (2,288,471)	$ (2,357,125)	$ (2,427,839)	$ (2,500,674)	$ (2,575,694)	$ (2,652,965)	$ (2,732,554)	$ (2,814,531)
Total Annual Expenses	**$ (4,703,489)**	**$ (4,420,143)**	**$ (4,868,796)**	**$ (4,559,509)**	**$ (4,632,343)**	**$ (6,580,085)**	**$ (5,097,354)**	**$ (5,176,942)**	**$ (5,258,918)**
Water Utility Revenue									
Customer Revenue									
New Service Connections	260	260	260	260	260	260	260	260	260
NE Expansion Area - New service connections	63	63							
Water Sales- Estimated 2011 base (gallons/year)	725,000,000	725,000,000	725,000,000	725,000,000	725,000,000	725,000,000	725,000,000	725,000,000	725,000,000
Water Sales- New Customers 2013-2019 (gallons/year)	140,625,000	140,625,000	140,625,000	140,625,000	140,625,000	140,625,000	140,625,000	140,625,000	140,625,000
Water Sales - New Customers 2020-2031 (gallons/year)	72,675,000	96,900,000	116,400,000	135,900,000	155,400,000	174,900,000	194,400,000	213,900,000	233,400,000
Water rates ($/1000 gal)	$ 2.73	$ 2.79	$ 2.84	$ 2.90	$ 2.96	$ 3.02	$ 3.08	$ 3.14	$ 3.20
Water Availability Charge (WAC) ($/connection)	$ 1,365	$ 1,399	$ 1,434	$ 1,470	$ 1,506	$ 1,544	$ 1,583	$ 1,622	$ 1,663
Connection/Trunk Charge ($/connection)	$ 1,852	$ 1,899	$ 1,946	$ 1,995	$ 2,044	$ 2,096	$ 2,148	$ 2,202	$ 2,257
Water rate revenue from 2012 customer base	$ 1,918,799	$ 1,957,175	$ 1,996,318	$ 2,036,245	$ 2,076,970	$ 2,118,509	$ 2,160,879	$ 2,204,097	$ 2,248,179
Water rate revenue from 2013-2019 customers	$ 384,241	$ 391,926	$ 399,765	$ 407,760	$ 415,915	$ 424,233	$ 432,718	$ 441,372	$ 450,200
Water rate revenue from 2019-2031 customers	$ 198,576	$ 270,063	$ 330,898	$ 394,059	$ 459,614	$ 527,633	$ 598,189	$ 671,357	$ 747,212
WAC Revenue(Service Connections x WAC)	$ 440,769	$ 451,789	$ 372,761	$ 382,080	$ 391,632	$ 401,422	$ 411,458	$ 421,744	$ 432,288
Connection/Trunk Charge Revenue (Service Connections when platted x Connection Charge)	$ 598,264	$ 613,220	$ 505,954	$ 518,603	$ 531,568	$ 544,857	$ 558,479	$ 572,441	$ 586,752
Interest Earnings	$ 238,728	$ 229,085	$ 225,701	$ 210,461	$ 201,627	$ 193,622	$ 158,396	$ 148,558	$ 139,618
Total Customer Revenue	$ 3,779,378	$ 3,913,259	$ 3,831,398	$ 3,949,207	$ 4,077,326	$ 4,210,278	$ 4,320,120	$ 4,459,570	$ 4,604,249
Finance Adjustments									
Trunk Charges returned per John Peterson's Agreement	$ (100,000)	$ (100,000)	$ (100,000)	$ (100,000)	$ (100,000)	$ (100,000)			
Internal Loan to offset Muni Center Debt beginning year 2009-2029 2% Paid off in 2011									
PW Land/Building-Internal Loan 2009-2029 @2%	$ 59,527	$ 59,527	$ 59,527	$ 59,527	$ 59,527	$ 59,527	$ 59,527	$ 59,527	$ 59,527
Internal Loan to offset Muni Center Debt beginning year 2011-2030 @2%	$ 61,853	$ 61,853	$ 61,853	$ 61,853	$ 61,853	$ 61,853	$ 61,853	$ 61,853	$ 61,853
Internal Loan for COR Land Purchase-10 Year @ 2% When Land Sold	$ 259,880	$ 259,880							
Total Finance Adjustments	$ 281,260	$ 281,260	$ 21,380	$ 21,380	$ 21,380	$ 21,380	$ 121,380	$ 121,380	$ 121,380
Water Utility Working Capital Balance									
Total Annual Expenses	$ (4,703,489)	$ (4,420,143)	$ (4,868,796)	$ (4,559,509)	$ (4,632,343)	$ (6,580,085)	$ (5,097,354)	$ (5,176,942)	$ (5,258,918)
Total Customer Revenue	$ 3,779,378	$ 3,913,259	$ 3,831,398	$ 3,949,207	$ 4,077,326	$ 4,210,278	$ 4,320,120	$ 4,459,570	$ 4,604,249
Finance Adjustments	$ 281,260	$ 281,260	$ 21,380	$ 21,380	$ 21,380	$ 21,380	$ 121,380	$ 121,380	$ 121,380
Net Income(Loss)	$ (642,852)	$ (225,624)	$ (1,016,019)	$ (588,921)	$ (533,637)	$ (2,348,427)	$ (655,855)	$ (595,993)	$ (533,289)
Beginning Water Utility Working Capital Balance	$ 15,915,206	$ 15,272,354	$ 15,046,729	$ 14,030,711	$ 13,441,790	$ 12,908,152	$ 10,559,726	$ 9,903,871	$ 9,307,878
Ending Water Utility Working Capital Balance	**$ 15,272,354**	**$ 15,046,729**	**$ 14,030,711**	**$ 13,441,790**	**$ 12,908,152**	**$ 10,559,726**	**$ 9,903,871**	**$ 9,307,878**	**$ 8,774,589**

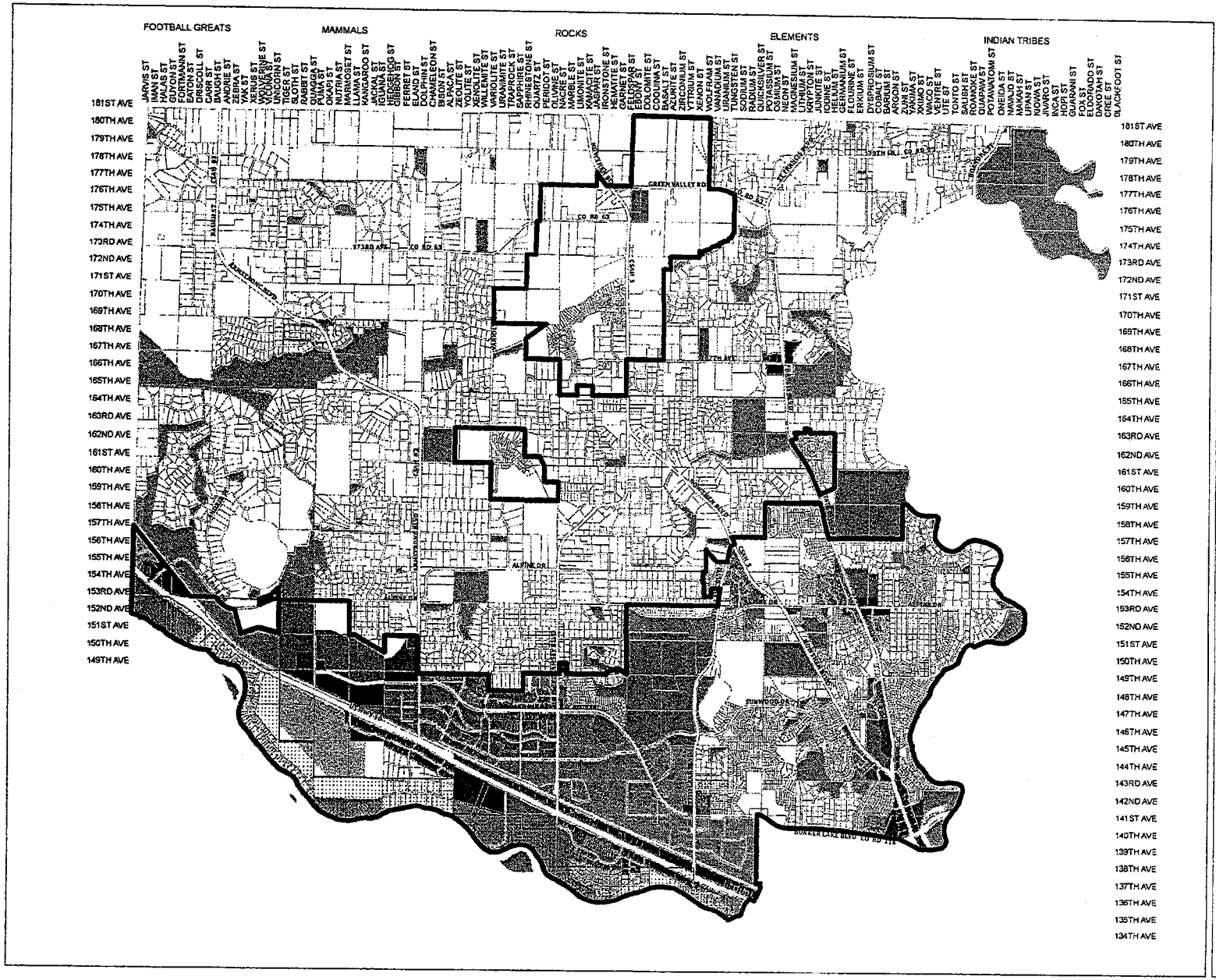
City of Ramsey			
Water Utility Finance Summary			
2 Phase Implementation of Water Treatment and Supply Facilities			
17-Apr-12	2029	2030	2031
Water Utility Expenses			
Capital Expenses-Equipment,CIP projects, Maintenenace improvements			
Miscellaneous Capital Expenditures and Equipment			
Utility Truck(2015, 2020, 2025, 2030)		($25,000.00)	
Water Supply & Treatment Improvements			
Renovate Pump House #2 (2016)			
Renovate Pump House #3 (2016)			
Well house I Improvements (2012)			
Well #1 Rehabilitation (2012-2015)			
Site Acquisition for Water Treatment Plant			
Water Meter Replacement			
Phase 1 - Water Treatment and Supply Facilities	$ (1,883,693)	$ (1,883,693)	$ (1,883,693)
Phase 2 - Water Treatment and Supply Facility Expansion	$ (312,722)	$ (312,722)	$ (312,722)
Water Storage Improvements and Maintenance			
Painting of 0.5 MG Water Tower No. 1 (2015)			
Painting of 1.5 MG Water Tower No. 2 (2025)			
Distribution System Improvements			
Alpine Drive-CSAH 5 to Germanium St Watermain			
Magnesium St Watermain Looping			
Fire Station #1 Extension of Water			
Southeast Loop			
North central Loop		$ (2,900,000)	
County Rd 57			
CSAH 5/153rd St.			
156th Lane NW			
General Infrastructure Needs	$ (250,000)	$ (250,000)	$ (250,000)
Distribution System Maintenance Improvements			
Watermain Looping Bunker Lake Blvd (2012)			
Watermain Looping Sunfish Lake Blvd (2016)			
Watermain Looping Ramsey Blvd Armstrong Blvd (2013)			
Subtotal - Capital Expenses	**$ (2,444,386)**	**$ (5,369,385)**	**$ (2,444,384)**
Operational Expenses			
Operating Expense-Distribution and Administration	$ (1,525,484)	$ (1,571,249)	$ (1,618,386)
Operating Expense-Treatment	$ (1,373,483)	$ (1,414,687)	$ (1,457,128)
Subtotal-Operating Expense	$ (2,898,967)	$ (2,985,936)	$ (3,075,514)
Total Annual Expenses	**$ (5,343,353)**	**$ (8,355,321)**	**$ (5,519,898)**
Water Utility Revenue			
Customer Revenue			
New Service Connections	260	260	260
NE Expansion Area - New service connections			
Water Sales- Estimated 2011 base (gallons/year)	725,000,000	725,000,000	725,000,000
Water Sales- New Customers 2013-2019 (gallons/year)	140,625,000	140,625,000	140,625,000
Water Sales - New Customers 2020-2031 (gallons/year)	252,900,000	272,400,000	291,900,000
Water rates ($/1000 gal)	$ 3.27	$ 3.33	$ 3.40
Water Availability Charge (WAC) ($/connection)	$ 1,704	$ 1,747	$ 1,790
Connection/Trunk Charge ($/connection)	$ 2,313	$ 2,371	$ 2,430
Water rate revenue from 2012 customer base	$ 2,293,142	$ 2,339,005	$ 2,385,785
Water rate revenue from 2013-2019 customers	$ 459,204	$ 468,388	$ 477,756
Water rate revenue from 2019-2031 customers	$ 825,832	$ 907,299	$ 991,693
WAC Revenue(Service Connections x WAC)	$ 443,095	$ 454,173	$ 465,527
Connection/Trunk Charge Revenue (Service Connections when platted x Connection Charge)	$ 601,421	$ 616,456	$ 631,868
Interest Earnings	$ 131,619	$ 123,711	$ 72,017
Total Customer Revenue	$ 4,754,313	$ 4,909,032	$ 5,024,646
Finance Adjustments			
Trunk Charges returned per John Peterson's Agreement			
Internal Loan to offset Muni Center Debt beginning year 2009-2029 2% Paid off in 2011			
PW Land/Building-Internal Loan 2009-2029 @2%			
Internal Loan to offset Muni Center Debt beginning year 2011-2030 @2%	**$ 61,853**		
Internal Loan for COR Land Purchase-10 Year @ 2% When Land Sold			
Total Finance Adjustments	$ 61,853	$ -	$ -
Water Utility Working Capital Balance			
Total Annual Expenses	$ (5,343,353)	$ (8,355,321)	$ (5,519,898)
Total Customer Revenue	$ 4,754,313	$ 4,909,032	$ 5,024,646
Finance Adjustments	$ 61,853	$ -	$ -
Net Income(Loss)	$ (527,187)	$ (3,446,289)	$ (495,252)
Beginning Water Utility Working Capital Balance	$ 8,774,589	$ 8,247,402	$ 4,801,113
Ending Water Utility Working Capital Balance	**$ 8,247,402**	**$ 4,801,113**	**$ 4,305,861**

APPENDIX C

PROPOSED WATER SYSTEM IMPROVEMENTS

APPENDIX D

COMPREHENSIVE PLAN
LAND USE MAPS



City of RAMSEY

2030 Comprehensive Plan Future Land Use Map Amendment 11-02

MUSA

MRCCA Boundary

Future Land Use

- LDR
- MDR
- HDR
- Office Park
- Commercial
- MU
- Business Park
- Public
- Rural Developing
- Rural Preserve
- Park

N W E S

0 0.5 1 Miles

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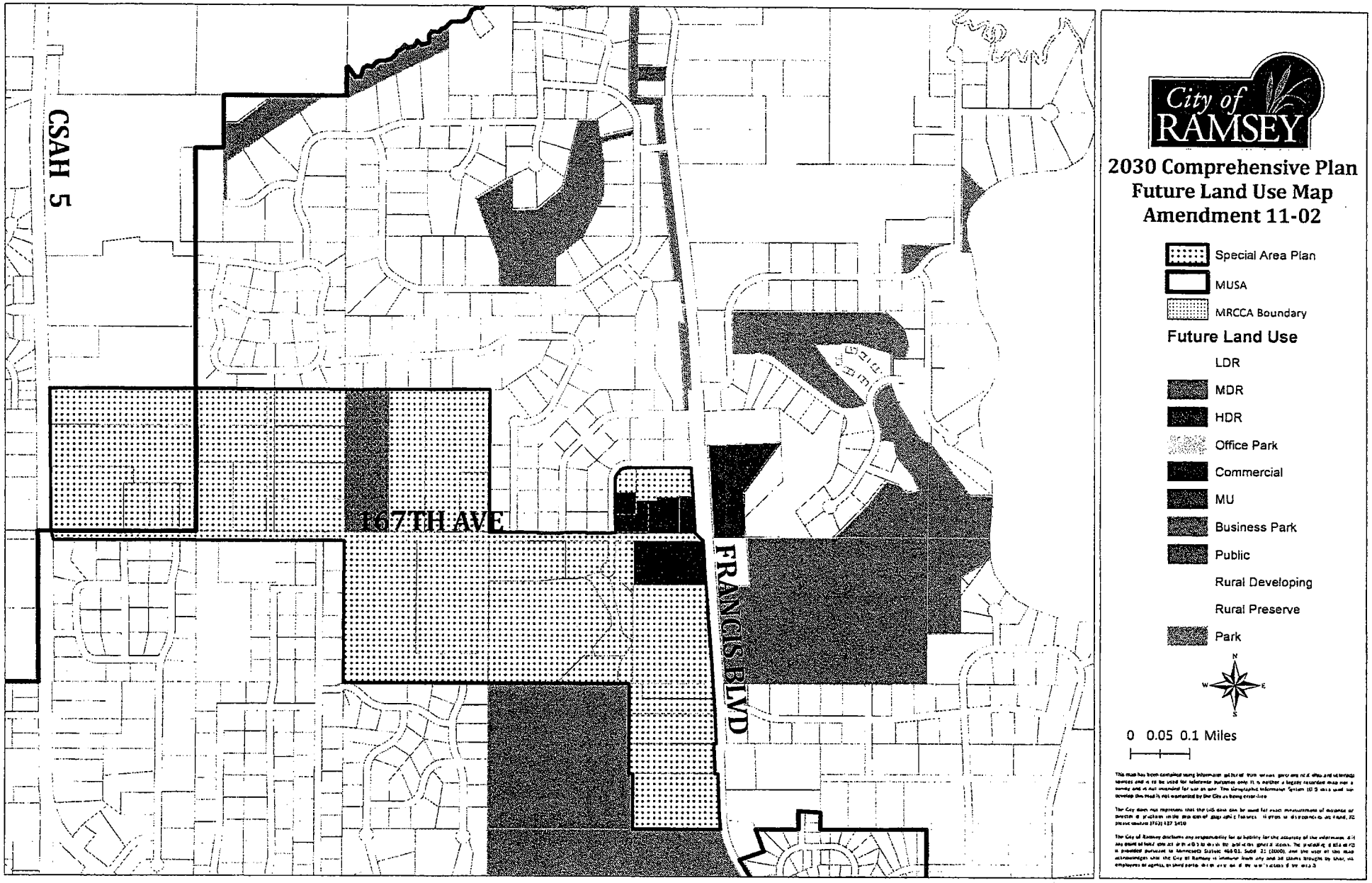
CSAH 5
167TH AVE
FRANCIS BLVD
City of RAMSEY
2030 Comprehensive Plan
Future Land Use Map
Amendment 11-02
Special Area Plan
MUSA
MRCCA Boundary
Future Land Use
LDR
MDR
HDR
Office Park
Commercial
MU
Business Park
Public
Rural Developing
Rural Preserve
Park
N
W
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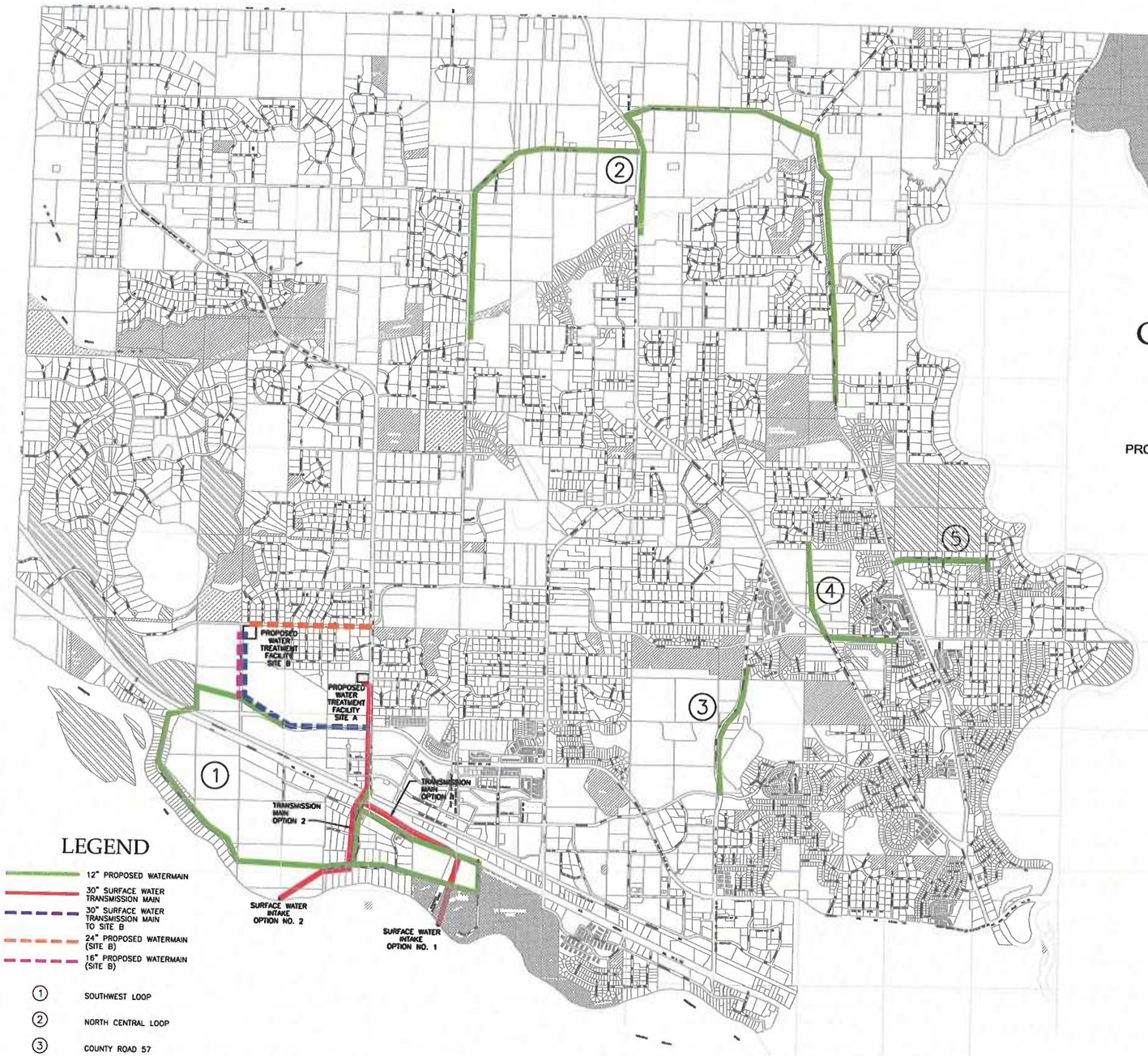
0 0.05 0.1 Miles



N

0 1000 2000
SCALE FEET

CITY OF RAMSEY MINNESOTA

FIGURE 1

PROPOSED WATER SYSTEM IMPROVEMENTS
COMPREHENSIVE WATER PLAN

PREPARED BY
BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN
BURNSVILLE, MN WILLMAR, MN CHASKA, MN
RAMSEY, MN MAPLEWOOD, MN BRAINERD, MN AMES, IA

MARCH 2012

NOTE:
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