Wastewater System Improvements

February 7, 2012

Presentation by:
Craig Pozega, PE
Why Are We Here

- County 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
Montana Pollutant Discharge Elimination System (MPDES) Permit

- Must have a MPDES permit to discharge wastewater
- Dawson County was issued a new MPDES Permit in January 2009
- Permit contains many new monitoring, reporting, and recording requirements
- Compliance schedule to meet future permit limits
Problem Definition

Water Quality
- Secondary Standards
- Ammonia
- Nutrients
- Whole Effluent Toxicity (WET)
- Hydraulic Capacity

Wastewater Disinfection
- Currently no disinfection of discharged effluent

Biosolid Accumulation
- Biosolids have never been removed from system
### Problem Definition

#### Table 3.3.2 MPDES Compliance Schedule

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install a primary effluent measuring device (flume or weir)</td>
<td>June 1, 2010</td>
</tr>
<tr>
<td>Measure and remove sludge in the lagoon cells, if necessary, and provide a letter documenting this work has been completed.</td>
<td>June 1, 2010</td>
</tr>
<tr>
<td>Provide annual progress reports, beginning December 31, 2010, to the Department explaining progress made in evaluating technologies and options to achieve ammonia, TRC and <em>E.coli</em> limits.</td>
<td>December 31, 2010</td>
</tr>
<tr>
<td>Complete evaluation of technologies and options to achieve ammonia, E. coli, and TRC limits and submit final engineering report detailing how and when these limits will be achieved during the next permit cycle.</td>
<td>December 31, 2013</td>
</tr>
</tbody>
</table>
Problem Definition

Collection System

- Line Between LS #1 and LS #2 Backups up During Storm Events
  - Potential for raw wastewater to be discharged to drainages
- Fair to Poor structural shape
- Highland Park and Forest Park in good condition
Evaluation of Existing System

2010 Population
- West Glendive Census Designated Place (CDP) 1,948 people

Projected Population (2030)
- West Glendive CDP 2,624 people
- The “oil boom” may increase this number considerably
Evaluation of Existing System

- **Existing Flow**
  - 302,000 gpd or 155 gpcd

- **Estimated Infiltration & Inflow**
  - 179,000 gpd

- **Projected Flow (2030)**
  - 374,000 gpd
The Collection System is comprised of 10.5 miles of pipe with two different collection systems

- **Northwest System (Highland Park)**
  - 9,300 feet of 8” pipe, 23 manholes, and a 6” siphon under I-94

- **Southern System**
  - 40,000 feet of 8”, 10”, and 12” gravity pipe, 124 manholes, 3 lift stations, and 1,500 feet of forcemain

Approximately 95% of collection system pipe is vitrified clay tile pipe
The Wastewater Treatment Facility (WWTF) consists of a two-cell facultative lagoon

- Original Lagoon Constructed in 1959 (9.9 acres) with the Second Lagoon Added in 1967 (21.1 acres)

Discharge to a Side Channel of the Yellowstone River

No Effluent Disinfection
Evaluation of Existing System
Evaluation of Existing System

Identified Deficiencies

Existing Treatment Cannot Meet Some Existing and Future Permit Limits

- Secondary Standards
  - BOD5
  - TSS
- Water Quality Based Standards
  - Ammonia
  - TMDL
  - WET
  - E.coli
**Evaluation of Existing System**

**Identified Deficiencies**

- **Collection**
  - System is in Fair Shape – cracks, fractures, and I&I are collection issues
  - Services Connected on Gravity Main Between Lift Station #1 and Lift Station #2
    - Public Works Department must monitor to ensure back ups and surcharge are kept at an absolute minimum
    - Major public health risk
Alternate Analysis

- Preliminary Design
- Operational Requirements
- Energy Requirements (Consumption)
- Regulatory Compliance and Permits
- Land Requirements
- Environmental Considerations
- Potential Construction Problems
- Cost Estimates$
All Alternatives include New Forcemain from LS #1 to LS #2 - Will Eliminate:

- Surcharge of Main and Sewer Backups
- Potential Exposure to Raw Sewage
- Need for Constant Monitoring During Storm Events

Wastewater Treatment Alternatives

- No Action
- Connection of West Glendive to City of Glendive Wastewater System
- Mechanically Aerated Lagoons with Storage & Irrigation
- Sequencing Batch Reactor (SBR)
- Complete/Partial Mix Aerated Lagoons
Connection to Glendive

Towne Street Bridge – Crossing Potential
Connection to Glendive

Project Features

- County Would Own Collection System Infrastructure
- City Would Own Treatment Infrastructure
- New Lift Station
- Coordination with MDT on Forcemain Bridge Installation
- City Responsible for Treatment and Meeting Any Permit Limits
- No O&M Issues with Treatment
- City/County Coordination and Agreements
Storage & Irrigation

Project Features

‣ Currently No Discharge Permit Required
‣ Future Regulatory Permitting ??
‣ Limited Expansion Capability
‣ Water Rights (New Legislation)
‣ Approx. 150 Acres Required
‣ New Aerated Lagoon
‣ New 30,000,000 Gallon Storage Lagoon
New SBR Site Location
SBR Plant
SBR Plant

Project Features

- Mechanical Treatment Plant
- Change Point of Discharge Directly to Yellowstone River
- Meets Secondary Treatment Standards
- Meets Ammonia Toxicity Limits
- Nutrient & TMDL Possible
- Effluent Disinfection (E. Coli)
- Provides Greatest Treatment of All Alternatives, Same as Connection to City of Glendive
- Can be Upgraded
- Increased O&M
- Highest Cost Alternative
Complete/Partial Mix Lagoons

- New Complete/Partial Mix Aerated Lagoons
- New Highland Park Lift Station
- Discharge to Yellowstone River
- Existing Lagoons (to be abandoned)
- New Force Main from Lift Station #2 to Headworks
- Connect to Lift Station #2
**Complete/Partial Mix Lagoons**

**Project Features**

- Change Point of Discharge Directly to Yellowstone River
- Meets Secondary Treatment Standards
- Meets Ammonia Toxicity Limits
- Nutrient & TMDL Difficult
- Effluent Disinfection (E. Coli)
- Provides Greater Treatment than Existing Lagoons
- Utilizes Existing Lagoon Footprint
- Easy to Operate
- No Process Control Capability
## Preliminary Cost Estimates

**Table 8.3.3**

**Preferred Alternatives**

**Present Worth Analysis**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>ALTERNATIVE T-1 Connection to City of Glendive</th>
<th>ALTERNATIVE T-2 Mechanically Aerated Lagoons with Storage and Irrigation</th>
<th>ALTERNATIVE T-3 Sequencing Batch Reactor (SBR) Mechanical Treatment Plant</th>
<th>ALTERNATIVE T-4 Complete/Partial Mix Aerated Lagoons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Costs</td>
<td>$2,899,000</td>
<td>$7,564,000</td>
<td>$7,095,000</td>
<td>$5,445,000</td>
</tr>
<tr>
<td>Annual O&amp;M Costs</td>
<td>$349,700</td>
<td>$239,000</td>
<td>$238,800</td>
<td>$183,900</td>
</tr>
<tr>
<td>20-Year Salvage Value</td>
<td>$541,000</td>
<td>$723,000</td>
<td>$962,000</td>
<td>$441,000</td>
</tr>
<tr>
<td>Present Worth of Salvage Value</td>
<td>$168,700</td>
<td>$225,400</td>
<td>$300,000</td>
<td>$137,500</td>
</tr>
<tr>
<td>Present Worth of Annual O&amp;M Cost</td>
<td>$5,244,933</td>
<td>$3,584,612</td>
<td>$3,581,613</td>
<td>$2,758,202</td>
</tr>
<tr>
<td>Present Worth Cost&lt;sup&gt;1&lt;/sup&gt;</td>
<td><strong>$7,975,233</strong></td>
<td><strong>$10,923,212</strong></td>
<td><strong>$10,376,613</strong></td>
<td><strong>$8,065,702</strong></td>
</tr>
</tbody>
</table>
Criteria To Rank Alternatives

- Technical Feasibility
- Environmental Impacts
- Life Cycle Costs
- Public Health and Safety
- Operational and Maintenance (O&M)
- Public Opinion
## Selection of Preferred Alternative

### Table 8.4: Decision Matrix

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weight: 8</td>
<td>Weight: 5</td>
<td>Weight: 10</td>
<td>Weight: 6</td>
<td>Weight: 10</td>
<td>Weight:</td>
<td></td>
</tr>
<tr>
<td>Score</td>
<td>Score</td>
<td>Wtd.</td>
<td>Score</td>
<td>Wtd.</td>
<td>Score</td>
<td>Wtd.</td>
<td>Score</td>
</tr>
<tr>
<td>City Connection</td>
<td>8.0</td>
<td>64</td>
<td>8.0</td>
<td>40</td>
<td>6.3</td>
<td>63</td>
<td>9.0</td>
</tr>
<tr>
<td>Storage &amp; Irrigation</td>
<td>5.5</td>
<td>44</td>
<td>7.0</td>
<td>35</td>
<td>3.7</td>
<td>37</td>
<td>7.0</td>
</tr>
<tr>
<td>SBR Plant</td>
<td>7.0</td>
<td>56</td>
<td>7.0</td>
<td>35</td>
<td>4.1</td>
<td>41</td>
<td>9.0</td>
</tr>
<tr>
<td>Complete/Partial Mix</td>
<td>6.0</td>
<td>48</td>
<td>6.0</td>
<td>30</td>
<td>6.2</td>
<td>62</td>
<td>7.0</td>
</tr>
</tbody>
</table>

It is important to note that the above scoring and weighting are subjective. Alternatives that score overall within 10 pts of each other may essentially hold the same degree of preference.
Selection of Preferred Alternative

ุ Draft Preferred Alternative for WWTP
  - Connection of West Glendive System to the City of Glendive System

保密 Estimated Capital Cost of Draft Preferred Alternative = $2,900,000

保密 Annual Estimated Cost for O&M = $442,000
  - Current County Collection System O&M Cost = $92,000
  - Treatment Fee to City of Glendive = $286,800
  - Additional Collection System O&M = $63,200
Project Funding Strategy

Funding Sources

- TSEP – Treasure State Endowment Program
- DNRC – Department of Natural Resources & Conservation
- CDBG – Community Development Block Grant
- SRF – State Revolving Fund
- RD – U.S. Department of Agriculture Rural Development
- STAG – State & Tribal Assistance Grant
- WRDA – Water Resource Development Act
Target Rate Analysis for Department of Commerce Grant Eligibility

Median Household Income (MHI) Based on 2000 Census = $33,487

Department of Commerce Target Rate Threshold

Water Systems = 1.4% of MHI
Sewer Systems = 0.9% of MHI
Combined Rate = 2.3% of MHI

(Combined Rate Applies to Communities Which Have Both Systems)

West Glendive Combined Target Rate = ($33,487)(2.3%)
= $770.20/year
= $64.18/month

West Glendive Sewer Only Target Rate = ($33,487)(0.9%)
= $301.37/year
= $25.12/month

Low & Moderate Income Percent = 38.1%
### Table 10.1.2
WEST GLENDIVE FUNDING OPTIONS FOR CONNECT TO CITY OF GLENDIVE PROJECT

<table>
<thead>
<tr>
<th>ITEM</th>
<th>SCENARIO #1</th>
<th>SCENARIO #2</th>
<th>SCENARIO #3</th>
<th>SCENARIO #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL PROJECT COST</td>
<td>$2,900,000</td>
<td>$2,900,000</td>
<td>$2,900,000</td>
<td>$2,900,000</td>
</tr>
<tr>
<td>TSEP Grant</td>
<td>$750,000</td>
<td>$750,000</td>
<td>$750,000</td>
<td>$750,000</td>
</tr>
<tr>
<td>DNRC Grant</td>
<td>$100,000</td>
<td>$100,000</td>
<td>$100,000</td>
<td>$100,000</td>
</tr>
<tr>
<td>County Reserves</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>SRF Loan (20 Years)</td>
<td>$2,050,000</td>
<td>$2,900,000</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>RD Loan (40 Years)</td>
<td>$0</td>
<td>$0</td>
<td>$2,050,000</td>
<td>$2,900,000</td>
</tr>
<tr>
<td>User Capital Cost/Month</td>
<td>$16.28</td>
<td>$23.03</td>
<td>$10.14</td>
<td>$14.35</td>
</tr>
<tr>
<td>Total Projected Annual O&amp;M Costs</td>
<td>$442,000</td>
<td>$442,000</td>
<td>$442,000</td>
<td>$442,000</td>
</tr>
<tr>
<td>User O&amp;M Cost/Month</td>
<td>$37.89</td>
<td>$37.89</td>
<td>$37.89</td>
<td>$37.89</td>
</tr>
<tr>
<td>Total Proposed Average Residential Sewer Cost/Month</td>
<td>$54.17</td>
<td>$60.92</td>
<td>$48.04</td>
<td>$52.24</td>
</tr>
<tr>
<td>Percent of Sewer Only Target Rate</td>
<td>215.7%</td>
<td>242.5%</td>
<td>191.2%</td>
<td>208.0%</td>
</tr>
</tbody>
</table>
Environmental Assessment

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

- Received Comments From:
  - US Dept. of Transportation Federal Highway Admin
  - Department of the Army, Corps of Engineers
  - Montana Dept of Labor and Industry
  - Dept of Natural Resources and Conservation
  - Montana Historical Society

- 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 Grant Applications – May 2012
- Design – August – December 2013
- Advertise and Bid Project – February 2014
- Construction Project – April – November 2014
Water/Wastewater • Transportation • Grant Administration • Development • Surveying • Environmental Resources • Planning • Construction Management

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