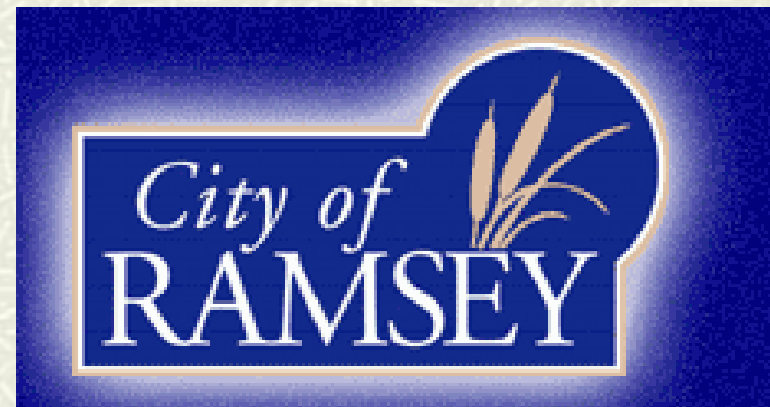


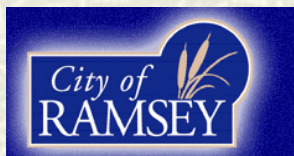
Surface Water Challenges



August 23, 2007

Items to be Presented

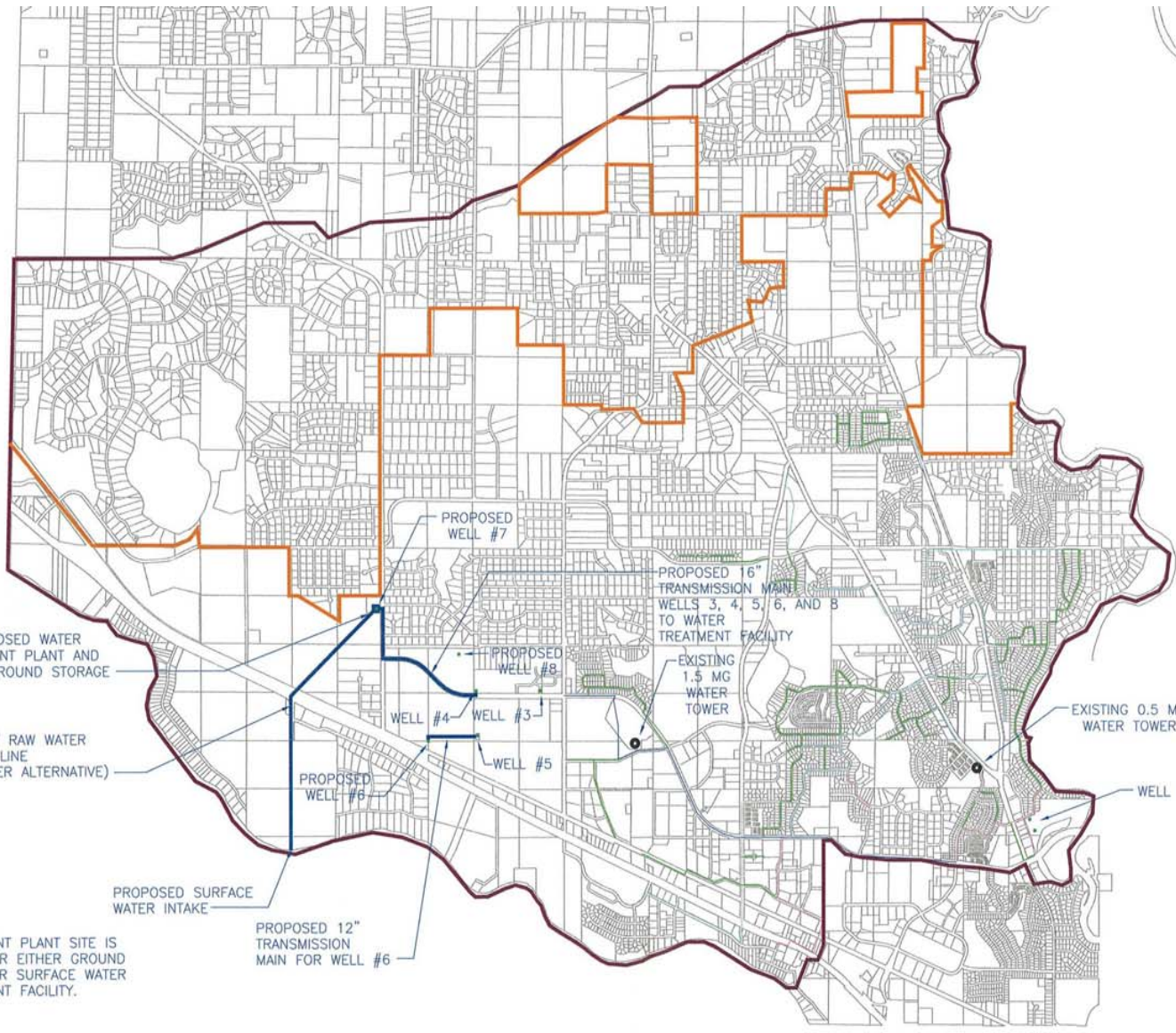
- # Background
- # Water Usage
- # Groundwater vs. Surface Water
- # Water Conservation
- # Source Water Options
- # Current Situation and Challenges Ahead





LEGEND

- 8" WATERMAIN
- 10" WATERMAIN
- 12" WATERMAIN
- 16" WATERMAIN
- WELL
- ⊙ WATERTOWER
- ULTIMATE SERVICE BOUNDARY
- PROJECTED 10 YEAR SERVICE AREA



PROPOSED WATER TREATMENT PLANT AND 1.5 MG GROUND STORAGE

PROPOSED 30" RAW WATER TRANSMISSION LINE (SURFACE WATER ALTERNATIVE)

PROPOSED SURFACE WATER INTAKE

PROPOSED 12" TRANSMISSION MAIN FOR WELL #6

PROPOSED WELL #7

PROPOSED WELL #8

WELL #4

WELL #3

PROPOSED WELL #6

EXISTING 1.5 MG WATER TOWER

PROPOSED 16" TRANSMISSION MAIN TO WELLS 3, 4, 5, 6, AND 8

EXISTING 0.5 MG WATER TOWER

WELL #1 AND #2

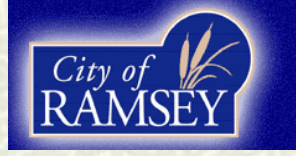
NOTE:
TREATMENT PLANT SITE IS SAME FOR EITHER GROUND WATER OR SURFACE WATER TREATMENT FACILITY.



BOLTON & MENK, INC.
Consulting Engineers & Surveyors
MANKATO, MN FARMINGTON, MN SLEEPY EYE, MN WILLMAR, MN
BURNSVILLE, MN CHASKA, MN AMES, IA

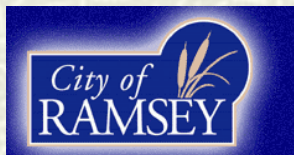
CITY OF RAMSEY
PROPOSED WATER SUPPLY AND TREATMENT IMPROVEMENTS

FIGURE ES-1

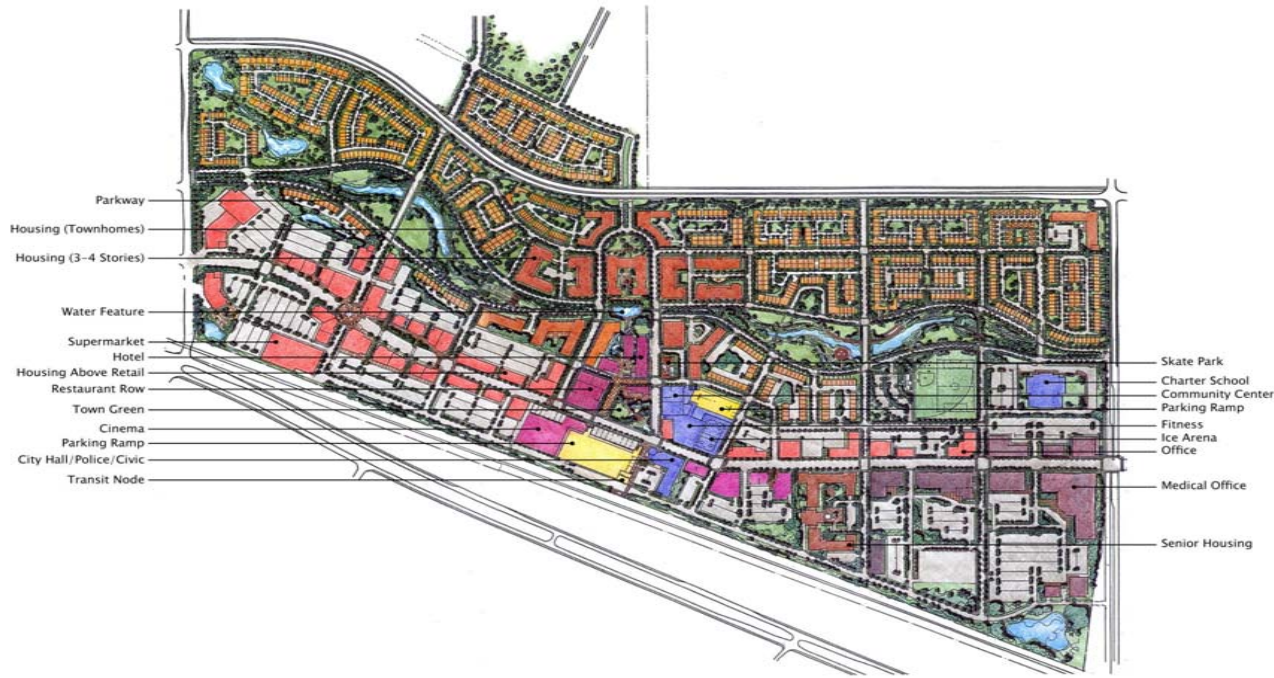


Background – Why is Ramsey Investigating Surface Water ?

- # Comprehensive Water Plan Update – 2004
 - Identified Need for 3 Additional Wells by 2007
 - Identified Need for 11 Additional Wells (19 Total) by 2020
- # Local Geology
 - Franconia-Ironton-Galesville
 - Mt. Simon/Hinckley
- # DNR will not issue any more appropriation permits for FIG wells
- # DNR will not allow any wells into the Mt Simon / Hinckley aquifer



Environmental Review of Ramsey Town Center (AUAR)

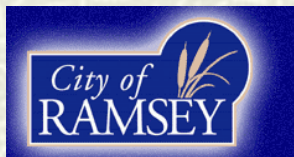


12 March 2004

esc ellness swenson graham architects inc.

RAMSEY TOWN CENTER
Ramsey, Minnesota

Site Plan



Comprehensive Water System Plan

Projected Water Service Area Population		
Year	Total Ramsey Population	Population Served by Water System
2000*	18,510	6,270
2004	23,254	11,246
2009	34,183	25,964
2014	38,193	32,899
2020	43,000	41,216

*Census Data
Source: 2004 Water Master Plan

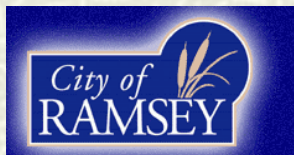
Water Service Area Demands

	Service Area Population	Average Daily Demand (MGD)	Maximum Daily Demand (MGD)	Total Wells Required
2004	11,246	1.69	5.90	6
2009	25,964	3.89	11.68	12
2014	32,899	4.93	14.80	15
2020	41,216	6.18	18.55	19

Well No. 6 Constructed in 2005
Wells No. 7 and No. 8 currently under construction
Projected pumping capacity with Wells 1-8 on-line is 8.27 mgd

Groundwater Advantages

- # Low capital expenditure (11 wells @ \$500,000 per well = \$5.5 million)
- # Low risk because system can grow as City grows
- # No treatment required
- # Lower operational costs (personnel/equipment replacement)
- # Consistent source water characteristics

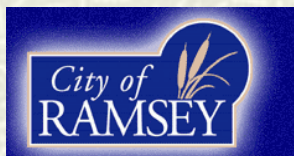


Groundwater Disadvantages

- # Potential contamination and interference issues (Ramsey currently not facing)
- # Resolution to those issues could mean groundwater treatment (unpredictable)
- # High in iron, manganese, and hardness

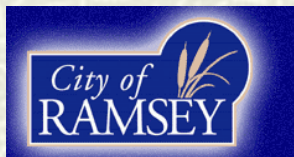
Surface Water Advantages

- # Provide flexibility in conjunctive use of surface water and existing ground water wells
- # Better utilization of natural resource
- # More predictable treatment costs
- # Promotes a local solution to a regional issue
- # Softer water and lower in iron and manganese content



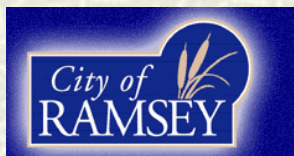
Surface Water Disadvantages

- # Higher operational costs
 - More specialized personnel
- # Large up front capital cost (~\$20 million vs. \$5.5 million)
- # Regional benefit out of City's control
- # Seasonal variation of source water characteristics
 - Temperature, Total suspended solids (TSS), etc



Water Conservation Efforts

- # Goal to Minimize Peak Day Demand
- # Even/Odd Sprinkling Ban
- # Graduated water rates
- # Modification of Development Standards
 - In process of requiring Minimum 6” Topsoil
- # Public Education
 - Ramsey resident articles
 - Website information (Conservation “tips”)
 - “Happy hydrant”



Public Education & Enforcement

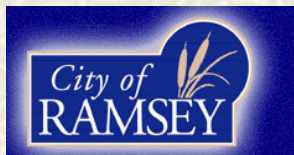


Water Supply Options

Surface Water Sources

■ Mississippi River

- Utilized by Minneapolis, St. Paul, and St. Cloud
- Flow typically ranges between 3500-9500 cfs (2262-6140 MGD)
- August 15, 2007 flow 2180 cfs (~1400 MGD)



Water Supply Options (cont.)

Ground Water

- Franconian-Ironton-Galesville

- Limited Available Formation

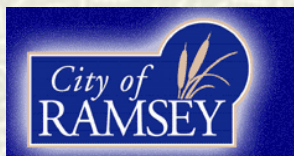
- Mt. Simon/Hinckley

- Seven County Metro Ban on New Wells

- Drift

- Likely Connection to Surface Water Features

Limited Future Access



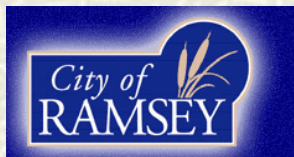
Surface Water Options

Surface Water Intake

- Minneapolis, St. Cloud utilize intake structures
- Requires pretreatment prior to filtration

Riverbank Collectors

- Individual wells
- Ranney collector
- Riverbank provides supplemental filtration
- Availability dependent upon local geology



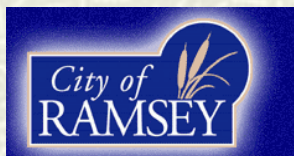
Riverbank Collector Investigation

Geology Review

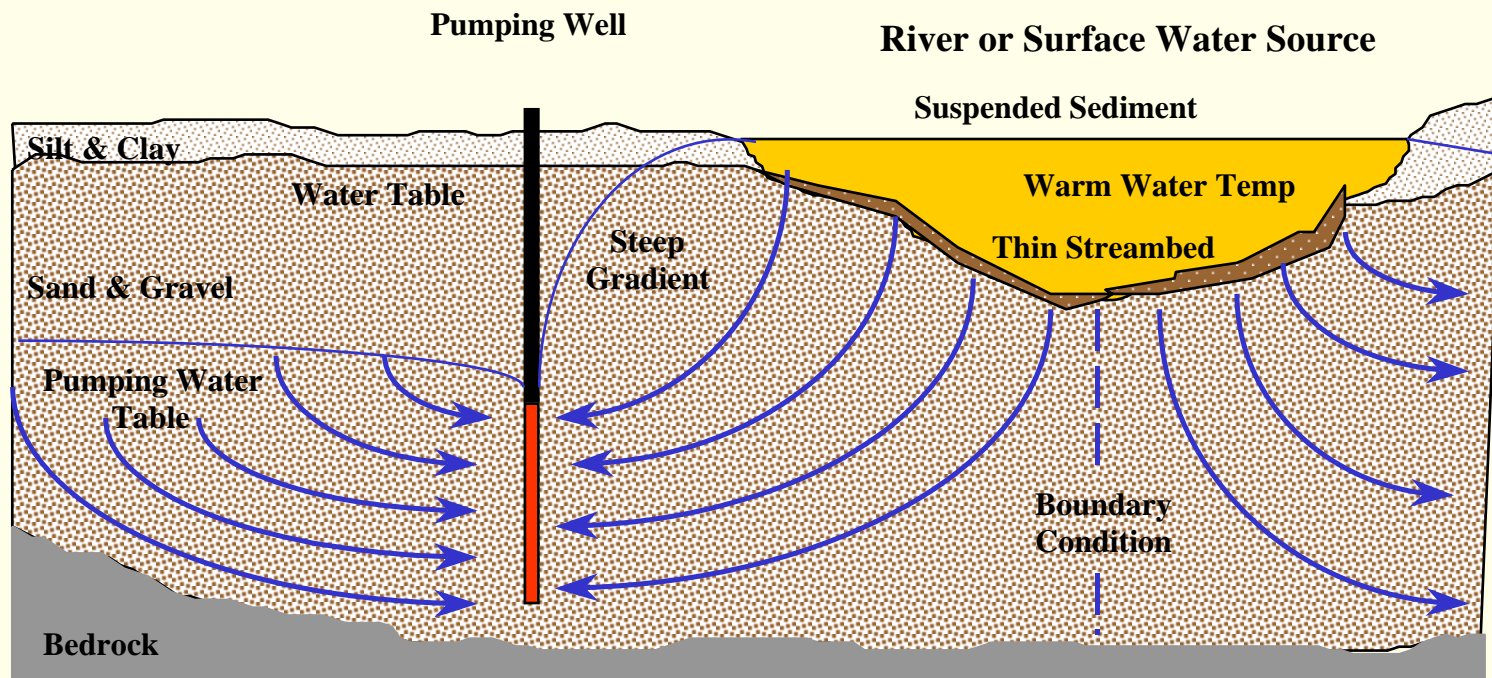
- Layne Reynolds contacted to review geology of area
- Table top investigation conducted
- Potential service areas identified
- Test Well Constructed at Mississippi West Park
 - Investigated to depth of 140'
 - Test pumped 3 different potential source layers
 - Maximum yield (50 gpm) indicated yield too low for ultimate development of this source

Additional Geotechnical Investigation

- 4 borings constructed to determine extent of geological formations
- Borings drilled to sandstone (80 to 120 feet deep)
- Again Maximum yield from boring test pumping (50 gpm)



Induced Infiltration



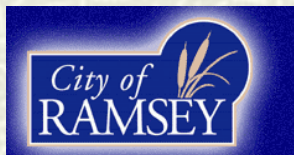
(Modified after Gollnitz, 2003)

Surface Water Intake

- # Riverbank collector wells yield too low for ultimate development
- # Surface water intake requires multi-seasonal pilot plant study due to potential fluctuations in water temperature and quality

Pilot Plant

- # Located at Mississippi West Park, Anoka County
- # Conventional Treatment – Required without Riverbank Filtration
 - Rapid Mix
 - Flocculation
 - Sedimentation
 - Membrane Filtration
 - Siemons Memcor
 - GE Zenon
 - GE Ionics (has discontinued testing)



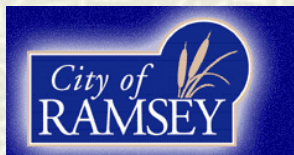
GE Zenon Installation



San Joaquin, CA – 36 MGD

Overview

- Surface water filtration
- Commissioned Summer 2005
- 8 process trains, 48 cassettes
- Phase II planned for 2010 completion



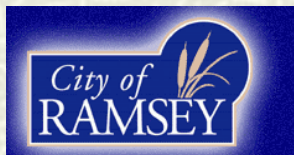
Siemens Memcor Installation



Overview

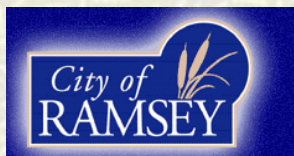
- Surface water filtration
- Commissioned April 2000
- Fully Automated

REVELSTOKE CANADA – 4.5 MGD



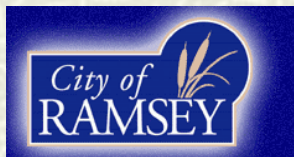
Challenges Ahead

- # Determine “Reasonableness” of Surface Water Source
- # Identification of Alternative Funding Sources
- # Site Selection for Water Treatment Plant
 - How much land is enough?
- # Membrane Supplier Selection
- # Justification of the Capital Expenditure
- # Design/Construction/Start Up



Requesting State Funding for Implementing Required Surface Water Treatment Facility

- # Cost difference for ground water vs. surface water = \$14.5 million
- # Would provide an available supplemental water supply to surrounding communities
- # Regional conjunctive use of surface water and existing ground water wells
- # Better regional utilization of natural resource
- # Cost effective to expand treatment facility for future growth in region





Questions???

