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Executive Summary

Lucerne Water Supply Level II Study

October 2011

Project Sponsor:
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1.0 INTRODUCTION
This report presents a Master Plan for the Lucerne Water and Sewer District (LWSD) as it transitions to the Big Horn Regional (BHR) Water System. Potential district expansion to serve rural users located east of the Big Horn River along Black Mountain Road was also evaluated.

DOWL HKM would like to thank the LWSD Board and System Operator as well as the Wyoming Water Development Commission for its support and assistance in completing this study.

2.0 EVALUATION OF EXISTING SYSTEM

**History:** The LWSD was established in 1976 to supply treated water to an area 4 to 10 miles north of Thermopolis. The LWSD encompasses 8.5 square miles of low-lying land along US Highway 20 west of the Big Horn River; and serves approximately 300 residents between Thermopolis and Kirby. The LWSD is also the primary water supply for Kirby.

In 1983, 12 miles of 6-inch PVC water main were installed to supply the LWSD with treated water from Thermopolis’ supply. A 200,000 gallon welded steel storage tank was also constructed. In 1984 the LWSD began serving Kirby, 2 miles north of the District.

Element 10, an extension of the BHR Northern Supply Pipeline from Winchester to Kirby is under construction. The project includes a pump station in Kirby that will supply Regional water from the Worland Well Field to the LWSD.

**System Description:** The 6-inch water lines within the district are SDR-21 (200 psi) PVC pipe. System appurtenances are pressure rated to 150 psi or greater.

Water supply for the LWSD can come from the storage tank on the north end of the system or the connection at Thermopolis. Pressure readings taken during system flow tests indicate higher pressure water from the Thermopolis connection, therefore little demand is placed on the tank. Monthly, a valve is closed to force water usage and turnover from the tank.

All system valves are operated annually and hydrants are utilized annually to flush waterlines, demonstrating the good operation and maintenance practices of this district.

The configuration of air release/air vacuum valve vaults prevents maintenance. It is recommended that improvements be made to the air release and air vacuum vaults as they fail or need maintenance. A retrofit is not practical, so replacement of the vault is recommended.

The connection to the Thermopolis system should be maintained for emergency supply between the district and town and to provide a way for the district to exercise its water right from the Big Horn River. The service agreement between the LWSD and Thermopolis has lapsed and should be reinstated.

**Mapping:** The LWSD system was surveyed and input into a geographic information system (GIS). Elevation contours were created from a 30M digital elevation model (DEM) obtained
from the Wyoming Geographic Information Science Center (WyGISC) Data Server. Aerial photography for the area was also obtained from WyGISC and input into the GIS mapping.

**Losses:** The LWSD reconciles their meter readings monthly to estimate line losses. The average monthly leakage for the LWSD was 8.38%.

**Water Rights:** The LWSD supply is currently direct flow from the Big Horn River and stored water in Boysen Reservoir. When the District connection to the BHR water supply is complete, these surface water rights will be of use only if needed in an emergency.

The BHR Joint Powers Board applied to the State Engineer's Office for enlargement permits to the well supplies encompassing its service area. The LWSD is included in the BHR Points of Use, so will be covered by BHR water rights once the transition to Regional supply occurs.

**Water Quality:** The BHR system obtains its water from two artesian wells owned by Worland. No treatment is necessary, other than chlorination. Monitored disinfection byproducts are very low, indicating an absence of organic material in the water. Therefore, chlorine residual is well maintained. Regardless, the LWSD system will be receiving water that has traveled nearly 50 miles since it was chlorinated. The District should monitor residual chlorine once the BHR supply comes online to ensure that adequate chlorine residual is being maintained.

**Regulatory Compliance:** The LWSD is a public water supply with identification number WY5600935. The water system is a Consecutive System to Thermopolis. As a Consecutive System and a Very Small System serving less than 300 customers, the District has limited monitoring and reporting requirements. The LWSD has had no violations of any kind within the previous 10 years.

Since the LWSD will soon receive all of its water supply from a groundwater source, it must comply with the requirements of the Groundwater Rule. It must also continue to comply with the Total Coliform Rule and Lead and Copper Rule.

**Finances:** Budgeted expenses for fiscal year 2011 were just under $131,000 and budgeted revenue was just under $195,000. The 2011 budget illustrates the District’s positive financial situation, with projected revenues exceeding expenses.

An emergency fund is funded annually and emergency reserves are approximately $283,000. The LWSD has accumulated depreciation over $556,000.

The District has adequate financial resources immediately available to complete all work necessary to transition its water supply from Thermopolis to the BHR system.

The rates charged by the LWSD result in a typical residential water bill of $61.75/month, assuming 8,000 gallons are used. The LWSD has the opportunity to revise its rate structure upon receiving its water from BHR as its cost for water will be reduced significantly. A revised rate structure might include a tiered usage structure, unlike the uniform rate currently charged.
Flow Testing: The LWSD waterlines were flow tested to gather hydraulic data to confirm system operations, determine system deficiencies, and help calibrate the hydraulic model. Six flow tests were performed, including the pipeline between Kirby and the LWSD. All tests resulted in calculated friction factors consistent with the material and age of the system. No flow restrictions or system deficiencies were identified during the flow tests.

Hydraulic Modeling: A hydraulic model of the LWSD was created using information from the system survey and hydraulic data from flow testing. The model was used to evaluate current conditions, conditions with the change to BHR supply, district expansion for Black Mountain Users, and to evaluate the system at a 20-year growth horizon.

Flow test data was input to the model and the model calibrated to accurately represent current conditions. Hazen Williams Friction Factors ($C_{FW}$) for the LWSD and the Kirby Supply Line ranged from 110-130; which is expected of 27 year old PVC waterline.

Water Demand and Growth: The following water use and growth projections were used.

<table>
<thead>
<tr>
<th>DESIGN FLOWS</th>
<th># METERS</th>
<th>AVG DAY (GPM)</th>
<th>PEAK DAY (GPM)</th>
<th>PEAK HOUR (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
<td>2030</td>
<td>2010</td>
<td>2030</td>
</tr>
<tr>
<td>Lucerne Water &amp; Sewer District</td>
<td>115</td>
<td>140</td>
<td>17.3</td>
<td>21</td>
</tr>
<tr>
<td>Black Mountain Users</td>
<td>50</td>
<td>61</td>
<td>7.5</td>
<td>9.2</td>
</tr>
<tr>
<td>Total</td>
<td>165</td>
<td>201</td>
<td>24.8</td>
<td>30.2</td>
</tr>
</tbody>
</table>

**Average Day Demand/Meter (gpd)** 216

Users/Meter ** 2.52

**Average Day Usage (gpcd)** 85.7

Peak Day/Average Day 2.8

Peak Hour/Average Day 4.0

Growth Factor (Annual) 1.0%


Modeling Results: Each demand scenario was applied to the calibrated model. During alternative analysis for the expansion into the Black Mountain Area, demands were distributed throughout that area based on the density of potential users.

The required pressure at the downstream side of the pump station in Kirby to maintain 50 psi at the LWSD high point for the 20-year planning horizon, peak hour demand scenario was determined to be 125 psi. The Element 10 design team verified that the pump station will provide the required pressure. The following table shows system pressures obtained from the water system model with water supplied by the BHR Element 10 project.
Modeling Results: BHR Water System Supply to Existing LWSD

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>ELEVATION (FT)</th>
<th>PRESSURE (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STATIC</td>
<td>AVG DAY (EXISTING CONDITIONS)</td>
</tr>
<tr>
<td>Lucerne Pump Station (outlet)</td>
<td>4285</td>
<td>124.7</td>
</tr>
<tr>
<td>LWSD Tank</td>
<td>4463</td>
<td>47.6</td>
</tr>
<tr>
<td>Black Mt Rd. @ BH River</td>
<td>4276.5</td>
<td>128.4</td>
</tr>
<tr>
<td>Sunnyview Dr. (south end)</td>
<td>4419</td>
<td>66.7</td>
</tr>
</tbody>
</table>

Supplying a minimum of 50 psi with the current system configuration leads to static pressures in the LWSD up to 130 psi. Record drawings show SDR 21 (200 psi) rated pipe; which can handle these pressures. System appurtenances are rated to 150 psi or greater. Service lines are typically not designed to withstand pressures over 90 psi; so individual PRVs will be needed on service lines where transmission main pressures are expected to exceed 90 psi.

The hydraulic grade at the existing LWSD tank from the new pump station will be approximately 78 feet above the tank overflow elevation at static conditions, therefore the existing tank is too low. It is recommended the tank be taken off line when the BHR supply becomes available.

An alternative to separate the LWSD system into two pressure zones with the installation of a pump station supplying users at higher elevations west of Highway 20 on Sunnyside Road was considered. The existing LWSD tank could then remain part of the system supplying the lower zone. This alternative was not appealing due to increased operation and maintenance required to maintain both the existing LWSD tank and a new booster pump station.

With the conversion to BHR supply, it is recommended the LWSD tank be abandoned and the system operated with one pressure zone supplied by the new pump station at Kirby.

Storage: With the existing storage tank being taken out of service, the need for new storage was considered. No new storage was determined necessary as fire flow demands are not included in this system design, the new pump station at Kirby is designed for peak hour demands and will be provided with an emergency generator. In addition, new storage is being added to the BHR system at Winchester as part of Element 10.

3.0 BLACK MOUNTAIN EXPANSION AREA

One goal of this study was to determine the feasibility of the LWSD serving new users east of the Big Horn River off of Black Mountain Road. The proposed LWSD expansion area is 7.5 square miles to the east of the Big Horn River, with approximately 50 users. Water usage rates for the Black Mountain Users were assumed to be similar to the users in the current LWSD.

There is an existing dead-end 6-inch waterline along Black Mountain Road. Since this waterline is in proximity to the proposed district expansion, it was used as a starting point for extending
service to the Black Mountain Users. A connection at the end of this existing waterline was used in all alternatives analyzed.

**Alternatives:** Three alternatives were evaluated to provide service to the potential LWSD expansion area. The first two alternatives are looped systems, while the third alternative is a branched system. These alternatives are described below.

**Alternative 1 -** This alternative begins with a connection to the existing 6-inch main just south of Kirby. The alignment goes south and east across the Big Horn River, runs through the Black Mountain area and connects to the existing LWSD waterline on Black Mountain Road. Several 4-inch laterals are included to supply water to potential users within the expansion area. This alternative provides redundancy to the existing district and reduces friction losses during peak demand scenarios.

**Alternative 2 -** This alternative also includes a looped waterline to serve the Black Mountain Users. The alignment begins with a connection to an existing 6-inch waterline just south of the LWSD tank. The alignment runs to the south and east across the Big Horn River where it turns south following Skelton Road until meeting Black Mountain Road. The alignment turns west, crossing the river and connecting to the existing LWSD waterline along Black Mountain Road. Four-inch laterals are included to serve potential new users. This alternative also provides benefit to the LWSD by reducing friction losses and providing some transmission redundancy.

**Alternative 3 -** This alternative consists of a branched system to serve new users of the proposed district expansion. The alignment begins at the east end of the existing LWSD waterline along Black Mountain Road and crosses the Big Horn River to the east. The alternative consists of a 6-inch transmission main backbone with 4-inch laterals to serve new users. This alternative offers no benefit to the hydraulics of the existing LWSD system.

**Hydraulic Analysis:** The existing LWSD system can handle the additional demand of the Black Mountain Users. Each alternative was modeled with water supplied by the Element 10 pump station at Kirby. Average Day, Peak Day and Peak Hour demand scenarios were created for current usage and projected usage at the 20-year growth horizon, and applied to the calibrated computer model.

**Modeling Results: Hydraulic Analysis of Alternatives to Serve Black Mountain Users**

<table>
<thead>
<tr>
<th>Node</th>
<th>Alt. 1</th>
<th>Alt. 2</th>
<th>Alt. 3</th>
<th>Alt. 1</th>
<th>Alt. 2</th>
<th>Alt. 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposed LWSD Pump Station</td>
<td>124.6</td>
<td>124.6</td>
<td>124.6</td>
<td>124.6</td>
<td>124.6</td>
<td>124.6</td>
</tr>
<tr>
<td>LWSD Tank</td>
<td>85.4</td>
<td>85.1</td>
<td>85.1</td>
<td>80.9</td>
<td>76</td>
<td>76</td>
</tr>
<tr>
<td>Black Mt Rd at Big Horn River</td>
<td>127.9</td>
<td>127.6</td>
<td>127.4</td>
<td>121.8</td>
<td>116.6</td>
<td>111.8</td>
</tr>
<tr>
<td>East End Proposed Black Mt System</td>
<td>116.1</td>
<td>115.8</td>
<td>115.5</td>
<td>110.5</td>
<td>104.9</td>
<td>99.3</td>
</tr>
<tr>
<td>South End Sunnyview Dr.</td>
<td>66.2</td>
<td>65.9</td>
<td>65.7</td>
<td>58.4</td>
<td>53.2</td>
<td>50</td>
</tr>
<tr>
<td>South End of LWSD</td>
<td>107.9</td>
<td>107.6</td>
<td>107.3</td>
<td>100.3</td>
<td>95.1</td>
<td>90.8</td>
</tr>
</tbody>
</table>
The advantage of the looped system in Alternatives 1 and 2 can be seen in the increased operating pressures at system high points. All alternatives maintain acceptable pressures.

**Discussion:** From a hydraulic standpoint, each alternative meets pressure requirements. The greater advantage of the looped system in Alternative 1 is that it provides redundancy for nearly the entire length of the pipeline from just south of Kirby to the existing Lucerne tank.

### 4.0 ECONOMIC ANALYSIS
Costs were estimated for the three alternatives to supply water to the Black Mountain Users.

#### Alternative 1 Cost Summary

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>TOTAL</th>
<th>LWSD</th>
<th>BLACK MT. USERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Plans and Specifications (10%)</td>
<td>$277,560</td>
<td>$3,870</td>
<td>$273,690</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
<td>$30,000</td>
<td>$383</td>
<td>$29,612</td>
</tr>
<tr>
<td>District Expansion</td>
<td>$50,000</td>
<td></td>
<td>$50,000</td>
</tr>
<tr>
<td>Acquisition of Access and Right-of-Way</td>
<td>$150,000</td>
<td></td>
<td>$150,000</td>
</tr>
<tr>
<td><strong>Cost of Components</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bond, Ins, Mob, Traffic Cont., Clearing, Utility Coordination</td>
<td>$290,000</td>
<td>$3,704</td>
<td>$285,858</td>
</tr>
<tr>
<td>Pipeline and Appurtenances</td>
<td>$1,730,600</td>
<td>$1,730,600</td>
<td></td>
</tr>
<tr>
<td>Service Connection Assemblies</td>
<td>$345,000</td>
<td></td>
<td>$345,000</td>
</tr>
<tr>
<td>RR Bores</td>
<td>$75,000</td>
<td></td>
<td>$75,000</td>
</tr>
<tr>
<td>River Crossings</td>
<td>$300,000</td>
<td></td>
<td>$300,000</td>
</tr>
<tr>
<td>Emergency Thermopolis Connection Improvements</td>
<td>$5,000</td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>LWSD Tank Modifications</td>
<td>$5,000</td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>LWSD Meter Pit Retrofits</td>
<td>$25,000</td>
<td></td>
<td>$25,000</td>
</tr>
<tr>
<td><strong>Construction Subtotal</strong></td>
<td>$2,775,600</td>
<td>$38,704</td>
<td>$2,736,896</td>
</tr>
<tr>
<td>Engineering During Construction (10%)</td>
<td>$277,560</td>
<td>$3,870</td>
<td>$273,690</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$3,560,720</td>
<td>$46,827</td>
<td>$3,513,893</td>
</tr>
<tr>
<td>Contingency (Subtotal X 15%)</td>
<td>$534,108</td>
<td>$7,024</td>
<td>$527,084</td>
</tr>
<tr>
<td><strong>TOTAL COST</strong></td>
<td>$4,094,828</td>
<td>$53,852</td>
<td>$4,040,976</td>
</tr>
</tbody>
</table>

- WWDC Eligible                                                                 | 2,960,414 |            | 2,960,414       |
- WWDC Non-Eligible                                                           | $1,134,414 | $53,852    | $1,080,562      |
- WWDC 67% Grant                                                              | $1,983,478 |            | $1,983,478      |
- Project Cost to Finance or Out-of Pocket Costs**                            | $2,111,350 | $53,852    | $2,057,499      |

**Note: Out-of-Pocket Costs = 33% of WWDC Eligible Items + Non-Eligible Items**

#### Alternative 2 Cost Summary

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>TOTAL</th>
<th>LWSD</th>
<th>BLACK MT. USERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Plans and Specifications (10%)</td>
<td>$251,735</td>
<td>$3,882</td>
<td>$247,853</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
<td>$30,000</td>
<td>$423</td>
<td>$29,577</td>
</tr>
<tr>
<td>District Expansion</td>
<td>$50,000</td>
<td></td>
<td>$50,000</td>
</tr>
<tr>
<td>Acquisition of Access and Right-of-Way</td>
<td>$150,000</td>
<td></td>
<td>$150,000</td>
</tr>
<tr>
<td><strong>Cost of Components</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bond, Ins, Mob, Traffic Cont., Clearing, Utility Coordination</td>
<td>$271,000</td>
<td>$3,821</td>
<td>$267,179</td>
</tr>
<tr>
<td>Pipeline and Appurtenances</td>
<td>$1,491,350</td>
<td></td>
<td>$1,491,350</td>
</tr>
</tbody>
</table>
### Executive Summary

**Lucerne Water Supply Level II Study**

<table>
<thead>
<tr>
<th>Cost of Components</th>
<th>TOTAL</th>
<th>LWSD</th>
<th>BLACK MT. USERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Connection Assemblies</td>
<td>$345,000</td>
<td></td>
<td>$345,000</td>
</tr>
<tr>
<td>RR Bores</td>
<td>$75,000</td>
<td></td>
<td>$75,000</td>
</tr>
<tr>
<td>River Crossings</td>
<td>$300,000</td>
<td></td>
<td>$300,000</td>
</tr>
<tr>
<td>Emergency Thermopolis Connection Improvements</td>
<td>$5,000</td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>LWSD Tank Modifications</td>
<td>$5,000</td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>LWSD Meter Pit Retrofits</td>
<td>$25,000</td>
<td></td>
<td>$25,000</td>
</tr>
<tr>
<td><strong>Construction Subtotal</strong></td>
<td>$2,517,350</td>
<td>$38,821</td>
<td>$2,478,529</td>
</tr>
<tr>
<td>Engineering During Construction (10%)</td>
<td>$251,735</td>
<td>$3,882</td>
<td>$247,853</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$3,250,820</td>
<td>$47,008</td>
<td>$3,203,812</td>
</tr>
<tr>
<td>Contingency (Subtotal X 15%)</td>
<td>$487,623</td>
<td>$7,051</td>
<td>$480,572</td>
</tr>
<tr>
<td><strong>TOTAL COST</strong></td>
<td>$3,738,443</td>
<td>$54,059</td>
<td>$3,684,384</td>
</tr>
</tbody>
</table>

- **WWDC Eligible**: $2,355,718
- **WWDC Non-Eligible**: $1,382,725
- **WWDC 67% Grant**: $1,578,331
- **Project Cost to Finance or Out-of-Pocket Costs**
  - **Out-of-Pocket Costs**: 33% of WWDC Eligible Items + Non-Eligible Items

### Alternative 3 Cost Summary

<table>
<thead>
<tr>
<th>Cost of Components</th>
<th>TOTAL</th>
<th>LWSD</th>
<th>BLACK MT. USERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bond, Ins, Mob, Traffic Cont., Clearing, Utility Coordination</td>
<td>$231,500</td>
<td>$4,156</td>
<td>$227,344</td>
</tr>
<tr>
<td>Pipeline and Appurtenances</td>
<td>$1,223,000</td>
<td></td>
<td>$1,223,000</td>
</tr>
<tr>
<td>Service Connection Assemblies</td>
<td>$345,000</td>
<td></td>
<td>$345,000</td>
</tr>
<tr>
<td>RR Bores</td>
<td>$150,000</td>
<td></td>
<td>$150,000</td>
</tr>
<tr>
<td>River Crossings</td>
<td>$150,000</td>
<td></td>
<td>$150,000</td>
</tr>
<tr>
<td>Emergency Thermopolis Connection Improvements</td>
<td>$5,000</td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>LWSD Tank Modifications</td>
<td>$5,000</td>
<td></td>
<td>$5,000</td>
</tr>
<tr>
<td>LWSD Meter Pit Retrofits</td>
<td>$25,000</td>
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<td>$25,000</td>
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<tr>
<td><strong>Construction Subtotal</strong></td>
<td>$1,984,500</td>
<td>$39,156</td>
<td>$1,944,344</td>
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<tr>
<td>Engineering During Construction (10%)</td>
<td>$198,450</td>
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<td>$194,534</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$2,611,400</td>
<td>$47,026</td>
<td>$2,563,874</td>
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<td>Contingency (Subtotal X 15%)</td>
<td>$391,710</td>
<td>$7,129</td>
<td>$384,581</td>
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<tr>
<td><strong>TOTAL COST</strong></td>
<td>$3,003,110</td>
<td>$54,655</td>
<td>$2,948,455</td>
</tr>
</tbody>
</table>

- **WWDC Eligible**: $1,382,835
- **WWDC Non-Eligible**: $1,620,275
- **WWDC 67% Grant**: $926,500
- **Project Cost to Finance or Out-of-Pocket Costs**
  - **Out-of-Pocket Costs**: 33% of WWDC Eligible Items + Non-Eligible Items
Proposed monthly water bills for the Black Mountain Users are presented below.

**Estimated Average Monthly Water Bills for Black Mountain Users**

<table>
<thead>
<tr>
<th>Estimated Average Monthly Water Bill</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>High End (Funding Scenario 1) *</td>
<td>$259.86</td>
<td>$264.92</td>
<td>$256.15</td>
</tr>
<tr>
<td>Low End (Funding Scenario 2) *</td>
<td>$181.63</td>
<td>$186.69</td>
<td>$177.92</td>
</tr>
</tbody>
</table>

* Includes Debt Retirement, $43 Base Charge, Water Use at 8,000 gallons/month at BHR rates

On February 9, 2011, the estimated bills shown above were presented to the LWSD Board and representatives of the Black Mountain Users. The Black Mountain Users indicated these monthly bills were above what they considered affordable. The project team was asked to consider other project structures that might reduce costs to the Black Mountain Users.

**District Cost Sharing:** Given that the transmission main from the northern connection south of Kirby to the first user in the northern portion of the Black Mountain area provided redundancy and headloss reduction to the District, it was assumed this would be appropriate for financial participation by the LWSD. The cost to construct this section of Alternative 1 was assumed to be paid by the LWSD. This redistribution of costs is shown below.

**Alternative 1 Cost Summary – With LWSD Cost Sharing Option**

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>TOTAL</th>
<th>LWSD</th>
<th>BLACK MT. USERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Plans and Specifications (10%)</td>
<td>$277,560</td>
<td>$74,432</td>
<td>$203,128</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
<td>$30,000</td>
<td>$7,368</td>
<td>$22,632</td>
</tr>
<tr>
<td>District Expansion</td>
<td>$50,000</td>
<td>$50,000</td>
<td></td>
</tr>
<tr>
<td>Acquisition of Access and Right-of-Way</td>
<td>$150,000</td>
<td>$150,000</td>
<td></td>
</tr>
<tr>
<td>Cost of Components</td>
<td>$2,775,600</td>
<td>$744,325</td>
<td>$2,031,275</td>
</tr>
<tr>
<td>Bond, Ins, Mob, Traffic Cont., Clearing, Utility Coordination</td>
<td>$290,000</td>
<td>$71,225</td>
<td>$218,775</td>
</tr>
<tr>
<td>Pipeline and Appurtenances</td>
<td>$1,730,600</td>
<td>413,100</td>
<td>$1,317,500</td>
</tr>
<tr>
<td>Service Connection Assemblies</td>
<td>$345,000</td>
<td>$345,000</td>
<td></td>
</tr>
<tr>
<td>RR Bores</td>
<td>$75,000</td>
<td>$75,000</td>
<td></td>
</tr>
<tr>
<td>River Crossings</td>
<td>$300,000</td>
<td>$150,000</td>
<td>$150,000</td>
</tr>
<tr>
<td>Emergency Thermopolis Connection Improvements</td>
<td>$5,000</td>
<td>$5,000</td>
<td></td>
</tr>
<tr>
<td>LWSD Tank Modifications</td>
<td>$5,000</td>
<td>$5,000</td>
<td></td>
</tr>
<tr>
<td>LWSD Meter Pit Retrofits</td>
<td>$25,000</td>
<td>$25,000</td>
<td></td>
</tr>
<tr>
<td><strong>Construction Subtotal</strong></td>
<td>$2,775,600</td>
<td>$744,325</td>
<td>$2,031,275</td>
</tr>
<tr>
<td>Engineering During Construction (10%)</td>
<td>$277,560</td>
<td>$74,432</td>
<td>$203,128</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>$3,560,720</td>
<td>$900,558</td>
<td>$2,660,162</td>
</tr>
<tr>
<td>Contingency (Subtotal X 15%)</td>
<td>$534,108</td>
<td>$135,084</td>
<td>$399,024</td>
</tr>
<tr>
<td><strong>TOTAL COST</strong></td>
<td>$4,094,828</td>
<td>$1,035,642</td>
<td>$3,059,186</td>
</tr>
<tr>
<td>WWDC Eligible</td>
<td>$2,960,414</td>
<td>$914,269</td>
<td>$2,046,146</td>
</tr>
<tr>
<td>WWDC Non-Eligible</td>
<td>$1,134,414</td>
<td>$121,373</td>
<td>$1,013,041</td>
</tr>
<tr>
<td>WWDC 67% Grant</td>
<td>$1,983,478</td>
<td>$612,560</td>
<td>$1,370,918</td>
</tr>
<tr>
<td>Project Cost to Finance or Out-of Pocket Costs**</td>
<td>$2,111,350</td>
<td>$423,082</td>
<td>$1,688,269</td>
</tr>
</tbody>
</table>

**Note:** Out-of-Pocket Costs = 33% of WWDC Eligible Items + Non-Eligible Items
The following table shows the benefit to the Black Mountain Users for the reduced amount of debt they would need to assume for the expansion under the Cost Sharing Option.

### Estimated Monthly Water Bills for Black Mountain Expansion With District Cost Share

<table>
<thead>
<tr>
<th></th>
<th>BLACK MOUNTAIN USERS</th>
<th>LWSD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High End (Funding Scenario 1)</strong> *</td>
<td>$221.34</td>
<td>$64.44</td>
</tr>
<tr>
<td><strong>Low End (Funding Scenario 2)</strong> *</td>
<td>$143.12</td>
<td>$64.44</td>
</tr>
</tbody>
</table>

* Includes Debt Retirement, $43 Base Charge, Water Use at 8,000 gallons/month at BHR rates

In the Cost Share Option, the LWSD assumes just over $430,000 in debt to support the expansion to the Black Mountain Users, or a debt retirement cost to each District user of $19.19/month. As the District will be paying considerably less for water upon connection to the BHR system, it could assume debt necessary to cost-share in the expansion with no change in costs to the LWSD users.

The LWSD Board decided it was not agreeable to the Cost Share Option because:

- The Board wishes to maintain its debt-free status.
- Fifty new taps were assumed to connect to an expansion. The Board was concerned that they may have to assume additional debt if a lesser number of taps connected.
- It was assumed the Black Mountain Users would be responsible to pay the majority of costs for the expansion. However, the LWSD Board recognized it would ultimately be responsible to pay for the expansion should the project not generate enough taps or if the Black Mountain Users defaulted on its loan.

Even with the LWSD cost share, the average bill was still higher than seemed affordable to the Black Mountain Users. Given this higher than anticipated cost, and the uncertainty of the number of taps willing to participate, the representatives stated they were not comfortable proceeding with the expansion.

### 5.0 SUMMARY OF RECOMMENDATIONS

The purpose of this study was two-fold: 1) determine required modifications to the existing LWDC system for the transition to the BHR supply and 2) determine the feasibility of providing water service to the Black Mountain Expansion Area.

**Lucerne Water and Sewer District:** Few modifications are required within the LWSD for its transition to the groundwater supply of the BHR system. The EPA must be notified when service to the LWSD begins from Element 10 as the type of water supply to the District will be changing from surface water to groundwater. Monitoring and reporting requirements for the District will not change with the new supply.
Both the LWSD and Thermopolis wish to maintain the connection between the two systems. It is recommended that improvements be made to piping in the connection vault to provide the LWSD the capability to meter water provided to Thermopolis. Periodic flushing of the waterline from Thermopolis to the south District boundary using the Thermopolis Supply is recommended.

With the inclusion of a generator in the pump station at Kirby and the emergency supply connection to Thermopolis, it is recommended that the existing water storage tank on the north end of the LWSD be abandoned.

It is recommended that the LWSD system maintain service with one pressure zone.

It is recommended the air/vacuum vaults be replaced to allow access to the valves.

**Black Mountain Expansion:** Alternative 1 is recommended because its larger looped system not only provides redundancy to the expansion area; it also has benefits to the existing District. With the ability to flow water in either leg of the loop, the alternative provides redundancy for the District supply and increased flexibility in the event of a leak or future connection.

Although the total cost estimate for Alternative 1 was higher than the other alternatives, more components of this system are eligible for funding, thereby lowering the cost to the District and the Black Mountain Users. This brought the estimated monthly cost to the Black Mountain Users equivalent to the estimates for the other two alternatives.

Due to the low density of development in the Black Mountain Area, the cost to individual users for water service expansion is quite high. In an attempt to obtain an affordable project for the Black Mountain Users, District participation was assumed in the form of paying for a portion of the looped transmission system. The Board indicated they were not comfortable entering into debt at this time. Without District participation in costs of expansion, the cost to the Black Mountain Users is not affordable.

For the Black Mountain Users to be eligible for funding and to receive water from the BHR system, they must be a legal entity. It makes the most sense for that entity to be an expansion of the existing District. The current District Board expressed concern with the increased financial liability of expanding their District to encompass the Black Mountain area. Even though proposed water bills were designed so the Black Mountain Users cover the cost of expansion, the expansion would, in fact, obligate the District Board to pay for the expansion if the Black Mountain Users did not get enough taps assigned or in some other way defaulted on the loan necessary for expansion.

Given the Board’s concerns, a District expansion of service into the Black Mountain area is not financially or politically feasible at this time.
**Offices In:**

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Lander  
Laramie  
Sheridan

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Anchorage  
Juneau  
Palmer

**Arizona**  
Tempe  
Tucson

**Montana**  
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Bozeman  
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