EXECUTIVE SUMMARY

Prepared for:

Wyoming Water Development Commission

And

Kemmerer-Diamondville Water and Wastewater Joint Powers Board

Authored by:

Forsgren Associates Inc.

OCTOBER 2009
KEMMERER-DIAMONDVILLE
MASTER PLAN
LEVEL I STUDY

October 2009

EXECUTIVE SUMMARY

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1.0 PROJECT HISTORY AND OVERVIEW

The Kemmerer-Diamondville water system originally operated as two independent systems serving each respective community. The City of Diamondville ultimately abandoned their water treatment plant in favor of being supplied through the Kemmerer system. The governance of the two systems was subsequently combined through the creation of a Joint Powers Board approximately 16 years ago. The system currently serves approximately 1440 connections representing a population of 3,600 persons.

1.2 SYSTEM OVERVIEW

The Kemmerer-Diamondville water system takes its raw water supply out of the Ham’s Fork River north of the City. The water is pumped directly from the river to the adjacent treatment plant. The treated water is then pumped directly into the Sorenson “base zone” tanks indirectly into the Diamondville tanks through the distribution system. From Sorenson Tanks, water is further pumped into the 0.5 MG Green Hill Tank to feed the higher pressure zone. The Diamondville storage tanks are located at the south end of the system and are controlled by altitude valves to prevent overfilling. The system is broken into three separate pressure zones (lower, intermediate, and upper). An overview of the entire system is shown in Figures 1.2 and 1.3.

1.3 USER RATES

The Kemmerer-Diamondville water system currently charges a base rate of $20 per connection per month for water service up to 3,500 gallons. They also charge an additional $15 per connection per month for system depreciation. Water use over 3,500 gallons per month is charged at $2.35 per 1000 gallons. So, the cumulative water rate is $35.00 per month plus $2.35 per 1000 gallons over 3,500 gallons usage. The system is fully metered.
Figure 1.3 – Kemmerer-Diamondville Water System Operational Schematic

KEMMERER-DIAMONDVILLE SYSTEM SCHEMATIC

[Diagram showing water system schematic with various zones, pump stations, and PRVs.]
1.4 EXISTING SYSTEM COMPONENTS

Key elements of the Kemmerer-Diamondville water system are discussed as follows

- **Raw Water Supply Source (Hams Fork Intake):** The Kemmerer-Diamondville water system takes raw water directly from the Ham's Fork through a 16-inch intake line. There is a 60 foot wide concrete weir wall located directly downstream to insure adequate pooling. The wall has proven to be ineffective during low-flow conditions. It has been common practice for system operators to sand-bag the wall to raise water levels during the late summer months.

- **Water Treatment Plant and Pump Station:** The existing KDJPB water treatment plant is approaching 40 years old. The treatment plant is manually controlled. System operators spend 18 hours/day on-site. The system received a boil-order associated with high turbidity problems in the spring of 2008. Forsgren Associates completed an evaluation of the WTP in May 2007 and a preliminary engineering report in September 2008. Based on concerns over the treatment plant’s age and its inability to maintain regulatory compliance while accommodating growth, a new WTP was recommended.

  The proposed new treatment facilities is currently under design and will have a capacity of 3000 gpm (4.6 mgd). That plant is presently under design and will be construction in 2010.

- **System Storage:** The system currently has 3.5 MG of finished storage at the Sorenson site, 0.5 MG at the Green Hill site, and 0.6 MG in Diamondville for a total of 4.6 MG. This total system storage is theoretically more than adequate to meet DEQ’s requirements of 25% of peak day plus fire. However, there are serious concerns about the location of these tanks, and the ability to meet future growth in the higher elevated areas. It is anticipated that the vast majority of future growth will be served through the Green Hill tank.

  There are problems with the structural condition of the roof of the 1.5 MG concrete tank at the Sorenson site. The roof consists of inverted pre-cast concrete double tees that have experienced significant spalling along the edges and on the underside of the decking.

- **Sorenson Pump Station:** The Sorenson Pump Station is located immediately adjacent to the Sorenson Tanks. Its function is to deliver water to the Green Hill Tank. There are currently three active pumps located along a manifold in the basement of the pump station.

- **Transmission Lines:** There are three critical transmission lines serving this system as follows –

  a) **Treatment Plant to Sorenson Tank:** This 24” DIP line is critical to the operation of the entire system. In the event of breakage or interruption, the entire Kemmerer-Diamondville area is without...
supply. The line crosses the river and a set of railroad tracks. The overall condition and reliability of this line is suspect.

b) Sorenson Tank Pump Station to Green Hill Tank: This 16” line is also vital for service to the upper and intermediate zones and is in good condition.

c) Green Hill Tank to North Service Area: This 12” DIP line is in poor condition with significant maintenance concerns. It is the only line feeding the areas along Highway 30 (business loop).

- Distribution System, Pressure Zones: Modeling revealed that the exiting distribution system is generally adequately sized to meet current demands. There is, however, concern that the Kemmerer High School is located in the higher end of the Lower zone. This area has limited pressure and fire delivery capacity (approximately 600 gpm).

### 1.5 WATER DEMANDS

Based on historic use, the following unit demands per connection were used in sizing and calculations for system improvements. These demands were also used in sizing the new water treatment plant presently under design.

- Peak Summer Day Demand: 2,222 gallons per connection
- Average Summer Day Demand: 900 gallons per connection
- Average Winter Day Demand (approximate indoor demand): 500 gallons per connection
- Average Yearly Demand: 625 gallons per day per connection, or 228,000 gallons (5.2 ac-ft) per connection per year

The Kemmerer-Diamondville Joint Powers Board (KDJPB) is anticipating that the service connections will increase by 600 connections over the next 20 years, for a total number of service connections of 2,040. This estimate is based on a build-out scenario of potential subdivisions, primarily located in the northwest portion of the service area. This growth equates to 1.8% per year. Based on the per-capita demands above, future demands were calculated as follows:

- Peak Day Demand: 4.6 million gallons per day (MGD), or 3,200 gallons per minute (GPM)
- Average Summer Day Demand: 1.8 MGD
- Average Winter Day Demand: 1.0 MGD
- Average Yearly Usage: 495 million gallons, or 1,430 acre-feet

### 1.6 AVAILABLE SUPPLY (RIVER FLOW)

The available water in the Hams Fork River appears to be sufficient to meet KDJPB’s needs.

### 1.7 SYSTEM MODELING AND GIS MAPPING

This master plan effort included the development of a system-wide computer model of the Kemmerer-Diamondville water system. This model utilized the most current Haestad (now Bentley) WaterCad software and will provide the KDJPB with a living tool to
evaluate current system operation, and to plan for future growth. A Kemmerer-Diamondville Water System GIS Database was also created to provide a computerized database inventory of the water system.

1.8 CONCLUSIONS and RECOMMENDED SYSTEM IMPROVEMENTS

Key recommendations and conclusions are summarized as follows. Recommended system improvements are shown schematically in Figure 1.4.

1.8.1 Sorenson Tank Rehabilitation: The 1.5 MG Sorenson tank has an inverted pre-stressed tee roof deck. That deck is experiencing unusual progressing spalling from the underside. The recommended long-term solution is the replacement of that deck with new double tees. It is also recommended that the new deck be covered with a membrane liner to prohibit moisture penetration.

1.8.2 Construct Additional Green Hill Storage (1 MG): The Green Hill Tank is marginally adequate for current demands, assuming maximum fire protection of 2,000 gpm for 2 hours to the north area. To meet future demands, it is calculated that, as a minimum, an additional 673,000 gallons will be needed at this location. Given the critical nature of this storage at the high end of the system, and it's redundancy significance to the overall system, an additional 1 MG tank is recommended at this location to provide redundancy in the event of pump or transmission line failure.

1.8.3 Construct Parallel 24" Transmission Line (Treatment Plant to Sorenson Tank): The existing 24" transmission line is literally the life-blood of the entire system. There is concern about the lack of redundancy to feed water from the treatment plant. This is particularly of concern at the river crossing and at the railroad tracks, where line breakage could result in longer-term outages. It is recommended that a second transmission line be constructed to insure adequate system redundancy. This line can be constructed in two phases, subject to funding:

   A. Construct critical areas of parallel 24” line (river crossing and railroad crossing.)
   B. Construct remainder parallel 24” line from water treatment plant to river and from railroad to Sorenson Tank.

1.8.4 Extend Intermediate Zone (South End): The school area situated west of 3rd street and north of Keane St. is located in the lower base pressure zone. This critical area has low pressures and only limited (approximately 500 gpm) fire protection. In addition to low pressures, it is fed via a single 6” dead-end line running along 3rd street. It is recommended that the intermediate zone be extended to the south to include the school facilities.

1.8.5 Construct 16” Green Hill Transmission Line: This transmission line is the sole feed to the northwest portion of the service area. This line is reportedly deteriorated and has a history of maintenance problems. It is recommended that a second parallel line be constructed.
1.8.6 Raw Water River Intake Facility: Historically, system operators have been required to sand-bag the Ham’s Fork cut-off wall during low flow periods to draw adequate raw water supply from the river. This is caused by a hydraulic suction head problem associated with the existing pump type and configuration. A revised pump and intake facility is currently under design as part of the on-going water treatment project. No changes are necessary or recommended for the river cut-off wall.

1.8.7 PRV Replacements / Repairs: Field inspections revealed that all PRV’s in the system were in need of repair or replacement. The KDJPB has retained Aqua Environmental to rebuild these valves.

1.8.8 Sorenson Pump Station Enlargement: The Sorenson Pump Station is, in our opinion, adequately sized to meet current and foreseeable future demands. No increases to pump station capacity are recommended at this time.

1.9 ECONOMICS

1.9.1 Estimated Project Costs

Estimated costs for recommended projects are summarized in Table 1.1. These costs are reflective of estimated 2011 construction costs and include engineering plus a 15% contingency.

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Estimated Cost (inclusive of engineering and contingency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sorenson Tank Rehabilitation</td>
<td>$293,900</td>
</tr>
<tr>
<td>2</td>
<td>Additional Green Hill Storage (1 MG)</td>
<td>$1,689,300</td>
</tr>
<tr>
<td>3</td>
<td>Construct Parallel 24” Treatment Plant to Sorenson Transmission Line</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(River Crossing through Railroad Crossing)</td>
<td>$797,800</td>
</tr>
<tr>
<td>4</td>
<td>Extend Intermediate Zone (8” waterline along 3rd Street from Elk to Antelope)</td>
<td>$115,900</td>
</tr>
<tr>
<td>5</td>
<td>Construct 16” Green Hill Transmission Line</td>
<td>$884,700</td>
</tr>
<tr>
<td>6</td>
<td>Construct Parallel 24” Treatment Plant to Sorenson Transmission Line</td>
<td>$2,416,700</td>
</tr>
<tr>
<td></td>
<td>(From WTP to river crossing and from railroad to Sorenson Tank)</td>
<td></td>
</tr>
<tr>
<td>*</td>
<td>Raw Water Intake Pumping Facility</td>
<td>N/A – Work is ongoing as part of WTP project</td>
</tr>
<tr>
<td>*</td>
<td>PRV Replacements and Repairs</td>
<td>N/A – Work is ongoing through maint. budget</td>
</tr>
</tbody>
</table>
Figure 1.4 – Recommended System Improvements

- Parallel 24" Transmission Line (Lower Priority)
- Redundant Parallel 24" Transmission River Crossing (High Priority)
- Redundant Parallel 24" Transmission Railroad Crossing (High Priority)
- Replace 1.5 MG Sorenson Tank Roof
- New 1 MG Green Hill Tank
- New 8" Waterline to extend Intermediate Zone south
- Rebuild PRV #1
- Rebuild PRV #2
- Rebuild PRV #3
- Rebuild PRV #4
- Rebuild PRV #5
1.9.2 Financing

- **WWDC Funding**: An assumption of 67% grant assistance for new construction from WWDC is used in this financial analysis based on discussions with WWDC staff and the experience on other similar projects. Replacement projects are assumed to be funded at 50% grant.

- **USDA Rural Development**: It is unlikely that Kemmerer-Diamondville could meet the eligibility criteria for grant funding based on size and income levels.

- **Wyoming State Loan and Investment (SLIB)**: It is proposed that non-WWDC eligible expenses, such as the rural distribution system, be funded through the SLIB program. In the past, they have typically granted 50% of eligible project costs. SLIB can provide grants in higher percentages based on project need and funding availability.

- **State Revolving Fund (SRF)**: Portions of this project are likely eligible for SRF loan funding for balance of the project not grant funded. An SRF loan at 2.5% over a period of 20 years has been assumed. SRF funding will require compliance with NEPA and other federal requirements. If the KDJPB elects to use SRF funding, the project(s) must be placed on their intended use plan to begin the SRF funding process.

1.9.3 Rate Impacts - Financial Capacity

Project costs and rate payer impacts based on an assumed funding scenario are summarized in Table 1.2. Project loan payments are broken down by monthly cost per existing connection to determine the average potential rate impact. This table assumes that all matching funds would be borrowed.

A detailed five year budget projection was generated based on the capacity development worksheet format developed by Wyoming SLIB / SRF program. Operating budgets were provided by the KDJPB. The rate financial projections included other capital projects including a $9.5 million water treatment plant currently under design.

It was assumed that the capital improvements recommended in this study would be constructed in 2011 with the exception of Item #6 (24" transmission line from the water treatment plant to the river and from the railroad to the Sorenson tank) which would be constructed the following year.

It is notable that the KDJPB has previously raised their rates in order to build a capital reserve account in anticipation of the water treatment plant and other capital project needs. The capacity development analysis indicates a growing reserve balance with an adequate debt coverage ratio of 1.59 in year five and an operating ratio of 1.79 in year five.
## Table 1.2
Project Funding / Rate Payer Impacts

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Estimated Project Cost</th>
<th>ASSUMED FUNDING SOURCE</th>
<th>Monthly Cost per Ratepayer (Based on 1,440 current users)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>WWDC Grant (67% new construction – 50% Rehabilitation)</td>
<td>WWDC Loan (4%, 30-year)</td>
<td>50% SLIB Grant</td>
</tr>
<tr>
<td>1</td>
<td>Sorenson Tank Rehabilitation</td>
<td>$ 297,800</td>
<td>$ 148,900</td>
<td>$ 148,900</td>
</tr>
<tr>
<td>2</td>
<td>Additional Green Hill Storage (1 MG)</td>
<td>$ 1,689,300</td>
<td>$ 1,131,800</td>
<td>$ 557,500</td>
</tr>
<tr>
<td>3</td>
<td>Construct Parallel 24” Treatment Plant to Sorenson Transmission Line (River Crossing through Railroad Crossing)</td>
<td>$ 797,800</td>
<td>$ 534,500</td>
<td>$ 263,300</td>
</tr>
<tr>
<td>4</td>
<td>Extend Intermediate Zone (8” waterline along 3rd Street from Elk to Antelope)</td>
<td>$ 115,900</td>
<td></td>
<td>$ 57,950</td>
</tr>
<tr>
<td>5</td>
<td>Construct 16” Green Hill Transmission Line</td>
<td>$ 884,700</td>
<td>$ 592,750</td>
<td>$ 291,950</td>
</tr>
<tr>
<td>6</td>
<td>Construct Parallel 24” Treatment Plant to Sorenson Transmission Line (From WTP to river crossing and from railroad to Sorenson Tank)</td>
<td>$ 2,416,700</td>
<td>$ 1,619,200</td>
<td>$ 797,500</td>
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<tr>
<td></td>
<td><strong>TOTALS</strong></td>
<td><strong>$ 7,11</strong></td>
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