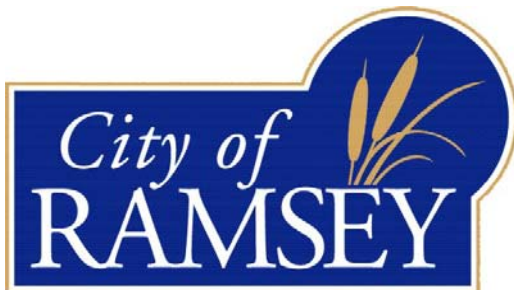


BOLTON & MENK, INC.
Consulting Engineers & Surveyors

Comprehensive Sanitary Sewer Study
City of Ramsey, Minnesota
May 2012
BMI Project No. R13.104503



COMPREHENSIVE SANITARY SEWER STUDY

FOR

CITY OF RAMSEY, MINNESOTA

MARCH 2012

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.

David P. Martini

Date: _____

Registration No. 26122

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EXECUTIVE SUMMARY

A. GENERAL

The purpose for this study is to update the City's Comprehensive Sewer Plans taking into account current population and land use projections. These projections are provided by the City's 2030 Comprehensive Plan. The planning period is 2012 through 2031.

As with past studies this study does not propose the expansion of sanitary sewers. The purpose of this report is to identify ultimate sewer flows based on current land use planning and identify the approximate location, sizing, and capacity of the trunk facilities needed to serve the 2030 Municipal Urban Service Area (MUSA) as proposed in the Comprehensive Plan. The Plan also presents alternatives for providing sanitary sewer service to the Special Area along 167th which is not currently within the 2030 MUSA but is proposed to be added within the planning period.

B. SANITARY SEWER FLOW PROJECTIONS

The design criteria used for this report are similar to the criteria used in past reports with some updates based on current planning efforts. Table ES.1 shows the design criteria used for the preparation of this report.

Table ES.1
Design Criteria

Description	Factor
Gallons Per Person Per Day	75.0
Flow Variation Factor	2.5 to 4.0
People Per Unit	2.7
Flow Per Unit (Gallons/Day)	202.5
Commercial / Industrial Flow Per Acre (gpd)	1,500
Public Land Flow Per Acre (gpd)	750

Land use planning assumptions utilized in the previous Comprehensive Sewer Plan were reviewed in conjunction with the 2030 Comprehensive Plan preparation. The major changes from previous planning efforts are the increase in the average density for low density residential area from 2.5 to 3.0 units per acre and the reduction in the household size from 3.0 to 2.7 persons per unit by 2030.

The City of Ramsey has been designated a “Developing Community” by the Metropolitan Council. The City can now extend sanitary sewer service anywhere within the City as long as the added flows do not exceed the City’s current capacity allocation of 3.8 million gallons per day (mgd). The previous restriction that sewer service could not extend north of Trott Brook has also been removed. The 2030 Comprehensive Plan shows the 2030 MUSA extending north of Trott Brook. It also indicates that significant areas south of Trott Brook would remain rural residential with no municipal sewer service.

The projected residential growth, as estimated by City staff, is 260 units per year from 2012 through 2031. This results in an addition 4,940 residential units by 2031. The estimated development of commercial, industrial and office land use property is presented in Table 5.4, Land Use staging in 5-year increments. This table projects a uniform development rate of 25 acres per year for the period 2012 to 2030, or a total of 475 acres.

Based on the design criteria and current land use planning, Table ES.2 provides a summary of the projected sanitary sewer flow for the 2012 to 2020 growth, 2012 to 2031 growth and the flows for both the Rum River District and Mississippi River District 2030 MUSA at full development.

Table ES.2
Sanitary Sewer Flow Summary

Description	Total Units	Total Population	Residential Flow (mgd)	Comm. / Ind. Office/Mixed Use Flow (mgd)	Other / Special Flow (mgd)	Daily Flow (mgd)
Growth 2012 to 2020	2,080	5,970	0.448	0.300		0.748
Growth 2012 to 2031	4,940	14,394	1.080	0.713		1.793
2030 MUSA - Rum River	9,989	26,970	2.023	0.117	0.062	2.202
2030 MUSA - Miss. River	2,564	6,923	0.519	2.118	0.027	2.665
2030 MUSA - Combined	12,553	33,893	2.542	2.235	0.089	4.866

C. EVALUATION OF EXISTING FACILITIES

At this time the regional components to serve the City of Ramsey are in place. The original sizing of these facilities was based on assumptions of land use patterns and densities that were developed before the regional sanitary sewer facilities were constructed. Originally, the North Trott Brook area was to receive sanitary sewer service from a future regional waste water treatment plant. However, the Metropolitan Council has now indicated that regional capacity can be provided through the existing Regional Disposal System by system capacity improvements.

The Champlin-Anoka-Brooklyn Center (CAB) interceptor serves the City of Ramsey. The CAB provides 14 mgd capacity to the northwest metropolitan area including Ramsey. Locally Ramsey has two main sanitary sewer districts that are each serviced by 30-inch reinforced concrete pipes. Sewer planning for the City has been and continues to be based on the known capacity of the two 30-inch interceptor sewers.

The City of Ramsey’s two interceptor sewers are designed for a combined flow of 7.87 million gallons per day (mgd). The interceptor sewer, which services the City’s Mississippi River Sewer District was designed for an average daily flow of 3.92 mgd and consists of a 30-inch reinforced concrete pipe that has a capacity of 15.4 cubic feet per second (cfs) or 9.97 mgd. The interceptor

sewer, which serves the City's Rum River District was designed for an average daily flow of 3.95 mgd and consists of a 30-inch reinforced concrete pipe that has a capacity of 12.6 cfs or 8.14 mgd.

On a local level, sewer planning will continue to be based on an ultimate daily flow of 7.87 mgd which accommodates the entire City at full development. The 2030 MUSA at full development has a projected flow of 4.867 mgd which is based on a population of 33,893. The projected 2031 sewer service population is 25,828. Therefore, the 2030 MUSA will support a population of 8,065 or 2,987 residential units, greater than the projected 2031 population.

The 2011 sewer flow for the City is 0.800 mgd. Based on the development projections, the 2012 to 2020 flow increase is 0.748 mgd for a total flow of 1.548 mgd. The 2012 to 2031 flow increase is 1.793 mgd for a total flow of 2.593 mgd. This is about 68 percent of the currently allocated flow allowance of 3.8 mgd.

D. PROPOSED SANITARY SEWER TRUNK EXTENSIONS

This Plan focuses on the proposed sanitary sewer trunk extensions and improvements which are required to service all areas within the 2030 MUSA boundaries. In addition, the Special Area along 167th Avenue which is proposed to be added to the MUSA is also addressed. This area is indicated on the Map under Item H in the Appendix. The extensions to service the 2030 MUSA are required in the following three areas and are shown on Figure 1 in the Appendix.

1. Subdistrict M3 located in the southwest corner of the City south of Highway 10. The improvements consist of an 18-inch gravity crossing of Highway 10, lift station, forcemain and trunk sewer extensions.
2. Subdistrict M4 located west of Armstrong Boulevard. The improvements consist of gravity sewer extension along the extension of Bunker Lake Boulevard.
3. Subdistricts R21 through R25 located north of Trott Brook in the north central portion of the City. Improvements in this area consist of gravity sewer extensions north of the existing lift station in the Brookfield neighborhood to service the area west of CSAH 5. The area east of CSAH 5 will require a lift station, forcemain and gravity sewer

extensions. This also requires a capacity upgrade of the existing lift station and the extension of gravity sewer north on Variolett Street

Two options have been considered for extension of sanitary sewer to the Special Area. The first option proposes a gravity trunk sewer. This has been previously referred to the northeast trunk and is sized to accommodate the entire northeast corner of the City. The second option proposes a lift station and forcemain sized to accommodate only the Special Area. After considering both options, the City has chosen to plan for the construction of a lift station and forcemain to serve this area.

The estimated project costs for the proposed improvements are summarized in Table ES.3.

Table ES.3
Estimated Project Costs

Improvement Location	Estimated Cost
Subdistrict M3	\$1,831,000
Subdistrict M4	414,500
Subdistricts R21 through R25	3,199,350
Lift Station RLS 3 Upgrade	215,000
<i>Subtotal:</i>	<i>\$6,036,850</i>
Northeast Trunk - Lift Station and Forcemain	\$1,296,900
<i>Total</i>	<i>\$7,333,750</i>

E. RECOMMENDATIONS

Providing sanitary sewer service to the additional areas within the 2030 MUSA will require extension of trunk sanitary sewer facilities to three general areas. The Special Area, if added to the MUSA, will require a separate trunk extension. The Comprehensive Sanitary Sewer Plan provides a guide plan for the location and sizing for the proposed extension. This information is graphically summarized on Figure 1 under Item I of the Appendix.

It is recommended that this Plan be adopted by the City Council. The schedule for the trunk system extensions is dependent on the rate and location of future growth. The implementation of each individual sewer extension will require a feasibility study which will evaluate the extension in more detail based on current information.

Initially the lift station/forcemain that will provide sewer service to the Special Area will be sized only to serve the selected service area. In order to expand the MUSA to the northeast portion of the City, capacity upgrades will be needed.

F. FINANCIAL IMPACT

The locations and sizing of the trunk sewer facilities shown on Figure 1 were used to develop an approximate total cost for facilities required to service the 2030 MUSA and Special Area. The total estimated cost for the extensions is \$7,333,750.

The sanitary sewer utility expenses consist of operation and maintenance (O & M) expenses in addition to these system expansion and improvement costs. An additional expense is the balance of \$111,848 of reimbursement to Oakwood/21st Century Bank. The revenue sources consist of usage fees and connection charges. The usage fees are intended to fully fund the O & M expenses. The connection charge is intended to fund system expansion and improvements.

Several alternates were identified for the connection charge rate analysis. The variables in the alternates were the options for providing sewer service to the Special Area and the equivalent factor for high density residential units. Full reimbursement to Oakwood/21st Century Bank was included in all alternates. After reviewing the alternatives the City has chosen to establish the connection charge that is summarized in Table ES.4.

Table ES.4
Connection Charge Summary
(Alternate 2b)

▪ Lift Station and FM Extension to Special Area	
▪ CIP Expenses	\$7,333,750
▪ 0.7 ERU for High Density Residential	
▪ Connection Charge Revenues	\$8,612,768
▪ Oakwood Reimbursement	\$111,848
▪ Total Gain	\$1,167,170
▪ Connection Charge Necessary to Balance	\$1,099 (\$172 Decrease)

The detailed analysis of the alternates that were considered is included as Item K in the Appendix. This shows that based on the listed assumptions, the sewer connection charge can be reduced by \$172 to \$1,099 per unit. The current per acre connection charge for commercial/industrial property is equivalent to 3.01 residential units. On this basis, the adjusted rate would be \$3,308 per acre.

The historic policy of requiring developers to fund sanitary sewer extensions with subsequent reimbursement from connection charges should be continued as a means to maintain a positive balance in the sewer utility fund and also to discourage premature sanitary sewer extensions.

SECTION 1

INTRODUCTION

A. PURPOSE

The purpose for this study is to update the City's Comprehensive Sewer Plan taking into account current population and land use projections. These projections are provided by the City's 2030 Comprehensive Plan. Past sanitary sewer studies have been completed for the City of Ramsey in the years 1971, 1974, 1978, 1989, 1991 and most recently in 2004 and 2005. Prior to 2004, sanitary sewer planning was completed primarily to determine the appropriate sizing of the metropolitan sewer facilities that ultimately serve the City of Ramsey. The intent of this study is to incorporate the key components of past studies into one working document for future sewer planning.

As with the 1991 and 2004 Comprehensive Sewer Plans, this study does not propose the expansion of sanitary sewers. The purpose of this report is to identify ultimate sewer flows based on current land use planning and identify the approximate location, sizing, and capacity of the trunk facilities needed to serve the potential growth.

This study also estimates the cost of projected future sanitary sewer system improvements and evaluates if the current connection charge system is adequate to fund the improvements.

B. REPORT ORGANIZATION

To adequately address the major areas that are evaluated, the report is organized in five sections as shown below:

Section 1: Introduction.

Section 2: Reviews projected sanitary sewer flows based on anticipated population trends.

Section 3: Evaluates the existing major sanitary sewer system components.

Section 4: Discusses the proposed sanitary sewer trunk system.

Section 5: Evaluates the adequacy of the current sanitary sewer connection charge.

Section 6: Summarizes recommendations and provides an implementation plan.

SECTION 2

SANITARY SEWER FLOW PROJECTIONS

A. PURPOSE

Sanitary sewer flow projections form the basis of planning for future sanitary sewer infrastructure needs. The City of Ramsey is located in the northwest corner of Anoka County and is experiencing growth which is requiring expansion of the sanitary sewer facilities necessary to convey sanitary sewer flow from proposed MUSA additions to existing trunk and interceptor sewers. In order to project future sanitary sewer flows, average daily flows for residential, commercial and industrial users must be evaluated and projected. In addition, maximum day to average day peaking factors must be determined in order to project the peak flows for infrastructure sizing.

This section will provide an analysis of land use trends based on comprehensive plan projections, population growth trends, historical usage, allocation of sanitary sewer demands to residential, commercial and industrial user categories, and projection of future average to peak sanitary sewer demands.

B. DESIGN CRITERIA

The 1974 City of Ramsey Comprehensive Sewer Plan used a per capita design flow of 100 gallons per capita per day. Sewer studies since 1978, including the 2005 Comprehensive Sewer Plan used a per capita design flow of 75 gallons per capita per day. The actual per capita flow for the City was 70 gallons per capita per day in 2011. Therefore, the 75 gpd design flow is supported by actual sewer flows experienced by the City and other similar metropolitan communities. This study recommends the continued use of 75 gallons per capita per day.

Sanitary sewer flow varies over a 24-hour period with peak flows generally in the morning and evenings. Therefore, in order to size sanitary sewer facilities, the variation between average and

peak flows is estimated. Typically flow variation between average and peak flows are between 2.5 for major trunk facilities and 4.0 for local lateral lines. Flow variation factors used in this study, as in past studies, were calculated using the empirical formula contained within the current edition of the 10-State “Standards for Wastewater Facilities”. The flow variation formula is based on population. As the population increases, the flow variation factor decreases.

This comprehensive plan is based on current land use planning. The plan continues the format of the 1991 plan by breaking down, in general, each 40-acre parcel in the City into developable and non-developable acres. To the extent possible the estimated number of units on undeveloped property comes directly from the 1991 plan. However, City staff has reviewed all of the development density assumptions used in this report to verify that they are consistent with current land use planning. Residential flow in previous plans was calculated based on 3.0 people per unit and 75 gallons per capita per day. This equates to 225 gallons per unit. Based on Chapter 4 of the City’s 2030 Comprehensive Plan, the household size is expected to decrease to 2.87 people per house for years 2012 to 2020 and to 2.7 people per house for years 2020 to 2030. Sanitary sewer facilities will be sized to accommodate service areas at full post 2030 development and therefore a household size of 2.7 will be used for planning. This equates to 202.5 gallons per household unit per day. Commercial, industrial, office and mixed use land use flows are calculated based on 20 people per acre, which equates to 1,500 gallons per acre per day. Public designated land use flows are estimated at 750 gallons per acre per day and special flows are taken directly from the 2005 study.

This report recommends that sewer sizing within the City of Ramsey continue to be based on ultimate flow projections. Previous Comprehensive Sanitary Sewer Studies anticipated that sewer treatment for the area north of Trott Brook would be treated at a future regional facility located within the North Trott Brook Service Area and also that all areas south of Trott Brook would ultimately develop to urban densities. The 2030 Comprehensive Plan shows the 2030 MUSA extending north of Trott Brook in the north central portion of the City. This expansion anticipates that significant areas south of Trott Brook would remain rural residential with no

sewer service.

This study verifies that the two existing interceptor sewers that serve the City of Ramsey have the capacity to serve the entire City both north and south of Trott Brook based on the development densities in the 2030 Comprehensive Plan for new developments and limited redevelopment of existing rural residential areas to higher density.

C. PAST PLANNING

Land use assumptions originally made in 1974 and 1978 were used to size the existing sanitary sewer facilities that serve the City of Ramsey. One of the key assumptions made at that time was that undeveloped property would ultimately be developed as residential property with a density of 2.5 dwelling units per acre. The other key assumption was a population estimate of 3.67 people per existing residential unit and a population projection of 3.2 people per unit for future residential growth.

In order to accurately reflect actual housing densities, the 1991 Comprehensive plan completed by Hakanson Anderson Associates, Inc. incorporated a detailed review of the impact that existing development would have on future development densities. The areas outside of the City's urban service boundary were permitted to subdivide into lot sizes of one acre and larger. According to the 1991 sewer plan, at the time of the report, approximately 1/3 of the land in the City's rural transition area was undeveloped. Based on this, the 1991 report attempted to project practical development density, which resulted in a development density of less than 2.5 units per acre in many areas. Ultimate sanitary sewer flows were calculated based on development assumptions for the following major land-planning categories:

Urban: This planning area consisted of land that was within the current metropolitan service area, which had been expanded to the 2000 MUSA line. Housing densities in this area were primarily fixed by existing development and preliminary plats and proposals. Sewer flow within the 2000 MUSA line was calculated based on the number of existing and proposed lots and the

assumption that undeveloped land would develop at the same density as adjacent properties.

Urban Reserve: This planning area consisted of land outside of the 2000 MUSA line but within the City's designated urban area. Land use controls at the time the 1991 plan was completed required a minimum lot size of 10 acres in an attempt to limit the subdivision of land until the MUSA line was extended into the urban reserve area. Sewer flow in this area was calculated based on densities similar to the MUSA lands except that development potential was restricted by existing plats with large lots.

Rural Transition: This planning area consisted of land within the Metropolitan Waste Control Commission's Sewer Service District number 3 boundary (land south of Trott Brook) but outside of the City's designated urban area. At the time of the 1991 plan, there were no plans to extend sewer into this area. However, the plan did note that long range planning recognized the potential for sewer service to this area and therefore major facilities had been sized accordingly.

Projected land use in the rural transition area was based on the following assumptions:

- Existing one-acre lots could be split in two.
- 2 ½ to 5-acre lots could be subdivided into three parcels.
- Parcels larger than 5-acres could be subdivided with a density of 2.5 units per acre.

Rural: This planning area consisted of the land north of Trott Brook. The 1991 Comprehensive Sewer Plan considered this area to be permanently unsewered.

D. CURRENT PLANNING

Chapter 5, Land Use, of the City's 2030 Comprehensive Plan provides the current land use planning and related assumptions. The 2030 Comprehensive Plan Future Land Use Map (Amendment 11-02) is included as Item G in the Appendix. This also shows the proposed 2030 MUSA boundary. The land use plan is intended to guide the future development of the community. As such, it provides the basis for projecting future sanitary sewer flows. The

projected sewer flows in turn provide the basis for sizing future sanitary sewer extensions and improvements. Based on the review and planning for the 2030 Comprehensive Plan, the previous development densities were modified. Table 1 provides a summary of the maximum allowed densities from Table 5-3 in the Comprehensive Plan, the projected average net densities of development between 2008 and 2030 from Table 5-7 and the average density goals from page 5-10.

Table 2.1
Residential Density Table

	Maximum Gross Density from Table 5-3 (units/acre)	Projected 2008-2030 Net Density from Table 5-7 (units/acre)	Average Density Goal (units/acre)
Low Density Residential	4	3	3.0
Medium Density Residential	7	6	6.0
High Density Residential	15	12	7.0

It is standard engineering practice to use conservatively high densities in projecting future sanitary sewer flows to ensure that facilities have adequate capacity for the ultimate sewer flows. Therefore, the study uses the projected 2008-2030 net densities from Table 2.1.

The proposed policy for the Rural Developing land use category, the largest land use in the City, includes enforcing a maximum density of one unit per 2.5 acres and also developing, implementing and enforcing a septic system inspection program and wellhead protection program. In other words, the Comprehensive Plan anticipated that areas in the Rural Developing land use areas will be serviced by on-site systems.

The Comprehensive Plan includes a Special Area Plan for an area along 167th Avenue between TH 47 and CSAH 5 as shown on Item H in the Appendix. With the exception of the most westerly 40 acres, this area is not included in the 2030 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 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. The City of Ramsey can now extend sanitary sewer service anywhere within MCES’s Sanitary Sewer District 3 boundary as long as the added flows do not exceed the City’s current capacity allocation of 3.8 mgd.

E. ULTIMATE SANITARY SEWER SERVICE AREA

Figure 1, the map of the 2030 Service Areas, included as Item I in the Appendix shows the proposed 2030 MUSA which defines the 2030 municipal sanitary sewer service area. The sanitary sewer flows from the 2030 MUSA at full development are tabulated in Appendix Item D for both the Mississippi River and Rum River Sewer Districts. Table 2.2 summarizes the residential units, population and average daily sanitary sewer flows from these tabulations.

Table 2.2
2030 MUSA at Full Development
Average Daily Sanitary Sewer Flow Summary

	Total Units	Total Population	Residential Flow (mgd)	Com./Ind. Office/Mixed Use Flow (mgd)	Other/Special Flow (mgd)	Total Flow (mgd)
Mississippi River District						
South of Trott Brook	2,564	6,923	0.519	2.118	0.027	2.665
North of Trott Brook	0	0	0	0	0	0
<i>Sub Total:</i>	<i>2,564</i>	<i>6,923</i>	<i>0.519</i>	<i>2.118</i>	<i>0.027</i>	<i>2.665</i>
Rum River District						
South of Trott Brook	8,090	21,843	1.638	0.117	0.062	1.817
North of Trott Brook	1,899	5,127	0.385	0	0	0.385
<i>Sub Total:</i>	<i>9,989</i>	<i>26,970</i>	<i>2.023</i>	<i>0.117</i>	<i>0.062</i>	<i>2.202</i>
Special Area	566	1,528	0.309	0.011	0	0.320
<i>Subtotal Rum River MUSA Special Area:</i>	<i>10,555</i>	<i>28,498</i>	<i>2.332</i>	<i>0.128</i>	<i>0.062</i>	<i>2.522</i>
<i>Total 2030 MUSA:</i>	<i>12,553</i>	<i>33,893</i>	<i>2.542</i>	<i>2.235</i>	<i>0.089</i>	<i>4.867</i>
<i>Total 2030 MUSA Plus Special Area:</i>	<i>13,199</i>	<i>35,421</i>	<i>2.851</i>	<i>2.246</i>	<i>0.089</i>	<i>5.187</i>

The 2030 MUSA will support a total of 12,553 residential units based on the land use densities discussed in the previous section. This results in a population of 33,893 based on 2.7 people per household. The projected 2031 sewer service population is 25,828. Therefore, the 2030 MUSA will support a population of 8,065 or 2,987 residential units, greater than the projected 2031 population.

Addition of the Special Area to the MUSA would add 566 residential units or 1,528 in population to the MUSA totals.

The sanitary sewer system improvements proposed in this study are intended to provide service for 50 to 80 years, well beyond the current 2030 planning period. While the goals and strategies in the 2030 Comprehensive Plan state that the Rural Developing land use area will always have on-site systems, the ultimate sanitary sewer service area could be the entire City. The sanitary sewer flows from each original property PIN south of Trott Brook at full development are tabulated in Appendix Item A for the Mississippi River Sewer District and in Appendix Item B for the Rum River Sewer District. The sewer flows for the area north of Trott Brook for each sewer subdistrict in the Mississippi River and Rum River Districts are tabulated in Appendix Item C. Table 2.3 provides a summary of the projected flows from the entire City at full development from these tabulations.

Table 2.3
Entire City at Full Development
Average Daily Sanitary Sewer Flow Summary

	Total Units	Total Population	Residential Flow (mgd)	Com./Ind. Office/Mixed Use Flow (mgd)	Other/Special Flow (mgd)	Total Flow (mgd)
Mississippi River District						
South of Trott Brook	5,461	14,745	1.106	2.205	0.03	3.341
North of Trott Brook	1,976	5,335	0.4	0	0	0.4
<i>Sub Total:</i>	<i>7,437</i>	<i>20,080</i>	<i>1.506</i>	<i>2.205</i>	<i>0.03</i>	<i>3.741</i>
Rum River District						
South of Trott Brook	13,451	36,318	2.724	0.143	0.164	3.031
North of Trott Brook	3,932	10,616	0.796	0	0	0.796
<i>Sub Total:</i>	<i>17,383</i>	<i>46,934</i>	<i>3.520</i>	<i>0.143</i>	<i>0.164</i>	<i>3.827</i>
<i>Total Both Districts:</i>	<i>24,820</i>	<i>67,014</i>	<i>5.026</i>	<i>2.348</i>	<i>0.194</i>	<i>7.568</i>

The table indicates that the City at full development would have 24,820 residential units with a population of 67,000.

F. RUM RIVER SEWER DISTRICT

The Rum River Sanitary Sewer District consists of about the northeast half of the City. This includes areas both north and south of Trott Brook as shown on Figure 1. The District includes an estimated 5,610 acres and 1,789 acres of developable property south and north of Trott Brook, respectively. The combined average ultimate sewer flow at full development of the entire District is 3.827 mgd.

The area within the 2030 MUSA consists of an estimated total developable area of 3,455 acres of which 2,822 acres are south of Trott Brook and 633 acres of north. The combined average sewer flow at full development of the 2030 MUSA is 2.202 mgd.

An existing 30-inch interceptor sewer receives the sewer flow from this district. The Northwest Trunk Sewer was extended from the interceptor in 2006 to extend service to the central portion of the City. Smaller local trunk and lateral sewers are proposed to serve local sub-districts.

G. MISSISSIPPI RIVER SEWER DISTRICT

This district consists of about the southwesterly half of the City. It also includes areas both north and south of Trott Brook as shown on Figure 1. The district includes an estimated 4,641 acres and 1,527 acres of developable property south and north of Trott Brook, respectively. The combined average ultimate sewer flow at full development of the entire District is 3.741 mgd.

The area within the 2030 MUSA consists of an estimated total developable area of 2,353 acres which is all south of Trott Brook. The combined average sewer flow at full development from the 2030 MUSA is 2.665 mgd.

An existing 30-inch interceptor sewer receives flow from this district. Small trunk and lateral sewers are proposed to serve the local sub-districts.

H. 2020 AND 2031 GROWTH PROJECTIONS

The projected residential growth, as estimated by City staff, is 260 units per year from 2012 through 2031. This results in an additional 4,940 residential units by 2031. The estimated development of commercial, industrial and office land use property is presented in Table 5.4, Land Use staging in 5-year increments. This table projects a uniform development rate of 25 acres per year for the period 2012 to 2030, or a total of 475 acres. The anticipated development “hot spots”, as determined by City staff, are shown on Figure 1. Based on the above development

projections, the projected average sanitary sewer flow increase is 0.748 mgd for 2012 to 2020 and 1.793 mgd for 2012 to 2031.

I. SUMMARY

Table 2.4 provides a summary of the projected sanitary sewer flows for the 2012 to 2020 growth, the 2012 to 2031 growth, the fully developed MUSA in both the Rum River and Mississippi River Sewer Districts and the ultimate development of the entire City.

**Table 2.4
Sanitary Sewer Flow Summary**

Description	Total Units	Total Population	Residential Flow (mgd)	Comm. / Ind. Office/Mixed Use Flow (mgd)	Other / Special Flow (mgd)	Daily Flow (mgd)
Growth 2012 to 2020	2,080	5,970	0.448	0.300		0.748
Growth 2012 to 2031	4,940	14,394	1.080	0.713		1.793
2030 MUSA - Rum River	9,989	26,970	2.023	0.117	0.062	2.202
2030 MUSA - Miss. River	2,564	6,923	0.519	2.118	0.027	2.665
Entire City - Rum River	17,383	46,934	3.520	0.143	0.164	3.827
Entire City - Miss. River	7,437	20,080	1.506	2.205	0.030	3.741

SECTION 3

EVALUATION OF EXISTING FACILITIES

A. GENERAL

The 1991 Comprehensive Sewer Plan completed by Hakanson Anderson Associates, Inc. included a detailed discussion of existing facilities and a history of regional planning efforts. In order to provide the City with one working document for future sewer planning and to maintain the history of regional planning efforts, this section provides a summary of the information contained within the 1991 report.

B. REGIONAL FACILITIES

At this time the regional components to serve the City of Ramsey are in place. However the original sizing of these facilities was based on assumptions of land use patterns and densities that were developed before the regional sanitary sewer facilities were constructed.

Ultimately, the Champlin-Anoka-Brooklyn Center (CAB) interceptor serves the City of Ramsey. The CAB provides 14 mgd capacity to the northwest metropolitan area including Ramsey. Past sewer planning did not propose the expansion of sanitary sewers. The primary purpose of past planning was to set the maximum potential size of the City's trunk sewer lines. Locally Ramsey has two main sanitary sewer districts that are each served by 30-inch reinforced concrete pipes. Sewer Planning for the City has been and continues to be based on the known capacity of the two 30-inch interceptor sewers. This study bases ultimate sewer flow on current land use planning within the City of Ramsey. At the present time, sanitary sewer service is provided to an estimated population of 11,434 within Ramsey, mostly in the southeast portion of the City.

The first of the two Metropolitan Waste Control Commission (MWCC) interceptors that serve sanitary sewer flow from the City of Ramsey was constructed in 1984 to serve the City's T.H. 10 and Industrial corridor. This line, which serves the City's Mississippi River Sewer District, consists of a 30-inch reinforced concrete pipe with a grade of 0.12%. The interceptor has a

capacity of 15.4 cubic feet per second (cfs) or 9.97 million gallons per day (mgd).

The second interceptor, known as the “Ramsey Second Interceptor Connection” was constructed in 1985. This line, which serves the City’s Rum River Sewer District consists of a 30-inch reinforced concrete pipe with a grade of 0.08%. The interceptor has a capacity of 12.6 cfs or 8.14 mgd.

The sizing of these two interceptor sewers was calculated based on significant planning efforts by the City of Ramsey and other regional agencies beginning with reports completed in the 1970’s. The federal “Clean Water Act” enacted in the 1960’s initiated the regional planning effort. Under the authority and direction of Section 201 of the act, the MWCC completed facilities planning studies. Specific to the City of Ramsey, the MWCC established the Sewer Service District 3 boundary, which has an outer limit just south of Trott Brook.

In the 1960’s the MWCC (now MCES) was given the responsibility of regionalizing ownership and management of sewage treatment. Planning studies were done to evaluate the facilities in the north metro area, including the Anoka Waste Water Treatment Plant (WWTP). As a result of the studies, the Anoka Treatment Plant was expanded and the Champlin-Anoka-Brooklyn Center (CAB) interceptor was sized and constructed. Ultimately the Anoka Wastewater Treatment Plant was eliminated and all flow from the City of Ramsey was sent to MCES’s Metro (Pigs Eye) wastewater treatment plant.

Based on the above-mentioned work, sewer planning for the City of Ramsey and other metro communities has been controlled by sewer capacity allocation. Ultimately, sizing for the City of Ramsey was based on a 1978 sewer report completed by the City, which identified three alternative sewer plans. Plan III was adopted by the City and was used for regional facility sizing.

As mentioned previously, the MWCC sized two interceptors to serve the City of Ramsey. One

connection designed to serve the City's Rum River Sewer District, was designed for an average daily flow of 3.95 mgd. The other connection designed to serve the City's Mississippi River District, was designed for an average daily flow of 3.92 mgd for a combined ultimate average daily design flow of 7.87 mgd.

According to the 1991 Comprehensive Sewer Plan, the metro agencies have recognized the potential for an average daily flow of 7.87 mgd from the City of Ramsey. This Study projects an average daily flow of 7.568 mgd from full development of the entire City (from Table 2.3) which is essentially the same as the 1991 Plan. However, at the time of the 1991 report the capacity that was allocated to the City in the Anoka Lift Station and CAB interceptor was only 2.8 mgd or approximately 35% of the City's ultimate design flow at that time. The 1991 report explained that the regional facility sizing was based on a conscious decision by the metropolitan agencies to minimize capital expenses by constructing facilities sized to meet the flow projections for specified planning periods, not ultimate flows. This is based on the assumption that not all communities will develop to their ultimate potential. However, as a result of the review process for the AUAR that was completed for the Ramsey Town Center (now CORE) project, the MWCC committed to an allocation of 3.8 mgd or 50% of the City's currently projected ultimate design flow.

The City of Ramsey is now considered to be a "Developing Community" by the Metropolitan Council. The designation originally allowed the City to extend sanitary sewer service anywhere within MCES Sanitary Sewer District 3 boundary (south of Trott Brook). Previous studies indicated that the area north of Trott Brook would be serviced by a proposed regional waste water treatment plant. Now, according to the Metropolitan Council, regional capacity for the north Trott Brook area can be provided through the existing Regional Disposal System by system capacity improvements. Therefore a future Regional waste water treatment plant is not being planned

The Metropolitan Council policy now provides the City flexibility to extend sanitary sewer

anywhere within the City provided that the allocation of 3.8 mgd is not exceeded. The City's 2030 Comprehensive Plan proposes expansion of the MUSA north of Trott Brook in the north central portion of the City. The plan also shows the majority of the existing rural residential development as Rural Developing land use which is proposed to be serviced with on-site systems.

Table 3.1 summarizes the average daily flow from Tables 2.2 and 2.3 for both Sewer Districts.

Table 3.1
Average Daily and Peak Flow Summary

	Average Flow (mgd)	Peak Flow Factor	Peak Flow (mgd)
Mississippi River District			
Entire District at Full Development	3.741	2.65	9.914
2030 MUSA at Full Development	2.665	3.11	8.288
<i>Full Capacity of Interceptor</i>			9.97
Rum River District			
Entire District at Full Development	3.827	2.29	8.764
2030 MUSA at Full Development	2.202	2.52	5.549
<i>Full Capacity of Interceptor</i>			8.14
Both Districts			
Entire City at Full Development	7.568		
2030 MUSA at Full Development	4.867		
Current MCES Allocation	3.8		

Table 3.1 also shows the full capacity of existing interceptors for both Districts. This comparison shows the interceptors have adequate capacity except for the Rum River District interceptor which is about 8 percent over capacity at full development of the entire district. This also shows

that at full development, the 2030 MUSA area sewer flow is expected to exceed the current MCES flow allocation.

The 2011 average sanitary sewer flow for Ramsey was 0.800 mgd. The projected sewer flow increase from 2012 to 2031 as shown on Table 2.4 is 1.793 mgd. This results in a total projected 2031 sewer flow of 2.513 mgd. Currently, the City's allocation for sewer discharge to MCES facilities is 3.8 mgd. Therefore, the projected 2031 sewer flow is 66 percent of the current allocation.

SECTION 4

PROPOSED SANITARY SEWER TRUNK SYSTEM

A. GENERAL

This Plan focuses on the proposed sanitary sewer trunk extensions and improvements which are required to provide service to all areas within the 2030 MUSA boundaries. In addition, the Special Area along 167th Avenue which is proposed to be added to the MUSA is also addressed.

The 2005 Plan presented a guide plan for the extension of the sanitary sewer trunk system to the entire City. This is shown on Proposed Service Area Map, dated December 2005, which is Item J in the Appendix. This plan is still valid and will be of benefit when future areas are considered for MUSA expansion.

Trunk sewers are mains that do not necessarily provide direct service to developable property but are necessary for system expansion or are mains that must be oversized or constructed at increased depth to provide service to future developments. Facilities such as lift stations or crossings of major highways or railroads are usually considered trunk costs.

B. TRUNK SANITARY SEWER SYSTEM

By utilizing aerial topography the existing unsewered subdivisions and undeveloped properties south of Trott Brook were evaluated in the 2005 Study to determine drainage areas. Based on this evaluation, proposed sewer sub-district boundaries were established so that each area will have a point to collect sanitary sewer flows into the trunk sewer system. It was proposed that a local sewer system would be developed to ultimately convey sanitary sewer flows to the trunk sewer system. The trunk sewers were proposed to be a combination of reinforced concrete pipes and PVC pipes. Pipe material will be determined based on the size and depth of the proposed lines. Table 4.1 summarizes the updated flow information for each of the proposed sanitary sewer districts based on the land use plan from the 2030 Comprehensive Plan and the design

criteria discussed in Section 2B. The detailed sewer flow tabulated by the original property PIN's is provided as Item E in the Appendix.

Table 4.1
Sanitary Sewer Sub-Districts

Sub-District	Total Units	Total Population	Daily Flow (mgd)	Peak Flow (mgd)	Peak Flow (cfs)
MLS-1	2,006	5,416	0.406	1.305	2.02
MLS-3	715	1,931	0.145	0.521	0.81
MLS-4	30	81	0.006	0.026	0.04
MLS-6	253	683	0.051	0.200	0.31
MLS-7	539	1,455	0.109	0.403	0.62
M2	446	1,204	0.093	0.349	0.54
M3	979	2,644	0.691	2.410	3.73
M4	722	1,949	0.357	1.281	1.98
M5	2,382	6,431	0.734	2.306	3.57
M6	739	1,995	0.150	0.537	0.83
M7	144	388	0.019	0.076	0.12
M8	113	304	0.023	0.093	0.14

Table 4.1 (Continued)
Sanitary Sewer Sub-Districts

Sub-District	Total Units	Total Population	Daily Flow (mgd)	Peak Flow (mgd)	Peak Flow (cfs)
RLS-1	597	1,613	0.121	0.442	0.68
RLS-2	411	1,110	0.083	0.314	0.49
RLS-3	2,090	5,643	0.423	1.353	2.09
RLS-4	240	648	0.049	0.190	0.29
RLS-6	253	683	0.051	0.200	0.31
RLS-7	539	1,455	0.109	0.403	0.62
RLS-8	1,649	4,452	0.334	1.099	1.70
R1	803	2,168	0.166	0.592	0.92
R2	742	2,003	0.151	0.540	0.84
R4	308	832	0.623	0.242	0.37
R5	504	1,361	0.102	0.379	0.59
R6	715	1,931	0.145	0.521	0.81
R7	176	475	0.355	0.142	0.22
R8	100	270	0.020	0.830	0.13
R9	304	821	0.068	0.260	0.40
R10	305	824	0.072	0.278	0.43
R11	453	1,223	0.107	0.399	0.62
R12	142	383	0.029	0.116	0.18
R13	203	548	0.041	0.163	0.25
R14	80	216	0.027	0.110	0.17
R15	125	338	0.025	0.103	0.16
R16	68	184	0.014	0.570	0.09
R17	268	724	0.054	0.211	0.33
R18	0	0	0.101	0.456	0.70

C. SYSTEM EXTENSIONS FOR 2030 MUSA

The sanitary sewer trunk system extension and improvement required to service the 2030 MUSA are shown on Figure 1 in the Appendix. The extensions are required generally in three areas which are individually discussed below. The proposed facilities are sized to accommodate the ultimate sewer flow from the entire service area for each extension including the areas outside of the 2030 MUSA boundary. This provides flexibility for allowing future MUSA expansions.

1. SUBDISTRICT M3

This subdistrict is located in the southwest corner of the City south of Highway 10. Service to this area will require extensions from the 30-inch trunk sewer on Sunwood Drive. The majority of the area will be serviced by lift station MLS-2 which will discharge to an 18-inch gravity sewer extended to the south side of Highway 10. The proposed trunk sewer on Bowers Drive will provide lateral benefit to the adjacent properties and the trunk cost is therefore limited to the oversizing and over depth costs.

The total estimated cost of the trunk sewer improvements to service the M3 subdistrict is \$1,831,000. Lateral sewer extensions from the proposed trunk will be required and these costs are not included.

2. SUBDISTRICT M4

This subdistrict is located north of Highway 10 and west of Armstrong Boulevard. Service to this area will require extensions from the 18-inch sewer on Bunker Lake Boulevard. The total estimated cost of the 12-inch and 15-inch gravity sewer extensions is \$414,500.

3. SUBDISTRICTS R21 THROUGH R25

These subdistricts are located north of Trott Brook in the north central portion of the City. Service to this area will require extensions from existing lift station RLS-3 in the Brookfield development. Subdistricts R21 and R22 on the west side of CSAH 5 can be

serviced from an 18-inch gravity sewer extension from the lift station. Subdistricts R23, R24, and R25 on the east side of CSAH 5 will be serviced by trunk sewers flowing to lift station RLS-8. The forcemain from the station will discharge to the proposed trunk sewer in subdistrict R22.

Existing lift station RLS-3 was not designed to accommodate the sewer flow from the north side of Trott Brook. The existing pumps will need to be replaced with higher capacity pumps. The existing 8-inch forcemain from lift station RLS-3 will be essentially at maximum capacity after the upgrade of the lift station pumps and will have high head loss from the flow through the pipe. The high head loss requires larger motors on the lift station pumps. To reduce this head loss somewhat, it is proposed to extend a 21-inch gravity sewer north in subdistrict R-1 on Variolite Street from the existing 24-inch trunk sewer. This reduces the forcemain length and related head loss.

The lift station upgrade at RLS-3 and the sewer extension in subdistrict R1 are south of Trott Brook but are required to provide sewer service to the subdistricts north of Trott Brook. The lift station upgrade will be required with the initial extension to the north side of Trott Brook. The R1 trunk construction would not be required until service is extended to Subdistricts R23 - R25. The total estimated costs are:

Subdistrict R23-R25	\$1,288,350
Subdistrict R21 and R22	1,911,000
Subdistrict R1	377,000
Subdistrict RLS-3	215,000
<i>Total:</i>	<i>\$3,791,350</i>

Itemized cost tabulations are provided in Item F in the Appendix.

D. SYSTEM EXTENSION FOR 167TH AVENUE SPECIAL AREA

The Special Area boundaries are shown on the map in Item H of the Appendix. With the exception of the westerly 40 acres, this area is not within the 2030 MUSA. It does, however, include one of the development “hot spots” shown on Figure 1 and is adjacent to another. Sewer service to this area was planned to be provided by extension of trunk sewer from the existing 30-inch trunk sewer for the Rum River District as shown on Figure 1. This was referred to as the Northeast Trunk Sewer and was studied in detail in a 2004 feasibility study. The southerly 30-inch sewer proposed in the feasibility study was constructed with the Northwest Trunk Sewer project in 2006.

The Northwest Trunk Sewer is sized to ultimately accommodate the sewer flow from the entire northeast portion of the City. The Special Area consists of an estimated 189 acres of developable residential property and 7 acres of commercial property. This is a very small portion of the ultimate service area for the Northeast Trunk. There is commercial property and also a development “hot spot” on the east side of Highway 47 which is not in the Special Area but should be considered as additions to the area.

With the small initial service area, a second option for providing sewer service to the Special Area consisting of a lift station and 8-inch forcemain is proposed as Alternate 2. The lift station would be located within the Special Area. For cost estimating purposes, the forcemain is assumed to follow the same route proposed for the gravity sewer. This lift station and forcemain are sized to accommodate the ultimate sewer flow from only the Special Area. The lift station and forcemain capacity could be increased to allow expansion of the Special Area.

E. SANITARY SEWER SERVICE AREAS

The system extensions discussed above will extend sewer service to the 2030 MUSA area and the 167th Avenue Special Area. In addition, the 2030 MUSA area extensions can also service areas beyond the 2030 MUSA boundaries. This information is summarized in Table 4.2.

Table 4.2
Proposed Sewer Extensions Service Area

District	Within 2030 MUSA		Within Special Area		Outside 2030 MUSA	
	Residential Units	Office/ Commercial/ Industrial/ Mixed Use (Ac.)	Residential Units	Office/ Commercial/ Industrial/ Mixed Use (Ac.)	Residential Units	Office/ Commercial/ Industrial/ Mixed Use (Ac.)
M3	979	310	0	0	0	0
M4	600	68	0	0	122	87
R1	0	0	0	0	190	0
R19	36	0	0	0	149	0
R20	0	0	0	0	165	0
R21	<u>135</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>246</u>	<u>0</u>
Total R19, 20 & 21	171	0	0	0	560	0
R23	666	0	0	0	120	0
R24	177	0	0	0	213	0
R25	<u>222</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>251</u>	<u>0</u>
Total R23, 24 & 25	1065	0	0	0	584	0
R6	120	0	360	0	0	0
R7	0	0	0	0	115	0
R8	0	0	0	0	110	0
R10	0	0	11	7	294	0
R11	0	0	195	0	258	0
R12	0	0	0	0	142	0
R13	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>203</u>	<u>0</u>
Total R6-8 & R10-13	120	0	566	7	1112	0
R26	0	0	0	0	419	0
R27	0	0	0	0	253	0
R28	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>120</u>	<u>0</u>
Total R26, 27 & 28	0	0	0	0	792	0
Total R6-8, R10-13 & R-26-28	120	0	566	7	1904	0
TOTAL	<u>2935</u>	<u>378</u>	<u>566</u>	<u>7</u>	<u>3360</u>	<u>87</u>

SECTION 5

RATE STUDY

A. GENERAL

This section reviews the City's current policies for funding trunk sanitary sewer improvements to determine if these policies are capable of funding the improvements proposed in this plan.

The City has a connection charge policy which requires all new connections to the sanitary sewer to pay this charge. The current charge rates are:

Residential property - \$1,271 per unit

Commercial/Industrial property - \$3,824 per acre

The City has a Sewer Utility Fund which is used for funding both capital improvement expenses and expenses related to operating and maintaining the sanitary sewer system. The data on the fund provided by City staff shows the fund to have an unaudited projected 2011 balance of \$4,862,722. The fund balance projections through 2025 show the balance generally between \$5,000,000 and \$6,000,000. The revenue sources for the fund are the revenue from sewer utility billings, trunk sewer connection charges and interest from investment of the fund balance. The revenue from sewer utility billings is approximately equal to the operating expenses.

Historically, the City has required properties and/or developers that want access to the municipal sanitary sewer system to fund the required extensions, not only to their site but across their site to provide for future extensions. These costs were offset by crediting their connection and lateral fees, but if the costs exceeded those amounts, the developer was required to fund the difference unless an agreement was reached with the City.

The City entered into a watermain and sanitary sewer cost contribution/reimbursement agreement with Oakwood Land Development, Inc. in 2006. This agreement established the procedures for reimbursing \$6,000,000 to Oakwood for its contribution to funding the sanitary sewer and

watermain extensions in 2006. This agreement was subsequently assigned to 21st Century bank. Based on the agreement, Oakwood would be credited with the total sewer connection charges on the lots that it develops. Based on information provided by the City, there is currently an unreimbursed balance of \$111,848.

The sanitary sewer rate analysis is based on the following assumptions:

1. Sanitary sewer system operations and maintenance costs will be funded by sewer utility revenue.
2. Sanitary sewer system improvements to extend service to new areas will be funded by sewer connection charges. This consists of trunk improvements only. Lateral improvement costs will be paid by benefitting properties.
3. The Sewer Utility Fund balance will be maintained at an average of one year of total expenses.

B. 2030 MUSA SEWER SYSTEM IMPROVEMENTS

The sanitary sewer system improvements which need to be funded from 2012 to 2031 consist of the improvements required to service the 2030 MUSA. The costs for these improvements from Section 4C are summarized on Table 5.1.

Table 5.1
2012 - 2031 Sanitary Sewer System Improvements

Sub-Districts	Total Project Cost
M3	\$1,831,000
M4	414,500
R21 through R25	3,791,350
<i>Total:</i>	<i>\$6,036,850</i>

The projected 2012 to 2031 residential development rate is 260 units per year, or a total of 4,940 units for the 19 year period. Based on Table 5-4 in the City’s 2030 Comprehensive Plan, the projected development rate for commercial and industrial property is 25 acres per year. This

results in 475 acres total for the 19 year period. The projected sewer connected charge revenue for 2012 to 2031 is tabulated in Table 5.2.

Table 5.2
2012 - 2031 Sanitary Sewer Connection Charge Revenue

Land Use	Units/Area	Connection Charge	Total
Residential	4,940 units	\$1,271/unit	\$6,278,740
Commercial/Industrial	475 acres	\$3,824/acre	1,816,400
<i>Total:</i>			<i>\$8,095,140</i>

Comparison of Tables 5.1 and 5.2 shows that the projected revenue exceeds the improvement costs by about \$2,000,000. This is based on no portions of the improvements being funded by developers.

The three areas serviced by the proposed 2012-2031 sewer system improvements have a projected total of 2,935 residential units and 378 acres of commercial/industrial area. Both of these are less than the projected total development for 2012 to 2031. The entire 2031 MUSA consisting of previous MUSA plus the new additions would provide an estimated total of 12,553 residential units with a population of 33,893. This population is well in excess of the estimated 2031 population of 25,828. Based on density and household size criteria used in this Study, the 2030 MUSA would support 2,987 units more than required for the 2031 population. These units would provide sewer connection charge revenue without significant expenses for system improvements.

The proposed improvements are sized to accommodate the sewer flows from the entire service area for each improvement including the areas outside of the 2030 MUSA boundary. Therefore, the benefit for these improvements extends outside of the 2030 MUSA. Any MUSA expansions beyond 2030 would generate additional connection charge revenue.

The connection charge revenue is based on development rates and therefore if actual rates differ,

the revenue collections are either slowed or accelerated. Maintaining the sewer fund balance and positive cash flow will require that the construction of sanitary sewer expansion be adjusted to match the actual growth. Ultimately, the total residential units and commercial/industrial properties paying connection charges will be the same as current projections.

C. SPECIAL AREA SYSTEM IMPROVEMENTS

The two alternatives for extending sewer service to this area are discussed in Section 4D. These consisted of a gravity sewer option previously described as the Northeast Trunk Sewer and of a lift station and forcemain option which will service only the Special Area. After review, the City has selected the lift station/forcemain alternate. The alternate has an estimated project cost of \$1,296,900.

The projected sewer connection charge revenue generated by full development of this Special Area is tabulated in Table 5.3.

**Table 5.3
Special Area Sanitary Sewer Connection Charge Revenue**

Land Use	Units/Area	Connection Charge	Total
Residential	566 units	\$1,271/unit	\$719,386
Commercial/Industrial	7 acres	\$3,824/acre	26,768
<i>Total:</i>			<i>\$746,154</i>

Table 5.3 shows that the revenue is about \$550,000 short of the estimated project cost. The Special Area requires a sewer pipe extension of over 10,000 feet to provide connection to the municipal sewer system. The Special Area is simply too small to fund the extension with only connection charge revenue.

Combining the Special Area Alternate 2 project cost with the 2030 MUSA project costs yield a total cost of \$7,333,750. Combining the project revenue yields a total of \$8,226,474. The revenue

exceeds the estimated improvement costs by about \$900,000 based on the current connection charge.

D. CONNECTION CHARGE ANALYSIS

The sanitary sewer utility expenses consist of operation and maintenance (O & M) expenses and of system expansion and improvements. An additional expense is the balance of \$111,848 of reimbursement to Oakwood/21st Century Bank. The revenue sources consist of usage fees and connection charges. The usage fees are intended to fully fund the O & M expenses. The connection charge is intended to fund system expansion and improvements.

The previous section indicated that the current connection charge rate was more than adequate to fund the proposed improvements. This was based on high density residential units being equivalent to a single family unit.

Four alternates were identified for the connection charge rate analysis. The variables in the alternates were the options for providing sewer service to the Special Area and the equivalent factor for high density residential units. Full reimbursement to Oakwood/21st Century Bank was included in all alternates. After review, the City has selected Alternate 2b which is summarized in Table 5.4.

**Table 5.4
Alternative 2b Summary**

▪ Lift Station and FM Extension to Special Area	
▪ CIP Expenses	\$7,333,750
▪ 0.7 ERU for High Density Residential	
▪ Connection Charge Revenues	\$8,612,768
▪ Oakwood Reimbursement	\$111,848
▪ Total Gain	\$1,167,170
▪ Connection Charge Necessary to Balance	\$1,099 (\$172 Decrease)

The detailed Alternate 2b analysis is included as Item K in the Appendix. This shows that based on the listed assumptions, the sewer connection charge can be reduced by \$172 to \$1,099 per unit. The current per acre connection charge for commercial/industrial property is equivalent to 3.01 residential units. On this basis, the adjusted rate would be \$3,308 per acre.

E. SUMMARY

The sewer usage fees are intended to fully fund the O & M costs of sanitary sewer systems. The usage rates should be adjusted as required to maintain a positive fund balance.

The sewer connection charge is intended to fully fund the costs of extending trunk sanitary sewer facilities. Based on the lift station/forcemain alternate to service the Special Area, the current charge rate can be reduced by \$172 per unit. The rate should be adjusted annually for inflationary increases.

Maintaining the desired balance in the Sewer Utility Fund is dependent on phasing in system extensions consistent with development demand and the related connection charge revenue. Continuing the historic policy of requiring developers to fund extensions with reimbursement from connection charges should be effective in maintaining a balance as the developer, not the sewer fund, is financing the extension. This should also discourage premature extensions.

SECTION 6

RECOMMENDATIONS

A. GENERAL

Providing sanitary sewer service to the additional areas within the 2030 MUSA will require extension of trunk sanitary sewer facilities to three general areas. The Special Area, if added to the MUSA, will require a separate trunk extension. The Comprehensive Sanitary Sewer Plan provides a guide plan for the location and sizing for the proposed extensions.

B. RECOMMENDATIONS

It is recommended that this Plan be adopted by the City Council. The schedule for the trunk system extensions is dependent on the rate and location of future growth. The implementation of each individual sewer extension will require a feasibility study which will evaluate the extension in more detail based on current information.

The selection of the lift station/forcemain alternate for providing sewer service to the Special Area will restrict future expansion of the MUSA in the northeast portion of City. Future capacity upgrades will be needed to expand this service area.

C. FINANCIAL IMPACT

The locations and sizing of the trunk sewer facilities shown on Figure 1 were use to develop an approximate total cost for facilities required to service the 2030 MUSA and Special Area. The total estimated cost for the extension is \$7,333,750. An analysis of the sewer connection charge policy indicates that this cost plus the balance of the reimbursement to Oakwood/21st Century Bank can be funded by connection charge revenue from the areas serviced by the extensions with some surplus. Eliminating the projected surplus in revenue would allow reduction in the current connection charge from \$1,271 to \$1,099 per unit.

The historic policy of requiring developer to fund sanitary sewer extensions with subsequent

reimbursement from connection charges should be continued as a means to maintain a positive balance in the sewer utility fund and also to discourage premature sanitary sewer extensions.

APPENDIX A

MISSISSIPPI RIVER SEWER DISTRICT FLOWS

MISSISSIPPI RIVER SERVICE AREA - FEBRUARY 2012

<u>MUSA</u>	<u>District</u>	<u>PIN</u>	<u>Total Area</u>	<u>Non Developable Area (Acres)</u>	<u>Developable Area (Acres)</u>	<u>Total Units</u>	<u>Density Units/Acre</u>	<u>Residential Flow (gpd)</u>	<u>Office / Comm./ Ind. / Mixed Use Flow (gpd)</u>	<u>Other / Special / Public Flow (gpd)</u>	<u>Rum River Flow (gpd)</u>	<u>Miss. River Flow (gpd)</u>	<u>MUSA Flow (gpd)</u>	<u>Total Flow (gpd)</u>
N	M	8340	20	6	14	18.2	1.3	3,686	0	0		3,686		3,686
N	M	17110	40	0	40	36	0.9	7,290	0	0		7,290		7,290
N	M	17120	40	0	40	32	0.8	6,480	0	0		6,480		6,480
N	M	17130	40	0	40	64	1.6	12,960	0	0		12,960		12,960
N	M	17140	40	0	40	44	1.1	8,910	0	0		8,910		8,910
N	M	17210	40	0	40	60	1.5	12,150	0	0		12,150		12,150
N	M	17220	40	5	35	0	0.0	0	0	0		0		0
N	M	17230	40	5	35	17.5	0.5	3,544	0	0		3,544		3,544
N	M	17240	40	15	25	62.5	2.5	12,656	0	0		12,656		12,656
N	M	17310	40	25	15	37.5	2.5	7,594	0	0		7,594		7,594
N	M	17320	40	30	10	18	1.8	3,645	0	0		3,645		3,645
N	M	17330	40	8	32	0	0.0	0	0	0		0		0
N	M	17340	40	5	35	38.5	1.1	7,796	0	0		7,796		7,796
N	M	17410	40	0	40	100	2.5	20,250	0	0		20,250		20,250
N	M	17420	40	3	37	48.1	1.3	9,740	0	0		9,740		9,740
N	M	17430	40	3	37	59.2	1.6	11,988	0	0		11,988		11,988
N	M	17440	40	0	40	80	2.0	16,200	0	0		16,200		16,200
N	M	18100	160	10	150	75	0.5	15,188	0	0		15,188		15,188
N	M	18200	160	5	155	77.5	0.5	15,694	0	0		15,694		15,694
N	M	18300	190	0	190	76	0.4	15,390	0	0		15,390		15,390
N	M	18400	130	60	70	70	1.0	14,175	0	0		14,175		14,175
N	M	19100	160	120	40	0	0.0	0	0	0		0		0
N	M	19210	80	0	80	0	0.0	0	0	0		0		0
Y	M	19220	20	0	20	0	0.0	0	30,000	0		30,000	30,000	30,000
Y	M	19230	20	0	20	8	0.4	1,620	30,000	0		31,620	31,620	31,620
Y	M	19240	30	20	10	0	0.0	0	15,000	0		15,000	15,000	15,000
Y	M	19320	41	0	41	246	6.0	49,815	0	0		49,815	49,815	49,815
Y	M	19340	38	20	18	0	0.0	0	19,500	1,500		21,000	21,000	21,000
Y	M	19400	68	30	38	79.8	2.1	16,160	0	1,500		17,660	17,660	17,660
N	M	19400	52	0	52	156	3.0	31,590	0	0		31,590		31,590
Y	M	19430	30	10	20	20	1.0	4,050	0	0		4,050	4,050	4,050
N	M	20110	40	0	40	100	2.5	20,250	0	0		20,250		20,250
N	M	20120	40	0	40	100	2.5	20,250	0	0		20,250		20,250
N	M	20130	45	0	45	72	1.6	14,580	0	0		14,580		14,580
N	M	20140	35	2	33	66	2.0	13,365	0	0		13,365		13,365
N	M	20210	40	10	30	54	1.8	10,935	0	750		11,685		11,685
N	M	20220	40	30	10	0	0.0	0	0	0		0		0
N	M	20230	40	5	35	0	0.0	0	0	0		0		0
N	M	20240	40	2	38	64.6	1.7	13,082	0	150		13,232		13,232
Y	M	20310	35	5	30	90	3.0	18,225	0	0		18,225	18,225	18,225
Y	M	20310	5	0	5	15	3.0	3,038	0	0		3,038	3,038	3,038
Y	M	20320	20	5	15	90	6.0	18,225	0	0		18,225	18,225	18,225
Y	M	20320	20	0	20	120	6.0	24,300	0	0		24,300	24,300	24,300
Y	M	20330	30	0	30	180	6.0	36,450	0	0		36,450	36,450	36,450
Y	M	20330	10	0	10	120	12.0	24,300	0	0		24,300	24,300	24,300
Y	M	20340	40	0	40	0	0.0	0	30,000	0		30,000	30,000	30,000
N	M	20410	40	0	40	92	2.3	18,630	0	0		18,630		18,630
N	M	20420	40	0	40	72	1.8	14,580	0	0		14,580		14,580
Y	M	20430	13	0	13	0	0.0	0	9,750	0		9,750	9,750	9,750
Y	M	20430	27	20	7	42	6.0	8,505	0	0		8,505	8,505	8,505
Y	M	20440	27	5	22	66	3.0	13,365	0	0		13,365	13,365	13,365
Y	M	20440	13	0	13	156	12.0	31,590	0	0		31,590	31,590	31,590
N	M	21130	40	0	40	120	3.0	24,300	0	0		24,300		24,300
N	M	21140	40	0	40	60	1.5	12,150	0	0		12,150		12,150
N	M	21210	40	0	40	48	1.2	9,720	0	0		9,720		9,720
N	M	21220	40	0	40	56	1.4	11,340	0	0		11,340		11,340
N	M	21230	40	30	10	25	2.5	5,063	0	0		5,063		5,063
N	M	21240	40	35	5	15	3.0	3,038	0	0		3,038		3,038
N	M	21310	40	15	25	32.5	1.3	6,581	0	1,125		7,706		7,706
N	M	21320	40	10	30	51	1.7	10,328	0	0		10,328		10,328

MISSISSIPPI RIVER SERVICE AREA - FEBRUARY 2012

<u>MUSA</u>	<u>District</u>	<u>PIN</u>	<u>Total Area</u>	<u>Non Developable Area (Acres)</u>	<u>Developable Area (Acres)</u>	<u>Total Units</u>	<u>Density Units/Acre</u>	<u>Residential Flow (gpd)</u>	<u>Office / Comm./ Ind. / Mixed Use Flow (gpd)</u>	<u>Other / Special / Public Flow (gpd)</u>	<u>Rum River Flow (gpd)</u>	<u>Miss. River Flow (gpd)</u>	<u>MUSA Flow (gpd)</u>	<u>Total Flow (gpd)</u>
N	M	21330	40	0	40	64	1.6	12,960	0	0		12,960		12,960
N	M	21340	40	0	40	72	1.8	14,580	0	0		14,580		14,580
N	M	21410	40	0	40	88	2.2	17,820	0	0		17,820		17,820
N	M	21420	40	0	40	76	1.9	15,390	0	0		15,390		15,390
N	M	21430	35	0	35	63	1.8	12,758	0	0		12,758		12,758
N	M	21440	45	0	45	67.5	1.5	13,669	0	0		13,669		13,669
N	M	22310	40	5	35	52.5	1.5	10,631	0	375		11,006		11,006
N	M	22320	8	0	8	19.2	2.4	3,888	0	0		3,888		3,888
N	M	22320	33	0	33	52.8	1.6	10,692	0	0		10,692		10,692
N	M	22330	25	0	25	52.5	2.1	10,631	0	0		10,631		10,631
N	M	22340	55	15	40	60	1.5	12,150	0	0		12,150		12,150
Y	M	22430	40	40	0	0	0.0	0	0	3,000		3,000	3,000	3,000
Y	M	27110	40	40	0	0	0.0	0	0	3,000		3,000	3,000	3,000
Y	M	27120	40	40	0	0	0.0	0	0	3,000		3,000	3,000	3,000
Y	M	27130	40	40	0	0	0.0	0	0	3,000		3,000	3,000	3,000
Y	M	27140	40	40	0	0	0.0	0	0	3,000		3,000	3,000	3,000
Y	M	27210	40	0	40	56	1.4	11,340	0	0		11,340	11,340	11,340
Y	M	27220	40	0	40	56	1.4	11,340	15,000	0		26,340	26,340	26,340
Y	M	27230	40	40	0	0	0.0	0	0	0		0	0	0
Y	M	27240	40	30	10	0	0.0	0	0	0		0	0	0
Y	M	27310	40	20	20	0	0.0	0	30,000	0		30,000	30,000	30,000
Y	M	27320	40	20	20	0	0.0	0	30,000	0		30,000	30,000	30,000
Y	M	27330	40	0	40	0	0.0	0	60,000	0		60,000	60,000	60,000
Y	M	27340	40	30	10	0	0.0	0	15,000	0		15,000	15,000	15,000
Y	M	27410	40	0	40	0	0.0	0	60,000	0		60,000	60,000	60,000
Y	M	27420	40	0	40	0	0.0	0	60,000	0		60,000	60,000	60,000
Y	M	27430	20	0	20	0	0.0	0	30,000	0		30,000	30,000	30,000
Y	M	27440	60	0	60	0	0.0	0	90,000	0		90,000	90,000	90,000
Y	M	28110	16	0	16	96	6.0	19,440	0	0		19,440	19,440	19,440
Y	M	28110	16	0	16	17.6	1.1	3,564	0	0		3,564	3,564	3,564
N	M	28120	28	0	28	30.8	1.1	6,237	0	0		6,237		6,237
Y	M	28120	20	0	20	120	6.0	24,300	0	0		24,300	24,300	24,300
Y	M	28210	20	0	20	0	0.0	0	30,000	0		30,000	30,000	30,000
Y	M	28210	20	0	20	0	0.0	0	30,000	0		30,000	30,000	30,000
Y	M	28220	40	0	40	0	0.0	0	60,000	0		60,000	60,000	60,000
Y	M	28320	30	0	30	18	0.6	3,645	25,800	0		29,445	29,445	29,445
Y	M	28330	50	0	50	50	1.0	10,125	0	0		10,125	10,125	10,125
Y	M	28340	30	0	30	0	0.0	0	45,000	0		45,000	45,000	45,000
Y	M	28430	12	0	12	0	0.0	0	18,000	0		18,000	18,000	18,000
Y	M	28440	24	0	24	0	0.0	0	36,000	0		36,000	36,000	36,000
Y	M	29110	57	0	57	0	0.0	0	85,500	0		85,500	85,500	85,500
Y	M	29110	13	0	13	0	0.0	0	19,500	0		19,500	19,500	19,500
Y	M	29120	30	0	30	0	0.0	0	45,000	0		45,000	45,000	45,000
Y	M	29120	20	0	20	0	0.0	0	30,000	0		30,000	30,000	30,000
Y	M	29130	30	0	30	0	0.0	0	45,000	0		45,000	45,000	45,000
Y	M	29140	13	0	13	0	0.0	0	19,500	0		19,500	19,500	19,500
Y	M	29210	30	0	30	0	0.0	0	45,000	0		45,000	45,000	45,000
Y	M	29220	15	0	15	0	0.0	0	22,500	0		22,500	22,500	22,500
Y	M	29230	65	0	65	0	0.0	0	97,500	0		97,500	97,500	97,500
Y	M	29240	25	0	25	75	3.0	15,188	0	0		15,188	15,188	15,188
Y	M	29240	25	0	25	0	0.0	0	45,000	0		45,000	45,000	45,000
Y	M	29310	40	0	40	0	0.0	0	60,000	0		60,000	60,000	60,000
Y	M	29320	24	0	24	72	3.0	14,580	0	0		14,580	14,580	14,580
Y	M	29320	6	0	6	36	6.0	7,290	0	0		7,290	7,290	7,290
Y	M	29330	18	0	18	37.8	2.1	7,655	0	0		7,655	7,655	7,655
Y	M	29340	20	0	20	60	3.0	12,150	0	0		12,150	12,150	12,150
Y	M	29340	20	0	20	0	0.0	0	1,500	0		1,500	1,500	1,500
Y	M	29410	35	0	35	35	1.0	7,088	0	0		7,088	7,088	7,088
Y	M	29420	20	0	20	60	3.0	12,150	0	0		12,150	12,150	12,150
Y	M	29420	20	0	20	0	0.0	0	30,000	0		30,000	30,000	30,000

MISSISSIPPI RIVER SERVICE AREA - FEBRUARY 2012

<u>MUSA</u>	<u>District</u>	<u>PIN</u>	<u>Total Area</u>	<u>Non Developable Area (Acres)</u>	<u>Developable Area (Acres)</u>	<u>Total Units</u>	<u>Density Units/Acre</u>	<u>Residential Flow (gpd)</u>	<u>Office / Comm./ Ind. / Mixed Use Flow (gpd)</u>	<u>Other / Special / Public Flow (gpd)</u>	<u>Rum River Flow (gpd)</u>	<u>Miss. River Flow (gpd)</u>	<u>MUSA Flow (gpd)</u>	<u>Total Flow (gpd)</u>
Y	M	29430	20	0	20	60	3.0	12,150	0	0		12,150	12,150	12,150
Y	M	29430	20	0	20	0	0.0	0	0	0		0	0	0
Y	M	29440	30	0	30	33	1.1	6,683	0	0		6,683	6,683	6,683
Y	M	30100	55	0	55	93.5	1.7	18,934	0	0		18,934	18,934	18,934
Y	M	30100	25	0	25	75	3.0	15,188	0	0		15,188	15,188	15,188
Y	M	33110	88	88	0	0	0.0	0	0	6,600		6,600	6,600	6,600
Y	M	33210	31	25	6	0	0.0	0	0	1,875		1,875	1,875	1,875
Y	M	33220	11	11	0	0	0.0	0	0	825		825	825	825
Y	M	34110	35	0	35	0	0.0	0	52,500	0		52,500	52,500	52,500
Y	M	34120	20	0	20	0	0.0	0	40,000	0		40,000	40,000	40,000
Y	M	34130	10	0	10	0	0.0	0	15,000	0		15,000	15,000	15,000
Y	M	34140	10	0	10	0	0.0	0	15,000	0		15,000	15,000	15,000
Y	M	34210	13	0	13	0	0.0	0	19,500	0		19,500	19,500	19,500
Y	M	34220	10	0	10	0	0.0	0	15,000	0		15,000	15,000	15,000
Y	M	34230	34	0	34	204	6.0	41,310	0	0		41,310	41,310	41,310
Y	M	34230	69	10	59	0	0.0	0	88,500	0		88,500	88,500	88,500
Y	M	34411	9	0	9	6.3	0.7	1,276	5,930	0		7,206	7,206	7,206
Y	M	34412	10	0	10	30	3.0	6,075	0	0		6,075	6,075	6,075
Y	M	34420	33	0	33	19.8	0.6	4,010	0	0		4,010	4,010	4,010
Y	M	35210	40	0	40	0	0.0	0	60,000	0		60,000	60,000	60,000
Y	M	35220	40	0	40	0	0.0	0	60,000	0		60,000	60,000	60,000
Y	M	35230	30	0	30	0	0.0	0	45,000	0		45,000	45,000	45,000
Y	M	35240	50	0	50	0	0.0	0	75,000	0		75,000	75,000	75,000
Y	M	35310	19	0	19	9.5	0.5	1,924	16,500	0		18,424	18,424	18,424
Y	M	35320	18	0	18	10.8	0.6	2,187	12,000	0		14,187	14,187	14,187
Y	M	CORE	247	0	247	0	0.0	0	370,500	0		370,500	370,500	370,500
TOTALS			5,689	1,048	4,641	5,461		1,105,751	2,205,480	29,700	0	3,340,931	2,752,010	3,340,931

APPENDIX B

RUM RIVER SEWER DISTRICT FLOWS

RUM RIVER SERVICE AREA - FEBRUARY 2012

<u>MUSA</u>	<u>District</u>	<u>PIN</u>	<u>Total Area</u>	<u>Non Developable Area (Acres)</u>	<u>Developable Area (Acres)</u>	<u>Total Units</u>	<u>Density Units/Acre</u>	<u>Residential Flow (gpd)</u>	<u>Office / Comm./ Ind. / Mixed Use Flow (gpd)</u>	<u>Other / Special / Public Flow (gpd)</u>	<u>Rum River Flow (gpd)</u>	<u>Miss. River Flow (gpd)</u>	<u>MUSA Flow (gpd)</u>	<u>Total Flow (gpd)</u>
N	R	1330	19	5	14	27	1.9	5,387	0	0	5,387			5,387
N	R	2330	12	4	8	20	2.5	4,050	0	0	4,050			4,050
N	R	2340	31	10	21	27	1.3	5,528	0	0	5,528			5,528
N	R	2430	40	12	28	84	3.0	17,010	0	0	17,010			17,010
N	R	2440	26	8	18	54	3.0	10,935	0	0	10,935			10,935
N	R	8430	20	8	12	25	2.1	5,103	0	0	5,103			5,103
N	R	8440	20	15	5	13	2.6	2,633	0	0	2,633			2,633
N	R	9330	30	20	10	25	2.5	5,063	0	0	5,063			5,063
N	R	9340	40	15	25	38	1.5	7,594	0	0	7,594			7,594
Y	R	9410	30	20	10	30	3.0	6,075	0	0	6,075		6,075	6,075
N	R	9420	15	15	0	0	0.0	0	0	0	0			0
N	R	9430	40	20	20	60	3.0	12,150	0	0	12,150			12,150
Y	R	9440	40	12	28	84	3.0	17,010	0	0	17,010		17,010	17,010
N	R	10110	35	15	20	28	1.4	5,670	0	0	5,670			5,670
Y	R	10120	30	10	20	60	3.0	12,150	0	0	12,150		12,150	12,150
Y	R	10130	40	0	40	120	3.0	24,300	0	0	24,300		24,300	24,300
N	R	10140	40	0	40	72	1.8	14,580	0	0	14,580			14,580
Y	R	10230	20	10	10	30	3.0	6,075	0	0	6,075		6,075	6,075
Y	R	10240	35	5	30	90	3.0	18,225	0	0	18,225		18,225	18,225
Y	R	10310	40	5	35	105	3.0	21,263	0	0	21,263		21,263	21,263
Y	R	10320	40	0	40	120	3.0	24,300	0	0	24,300		24,300	24,300
Y	R	10330	40	8	32	96	3.0	19,440	0	0	19,440		19,440	19,440
Y	R	10340	40	0	40	120	3.0	24,300	0	0	24,300		24,300	24,300
N	R	10410	40	0	40	120	3.0	24,300	0	0	24,300		24,300	24,300
Y	R	10420	40	0	40	120	3.0	24,300	0	0	24,300		24,300	24,300
N	R	10430	40	8	32	61	1.9	12,312	0	0	12,312			12,312
N	R	10440	20	0	20	42	2.1	8,505	0	0	8,505			8,505
N	R	10440	20	0	20	60	3.0	12,150	0	0	12,150			12,150
N	R	11110	50	10	40	120	3.0	24,300	0	0	24,300			24,300
N	R	11120	40	10	30	90	3.0	18,225	0	0	18,225			18,225
N	R	11130	40	20	20	60	3.0	12,150	0	0	12,150			12,150
N	R	11140	40	15	25	35	1.4	7,088	0	0	7,088			7,088
N	R	11210	40	8	32	80	2.5	16,200	0	0	16,200			16,200
N	R	11220	40	8	32	80	2.5	16,200	0	0	16,200			16,200
N	R	11230	20	0	20	26	1.3	5,265	0	0	5,265			5,265
N	R	11230	20	0	20	50	2.5	10,125	0	0	10,125			10,125
N	R	11240	20	0	20	40	2.0	8,100	0	0	8,100			8,100
N	R	11240	20	0	20	50	2.5	10,125	0	0	10,125			10,125
N	R	11310	40	0	40	68	1.7	13,770	0	0	13,770			13,770
N	R	11320	40	0	40	120	3.0	24,300	0	0	24,300			24,300
N	R	11330	40	0	40	120	3.0	24,300	0	0	24,300			24,300
N	R	11340	40	0	40	120	3.0	24,300	0	0	24,300			24,300
N	R	11410	40	20	20	34	1.7	6,885	0	0	6,885			6,885
N	R	11420	30	3	27	11	0.4	2,187	0	0	2,187			2,187
N	R	11420	7	0	7	0	0.0	0	10,500	0	10,500			10,500
N	R	11430	20	5	15	45	3.0	9,113	0	0	9,113			9,113
N	R	11430	10	0	10	30	3.0	6,075	0	0	6,075			6,075
N	R	11430	10	0	10	0	0.0	0	15,000	0	15,000			15,000
N	R	11440	40	40	0	0	0.0	0	0	0	0			0
N	R	12220	20	5	15	18	1.2	3,645	0	0	3,645			3,645
N	R	12230	21	0	21	13	0.6	2,552	0	0	2,552			2,552
N	R	12320	21	10	11	8	0.7	1,559	0	0	1,559			1,559
N	R	12330	35	15	20	34	1.7	6,885	0	0	6,885			6,885
N	R	13200	110	0	110	275	2.5	55,688	0	0	55,688			55,688
N	R	13300	155	20	135	0	0.0	0	0	101,250	101,250			101,250
Y	R	13430	30	2	28	53	1.9	10,773	0	0	10,773		10,773	10,773
N	R	14110	20	0	20	42	2.1	8,505	0	0	8,505			8,505
N	R	14110	20	0	20	60	3.0	12,150	0	0	12,150			12,150
N	R	14120	40	0	40	120	3.0	24,300	0	0	24,300			24,300
N	R	14130	40	40	0	0	0.0	0	0	0	0			0

RUM RIVER SERVICE AREA - FEBRUARY 2012

<u>MUSA</u>	<u>District</u>	<u>PIN</u>	<u>Total Area</u>	<u>Non Developable Area (Acres)</u>	<u>Developable Area (Acres)</u>	<u>Total Units</u>	<u>Density Units/Acre</u>	<u>Residential Flow (gpd)</u>	<u>Office / Comm/ Ind. / Mixed Use Flow (gpd)</u>	<u>Other / Special / Public Flow (gpd)</u>	<u>Rum River Flow (gpd)</u>	<u>Miss. River Flow (gpd)</u>	<u>MUSA Flow (gpd)</u>	<u>Total Flow (gpd)</u>
Y	R	14140	40	0	40	100	2.5	20,250	0	0	20,250		20,250	20,250
N	R	14210	40	40	0	0	0.0	0	0	0	0			0
N	R	14220	40	0	40	76	1.9	15,390	0	0	15,390			15,390
N	R	14230	25	7	18	22	1.2	4,374	0	0	4,374			4,374
N	R	14240	40	20	20	40	2.0	8,100	0	0	8,100			8,100
N	R	14310	40	0	40	68	1.7	13,770	0	0	13,770			13,770
N	R	14320	50	5	45	59	1.3	11,846	0	0	11,846			11,846
N	R	14320	5	0	5	15	3.0	3,038	0	0	3,038			3,038
N	R	14330	35	15	20	60	3.0	12,150	0	0	12,150			12,150
Y	R	14340	40	0	40	80	2.0	16,200	0	0	16,200		16,200	16,200
Y	R	14410	25	15	10	25	2.5	5,063	0	0	5,063		5,063	5,063
N	R	14420	55	10	45	68	1.5	13,669	0	0	13,669			13,669
Y	R	14430	40	0	40	100	2.5	20,250	0	0	20,250		20,250	20,250
Y	R	14440	35	0	35	88	2.5	17,719	0	0	17,719		17,719	17,719
N	R	15110	40	0	40	72	1.8	14,580	0	0	14,580			14,580
N	R	15120	40	0	40	48	1.2	9,720	0	0	9,720			9,720
N	R	15130	40	0	40	68	1.7	13,770	0	0	13,770			13,770
N	R	15140	40	5	35	60	1.7	12,049	0	0	12,049			12,049
N	R	15210	40	0	40	76	1.9	15,390	0	0	15,390			15,390
N	R	15220	40	0	40	56	1.4	11,340	0	0	11,340			11,340
N	R	15230	40	0	40	64	1.6	12,960	0	0	12,960			12,960
N	R	15240	40	7	33	56	1.7	11,360	0	525	11,885			11,885
N	R	15310	40	0	40	56	1.4	11,340	0	0	11,340			11,340
N	R	15320	40	0	40	92	2.3	18,630	0	0	18,630			18,630
N	R	15330	40	25	15	23	1.5	4,556	0	0	4,556			4,556
N	R	15340	40	10	30	48	1.6	9,720	0	0	9,720			9,720
N	R	15410	20	15	5	8	1.6	1,620	0	0	1,620			1,620
N	R	15410	15	0	15	45	3.0	9,113	0	0	9,113			9,113
N	R	15420	40	5	35	70	2.0	14,175	0	0	14,175			14,175
N	R	15430	40	10	30	36	1.2	7,290	0	0	7,290			7,290
N	R	15440	45	15	30	30	1.0	6,075	0	0	6,075			6,075
N	R	16110	40	5	35	74	2.1	14,884	0	0	14,884			14,884
N	R	16120	40	10	30	60	2.0	12,150	0	0	12,150			12,150
Y	R	16130	40	15	25	63	2.5	12,656	0	0	12,656		12,656	12,656
N	R	16140	40	15	25	43	1.7	8,606	0	0	8,606			8,606
N	R	16210	40	8	32	45	1.4	9,072	0	0	9,072			9,072
N	R	16220	40	0	40	44	1.1	8,910	0	0	8,910			8,910
Y	R	16230	45	45	0	0	0.0	0	0	3,375	3,375		3,375	3,375
Y	R	16240	35	5	30	90	3.0	18,225	0	375	18,600		18,600	18,600
N	R	16310	40	0	40	100	2.5	20,250	0	0	20,250			20,250
N	R	16320	40	0	40	100	2.5	20,250	0	0	20,250			20,250
N	R	16330	40	0	40	100	2.5	20,250	0	0	20,250			20,250
N	R	16340	40	0	40	100	2.5	20,250	0	0	20,250			20,250
Y	R	16410	40	20	20	60	3.0	12,150	0	0	12,150		12,150	12,150
Y	R	16420	40	5	35	105	3.0	21,263	0	0	21,263		21,263	21,263
N	R	16430	40	5	35	25	0.7	4,961	0	0	4,961			4,961
N	R	16440	40	25	15	45	3.0	9,113	0	0	9,113			9,113
Y	R	19200	60	8	52	52	1.0	10,530	0	0	10,530		10,530	10,530
Y	R	19300	41	20	21	53	2.5	10,631	0	0	10,631		10,631	10,631
N	R	21110	40	18	22	44	2.0	8,910	0	0	8,910			8,910
N	R	21120	40	5	35	21	0.6	4,253	0	375	4,628			4,628
N	R	22110	50	10	40	36	0.9	7,290	0	0	7,290			7,290
N	R	22120	40	5	35	67	1.9	13,466	0	0	13,466			13,466
N	R	22130	40	0	40	72	1.8	14,580	0	0	14,580			14,580
N	R	22140	40	0	40	60	1.5	12,150	0	0	12,150			12,150
N	R	22210	40	0	40	100	2.5	20,250	0	0	20,250			20,250
N	R	22220	40	0	40	100	2.5	20,250	0	0	20,250			20,250
N	R	22230	40	0	40	120	3.0	24,300	0	0	24,300			24,300
N	R	22240	40	0	40	100	2.5	20,250	0	0	20,250			20,250
Y	R	22410	40	25	15	0	0.0	0	0	3,000	3,000		3,000	3,000

RUM RIVER SERVICE AREA - FEBRUARY 2012

<u>MUSA</u>	<u>District</u>	<u>PIN</u>	<u>Total Area</u>	<u>Non Developable Area (Acres)</u>	<u>Developable Area (Acres)</u>	<u>Total Units</u>	<u>Density Units/Acre</u>	<u>Residential Flow (gpd)</u>	<u>Office / Comm./ Ind. / Mixed Use Flow (gpd)</u>	<u>Other / Special / Public Flow (gpd)</u>	<u>Rum River Flow (gpd)</u>	<u>Miss. River Flow (gpd)</u>	<u>MUSA Flow (gpd)</u>	<u>Total Flow (gpd)</u>
Y	R	22420	40	25	15	0	0.0	0	0	3,000	3,000		3,000	3,000
Y	R	22440	40	40	0	0	0.0	0	0	3,000	3,000		3,000	3,000
Y	R	23110	45	0	45	113	2.5	22,781	0	0	22,781		22,781	22,781
Y	R	23120	40	0	40	120	3.0	24,300	0	0	24,300		24,300	24,300
Y	R	23130	35	0	35	105	3.0	21,263	0	0	21,263		21,263	21,263
Y	R	23141	40	0	40	240	6.0	48,600	0	0	48,600		48,600	48,600
Y	R	23142	20	0	20	50	2.5	10,125	0	0	10,125		10,125	10,125
Y	R	23144	10	0	10	60	6.0	12,150	0	0	12,150		12,150	12,150
Y	R	23210	20	0	20	60	3.0	12,150	0	0	12,150		12,150	12,150
Y	R	23210	10	0	10	60	6.0	12,150	0	0	12,150		12,150	12,150
N	R	23220	30	0	30	90	3.0	18,225	0	0	18,225		18,225	18,225
Y	R	23230	15	0	15	24	1.6	4,860	0	0	4,860		4,860	4,860
Y	R	23230	15	0	15	45	3.0	9,113	0	0	9,113		9,113	9,113
Y	R	23240	10	0	10	14	1.4	2,835	0	0	2,835		2,835	2,835
Y	R	23240	50	0	50	300	6.0	60,750	0	0	60,750		60,750	60,750
Y	R	23310	30	10	20	50	2.5	10,125	0	0	10,125		10,125	10,125
Y	R	23321	20	0	20	60	3.0	12,150	0	0	12,150		12,150	12,150
Y	R	23322	10	0	10	30	3.0	6,075	0	0	6,075		6,075	6,075
Y	R	23323	20	0	20	0	0.0	0	0	0	0		0	0
Y	R	23331	10	0	10	30	3.0	6,075	0	0	6,075		6,075	6,075
Y	R	23332	10	0	10	60	6.0	12,150	0	0	12,150		12,150	12,150
Y	R	23333	10	0	10	60	6.0	12,150	0	0	12,150		12,150	12,150
Y	R	23334	10	2	8	24	3.0	4,860	0	0	4,860		4,860	4,860
Y	R	23340	35	8	27	81	3.0	16,403	0	0	16,403		16,403	16,403
Y	R	23341	5	5	0	0	0.0	0	0	0	0		0	0
Y	R	23410	24	0	24	72	3.0	14,580	0	0	14,580		14,580	14,580
Y	R	23413	6	0	6	18	3.0	3,645	0	9,000	12,645		12,645	12,645
Y	R	23414	14	0	14	42	3.0	8,505	0	0	8,505		8,505	8,505
Y	R	23420	40	5	35	105	3.0	21,263	0	0	21,263		21,263	21,263
Y	R	23420	15	0	15	90	6.0	18,225	0	0	18,225		18,225	18,225
Y	R	23430	50	10	40	0	0.0	0	0	30,000	30,000		30,000	30,000
Y	R	23441	15	0	15	48	3.2	9,720	0	0	9,720		9,720	9,720
Y	R	23442	5	0	5	13	2.6	2,633	0	0	2,633		2,633	2,633
Y	R	23443	3	0	3	4	1.3	790	0	0	790		790	790
Y	R	23444	6	0	6	18	3.0	3,645	0	0	3,645		3,645	3,645
Y	R	24110	30	5	25	40	1.6	8,100	0	375	8,475		8,475	8,475
Y	R	24120	40	4	36	83	2.3	16,767	0	0	16,767		16,767	16,767
Y	R	24130	40	0	40	100	2.5	20,250	0	0	20,250		20,250	20,250
Y	R	24140	40	0	40	100	2.5	20,250	0	0	20,250		20,250	20,250
Y	R	24210	40	5	35	60	1.7	12,049	0	375	12,424		12,424	12,424
Y	R	24220	35	0	35	46	1.3	9,214	0	0	9,214		9,214	9,214
Y	R	24231	22	0	22	132	6.0	26,730	0	0	26,730		26,730	26,730
Y	R	24231	8	0	8	0	0.0	0	12,000	0	12,000		12,000	12,000
Y	R	24234	15	0	15	90	6.0	18,225	7,500	0	25,725		25,725	25,725
Y	R	24240	30	0	30	48	1.6	9,720	0	0	9,720		9,720	9,720
Y	R	24310	16	16	0	0	0.0	0	24,000	0	24,000		24,000	24,000
Y	R	24310	17	0	17	102	6.0	20,655	0	0	20,655		20,655	20,655
Y	R	24322	13	0	13	33	2.5	6,581	0	0	6,581		6,581	6,581
Y	R	24322	5	0	5	30	6.0	6,075	0	0	6,075		6,075	6,075
Y	R	24323	32	0	32	61	1.9	12,312	0	0	12,312		12,312	12,312
Y	R	24330	18	0	18	32	1.8	6,561	0	0	6,561		6,561	6,561
Y	R	24340	21	0	21	53	2.5	10,631	0	0	10,631		10,631	10,631
Y	R	24410	34	0	34	71	2.1	14,459	0	0	14,459		14,459	14,459
Y	R	24421	40	0	40	72	1.8	14,580	0	0	14,580		14,580	14,580
Y	R	24422	43	0	43	73	1.7	14,803	0	0	14,803		14,803	14,803
Y	R	24433	27	0	27	68	2.5	13,669	0	0	13,669		13,669	13,669
Y	R	24440	36	0	36	54	1.5	10,935	0	0	10,935		10,935	10,935
Y	R	25100	49	0	49	108	2.2	21,830	0	0	21,830		21,830	21,830
Y	R	25210	18	0	18	54	3.0	10,935	0	0	10,935		10,935	10,935
Y	R	25212	22	5	17	102	6.0	20,655	0	0	20,655		20,655	20,655

RUM RIVER SERVICE AREA - FEBRUARY 2012

MUSA	District	PIN	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow (gpd)	Office / Comm / Ind. / Mixed Use Flow (gpd)	Other / Special / Public Flow (gpd)	Rum River Flow (gpd)	Miss. River Flow (gpd)	MUSA Flow (gpd)	Total Flow (gpd)
Y	R	25220	35	0	35	60	1.7	12,049	0	0	12,049		12,049	12,049
Y	R	25231	18	0	18	34	1.9	6,926	0	0	6,926		6,926	6,926
Y	R	25233	17	0	17	44	2.6	8,951	0	0	8,951		8,951	8,951
Y	R	25234	5	0	5	13	2.6	2,633	0	0	2,633		2,633	2,633
Y	R	25241	12	0	12	36	3.0	7,290	0	0	7,290		7,290	7,290
Y	R	25242	14	0	14	84	6.0	17,010	0	0	17,010		17,010	17,010
Y	R	25242	14	0	14	84	6.0	17,010	0	0	17,010		17,010	17,010
Y	R	25310	5	5	0	0	0.0	0	0	3,750	3,750		3,750	3,750
Y	R	25310	5	0	5	60	12.0	12,150	0	0	12,150		12,150	12,150
Y	R	25310	5	0	5	30	6.0	6,075	0	0	6,075		6,075	6,075
Y	R	25312	14	0	14	84	6.0	17,010	0	0	17,010		17,010	17,010
Y	R	25313	3	0	3	36	12.0	7,290	0	0	7,290		7,290	7,290
Y	R	25314	8	0	8	24	3.0	4,860	0	0	4,860		4,860	4,860
Y	R	25320	40	0	40	100	2.5	20,250	0	0	20,250		20,250	20,250
Y	R	25330	36	10	26	78	3.0	15,795	0	750	16,545		16,545	16,545
Y	R	25340	44	10	34	102	3.0	20,655	6,000	750	27,405		27,405	27,405
Y	R	25410	7	0	7	10	1.4	1,985	0	0	1,985		1,985	1,985
Y	R	25420	30	0	30	36	1.2	7,290	15,000	0	22,290		22,290	22,290
Y	R	25431	8	0	8	12	1.5	2,430	0	0	2,430		2,430	2,430
Y	R	25432	8	0	8	96	12.0	19,440	3,000	0	22,440		22,440	22,440
Y	R	25433	4	0	4	48	12.0	9,720	1,500	0	11,220		11,220	11,220
Y	R	25434	4	0	4	0	0.0	0	6,000	0	6,000		6,000	6,000
Y	R	25440	15	15	0	0	0.0	0	0	1,125	1,125		1,125	1,125
Y	R	26111	10	0	10	30	3.0	6,075	0	0	6,075		6,075	6,075
Y	R	26112	29	0	29	87	3.0	17,618	0	0	17,618		17,618	17,618
Y	R	26113	16	10	6	12	2.0	2,430	0	0	2,430		2,430	2,430
Y	R	26120	18	10	8	24	3.0	4,860	0	0	4,860		4,860	4,860
Y	R	26120	7	0	7	18	2.5	3,544	0	0	3,544		3,544	3,544
Y	R	26130	37	22	15	14	0.9	2,734	0	0	2,734		2,734	2,734
Y	R	26133	3	0	3	10	3.3	2,005	0	0	2,005		2,005	2,005
Y	R	26140	40	0	40	80	2.0	16,200	0	0	16,200		16,200	16,200
Y	R	26210	35	25	10	30	3.0	6,075	0	0	6,075		6,075	6,075
Y	R	26222	30	15	15	90	6.0	18,225	0	0	18,225		18,225	18,225
Y	R	26231	32	10	22	66	3.0	13,365	0	0	13,365		13,365	13,365
Y	R	26233	15	0	15	45	3.0	9,113	0	0	9,113		9,113	9,113
Y	R	26241	35	0	35	88	2.5	17,719	0	0	17,719		17,719	17,719
Y	R	26244	13	0	13	36	2.8	7,371	0	0	7,371		7,371	7,371
Y	R	26310	40	11	29	104	3.6	21,141	0	825	21,966		21,966	21,966
Y	R	26320	40	5	35	88	2.5	17,719	0	0	17,719		17,719	17,719
Y	R	26330	30	0	30	75	2.5	15,188	0	0	15,188		15,188	15,188
Y	R	26330	10	0	10	120	12.0	24,300	0	0	24,300		24,300	24,300
Y	R	26340	40	27	13	20	1.5	3,949	0	0	3,949		3,949	3,949
Y	R	26410	30	20	10	25	2.5	5,063	0	0	5,063		5,063	5,063
Y	R	26411	10	5	5	6	1.2	1,215	0	0	1,215		1,215	1,215
Y	R	26420	40	15	25	53	2.1	10,631	0	0	10,631		10,631	10,631
Y	R	26430	40	14	26	57	2.2	11,583	0	0	11,583		11,583	11,583
Y	R	26440	40	10	30	66	2.2	13,365	0	750	14,115		14,115	14,115
Y	R	35110	8	0	8	18	2.2	3,564	0	0	3,564		3,564	3,564
Y	R	35121	4	0	4	10	2.5	2,025	0	0	2,025		2,025	2,025
Y	R	35122	7	5	2	6	3.0	1,215	0	0	1,215		1,215	1,215
Y	R	36110	13	13	0	0	0.0	0	0	975	975		975	975
Y	R	36121	10	0	10	120	12.0	24,300	0	750	25,050		25,050	25,050
Y	R	36132	4	0	4	3	0.8	648	6,000	0	6,648		6,648	6,648
Y	R	36133	9	0	9	1	0.1	182	13,500	0	13,682		13,682	13,682
Y	R	36134	20	15	5	2	0.4	405	7,500	0	7,905		7,905	7,905
Y	R	36210	20	7	13	78	6.0	15,795	9,000	0	24,795		24,795	24,795
Y	R	36221	7	0	7	14	2.0	2,835	3,000	0	5,835		5,835	5,835
Y	R	36222	13	0	13	78	6.0	15,795	3,000	0	18,795		18,795	18,795
TOTALS			6,938	1,328	5,610	13,451	620	2,723,868	142,500	164,325	3,030,693	0	1,817,441	3,030,693

APPENDIX C

NORTH TROTT BROOK SANITARY SEWER FLOWS

NORTH TROTT BROOK - SANITARY SEWER FLOWS

MUSA	District	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow (gpd)	Rum River Flow (gpd)	Miss. River Flow (gpd)	MUSA Flow (gpd)	Total Flow (gpd)	UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS	GPM
N	M9	296	200	96	288	3.0	58,320		58,320		58,320	288	2.7	777.6	58,320	3.87	225,569	0.35	156,645,296
N	M10	282	114	168	134	0.8	27,216		27,216		27,216	134	2.7	362.88	27,216	4.04	110,004	0.17	76,391,803.16
N	M11	979	500	479	335	0.7	67,898		67,898		67,898	335	2.7	905.31	67,898	3.83	259,876	0.40	180,469,715.6
N	M12	197	159	38	114	3.0	23,085		23,085		23,085	114	2.7	307.8	23,085	4.07	94,041	0.15	65,306,220.36
N	M13	558	8	550	715	1.3	144,788		144,788		144,788	715	2.7	1930.5	144,788	3.60	520,899	0.81	361,735,484.6
N	M14	202	82	120	360	3.0	72,900		72,900		72,900	360	2.7	972	72,900	3.81	277,597	0.43	192,775,848.2
N	M15	80	4	76	30	0.4	6,156		6,156		6,156	30	2.7	82.08	6,156	4.27	26,262	0.04	18,237,453.01
SUBTOTAL MISSISSIPPI RIVER MUSA FLOWS		2594	1,067	1527	1,977		400,363		400,363		400,363	1,977		5,338	400,363	3.22	1,288,585	2.34	894,850,493.2
N	R19	332	83	249	149	0.5	30,254	30,254			30,254	149	2.7	403.38	30,254	4.02	121,632	0.19	84,466,442.09
Y	R19	12	0	12	36	3.0	7,290	7,290	7,290		7,290	36	2.7	97.2	7,290	4.25	30,960	0.05	21,500,683.4
N	R20	335	280	55	165	3.0	33,413	33,413			33,413	165	2.7	445.5	33,413	4.00	133,633	0.21	92,800,700.27
N	R21	105	23	82	246	3.0	49,815	49,815			49,815	246	2.7	664.2	49,815	3.91	194,657	0.30	135,178,182.5
Y	R21	58	13	45	135	3.0	27,338	27,338	27,338		27,338	135	2.7	364.5	27,338	4.04	110,471	0.17	76,715,989.95
N	R22	32	0	32	96	3.0	19,440	19,440			19,440	96	2.7	259.2	19,440	4.10	79,798	0.12	55,415,081.14
Y	R22	319	98	221	663	3.0	134,258	134,258	134,258		134,258	663	2.7	1790.1	134,258	3.62	486,379	0.75	337,763,114
Y	R23	282	60	222	666	3.0	134,865	134,865	134,865		134,865	666	2.7	1798.2	134,865	3.62	488,379	0.76	339,152,395.7
N	R23	20	0	20	120	6.0	24,300	24,300			24,300	120	2.7	324	24,300	4.06	98,755	0.15	68,579,807.2
Y	R24	69	10	59	177	3.0	35,843	35,843	35,843		35,843	177	2.7	477.9	35,843	3.98	142,805	0.22	99,170,359.5
N	R24	94	23	71	213	3.0	43,133	43,133			43,133	213	2.7	575.1	43,133	3.94	170,037	0.26	118,081,035.6
N	R25	235	42	193	251	1.3	50,807	50,807			50,807	251	2.7	677.43	50,807	3.90	198,287	0.31	137,698,962.4
Y	R25	116	42	74	222	3.0	44,955	44,955	44,955		44,955	222	2.7	599.4	44,955	3.93	176,782	0.27	122,765,323.5
N	R26	278	117	161	419	2.6	84,767	84,767			84,767	419	2.7	1130.22	84,767	3.77	319,154	0.49	221,634,642.2
N	R27	334	81	253	253	1.0	51,233	51,233			51,233	253	2.7	683.1	51,233	3.90	199,840	0.31	138,777,936.6
N	R28	48	8	40	120	3.0	24,300	24,300			24,300	120	2.7	324	24,300	4.06	98,755	0.15	68,579,807.2
SUBTOTAL RUM RIVER MUSA FLOWS		2,669	880	1,789	3,931		796,007	796,007	400,363	384,548	796,007	3,931		10,613.43	796,007	2.93	2,331,467	4.72	1,619,074.5
TOTAL MUSA FLOWS:		5,263	1,947	3,316	5,908		1,196,370	796,007	800,726	384,548	1,196,370	5,908		15,952	1,196,370	2.75	3,620,052	7.06	2,513,925.0

APPENDIX D

2030 MUSA SERVICE AREA FLOWS

2030 MUSA SERVICE AREA - FEBRUARY 2012

MUSA	District	PIN	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow (gpd)	Office / Comm / Ind. / Mixed Use Flow (gpd)	Other / Special / Public Flow (gpd)	Rum River Flow (gpd)	Miss. River Flow (gpd)	MUSA Flow (gpd)	Total Flow (gpd)
Y	M	19220	20	0	20	0	0.0	0	30,000	0	0	30,000	30,000	30,000
Y	M	19230	20	0	20	8	0.4	1,620	30,000	0	0	31,620	31,620	31,620
Y	M	19240	30	20	10	0	0.0	0	15,000	0	0	15,000	15,000	15,000
Y	M	19320	41	0	41	246	6.0	49,815	0	0	0	49,815	49,815	49,815
Y	M	19340	38	20	18	0	0.0	0	19,500	1,500	0	21,000	21,000	21,000
Y	M	19400	68	30	38	80	2.1	16,160	0	1,500	0	17,660	17,660	17,660
Y	M	19430	30	10	20	20	1.0	4,050	0	0	0	4,050	4,050	4,050
Y	M	20310	35	5	30	90	3.0	18,225	0	0	0	18,225	18,225	18,225
Y	M	20310	5	0	5	15	3.0	3,038	0	0	0	3,038	3,038	3,038
Y	M	20320	20	5	15	90	6.0	18,225	0	0	0	18,225	18,225	18,225
Y	M	20320	20	0	20	120	6.0	24,300	0	0	0	24,300	24,300	24,300
Y	M	20330	30	0	30	180	6.0	36,450	0	0	0	36,450	36,450	36,450
Y	M	20330	10	0	10	120	12.0	24,300	0	0	0	24,300	24,300	24,300
Y	M	20340	40	0	40	0	0.0	0	30,000	0	0	30,000	30,000	30,000
Y	M	20430	13	0	13	0	0.0	0	9,750	0	0	9,750	9,750	9,750
Y	M	20430	27	20	7	42	6.0	8,505	0	0	0	8,505	8,505	8,505
Y	M	20440	27	5	22	66	3.0	13,365	0	0	0	13,365	13,365	13,365
Y	M	20440	13	0	13	156	12.0	31,590	0	0	0	31,590	31,590	31,590
Y	M	22430	40	40	0	0	0.0	0	0	3,000	0	3,000	3,000	3,000
Y	M	27110	40	40	0	0	0.0	0	0	3,000	0	3,000	3,000	3,000
Y	M	27120	40	40	0	0	0.0	0	0	3,000	0	3,000	3,000	3,000
Y	M	27130	40	40	0	0	0.0	0	0	3,000	0	3,000	3,000	3,000
Y	M	27140	40	40	0	0	0.0	0	0	3,000	0	3,000	3,000	3,000
Y	M	27210	40	0	40	56	1.4	11,340	0	0	0	11,340	11,340	11,340
Y	M	27220	40	0	40	56	1.4	11,340	15,000	0	0	26,340	26,340	26,340
Y	M	27230	40	0	40	0	0.0	0	0	0	0	0	0	0
Y	M	27240	40	30	10	0	0.0	0	0	0	0	0	0	0
Y	M	27310	40	20	20	0	0.0	0	30,000	0	0	30,000	30,000	30,000
Y	M	27320	40	20	20	0	0.0	0	30,000	0	0	30,000	30,000	30,000
Y	M	27330	40	0	40	0	0.0	0	60,000	0	0	60,000	60,000	60,000
Y	M	27340	40	30	10	0	0.0	0	15,000	0	0	15,000	15,000	15,000
Y	M	27410	40	0	40	0	0.0	0	60,000	0	0	60,000	60,000	60,000
Y	M	27420	40	0	40	0	0.0	0	60,000	0	0	60,000	60,000	60,000
Y	M	27430	20	0	20	0	0.0	0	30,000	0	0	30,000	30,000	30,000
Y	M	27440	60	0	60	0	0.0	0	90,000	0	0	90,000	90,000	90,000
Y	M	28110	16	0	16	96	6.0	19,440	0	0	0	19,440	19,440	19,440
Y	M	28110	16	0	16	18	1.1	3,564	0	0	0	3,564	3,564	3,564
Y	M	28120	20	0	20	120	6.0	24,300	0	0	0	24,300	24,300	24,300
Y	M	28210	20	0	20	0	0.0	0	0	0	0	0	0	0
Y	M	28210	20	0	20	0	0.0	0	0	0	0	0	0	0
Y	M	28220	40	0	40	0	0.0	0	60,000	0	0	60,000	60,000	60,000
Y	M	28320	30	0	30	18	0.6	3,645	25,800	0	0	29,445	29,445	29,445
Y	M	28330	50	0	50	50	1.0	10,125	0	0	0	10,125	10,125	10,125
Y	M	28340	30	0	30	0	0.0	0	45,000	0	0	45,000	45,000	45,000
Y	M	28430	12	0	12	0	0.0	0	18,000	0	0	18,000	18,000	18,000
Y	M	28440	24	0	24	0	0.0	0	36,000	0	0	36,000	36,000	36,000
Y	M	29110	57	0	57	0	0.0	0	85,500	0	0	85,500	85,500	85,500
Y	M	29110	13	0	13	0	0.0	0	19,500	0	0	19,500	19,500	19,500
Y	M	29120	30	0	30	0	0.0	0	45,000	0	0	45,000	45,000	45,000
Y	M	29120	20	0	20	0	0.0	0	30,000	0	0	30,000	30,000	30,000
Y	M	29130	30	0	30	0	0.0	0	45,000	0	0	45,000	45,000	45,000
Y	M	29140	13	0	13	0	0.0	0	19,500	0	0	19,500	19,500	19,500
Y	M	29210	30	0	30	0	0.0	0	45,000	0	0	45,000	45,000	45,000
Y	M	29220	15	0	15	0	0.0	0	22,500	0	0	22,500	22,500	22,500
Y	M	29230	65	0	65	0	0.0	0	97,500	0	0	97,500	97,500	97,500
Y	M	29240	25	0	25	75	3.0	15,188	7,500	0	0	22,688	22,688	22,688
Y	M	29240	25	0	25	0	0.0	0	37,500	0	0	37,500	37,500	37,500
Y	M	29310	40	0	40	0	0.0	0	60,000	0	0	60,000	60,000	60,000
Y	M	29320	24	0	24	72	3.0	14,580	0	0	0	14,580	14,580	14,580
Y	M	29320	6	0	6	36	6.0	7,290	0	0	0	7,290	7,290	7,290
Y	M	29330	18	0	18	38	2.1	7,655	0	0	0	7,655	7,655	7,655
Y	M	29340	20	0	20	60	3.0	12,150	0	0	0	12,150	12,150	12,150
Y	M	29340	20	0	20	0	0.0	0	1,500	0	0	1,500	1,500	1,500

2030 MUSA SERVICE AREA - FEBRUARY 2012

MUSA	District	PIN	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow (gpd)	Office / Comm / Ind. / Mixed Use Flow (gpd)	Other / Special / Public Flow (gpd)	Rum River Flow (gpd)	Miss. River Flow (gpd)	MUSA Flow (gpd)	Total Flow (gpd)
Y	M	29410	35	0	35	35	1.0	7,088	0	0	0	7,088	7,088	7,088
Y	M	29420	20	0	20	60	3.0	12,150	3,000	0	0	15,150	15,150	15,150
Y	M	29420	20	0	20	0	0.0	0	0	0	0	0	0	0
Y	M	29430	20	0	20	60	3.0	12,150	0	0	0	12,150	12,150	12,150
Y	M	29430	20	0	20	0	0.0	0	0	0	0	0	0	0
Y	M	29440	30	0	30	33	1.1	6,683	0	0	0	6,683	6,683	6,683
Y	M	30100	55	0	55	94	1.7	18,934	0	0	0	18,934	18,934	18,934
Y	M	30100	25	0	25	75	3.0	15,188	0	0	0	15,188	15,188	15,188
Y	M	33110	88	88	0	0	0.0	0	0	6,600	0	6,600	6,600	6,600
Y	M	33210	31	25	0	0	0.3	0	0	1,875	0	1,875	1,875	1,875
Y	M	33220	11	11	0	0	0.0	0	0	825	0	825	825	825
Y	M	34110	35	0	35	0	0.0	0	52,500	0	0	52,500	52,500	52,500
Y	M	34120	20	0	20	0	0.0	0	40,000	0	0	40,000	40,000	40,000
Y	M	34130	10	0	10	0	0.0	0	15,000	0	0	15,000	15,000	15,000
Y	M	34140	10	0	10	0	0.5	0	15,000	0	0	15,000	15,000	15,000
Y	M	34210	13	0	13	0	0.0	0	19,500	0	0	19,500	19,500	19,500
Y	M	34220	10	0	10	0	0.9	0	15,000	0	0	15,000	15,000	15,000
Y	M	34230	34	0	34	204	6.0	41,310	0	0	0	41,310	41,310	41,310
Y	M	34230	69	10	59	0	0.0	0	88,500	0	0	88,500	88,500	88,500
Y	M	34411	9	0	9	6	0.7	1,276	5,930	0	0	7,206	7,206	7,206
Y	M	34412	10	0	10	30	3.0	6,075	0	0	0	6,075	6,075	6,075
Y	M	34420	33	0	33	20	0.6	4,010	0	0	0	4,010	4,010	4,010
Y	M	35210	40	0	40	0	0.0	0	60,000	0	0	60,000	60,000	60,000
Y	M	35220	40	0	40	0	0.0	0	60,000	0	0	60,000	60,000	60,000
Y	M	35230	30	0	30	0	0.0	0	45,000	0	0	45,000	45,000	45,000
Y	M	35240	50	0	50	0	0.0	0	75,000	0	0	75,000	75,000	75,000
Y	M	35310	19	0	19	10	0.5	1,924	16,500	0	0	18,424	18,424	18,424
Y	M	35320	18	0	18	11	0.6	2,187	12,000	0	0	14,187	14,187	14,187
Y	M	CORE	247	0	247	0	0	0	370,500	0	0	370,500	370,500	370,500
SUBTOTAL MISSISSIPPI RIVER MUSA FLOWS			2,948	589	2,353	2,564		519,230	2,118,480	27,300	0	2,665,010	2,665,010	2,665,010
Y	R	9410	30	20	10	30	3.0	6,075	0	0	6,075	6,075	6,075	6,075
Y	R	9440	40	12	28	84	3.0	17,010	0	0	0	17,010	17,010	17,010
Y	R	10120	30	10	20	60	3.0	12,150	0	0	12,150	12,150	12,150	12,150
Y	R	10130	40	0	40	120	3.0	24,300	0	0	24,300	24,300	24,300	24,300
Y	R	10230	20	10	10	30	3.0	6,075	0	0	0	6,075	6,075	6,075
Y	R	10240	35	5	30	90	3.0	18,225	0	0	0	18,225	18,225	18,225
Y	R	10310	40	5	35	105	3.0	21,263	0	0	0	21,263	21,263	21,263
Y	R	10320	40	0	40	120	3.0	24,300	0	0	0	24,300	24,300	24,300
Y	R	10330	40	8	32	96	3.0	19,440	0	0	0	19,440	19,440	19,440
Y	R	10340	40	0	40	120	3.0	24,300	0	0	0	24,300	24,300	24,300
Y	R	10420	40	0	40	120	3.0	24,300	0	0	0	24,300	24,300	24,300
Y	R	13430	30	2	28	53	1.9	10,773	0	0	0	10,773	10,773	10,773
Y	R	14120	40	0	40	100	2.5	20,250	0	0	0	20,250	20,250	20,250
Y	R	14340	40	0	40	80	2.0	16,200	0	0	0	16,200	16,200	16,200
Y	R	14410	25	15	10	25	2.5	5,063	0	0	0	5,063	5,063	5,063
Y	R	14430	40	0	40	100	2.5	20,250	0	0	0	20,250	20,250	20,250
Y	R	14440	35	0	35	88	2.5	17,719	0	0	0	17,719	17,719	17,719
Y	R	16130	40	15	25	63	2.5	12,656	0	0	0	12,656	12,656	12,656
Y	R	16230	45	45	0	0	0.0	0	0	3,375	3,375	3,375	3,375	3,375
Y	R	16240	35	5	30	90	3.0	18,225	0	375	18,600	18,600	18,600	18,600
Y	R	16410	40	20	20	60	3.0	12,150	0	0	12,150	12,150	12,150	12,150
Y	R	16420	40	5	35	105	3.0	21,263	0	0	0	21,263	21,263	21,263
Y	R	19200	60	8	52	52	1.0	10,530	0	0	0	10,530	10,530	10,530
Y	R	19300	41	20	21	53	2.5	10,631	0	0	0	10,631	10,631	10,631
Y	R	22410	40	25	15	0	0.0	0	0	3,000	3,000	3,000	3,000	3,000
Y	R	22420	40	25	15	0	0.0	0	0	3,000	3,000	3,000	3,000	3,000
Y	R	22440	40	40	0	0	0.0	0	0	3,000	3,000	3,000	3,000	3,000
Y	R	23110	45	0	45	113	2.5	22,781	0	0	0	22,781	22,781	22,781
Y	R	23120	40	0	40	120	3.0	24,300	0	0	0	24,300	24,300	24,300
Y	R	23130	35	0	35	105	3.0	21,263	0	0	0	21,263	21,263	21,263
Y	R	23141	40	0	40	240	6.0	48,600	0	0	0	48,600	48,600	48,600

2030 MUSA SERVICE AREA - FEBRUARY 2012

MUSA	District	PIN	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow (gpd)	Office / Comm / Ind. / Mixed Use Flow (gpd)	Other / Special / Public Flow (gpd)	Rum River Flow (gpd)	Miss. River Flow (gpd)	MUSA Flow (gpd)	Total Flow (gpd)
Y	R	23142	20	0	20	50	2.5	10,125	0	0	10,125		10,125	10,125
Y	R	23144	10	0	10	60	6.0	12,150	0	0	12,150		12,150	12,150
Y	R	23210	20	0	20	60	3.0	12,150	0	0	12,150		12,150	12,150
Y	R	23210	10	0	10	60	6.0	12,150	0	0	12,150		12,150	12,150
Y	R	23230	15	0	15	24	1.6	4,860	0	0	4,860		4,860	4,860
Y	R	23230	15	0	15	45	3.0	9,113	0	0	9,113		9,113	9,113
Y	R	23240	10	0	10	14	1.4	2,835	0	0	2,835		2,835	2,835
Y	R	23240	50	0	50	300	6.0	60,750	0	0	60,750		60,750	60,750
Y	R	23310	30	10	20	50	2.5	10,125	0	0	10,125		10,125	10,125
Y	R	23321	20	0	20	60	3.0	12,150	0	0	12,150		12,150	12,150
Y	R	23322	10	0	10	30	3.0	6,075	0	0	6,075		6,075	6,075
Y	R	23323	20	0	20	0	0.0	0	0	0	0		0	0
Y	R	23331	10	0	10	30	3.0	6,075	0	0	6,075		6,075	6,075
Y	R	23332	10	0	10	60	6.0	12,150	0	0	12,150		12,150	12,150
Y	R	23333	10	0	10	60	6.0	12,150	0	0	12,150		12,150	12,150
Y	R	23334	10	2	8	24	3.0	4,860	0	0	4,860		4,860	4,860
Y	R	23340	35	8	27	81	3.0	16,403	0	0	16,403		16,403	16,403
Y	R	23341	5	5	0	0	0.0	0	0	0	0		0	0
Y	R	23410	24	0	24	72	3.0	14,580	0	0	14,580		14,580	14,580
Y	R	23413	6	0	6	18	3.0	3,645	0	9,000	12,645		12,645	12,645
Y	R	23414	14	0	14	42	3.0	8,505	0	0	8,505		8,505	8,505
Y	R	23420	40	5	35	105	3.0	21,263	0	0	21,263		21,263	21,263
Y	R	23420	15	0	15	90	6.0	18,225	0	0	18,225		18,225	18,225
Y	R	23430	50	10	40	0	0.0	0	0	30,000	30,000		30,000	30,000
Y	R	23441	15	0	15	48	3.2	9,720	0	0	9,720		9,720	9,720
Y	R	23442	5	0	5	13	2.6	2,633	0	0	2,633		2,633	2,633
Y	R	23443	3	0	3	4	1.3	790	0	0	790		790	790
Y	R	23444	6	0	6	18	3.0	3,645	0	0	3,645		3,645	3,645
Y	R	24110	30	5	25	40	1.6	8,100	0	375	8,475		8,475	8,475
Y	R	24120	40	4	36	83	2.3	16,767	0	0	16,767		16,767	16,767
Y	R	24130	40	0	40	100	2.5	20,250	0	0	20,250		20,250	20,250
Y	R	24140	40	0	40	100	2.5	20,250	0	0	20,250		20,250	20,250
Y	R	24210	40	5	35	60	1.7	12,049	0	375	12,424		12,424	12,424
Y	R	24220	35	0	35	46	1.3	9,214	0	0	9,214		9,214	9,214
Y	R	24231	22	0	22	132	6.0	26,730	0	0	26,730		26,730	26,730
Y	R	24231	8	0	8	0	0.0	0	12,000	0	12,000		12,000	12,000
Y	R	24234	15	0	15	90	6.0	18,225	7,500	0	25,725		25,725	25,725
Y	R	24240	30	0	30	48	1.6	9,720	0	0	9,720		9,720	9,720
Y	R	24310	16	16	0	0	0.0	0	24,000	0	24,000		24,000	24,000
Y	R	24310	17	0	17	102	6.0	20,655	0	0	20,655		20,655	20,655
Y	R	24322	13	0	13	33	2.5	6,581	0	0	6,581		6,581	6,581
Y	R	24322	5	0	5	30	6.0	6,075	0	0	6,075		6,075	6,075
Y	R	24323	32	0	32	61	1.9	12,312	0	0	12,312		12,312	12,312
Y	R	24330	18	0	18	32	1.8	6,561	0	0	6,561		6,561	6,561
Y	R	24340	21	0	21	53	2.5	10,631	0	0	10,631		10,631	10,631
Y	R	24410	34	0	34	71	2.1	14,459	0	0	14,459		14,459	14,459
Y	R	24421	40	0	40	72	1.8	14,580	0	0	14,580		14,580	14,580
Y	R	24422	43	0	43	73	1.7	14,803	0	0	14,803		14,803	14,803
Y	R	24433	27	0	27	68	2.5	13,669	0	0	13,669		13,669	13,669
Y	R	24440	36	0	36	54	1.5	10,935	0	0	10,935		10,935	10,935
Y	R	25100	49	0	49	108	2.2	21,830	0	0	21,830		21,830	21,830
Y	R	25210	18	0	18	54	3.0	10,935	0	0	10,935		10,935	10,935
Y	R	25212	22	5	17	102	6.0	20,655	0	0	20,655		20,655	20,655
Y	R	25220	35	0	35	60	1.7	12,049	0	0	12,049		12,049	12,049
Y	R	25231	18	0	18	34	1.9	6,926	0	0	6,926		6,926	6,926
Y	R	25233	17	0	17	44	2.6	8,951	0	0	8,951		8,951	8,951
Y	R	25234	5	0	5	13	2.6	2,633	0	0	2,633		2,633	2,633
Y	R	25241	12	0	12	36	3.0	7,290	0	0	7,290		7,290	7,290
Y	R	25242	14	0	14	84	6.0	17,010	0	0	17,010		17,010	17,010
Y	R	25242	14	0	14	84	6.0	17,010	0	0	17,010		17,010	17,010
Y	R	25310	5	5	0	0	0.0	0	0	3,750	3,750		3,750	3,750
Y	R	25310	5	0	5	60	12.0	12,150	0	0	12,150		12,150	12,150
Y	R	25310	5	0	5	30	6.0	6,075	0	0	6,075		6,075	6,075

2030 MUSA SERVICE AREA - FEBRUARY 2012

MUSA	District	PIN	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow (gpd)	Office / Comm./ Ind. / Mixed Use Flow (gpd)	Other / Special / Public Flow (gpd)	Rum River Flow (gpd)	Miss. River Flow (gpd)	MUSA Flow (gpd)	Total Flow (gpd)
Y	R	25312	14	0	14	84	6.0	17,010	0	0	17,010		17,010	17,010
Y	R	25313	3	0	3	36	12.0	7,290	0	0	7,290		7,290	7,290
Y	R	25314	8	0	8	24	3.0	4,860	0	0	4,860		4,860	4,860
Y	R	25320	40	0	40	100	2.5	20,250	0	0	20,250		20,250	20,250
Y	R	25330	36	10	26	78	3.0	15,795	0	750	16,545		16,545	16,545
Y	R	25340	44	10	34	102	3.0	20,655	6,000	750	27,405		27,405	27,405
Y	R	25410	7	0	7	10	1.4	1,985	0	0	1,985		1,985	1,985
Y	R	25420	30	0	30	36	1.2	7,290	15,000	0	22,290		22,290	22,290
Y	R	25431	8	0	8	12	1.5	2,430	0	0	2,430		2,430	2,430
Y	R	25432	8	0	8	96	12.0	19,440	3,000	0	22,440		22,440	22,440
Y	R	25433	4	0	4	48	12.0	9,720	1,500	0	11,220		11,220	11,220
Y	R	25434	4	0	4	0	0.0	0	6,000	0	6,000		6,000	6,000
Y	R	25440	15	15	0	0	0.0	0	0	1,125	1,125		1,125	1,125
Y	R	26111	10	0	10	30	3.0	6,075	0	0	6,075		6,075	6,075
Y	R	26112	29	0	29	87	3.0	17,618	0	0	17,618		17,618	17,618
Y	R	26113	16	10	6	12	2.0	2,430	0	0	2,430		2,430	2,430
Y	R	26120	18	10	8	20	2.5	4,050	0	0	4,050		4,050	4,050
Y	R	26120	7	0	7	21	3.0	4,253	0	0	4,253		4,253	4,253
Y	R	26130	37	22	15	14	0.9	2,734	0	0	2,734		2,734	2,734
Y	R	26133	3	0	3	10	3.3	2,005	0	0	2,005		2,005	2,005
Y	R	26140	40	0	40	80	2.0	16,200	0	0	16,200		16,200	16,200
Y	R	26210	35	25	10	30	3.0	6,075	0	0	6,075		6,075	6,075
Y	R	26222	30	15	15	90	6.0	18,225	0	0	18,225		18,225	18,225
Y	R	26231	32	10	22	66	3.0	13,365	0	0	13,365		13,365	13,365
Y	R	26233	15	0	15	45	3.0	9,113	0	0	9,113		9,113	9,113
Y	R	26241	35	0	35	88	2.5	17,719	0	0	17,719		17,719	17,719
Y	R	26244	13	0	13	36	2.8	7,371	0	0	7,371		7,371	7,371
Y	R	26310	40	11	29	104	3.6	21,141	0	825	21,966		21,966	21,966
Y	R	26320	40	5	35	88	2.5	17,719	0	0	17,719		17,719	17,719
Y	R	26330	30	0	30	75	2.5	15,188	0	0	15,188		15,188	15,188
Y	R	26330	10	0	10	120	12.0	24,300	0	0	24,300		24,300	24,300
Y	R	26340	40	27	13	20	1.5	3,949	0	0	3,949		3,949	3,949
Y	R	26410	30	20	10	25	2.5	5,063	0	0	5,063		5,063	5,063
Y	R	26411	10	5	5	6	1.2	1,215	0	0	1,215		1,215	1,215
Y	R	26420	40	15	25	53	2.1	10,631	0	0	10,631		10,631	10,631
Y	R	26430	40	14	26	57	2.2	11,583	0	0	11,583		11,583	11,583
Y	R	26440	40	10	30	66	2.2	13,365	0	750	14,115		14,115	14,115
Y	R	35110	8	0	8	18	2.2	3,564	0	0	3,564		3,564	3,564
Y	R	35121	4	0	4	10	2.5	2,025	0	0	2,025		2,025	2,025
Y	R	35122	7	5	2	6	3.0	1,215	0	0	1,215		1,215	1,215
Y	R	36110	13	13	0	0	0.0	0	0	975	975		975	975
Y	R	36121	10	0	10	120	12.0	24,300	0	750	25,050		25,050	25,050
Y	R	36132	4	0	4	3	0.8	648	6,000	0	6,648		6,648	6,648
Y	R	36133	9	0	9	1	0.1	182	13,500	0	13,682		13,682	13,682
Y	R	36134	20	15	5	2	0.4	405	7,500	0	7,905		7,905	7,905
Y	R	36210	20	7	13	78	6.0	15,795	9,000	0	24,795		24,795	24,795
Y	R	36221	7	0	7	14	2.0	2,835	3,000	0	5,835		5,835	5,835
Y	R	36222	13	0	13	78	6.0	15,795	3,000	0	18,795		18,795	18,795
Y	R19		12	0	12	36	3.0	8,100	0	0	8,163		8,163	8,163
Y	R21		58	13	45	135	3.0	30,375	0	0	30,629		30,629	30,629
Y	R22		319	98	221	663	3.0	149,175	0	0	150,479		150,479	150,479
Y	R23		282	60	222	666	3.0	149,850	0	0	151,083		151,083	151,083
Y	R24		69	10	59	177	3.0	39,825	0	0	40,143		40,143	40,143
Y	R25		116	42	74	222	3.0	49,950	0	0	50,407		50,407	50,407
SUBTOTAL RUM RIVER MUSA FLOWS			4,327	872	3,455	9,989		2,065,439	117,000	62,175	2,248,243		2,248,243	2,248,243
TOTAL MUSA FLOWS			7,275	1,461	5,808	12,553		2,584,670	2,235,480	89,475	2,248,243	2,665,010	4,913,254	4,913,254

APPENDIX E
SEWER DISTRICT FLOWS

SEWER DISTRICT FLOWS -

District	PIN/Subdistrict	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow	Office / Comm./ Ind. / Mixed Use Flow	Other / Special / Public Flow	Rum River Flow	Miss. River Flow	MUSA Flow	Total Flow
MLS-1	18100	160	10	150	75	0.5	15,188	0	0		15,188		15,188
MLS-1	18200	160	5	155	77.5	0.5	15,694	0	0		15,694		15,694
MLS-1	18300	190	0	190	76	0.4	15,390	0	0		15,390		15,390
MLS-1	18400	130	60	70	70	1.0	14,175	0	0		14,176		14,176
MLS-1	17230	40	5	35	17.5	0.5	3,544	0	0		3,544		3,544
MLS-1	17240	40	15	25	62.5	2.5	12,656	0	0		12,656		12,656
MLS-1	17310	40	25	15	37.5	2.5	7,594	0	0		7,594		7,594
MLS-1	17320	40	30	10	18	1.8	3,645	0	0		3,647		3,647
MLS-1	17420	40	3	37	48.1	1.3	9,740	0	0		9,740		9,740
MLS-1	17330	40	8	32	0	0.0	0	0	0		0		0
MLS-1	17340	40	5	35	38.5	1.1	7,796	0	0		7,796		7,796
MLS-1	8340	20	6	14	18.2	1.3	3,686	0	0		3,686		3,686
MLS-1	17110	40	0	40	36	0.9	7,290	0	0		7,290		7,290
MLS-1	17120	40	0	40	32	0.8	6,480	0	0		6,480		6,480
MLS-1	17130	40	0	40	64	1.6	12,960	0	0		12,960		12,960
MLS-1	17140	40	0	40	44	1.1	8,910	0	0		8,910		8,910
MLS-1	17210	40	0	40	60	1.5	12,150	0	0		12,150		12,150
MLS-1	17220	40	5	35	0	0.0	0	0	0		0		0
MLS-1	M9	296	200	96	288	3.0	58,320	0	0		58,320		58,320
MLS-1	M10	282	114	168	134	0.8	27,135	0	0		27,135		27,135
MLS-1	M11	979	500	479	335	0.7	67,838	0	0		67,838		67,838
MLS-1	M12	197	159	38	114	3.0	23,085	0	0		23,085		23,085
MLS-1	M14	202	82	120	360	3.0	72,900	0	0		72,900		72,900
					2005.8								406,179
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
2,006	2.7	5,416	406,179	3.21	1,304,925	2.02							
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MLS-3	M13	558	8	550	715	1.3	144,788	0	0		144,788		144,788
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
715	2.7	1,931	144,788	3.60	520,899	0.81							
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MLS-4	M15	80	4	76	30	0.4	6,075	0	0		6,075		6,075
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
30	2.7	81	6,075	4.27	25,925	0.04							
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M2	19100	160	120	40	0	0.0	0	0	0		0	0	0
M2	19210	80	0	80	0	0.0	0	0	0		0	0	0
M2	19400	68	30	38	79.8	2.1	16,160	0	1,500		17,660	17,660	17,660
M2	19400	52	0	52	156	3.0	31,590	0	1,500		33,090	33,090	33,090
M2	20320	20	5	15	90	6.0	18,225	0	0		18,225	18,225	18,225
M2	20320	20	0	20	120	6.0	24,300	0	0		24,300	24,300	24,300
					445.8								93,275
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
446	2.7	1,204	93,275	3.75	349,467	0.54							

SEWER DISTRICT FLOWS -

District	PIN/Subdistrict	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow	Office / Comm./ Ind. / Mixed Use Flow	Other / Special / Public Flow	Rum River Flow	Miss. River Flow	MUSA Flow	Total Flow
M3	19320	41	0	41	246	6.0	49,815	0	0		49,815	49,815	49,815
M3	19220	20	0	20	0	0.0	0	30,000	0		30,000	30,000	30,000
M3	19230	20	0	20	8	0.4	1,620	30,000	0		31,620	31,620	31,620
M3	19240	30	20	10	0	0.0	0	15,000	0		15,000	15,000	15,000
M3	19340	38	20	18	0	0.0	0	19,500	1,500		21,000	21,000	21,000
M3	19430	30	10	20	20	1.0	4,050	0	0		4,050	4,050	4,050
M3	28320	30	0	30	18	0.6	3,645	25,800	0		29,445	29,445	29,445
M3	28330	50	0	50	50	1.0	10,125	0	0		10,125	10,125	10,125
M3	28340	30	0	30	0	0.0	0	45,000	0		45,000	45,000	45,000
M3	28430	12	0	12	0	0.0	0	18,000	0		18,000	18,000	18,000
M3	29130	30	0	30	0	0.0	0	45,000	0		45,000	45,000	45,000
M3	29140	13	0	13	0	0.0	0	19,500	0		19,500	19,500	19,500
M3	29230	65	0	65	0	0.0	0	97,500	0		97,500	97,500	97,500
M3	29240	25	0	25	75	3.0	15,188	0	0		15,188	15,188	15,188
m3	29240	25	0	25	0	0.0	0	45,000	0		45,000	45,000	45,000
M3	29310	40	0	40	0	0.0	0	60,000	0		60,000	60,000	60,000
M3	29320	24	0	24	72	3.0	14,580	0	0		14,580	14,580	14,580
M3	29320	6	0	6	36	6.0	7,290	0	0		7,290	7,290	7,290
M3	29330	18	0	18	37.8	2.1	7,655	0	0		7,655	7,655	7,655
M3	29340	20	0	20	60	3.0	12,150	0	0		12,150	12,150	12,150
M4	29340	20	0	20	0	0.0	0	1,500	0		1,500	1,500	1,500
M3	29410	35	0	35	35	1.0	7,088	0	0		7,088	7,088	7,088
M3	29420	20	0	20	60	3.0	12,150	0	0		12,150	12,150	12,150
M3	29420	20	0	20	0	0.0	0	30,000	0		30,000	30,000	30,000
M3	29430	20	0	20	60	3.0	12,150	0	0		12,150	12,150	12,150
M3	29430	20	0	20	0	0.0	0	0	0		0	0	0
M3	29440	30	0	30	33	1.1	6,683	0	0		6,683	6,683	6,683
M3	30100	55	0	55	93.5	1.7	18,934	0	0		18,934	18,934	18,934
M3	30100	25	0	25	75	3.0	15,188	0	0		15,188	15,188	15,188
M3	33110	88	88	0	0	0.0	0	0	6,600		6,600	6,600	6,600
M3	33210	31	25	6	0	0.0	0	0	1,875		1,875	1,875	1,875
M3	33220	11	11	0	0	0.0	0	0	825		825	825	825
					979.3								690,908
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
979	2.7	2,644	690,908	3.49	2,410,174	3.73							
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M4	19400	68	30	38	80	2.1	16,160	0	1,500		17,660	17,660	17,660
M4	20310	35	5	30	90	3.0	18,225	0	0		18,225	18,225	18,225
M4	20320	20	5	15	90	6.0	18,225	0	0		18,225	18,225	18,225
M5	20320	20	0	20	120	6.0	24,300	0	0		24,300	24,300	24,300
M4	20330	30	0	30	180	6.0	36,450	0	0		36,450	36,450	36,450
M4	20330	10	0	10	120	12.0	24,300	0	0		24,300	24,300	24,300
M4	20340	40	0	40	0	0.0	0	30,000	0		30,000	30,000	30,000
M4	20430	13	0	13	0	0.0	0	9,750	0		9,750	9,750	9,750
M4	20430	27	20	7	42	6.0	8,505	0	0		8,505	8,505	8,505
M4	29110	57	0	57	0	0.0	0	85,500	0		85,500	85,500	85,500
M4	29110	13	0	13	0	0.0	0	19,500	0		19,500	19,500	19,500
M4	29120	30	0	30	0	0.0	0	45,000	0		45,000	45,000	45,000
M4	29120	20	0	20	0	0.0	0	30,000	0		30,000	30,000	30,000
M4	29210	30	0	30	0	0.0	0	45,000	0		45,000	45,000	45,000
M4	29220	15	0	15	0	0.0	0	22,500	0		22,500	22,500	22,500
					722								356,505
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
722	2.7	1,949	356,505	3.59	1,281,460	1.98							

SEWER DISTRICT FLOWS -

District	PIN/Subdistrict	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow	Office / Comm. / Ind. / Mixed Use Flow	Other / Special / Public Flow	Rum River Flow	Miss. River Flow	MUSA Flow	Total Flow
M5	17410	40	0	40	100	2.5	20,250	0	0		20,250		20,250
M5	17430	40	3	37	59.2	1.6	11,988	0	0		11,988		11,988
M5	17440	40	0	40	80	2.0	16,200	0	0		16,200		16,200
M5	20120	40	0	40	100	2.5	20,250	0	0		20,250		20,250
M5	20210	40	10	30	54	1.8	10,935	0	750		11,685		11,685
M5	20220	40	30	10	0	0.0	0	0	0		0		0
M5	20230	40	5	35	0	0.0	0	0	0		0		0
M5	20240	40	2	38	64.6	1.7	13,082	0	150		13,232		13,232
M5	20110	40	0	40	100	2.5	20,250	0	0		20,250		20,250
M5	20130	45	0	45	72	1.6	14,580	0	0		14,580		14,580
M5	20140	35	2	33	66	2.0	13,365	0	0		13,365		13,365
M5	20410	40	0	40	92	2.3	18,630	0	0		18,630		18,630
M5	20420	40	0	40	72	1.8	14,580	0	0		14,580		14,580
M5	20310	35	5	30	90	3.0	18,225	0	0		18,225	18,225	18,225
M5	20310	5	0	5	15	3.0	3,038	0	0		3,038	3,038	3,038
M5	20440	27	5	22	66	3.0	13,365	0	0		13,365	13,365	13,365
M5	20440	13	0	13	156	12.0	31,590	0	0		31,590	31,590	31,590
M5	21210	40	0	40	48	1.2	9,720	0	0		9,720		9,720
M5	21220	40	0	40	56	1.4	11,340	0	0		11,340		11,340
M5	21230	40	30	10	25	2.5	5,063	0	0		5,063		5,063
M5	21240	40	35	5	15	3.0	3,038	0	0		3,038		3,038
M5	21310	40	15	25	32.5	1.3	6,581	0	1,125		7,706		7,706
M5	21320	40	10	30	51	1.7	10,328	0	0		10,328		10,328
M5	21330	40	0	40	64	1.6	12,960	0	0		12,960		12,960
M5	21340	40	0	40	72	1.8	14,580	0	0		14,580		14,580
					1550.3								
<u>UNITS</u>	<u>POP/UNIT</u>	<u>TOTAL POP.</u>	<u>DAILY FLOW</u>	<u>PEAK FACTOR</u>	<u>GAL/DAY</u>	<u>CFS</u>							
2,382	2.7	6,431	733,955	3.14	2,306,069	3.57							
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M6	21130	40	0	40	120	3.0	24,300	0	0		24,300		24,300
M6	21140	40	0	40	60	1.5	12,150	0	0		12,150		12,150
M6	21410	40	0	40	88	2.2	17,820	0	0		17,820		17,820
M6	21420	40	0	40	76	1.9	15,390	0	0		15,390		15,390
M6	21430	35	0	35	63	1.8	12,758	0	0		12,758		12,758
M6	21440	45	0	45	67.5	1.5	13,669	0	0		13,669		13,669
M6	28110	16	0	16	96	6.0	19,440	0	0		19,440	19,440	19,440
M6	28110	16	0	16	17.6	1.1	3,564	0	0		3,564	3,564	3,564
M6	28120	28	0	28	30.8	1.1	6,237	0	0		6,237	6,237	6,237
M6	28120	20	0	20	120	6.0	24,300	0	0		24,300	24,300	24,300
					738.9								
<u>UNITS</u>	<u>POP/UNIT</u>	<u>TOTAL POP.</u>	<u>DAILY FLOW</u>	<u>PEAK FACTOR</u>	<u>GAL/DAY</u>	<u>CFS</u>							
739	2.7	1,995	149,627	3.59	536,657	0.83							
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M7	22320	33	0	33	19.2	0.6	3,888	0	0		3,888		3,888
M7	22310	40	5	33	52.5	1.6	10,631	0	375		11,006		11,006
M7	22320	33	0	33	19.2	0.6	3,888	0	0		3,888		3,888
M7	22320	33	0	33	52.8	1.6	10,692	0	0		10,692		10,692
					144								
<u>UNITS</u>	<u>POP/UNIT</u>	<u>TOTAL POP.</u>	<u>DAILY FLOW</u>	<u>PEAK FACTOR</u>	<u>GAL/DAY</u>	<u>CFS</u>							
144	2.7	388	18,782	4.03	75,663	0.12							

SEWER DISTRICT FLOWS -

District	PIN/Subdistrict	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow	Office / Comm/ Ind. / Mixed Use Flow	Other / Special / Public Flow	Rum River Flow	Miss. River Flow	MUSA Flow	Total Flow
M8	22330	25	0	25	52.5	2.1	10,631	0	0				10,631
M8	22340	55	15	40	60	1.5	12,150	0	0		10,631		12,150
					112.5								22,781
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
113	2.7	304	22,781	4.08	92,860	0.14							
RLS-1	2330	12	4	8	20	2.5	4,050	0	0	4,050			4,050
RLS-1	2340	31	10	21	27.3	1.3	5,528	0	0	5,528			5,528
RLS-1	2430	40	12	28	84	3.0	17,010	0	0	17,010			17,010
RLS-1	10110	35	15	20	28	1.4	5,670	0	0	5,670			5,670
RLS-1	10140	40	0	40	72	1.8	14,580	0	0	14,580			14,580
RLS-1	11120	40	10	30	90	3.0	18,225	0	0	18,225			18,225
RLS-1	11210	40	8	32	80	2.5	16,200	0	0	16,200			16,200
RLS-1	11220	40	8	32	80	2.5	16,200	0	0	16,200			16,200
RLS-1	11230	20	0	20	26	1.3	5,265	0	0	5,265			5,265
RLS-1	11230	20	0	20	50	2.5	10,125	0	0	10,125			10,125
RLS-1	11240	20	0	20	40	2.0	8,100	0	0	8,100			8,100
RLS-1	11240	20	0	20	50	2.5	10,125	0	0	10,125			10,125
					597.3								120,953
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
597	2.7	1,613	120,953	3.66	442,276	0.68							
RLS-2	11440	40	40	0	0	0.0	0	0	0	0			0
RLS-2	12330	35	15	20	34	1.7	6,885	0	0	6,885			6,885
RLS-2	13200	110	0	110	275	2.5	55,688	0	0	55,688			55,688
RLS-2	14110	20	0	20	42	2.1	8,505	0	0	8,505			8,505
RLS-2	14110	20	0	20	60	3.0	12,150	0	0	12,150			12,150
					411								83,228
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
411	2.7	1,110	83,228	3.77	313,801	0.49							
RLS-3	9410	30	20	10	30	3.0	6,075	0	0	6,075			6,075
RLS-3	9440	40	12	28	84	3.0	17,010	0	0	17,010			17,010
RLS-3	10120	30	10	20	60	3.0	12,150	0	0	12,150			12,150
RLS-3	10130	40	0	40	120	3.0	24,300	0	0	24,300			24,300
RLS-3	10230	20	10	10	30	3.0	6,075	0	0	6,075			6,075
RLS-3	10240	35	5	30	90	3.0	18,225	0	0	18,225			18,225
RLS-3	10310	40	5	35	105	3.0	21,263	0	0	21,263			21,263
RLS-3	10320	40	0	40	120	3.0	24,300	0	0	24,300			24,300
RLS-3	10330	40	8	32	96	3.0	19,440	0	0	19,440			19,440
RLS-3	R19	332	83	249	149	0.6	30,173	0	0	33,615			30,173
RLS-3	R19	12	0	12	36	3.0	7,290	0	0	8,100			7,290
RLS-3	R20	335	280	55	165	3.0	33,413	0	0	33,413			33,413
RLS-3	R21	105	23	82	246	3.0	49,815	0	0	49,815			49,815
RLS-3	R22	32	0	32	96	3.0	19,440	0	0	19,440			19,440
RLS-3	R22	319	98	221	663	3.0	134,258	0	0	134,258			134,258
					2090								423,225
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
2,090	2.7	5,643	423,225	3.20	1,352,587	2.09							

SEWER DISTRICT FLOWS -

District	PIN/Subdistrict	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow	Office / Comm./ Ind. / Mixed Use Flow	Other / Special / Public Flow	Rum River Flow	Miss. River Flow	MUSA Flow	Total Flow
RLS-4	1330	19	5	14	27	1.9	5,468	0	0	5,468			5,468
RLS-4	2440	26	8	18	54	3.0	10,935	0	0	10,935			10,935
RLS-4	11110	50	10	40	120	3.0	24,300	0	0	24,300			24,300
RLS-4	12220	20	5	15	18	1.2	3,645	0	0	3,645			3,645
RLS-4	12230	21	0	21	13	0.6	2,633	0	0	2,633			2,633
RLS-4	12320	21	10	11	8	0.7	1,620	0	0	1,620			1,620
					240								48,600
<u>UNITS</u>	<u>POP/UNIT</u>	<u>TOTAL POP.</u>	<u>DAILY FLOW</u>	<u>PEAK FACTOR</u>	<u>GAL/DAY</u>	<u>CFS</u>							
240	2.7	648	48,600	3.91	190,203	0.29							
RLS-6	R27	334	81	253	253	1.0	51,233	0	0	51,233			51,233
					253								51,233
<u>UNITS</u>	<u>POP/UNIT</u>	<u>TOTAL POP.</u>	<u>DAILY FLOW</u>	<u>PEAK FACTOR</u>	<u>GAL/DAY</u>	<u>CFS</u>							
253	2.7	683	51,233	3.90	199,840	0.31							
RLS-7	R26	278	117	161	419	2.6	84,848	0	0	84,848			84,848
RLS-7	R28	48	8	40	120	3.0	24,300	0	0	24,300			24,300
					539								109,148
<u>UNITS</u>	<u>POP/UNIT</u>	<u>TOTAL POP.</u>	<u>DAILY FLOW</u>	<u>PEAK FACTOR</u>	<u>GAL/DAY</u>	<u>CFS</u>							
539	2.7	1,455	109,148	3.69	402,647	0.62							
RLS-8	R23	282	60	222	666	3.0	134,865	0	0	134,865			134,865
RLS-8	R23	20	0	20	120	6.0	24,300	0	0	24,300			24,300
RLS-8	R24	69	10	59	177	3.0	35,843	0	0	35,843			35,843
RLS-8	R24	94	23	71	213	3.0	43,133	0	0	43,133			43,133
RLS-8	R25	235	42	193	251	1.3	50,828	0	0	50,828			50,828
RLS-8	R25	116	42	74	222	3.0	44,955	0	0	44,955			44,955
					1649								333,923
<u>UNITS</u>	<u>POP/UNIT</u>	<u>TOTAL POP.</u>	<u>DAILY FLOW</u>	<u>PEAK FACTOR</u>	<u>GAL/DAY</u>	<u>CFS</u>							
1,649	2.7	4,452	333,923	3.29	1,099,042	1.70							
R1	8430	20	8	12	25	2.1	5,063	0	0	5,063			5,063
R1	8440	20	15	5	13	2.6	2,633	0	0	2,633			2,633
R1	9330	30	20	10	25	2.5	5,063	0	0	5,063			5,063
R1	9340	40	15	25	38	1.5	7,695	0	0	7,695			7,695
R1	9420	15	15	0	30	0.0	6,075	0	0	6,075			6,075
R1	9430	40	20	20	60	3.0	12,150	0	0	12,150			12,150
R1	15220	40	0	40	56	1.4	11,340	0	0	11,340			11,340
R1	16110	40	5	35	74	2.1	14,985	0	0	14,985			14,985
R1	16120	40	10	30	60	2.0	12,150	0	0	12,150			12,150
R1	16140	40	15	25	43	1.7	8,708	0	0	8,708			8,708
R1	16210	40	8	32	45	1.4	9,113	0	0	9,113			9,113
R1	16220	40	0	40	44	1.1	8,910	0	0	8,910			8,910
R1	16230	45	45	0	0	0.0	0	0	3,375	3,375		3,375	
R1	16240	35	5	30	90	3.0	18,225	0	375	18,600			18,600
R1	16310	40	0	40	100	2.5	20,250	0	0	20,250			20,250
R1	16320	40	0	40	100	2.5	20,250	0	0	20,250			20,250
					803								166,358
<u>UNITS</u>	<u>POP/UNIT</u>	<u>TOTAL POP.</u>	<u>DAILY FLOW</u>	<u>PEAK FACTOR</u>	<u>GAL/DAY</u>	<u>CFS</u>							
803	2.7	2,168	166,358	3.56	591,945	0.92							

SEWER DISTRICT FLOWS -

District	PIN/Subdistrict	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow	Office / Comm./ Ind. / Mixed Use Flow	Other / Special / Public Flow	Rum River Flow	Miss. River Flow	MUSA Flow	Total Flow
R2	15230	40	0	40	64	1.6	12,960	0	0	12,960			12,960
R2	15320	40	0	40	92	2.3	18,630	0	0	18,630			18,630
R2	15330	40	25	15	23	1.5	4,658	0	0	4,658			4,658
R2	16130	40	15	25	63	2.5	12,758	0	0	12,758			12,758
R2	16330	40	0	40	100	2.5	20,250	0	0	20,250			20,250
R2	16340	40	0	40	100	2.5	20,250	0	0	20,250			20,250
R2	16410	40	20	20	60	3.0	12,150	0	0	12,150			12,150
R2	16420	40	5	35	105	3.0	21,263	0	0	21,263			21,263
R2	16430	40	5	35	25	0.7	5,063	0	0	5,063			5,063
R2	16440	40	25	15	45	3.0	9,113	0	0	9,113			9,113
R2	21110	40	18	22	44	2.0	8,910	0	0	8,910			8,910
R2	21120	40	5	35	21	0.6	4,253	0	375	4,628			4,628
					742								150,630
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
742	2.7	2,003	150,630	3.59	540,041	0.84							
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R4	10340	40	0	40	120	3.0	24,300	0	0	24,300			24,300
R4	15210	40	0	40	76	1.9	15,390	0	0	15,390			15,390
R4	15240	40	7	33	56	1.7	11,340	0	525	11,865			11,865
R4	15310	40	0	40	56	1.4	11,340	0	0	11,340			11,340
					308								62,895
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
308	2.7	832	62,895	3.85	242,159	0.37							
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R5	15340	40	10	30	48	1.6	9,720	0	0	9,720			9,720
R5	15430	40	10	30	36	1.2	7,290	0	0	7,290			7,290
R5	22210	40	0	40	100	2.5	20,250	0	0	20,250			20,250
R5	22220	40	0	40	100	2.5	20,250	0	0	20,250			20,250
R5	22230	40	0	40	120	3.0	24,300	0	0	24,300			24,300
R5	22240	40	0	40	100	2.5	20,250	0	0	20,250			20,250
					504								102,060
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
504	2.7	1,361	102,060	3.71	378,617	0.59							
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R6	10410	40	0	40	120	3.0	24,300	0	0	24,300			24,300
R6	10420	40	0	40	120	3.0	24,300	0	0	24,300			24,300
R6	10430	40	8	32	61	1.9	12,353	0	0	12,353			12,353
R6	10440	20	0	20	42	2.1	8,505	0	0	8,505			8,505
R6	10440	20	0	20	60	3.0	12,150	0	0	12,150			12,150
R6	11320	40	0	40	120	3.0	24,300	0	0	24,300			24,300
R6	11330	40	0	40	120	3.0	24,300	0	0	24,300			24,300
R6	15110	40	0	40	72	1.8	14,580	0	0	14,580			14,580
					715								144,788
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
715	2.7	1,931	144,788	3.60	520,899	0.81							

SEWER DISTRICT FLOWS -

District	PIN/Subdistrict	Total Area	Non Developable Area (Acres)	Developable Area (Acres)	Total Units	Density Units/Acre	Residential Flow	Office / Comm./ Ind. / Mixed Use Flow	Other / Special / Public Flow	Rum River Flow	Miss. River Flow	MUSA Flow	Total Flow
R7	15120	40	0	40	48	1.2	9,720	0	0	9,720			9,720
R7	15130	40	0	40	68	1.7	13,770	0	0	13,770			13,770
R7	15140	40	5	35	60	1.7	12,049	0	0	12,049			12,049
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
176	2.7	475	35,539	3.99	141,640	0.22							
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R8	15420	40	5	35	70	2.0	14,175	0	0	14,175			14,175
R8	15440	45	15	30	30	1.0	6,075	0	0	6,075			6,075
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
100	2.7	270	20,250	4.10	82,977	0.13							
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R9	22110	50	10	40	36	0.9	7,290	0	0	7,290			7,290
R9	22120	40	5	35	67	1.9	13,568	0	0	13,568			13,568
R9	22130	40	0	40	72	1.8	14,580	0	0	14,580			14,580
R9	22140	40	0	40	60	1.5	12,150	0	0	12,150			12,150
R9	22410	40	25	15	0	0.0	0	0	3,000	3,000		3,000	3,000
R9	22420	40	25	15	0	0.0	0	0	3,000	3,000		3,000	3,000
R9	23230	15	0	15	24	1.6	4,860	0	0	4,860		4,860	4,860
R9	23230	15	0	15	45	3.0	9,113	0	0	9,113		9,113	9,113
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
304	2.7	821	67,560	3.85	260,353	0.40							
<hr/>													
R10	11130	40	20	20	60	3.0	12,150	0	0	12,150			12,150
R10	11230	20	0	20	26	1.3	5,265	0	0	5,265			5,265
R10	11230	20	0	20	50	2.5	10,125	0	0	10,125			10,125
R10	11240	20	0	20	40	2.0	8,100	0	0	8,100			8,100
R10	11240	20	0	20	50	2.5	10,125	0	0	10,125			10,125
R10	11310	40	0	40	68	1.7	13,770	0	0	13,770			13,770
R10	11420	30	3	27	11	0.4	2,228	0	0	2,228			2,228
R10	11420	7	0	7	0	0.0	0	10,500	0	10,500			10,500
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
305	2.7	824	72,263	3.85	278,413	0.43							
<hr/>													
R11	11340	40	0	40	120	3.0	24,300	0	0	24,300			24,300
R11	11430	20	5	15	45	3.0	9,113	0	0	9,113			9,113
R11	11430	10	0	10	30	3.0	6,075	0	0	6,075			6,075
R11	11430	10	0	10	0	0.0	0	15,000	0	15,000			15,000
R11	14120	40	0	40	120	3.0	24,300	0	0	24,300			24,300
R11	14210	40	40	0	0	0.0	0	0	0	0			0
R11	14220	40	0	40	76	1.9	15,390	0	0	15,390			15,390
R11	14230	25	7	18	22	1.2	4,455	0	0	4,455			4,455
R11	14240	40	20	20	40	2.0	8,100	0	0	8,100			8,100
UNITS	POP/UNIT	TOTAL POP.	DAILY FLOW	PEAK FACTOR	GAL/DAY	CFS							
453	2.7	1,223	106,733	3.74	399,383	0.62							

APPENDIX F
COST ESTIMATES

2030 MUSATrunk Sanitary Sewer System Improvements

DISTRICT	LOCATION	SIZE (IN.)	LENGTH (FT.)	COST PER FOOT	LIFT STATION	COST
<u>M3</u>	MLS-2				\$350,000	\$350,000
	MLS-2 to MH-11A	12" FM	1750	\$110		\$192,500
	MH-11A to MH-11	18"	850	\$230		\$195,500
	MH-11A to MH-11	18" Jacking	250	\$500		\$125,000
	MLS-2 to MH-9A	18"	3600	\$230		\$828,000
	MH-9A to MH-9	12"(oversizing only)	5600	\$25		\$140,000
TOTAL M3 DISTRICT						\$1,831,000
<u>M4</u>	MH-10A to MH-58	12"	1400	\$130		\$182,000
	MH-10A to MH-58	15"	1500	\$155		\$232,500
TOTAL M4 DISTRICT						\$414,500
<u>R1</u>	MH-92 to MH-89	21"	1300	\$290		\$377,000
TOTAL R1 DISTRICT						\$377,000
<u>R23, 24 & 25</u>	RLS-8				\$305,000	\$305,000
	RLS-8 to MH-82	8" FM	720	\$80		\$57,600
	RLS-8 to MH-82	8" FM Jacking	80	\$250		\$20,000
	RLS-8 to MH-84A	10"	2350	\$115		\$270,250
	RLS-8 to MH-83A	12"	2500	\$130		\$325,000
	MH-83A to MH-83	10"	2700	\$115		\$310,500
TOTAL R23, 24 & 25 DISTRICT						\$1,288,350
<u>R21 & 22</u>	MH-79 to MH-78	10"	5100	\$115		\$586,500
	MH-81 to MH-79	12"	900	\$130		\$117,000
	MH-81 to MH-82	18"	4400	\$230		\$1,012,000
	RLS-3 to MH-81	18"	850	\$230		\$195,500
TOTAL R21 & 22 DISTRICT						\$1,911,000
<u>RLS-3</u>	RLS-3				\$215,000 (upgrade existing LS)	\$215,000
TOTAL RLS-3 DISTRICT						\$215,000
TOTAL						<u>\$6,036,850</u>

**Alternate 2 - Lift Station and Forcemain
Northeast Sewer Extension**

ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT COST	TOTAL
1	LIFT STATION	1	LS	\$350000	350,000
2	DRIVEWAY	1	LS	\$5,000	\$5,000
3	DEWATERING	1	LS	\$5,000	\$5,000
4	8" DIP FORCEMAIN	10000	LF	\$35	\$350,000
5	VACUUM RELEASE MANHOLE	2	EA	\$8,000	\$16,000
6	FITTINGS	1540	LB	\$5	\$7,700
7	CLASS 5 AGGREGATE BASE	1000	TON	\$120	\$20,000
8	BITUMINOUS BASE COURSE	200	TON	\$80	\$16,000
9	BITUMINOUS WEARING COURSE	1200	SY	\$8	\$9,600
10	12" CMP APPROACH END CULVERTS	700	LF	\$30	\$21,000
11	CMP FLARED END SECTIONS	36	EA	\$250	\$9,000
12	SEED AND MULCH	7	ACRE	\$1,000	\$7,000
13	SILT FENCE	5000	LF	\$2	\$10,000
MOBILIZATION (5%)					\$41,315
SOIL CORRECTION CONTINGENCY					\$37,800
CONSTRUCTION COST					\$997,615
SOFT COST (30%)					\$299,285
TOTAL PROJECT COST					\$1,296,900*

*Land and easement acquisition costs are not included.

APPENDIX G
FUTURE LAND USE MAP

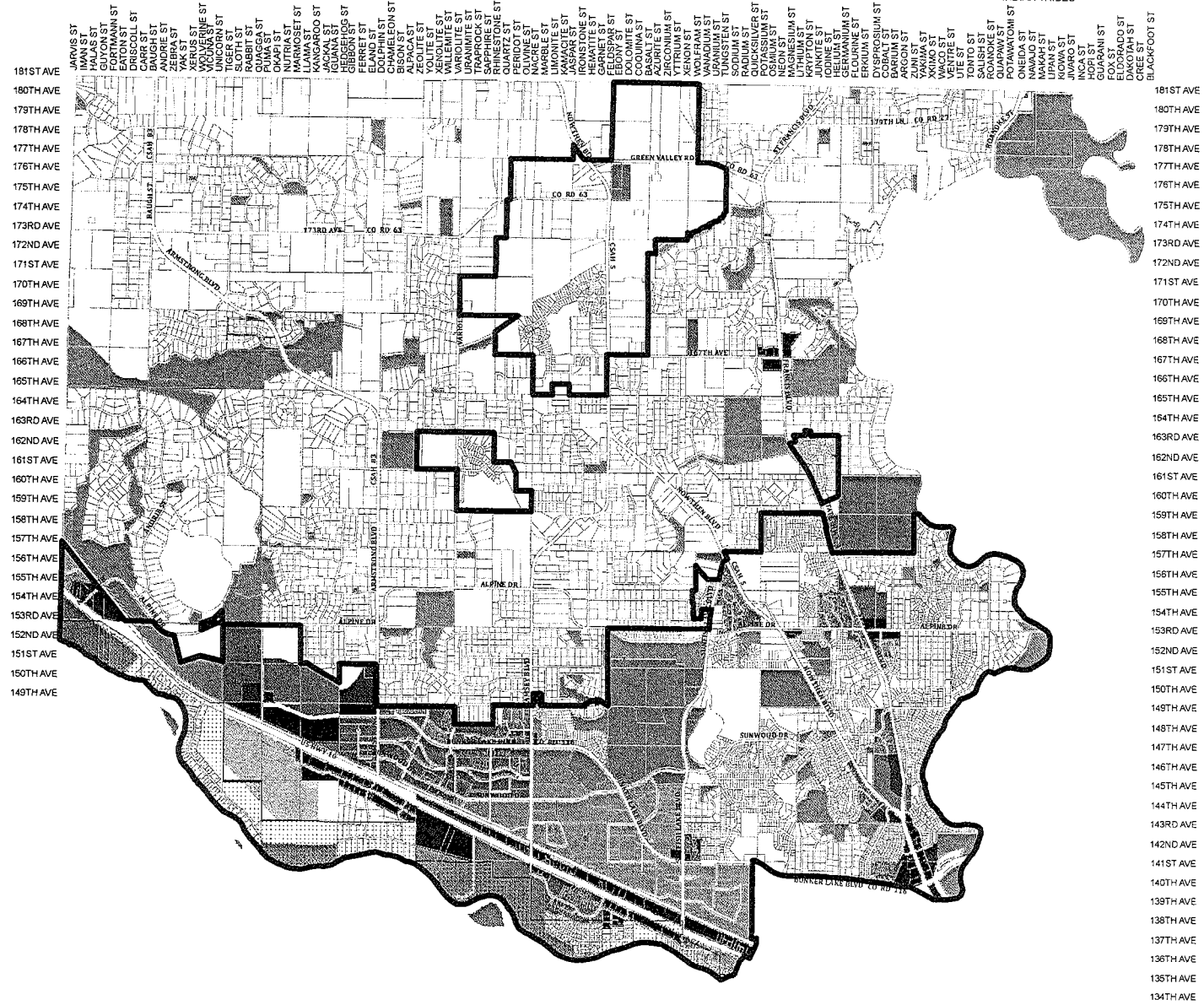
FOOTBALL GREATS

MAMMALS

ROCKS

ELEMENTS





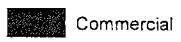


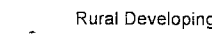
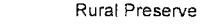

INDIAN TRIBES

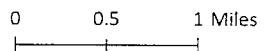
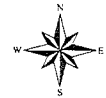


2030 Comprehensive Plan Future Land Use Map Amendment 11-02

-  MUSA
-  MRCCA Boundary

Future Land Use

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

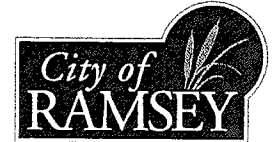
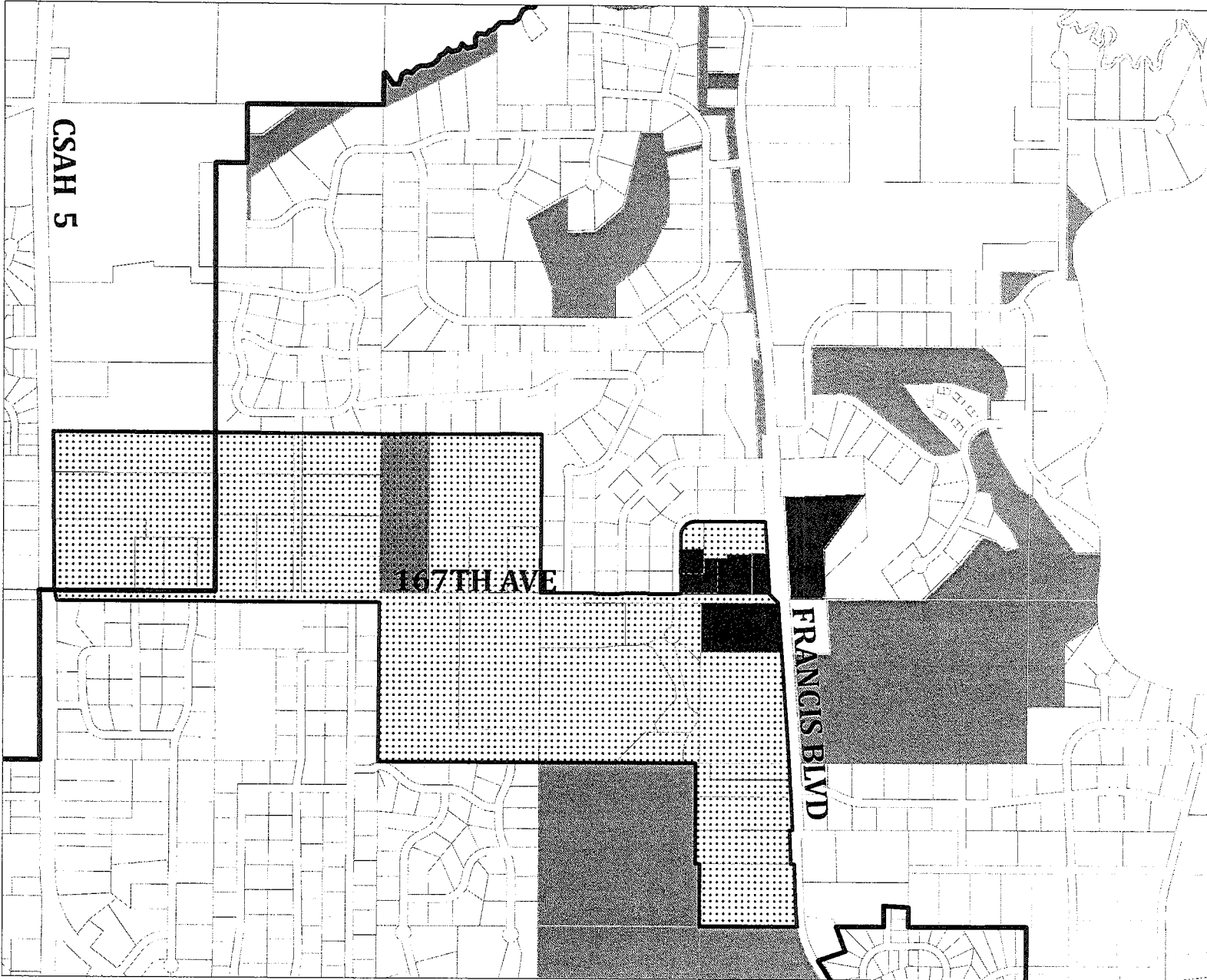


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
The City does not represent that the GIS data can be used for exact measurements of distance or direction or location in the absence of graphical features. If you are interested in GIS data, please contact (763) 427-1410.

The City of Ramsey disclaims any responsibility for or liability for the accuracy of the information as of any point of time or as to its use in any other context. The user of this map is provided pursuant to Minnesota Statute 466.03, Subd. 21 (2000), and the user of this map acknowledges that the City of Ramsey is immune from any and all claims brought by User, its employees or agents, or third parties, in or out of state, arising out of the use of this map.












APPENDIX H
SPECIAL AREA MAP

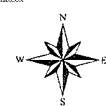


**2030 Comprehensive Plan
Future Land Use Map
Amendment 11-02**

-  Special Area Plan
-  MUSA
-  MRCCA Boundary

Future Land Use

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



0 0.05 0.1 Miles



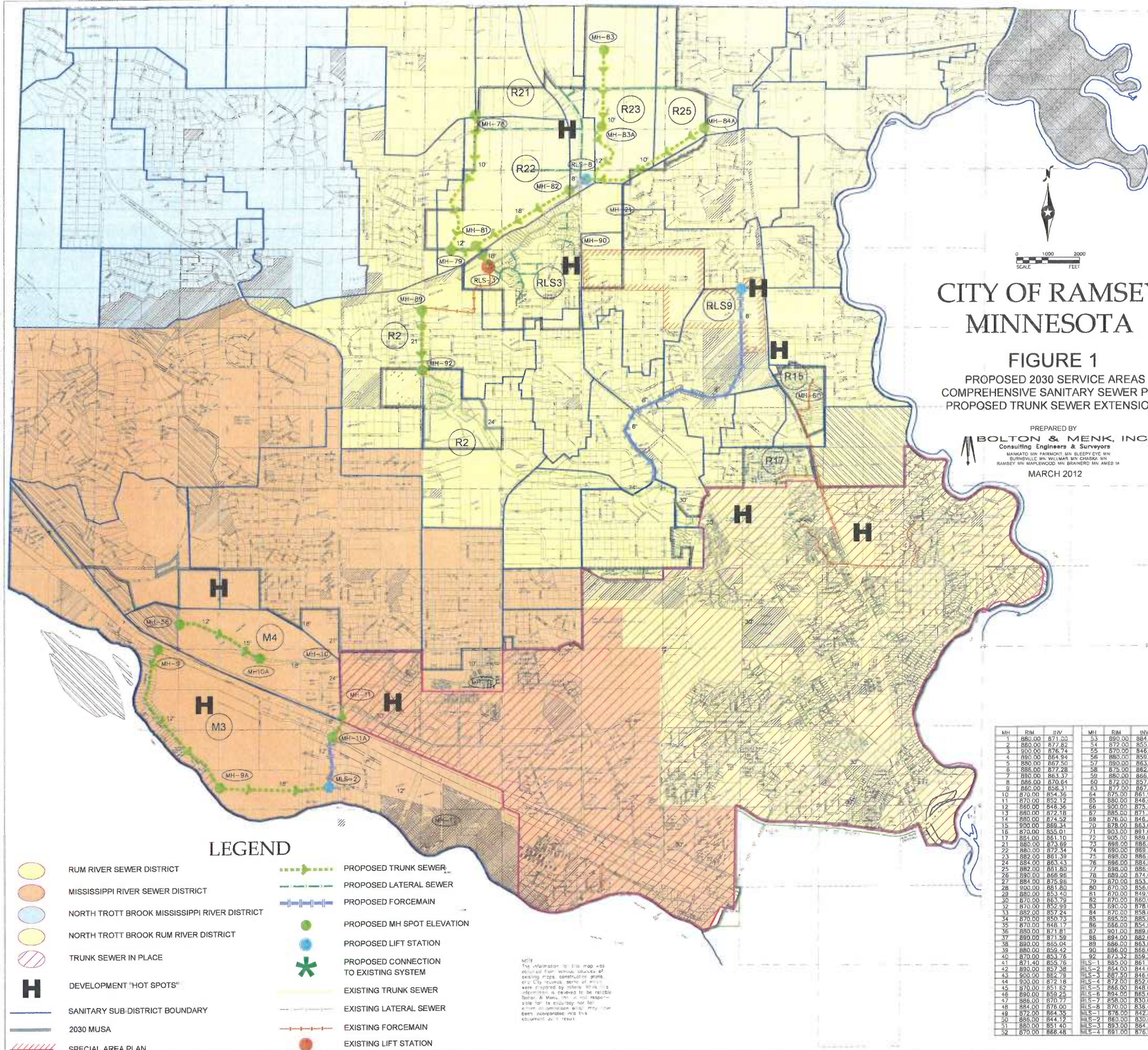
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The City does not represent that the GIS data can be used for exact measurement of distance or direction or location in the absence of physical features. Errors or discrepancies in fact, law, or policy may occur. Please contact (763) 427-3410.

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APPENDIX I

FIGURE 1 – PROPOSED SERVICE AREA, MARCH 2012



CITY OF RAMSEY MINNESOTA

FIGURE 1
PROPOSED 2030 SERVICE AREAS
COMPREHENSIVE SANITARY SEWER PLAN
PROPOSED TRUNK SEWER EXTENSIONS

PREPARED BY
BOLTON & MENK, INC.
Consulting Engineers & Surveyors
BANKATO MN PARKBENT MN SLEEPY EYE MN
BURNSVILLE MN WILMAR MN CHASMA MN
RAMSEY MN MAPLEWOOD MN BRAINERD MN AMES IA
MARCH 2012

LEGEND

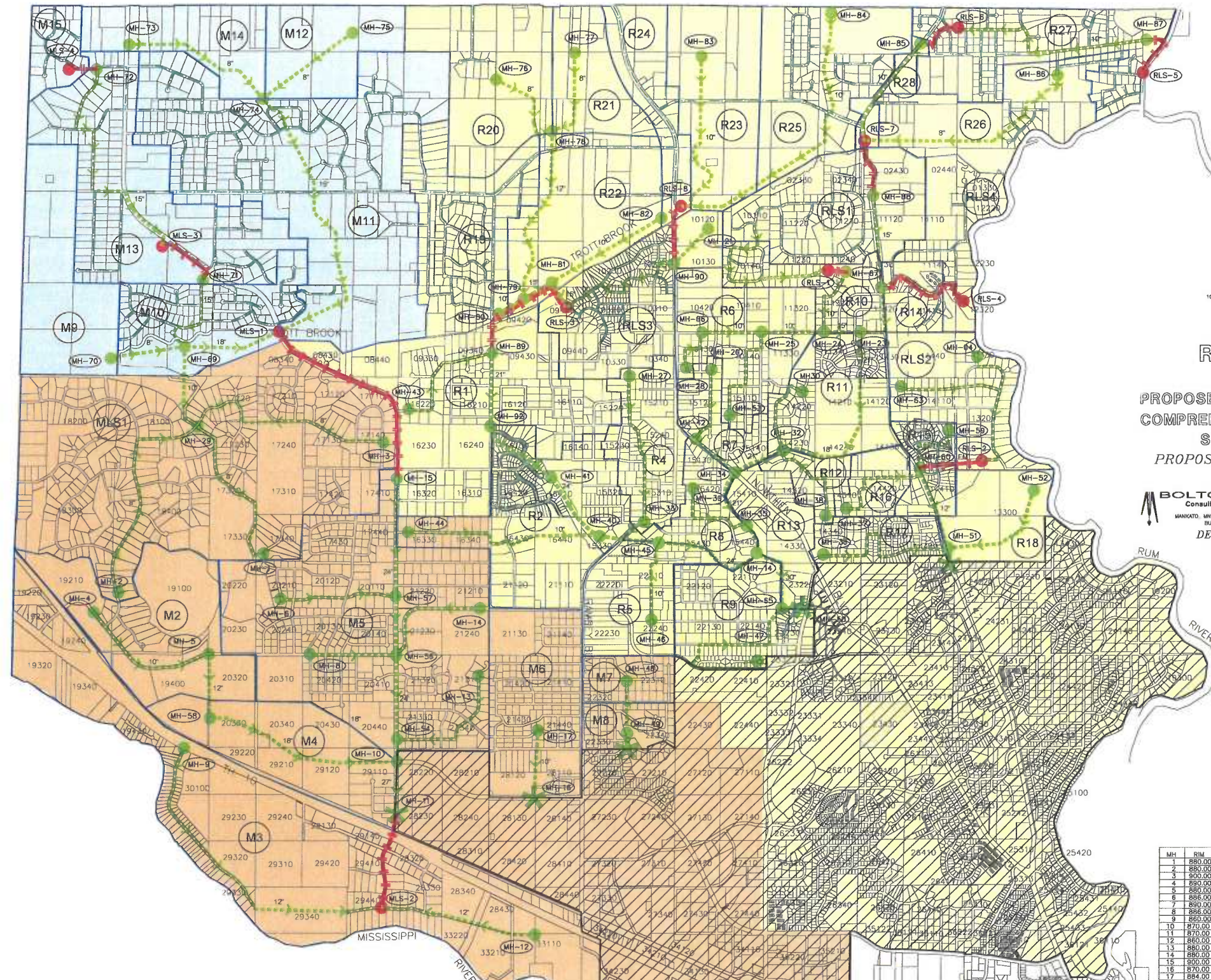
- RUM RIVER SEWER DISTRICT
- MISSISSIPPI RIVER SEWER DISTRICT
- NORTH TROTT BROOK MISSISSIPPI RIVER DISTRICT
- NORTH TROTT BROOK RUM RIVER DISTRICT
- TRUNK SEWER IN PLACE
- H DEVELOPMENT "HOT SPOTS"
- SANITARY SUB-DISTRICT BOUNDARY
- 2030 MUSA
- SPECIAL AREA PLAN
- PROPOSED TRUNK SEWER
- PROPOSED LATERAL SEWER
- PROPOSED FORCEMAIN
- PROPOSED MH SPOT ELEVATION
- PROPOSED LIFT STATION
- PROPOSED CONNECTION TO EXISTING SYSTEM
- EXISTING TRUNK SEWER
- EXISTING LATERAL SEWER
- EXISTING FORCEMAIN
- EXISTING LIFT STATION

MH	RIM	INV	MH	RIM	INV
1	880.00	871.00	53	890.00	884.24
2	880.00	877.82	54	872.00	853.52
3	900.00	876.74	55	870.00	846.85
4	880.00	864.84	56	868.00	855.02
5	880.00	867.50	57	890.00	863.02
6	888.00	877.28	58	875.00	862.98
7	880.00	863.47	59	885.00	868.43
8	888.00	870.84	60	874.00	857.78
9	860.00	856.31	63	877.00	867.84
10	870.00	854.36	64	875.00	861.90
11	870.00	852.12	65	880.00	848.66
12	860.00	846.36	66	800.00	875.45
13	860.00	872.18	67	885.00	871.38
14	880.00	874.32	68	876.00	848.32
15	900.00	868.34	70	878.00	863.00
16	870.00	865.01	71	905.00	881.00
17	854.00	861.10	72	905.00	889.00
21	880.00	873.69	73	898.00	886.00
22	860.00	872.34	74	890.00	869.20
23	882.00	861.39	75	898.00	886.00
24	884.00	863.43	76	896.00	884.00
25	882.00	861.80	77	898.00	886.00
26	890.00	868.86	78	898.00	874.00
27	884.00	875.86	79	870.00	853.20
28	900.00	861.60	80	870.00	856.00
29	880.00	863.40	81	870.00	849.90
30	870.00	863.39	82	870.00	860.00
32	870.00	852.99	83	890.00	878.00
33	882.00	867.24	84	870.00	858.00
34	870.00	850.73	85	895.00	885.00
35	870.00	848.17	86	866.00	854.00
36	880.00	871.61	87	891.00	889.00
37	890.00	871.59	88	894.00	882.00
38	880.00	865.04	89	886.00	863.00
39	880.00	869.42	90	896.00	866.00
40	870.00	853.76	92	873.32	859.26
41	871.40	855.76	LS-1	885.00	861.72
42	890.00	857.48	LS-2	894.00	844.00
43	900.00	862.79	LS-3	887.00	846.00
44	900.00	872.18	LS-4	872.00	852.00
45	870.00	851.62	LS-5	866.00	848.00
46	890.00	859.25	LS-6	894.00	865.00
47	886.00	870.77	LS-7	858.00	830.00
48	884.00	876.00	LS-8	870.00	838.44
49	872.00	864.35	LS-9	876.00	842.84
50	886.00	844.12	LS-2	860.00	830.00
51	883.00	861.40	LS-3	891.00	864.58
52	870.00	866.49	LS-4	891.00	874.50

M:\Projects\2012\2030\2030\PROPOSED SEWER PLAN.DWG 3/16/12 1:01 PM

APPENDIX J

PROPOSED SERVICE AREA, DECEMBER 2005



**CITY OF
RAMSEY
MINNESOTA**

**PROPOSED SERVICE AREAS
COMPREHENSIVE SANITARY
SEWER PLAN
PROPOSED SUB-DISTRICTS**

PREPARED BY
BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MINNETONKA, MN FARMINGTON, MN SLEEPY HOLE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN ANES, IA
DECEMBER, 2005

LEGEND

- NORTHWEST AREA SEWER DISTRICT
- NORTHEAST AREA SEWER DISTRICT
- RUM RIVER SEWER DISTRICT - 3.64 MGD
- MISSISSIPPI RIVER SEWER DISTRICT - 3.68 MGD
- TRUNK SEWER IN PLACE
- SANITARY SUB-DISTRICT BOUNDARY
- PIN NUMBER
- PROPOSED TRUNK SEWER
- PROPOSED FORCEMAIN
- PROPOSED LATERAL SEWER
- PROPOSED MH SPOT ELEVATION
- PROPOSED LIFT STATION
- PROPOSED CONNECTION TO EXISTING SYSTEM

NOTE:
The information for this map was obtained from various sources of existing maps, construction plans, and City records, some of which were prepared by others. While the information is believed to be reliable, Bolton & Menk, Inc. is not responsible for its accuracy nor for errors or omissions which may have been incorporated into this document as a result.

MH	RIM	INV	MH	RIM	INV
1	880.00	871.00	53	890.00	884.23
2	880.00	877.82	54	872.00	855.52
3	890.00	876.74	55	870.00	848.65
4	890.00	884.94	56	880.00	859.92
5	880.00	867.50	57	890.00	863.02
6	886.00	877.28	58	875.00	862.96
7	890.00	863.57	59	880.00	865.45
8	886.00	870.64	60	872.00	857.78
9	850.00	858.51	63	872.00	867.84
10	870.00	854.36	64	875.00	861.90
11	870.00	852.12	65	880.00	848.66
12	880.00	848.36	66	900.00	875.45
13	880.00	872.18	67	885.00	871.18
14	880.00	874.52	68	876.00	848.32
15	880.00	889.34	70	878.00	863.50
16	870.00	855.01	71	903.00	891.00
17	884.00	861.10	72	905.00	889.00
21	880.00	873.69	73	898.00	895.00
22	880.00	872.34	74	880.00	869.20
23	882.00	861.39	75	898.00	886.00
24	884.00	883.43	76	898.00	884.00
25	882.00	861.80	77	898.00	886.00
26	890.00	866.96	78	889.00	874.00
27	884.00	875.96	79	870.00	853.20
28	890.00	881.80	80	870.00	856.00
29	880.00	853.40	81	870.00	849.90
30	870.00	863.79	82	870.00	860.00
32	870.00	852.99	83	890.00	878.00
33	882.00	857.24	84	870.00	858.00
34	870.00	850.73	85	885.00	885.00
35	870.00	848.17	86	866.00	854.00
36	880.00	871.81	87	801.00	889.00
37	880.00	871.59	88	894.00	882.00
38	880.00	865.04	89	886.00	863.00
39	880.00	859.42	90	886.00	866.00
40	870.00	853.76	92	873.32	859.26
41	871.60	855.76	RLS-1	885.00	861.72
42	880.00	857.48	RLS-2	884.00	844.00
43	900.00	882.79	RLS-3	887.50	846.00
44	900.00	872.18	RLS-4	872.00	852.00
45	870.00	851.62	RLS-5	866.00	848.00
46	890.00	859.25	RLS-6	894.00	865.00
47	885.00	870.77	RLS-7	858.00	830.00
48	884.00	876.00	RLS-8	870.00	836.44
49	872.00	864.35	MLS-1	876.00	842.84
50	886.00	844.12	MLS-2	860.00	830.00
51	880.00	851.40	MLS-3	883.00	864.58
52	870.00	866.48	MLS-4	881.00	876.50

APPENDIX K

SANITARY SEWER CIP & CONNECTION CHARGE SUMMARY

