SEELEY LAKE SEWER DISTRICT

Wastewater System Improvements

April 12, 2012
Presented by:
Craig Pozega, PE

Great West Engineering
WHY ARE WE HERE

- District has identified wastewater system needs
- Wastewater System Preliminary Engineering Report
- Environmental Assessment
- PUBLIC COMMENT
What is a Preliminary Engineering Report (PER)

- Required by Funding Agencies to Qualify for Grants
- Problem Definition
- Describes Existing System
- Evaluate Alternatives including Selection of a Preferred Alternative
- Establishes Costs and Potential Funding Scenarios
- Implementation Schedule
- PUBLIC COMMENT
SEELEY LAKE SEWER DISTRICT

- Created in June of 1992
INITIAL DISTRICT CONCERNS

• Shallow Groundwater
• Groundwater Monitoring wells
• Studies of Seeley Lake Water Quality
• Wastewater Flows
• MBMG Study Demonstrated That Groundwater Flowing Under Townsite Flows to Seeley Lake

• High Septic Tank Densities in Area Combined With Small Lot Sizes
BACKGROUND

• Prepared a Preliminary Engineering Report in 2004
  – Pursued Several Grants
• Completed Income Survey in 2007
  – Missoula County
  – Phase 1
  – CDBG
• Prepared an Amendment to the 2004 PER in 2008
  – More detailed Pre-Designed Collection System & Treatment System
  – Pursue Additional Funding
BACKGROUND

• Current District Grants (approximate)
  – TSEP - $0
  – STAG - $721,000
  – DNRC - $100,000
  – WRDA - $280,000
  – Missoula County - $100,000
LOCATIONS OF SEPTIC SYSTEMS
CURRENT SEWER DISTRICT

• Property size

- 6% - 30 Years or Older
- 45% - 20 Years or Older
- 70% 10 Years or Older
SUMMARY OF CURRENT SITUATION

• Undersized Lots for Septic Systems
• High Septic Tank Numbers and Density
• Older Septic Systems
• Many Replacements
• Continue to Use Seepage Pits
SUMMARY OF CURRENT SITUATION

• Substandard to Current Technology
• Lower Level of Treatment
• Does Not Satisfy Current Regulations or Sanitary Standards
• Economic Development Limitations
CURRENT STUDIES

• Montana Bureau of Mines and Geology (MBMG) Groundwater Report
• Clearwater Resource Council (CRC)
• District Well Monitoring
GROUNDWATER FLOW PATH

LEgend
- MBMG GROUNDWATER FLOW PATH
- EXIST. SEPTIC TANK
- MBMG MONITORING WELL (ELEVATED CHLORIDES & NITRATES)
- MBMG MONITORING WELL (NO ELEVATED CHLORIDES & NITRATES)
- DISTRICT MONITORING WELL
MBMG STUDY CONCLUSIONS

• Nitrate and Chloride Data Suggest Groundwater is Being Degraded by Septic Tank Effluent

• Additional Development Along The Shoreline of The Lake Would Likely Result in Septic Tank Effluent Reaching The Lake.

• Indications of Degradation Might be a Gradual Increase in Algae Along The Shore and Decreased Water Visibility
MBMG STUDY CONCLUSIONS (CONTINUED…)

• A Groundwater Monitoring Network Should be Established to Monitor Future Changes.

• Development East And South of Town is Not Likely to Threaten The Lake, as Groundwater is More Likely to Flow Toward Clearwater River or Morrell Creek, But May Cause Degradation.
NITRATE IN SEELEY LAKE AREA GROUNDWATER
DISTRICT MONITORING WELLS

Well Nitrate/Nitrite

Date of Samples Taken

09/01/02  01/14/04  05/28/05  10/10/06  02/22/08  07/06/09  11/18/10  04/01/12

Nitrate/Nitrite (mg/L)

0  1  2  3  4  5  6  7  8  9  10  11  12  13  14

EPA MCL
Level II Limit
Standard Drainfield Limit

Linear (Well #1 (Nitrate/Nitrite))
Linear (Well #2 (Nitrate/Nitrite))
Linear (Well #3 (Nitrate/Nitrite))
Well 3 - Chloride Levels vs. Nitrate/Nitrite Levels

\[ y = 10.453x + 49.898 \]

\[ R^2 = 0.0924 \]
BENEFITS OF WASTEWATER IMPROVEMENTS

• Groundwater & Surface Water
• Recreation Value of Lake & Rivers
• Public Health
  – Septic System Failure in Yards
  – Drinking Water Contamination
  – Swimming / Boating
BENEFITS OF WASTEWATER IMPROVEMENTS (CONTINUED...)

- Satisfy Current Sanitary Standards
- Economic Development
- Community Growth
- Regulatory Compliance
- Protect / Enhance Property Value
WASTEWATER TREATMENT

- Surface water
- Groundwater

- Non-Discharging
  - Reuse
PLANNING TO MEET EFFLUENT LIMITS DRIVES LEVEL OF TREATMENT

• Treating to the appropriate level is important
• Determining the desired effluent level of BOD, TSS, TN, and TP will allow cost optimization for the rate-payers
WASTEWATER TREATMENT ALTERNATIVES CONSIDERED

- Facultative Lagoon
- Aerated Lagoon
- Total Retention Lagoon
- Constructed Wetlands
- Septic Tank / Dosed Drainfield
- Septic Tank, Sand Filter & Dosed Drainfield
- Snowfluent
WASTEWATER TREATMENT ALTERNATIVES CONSIDERED (CONTINUED…)

- Biological Nutrient Removal (BNR)
- Fixed Film
- Conventional Activated Sludge
- Biolac
- **Sequencing Batch Reactor (SBR)**
- **Membrane Bio Reactor (MBR)**
- **Storage & Irrigation**
LAGOON TREATMENT
STORAGE & IRRIGATION

• Lagoon Treatment
  – Medium space
  – Medium capital cost
  – Low O&M cost
  – Simple O&M
  – Not viable for groundwater and surface water disposal because of low & variable treatment performance
  – Irrigation & evaporation disposal only
STORAGE & IRRIGATION
STORAGE & IRRIGATION

• Preliminary analysis:
  – 20 acres for treatment and storage ponds
  – 130 acres for irrigation
  – Slopes <1% preferable, but 2-4% is acceptable
  – Lagoons should not be near occupied residences and/or businesses
TREATMENT ALTERNATIVES

- Membrane Bio-Reactor (MBR)
  - Lowest spatial requirements
  - Highest quality treatment
  - Highest capital cost
  - Highest O&M cost
  - Medium O&M effort

- Generally utilized when very high quality treatment is needed or space is very limited
WASTEWATER TECHNOLOGIES

- Aqua-Aerobic® MBR Bioreactors
WASTEWATER TECHNOLOGIES

– Membrane Biological Reactors (MBR)
WASTEWATER TECHNOLOGIES

• Sequencing Batch Reactors (SBR)
  – Low Space Requirement
  – Reliable Nitrogen Removal – 5-7 mg/l
  – Easily Automated
  – Relatively Simple O&M
  – Expandable
  – Lower O&M Cost Than Most Mechanical Plants
  – Lower Capital Cost Than Most Mechanical Plants
  – Groundwater Disposal
PREFERRED ALTERNATIVE

- Sequencing Batch Reactor (SBR)
U.V. DISINFECTION
SOME CRITERIA TO IDENTIFY TREATMENT & DISPOSAL SITES

- Land use
- Land ownership
- Wastewater type
- Population density
- Daily flow
- Lay of the land
- Environmental concerns
- Historical sites
- Wetlands
- Endangered species
- Constructability
- Aesthetics
- Ordinances
- Available utilities
- Rights-of-way
- Groundwater quality
- Depth to groundwater
- Soil conditions
- District priorities
- Public opinion
- Topography
- Slope
WASTEWATER TREATMENT SITE SELECTION

- Site selection is dependent on several things:
  - Method of Discharge
  - Level of Treatment
  - Type of Treatment
- Seeley Lake Alternatives:
  - Lagoon Treatment – Storage & Irrigation
    - No viable site identified
  - Biological Nutrient Removal – MBR & SBR
    - Private
    - United States Forest Service (USFS)
    - State of Montana - DNRC
PROPOSED TREATMENT SITE
PREFERRED ALTERNATIVE

• Sequencing Batch Reactor
  – Phased Approach

• Phases 1 & 2 Total Cost $4.3 Million
  – O & M Costs (Includes Collection)
    • $159,000

• Phases 1-4 Total Cost $6.3 Million
  – O & M Costs (Includes Collection)
    • $285,000
Proposed Collection System
ESTIMATED COLLECTION SYSTEM COST

• Phase 1 Total Cost  $2.6 Million
• Phases 1-4 Total Cost $8.7 Million
ESTIMATED TOTAL SYSTEM COSTS

- Phase 1
  - $6.9 M
- Phases 1-4
  - $15 M
POTENTIAL GRANT OR FUNDING SOURCES

• Department of Natural Resources & Conservation (DNRC)
• Water Resource Development Act (WRDA)
• State & Tribal Assistance Grant (STAG)
• Community Development Block Grant (CDBG)
• Treasure State Endowment Program (TSEP)
• Rural Development (RD)
• Congressional Appropriation
• Others
## RESIDENTIAL USER RATES

### SEELEY LAKE SEWER DISTRICT

#### FUNDING OPTIONS FOR PHASE 1 WASTEWATER PROJECT

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<thead>
<tr>
<th>ITEM</th>
<th>SCENARIO #1</th>
<th>SCENARIO #2</th>
<th>SCENARIO #3</th>
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<tbody>
<tr>
<td><strong>TSEP, DNRC, STAG, WRDA Grants, w/ SRF Loan (3.75% / 20 yrs)</strong></td>
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<td>Phase 1 Collection System Costs</td>
<td>$2,569,500</td>
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<td>Phase 1 Treatment System Costs (SBR)</td>
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<td><strong>Rounded Total</strong></td>
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<td>District TSEP Grant</td>
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<td>DNRC Grant</td>
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<td>CDBG Grant</td>
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<td>WRDA Grant</td>
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<td>STAG Grant</td>
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<td>SRF Loan Forgiveness</td>
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<td>Missoula County</td>
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<td>SRF Loan (20 Years)</td>
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<td>RD Loan (40 Years)</td>
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<td><strong>Total Project Funds</strong></td>
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**User Capital Cost/Month**
- **$185.81**
- **$61.61**
- **$39.24**

**TOTAL ANNUAL O&M COSTS**
- **$158,700**
- **$158,700**
- **$158,700**

**User O&M Cost/Month**
- **$62.98**
- **$62.98**
- **$62.98**

**USER COST/MONTH FOR PROJECT**
- **$248.79**
- **$124.58**
- **$102.22**

1 Table is based on an estimated 210 EDU's
What is an Environmental Assessment?
- Public Document Analyzing the Complexity and Seriousness of Environmental Issues

Draft EA has been completed
- All Recommended State and Federal Agencies have been Contacted and Some Responses have been Received
- Public Comments can be provided tonight
ENVIRONMENTAL ASSESSMENT

• To Date, No Comments Have Been of Significant Impact
• Decision:
  – Environmental Assessment is acceptable;
  – Environmental Impact Statement (EIS) is not necessary
WHERE TO GO FROM HERE?

- Public Comment on Draft PER
- Public Comment on EA
- Final PER
- Submit TSEP Grant Application – May 2012
- Design – 2013
- Advertise and Bid Project – February 2014
- Construction Project – April – November 2014
THANK YOU FOR YOUR TIME

QUESTIONS?

GreatWest engineering