Executive Summary
May 2011

Sheridan
Supplemental Supply Study
Level II, Phase I

Prepared For:
Wyoming Water Development Commission
6920 Yellowtail Road
Cheyenne, WY 82002

Prepared By:
DOWL HKM
16 W. 8th Street
P.O. Box 7010
Sheridan, WY 82801

Project Sponsor:
City of Sheridan
P.O. Box 848
Sheridan, WY 82801
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Hydro Logic, LLC

Public Relations Consulting
Empowering Strategic Solutions
1.0 INTRODUCTION
The WWDC hired DOWL HKM in June 2009 to determine the best long-term water supply for the City of Sheridan (City) and Sheridan Area Water Supply Joint Powers Board (JPB). The project considered whether a Need exists for supplemental supply and evaluated alternatives to meet the Need.

2.0 EXISTING SYSTEM OVERVIEW
The public water supply includes two systems: the City system provides water within the city limits and to limited customers outside the city; the JPB system provides water to rural users outside the city limits.

The City and JPB systems divert raw water from Big Goose Creek at the Intake, 12 miles west of town. Raw water is piped to the Big Goose Water Treatment Plant (BGWTP) and the Sheridan Water Treatment Plant (SWTP). Generally, the BGWTP supplies JPB customers and the SWTP supplies City customers.

The water supply includes direct flow water rights from Big Goose Creek and storage rights from mountain reservoirs. The City owns Twin Lakes and both entities own shares in Park Reservoir and Dome Lake.

3.0 PUBLIC PARTICIPATION
A public involvement plan was developed. A project website was established, including an online survey. Links to the project website were provided from the City’s webpage, included on water bills and advertised on the radio. Just under 400 people visited the project website.

Four public workshops were conducted during the project: August 25, 2009 to introduce the study; November 12, 2009 to share conclusions of the Needs Assessment; March 23, 2010 to present alternative supplies; and April 7, 2011 following publication of the draft report.

Water supply stakeholders were contacted personally to discuss this study and water supply issues.

4.0 NEEDS ASSESSMENT
The Purpose of this study was to “Provide a sustainable water supply for the Sheridan area over a 50-year planning period.” Evaluation of the Need consisted of documenting existing supplies and comparing those supplies with the projected water use through the 50-year planning horizon.

The following table itemizes City and JPB water rights, makes adjustments for operational constraints and presents a realistic value of water that is actually available to the water system.

<table>
<thead>
<tr>
<th>WATER RIGHT</th>
<th>City</th>
<th>Total Ac-Fl Available</th>
<th>JPB</th>
<th>Total Ac-Fl Available</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CFS</td>
<td>Adjustments</td>
<td>CFS</td>
<td>Adjustments</td>
</tr>
<tr>
<td>Direct flow/Big Goose unregulated*</td>
<td>16</td>
<td>3 cfs to VA, so 13 cfs available for 265 days</td>
<td>6,833.1</td>
<td>7.14</td>
</tr>
<tr>
<td></td>
<td>1.77</td>
<td>Available for 80 days</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct flow/Big Goose in regulation*</td>
<td>13</td>
<td>3 cfs allocated to VA so 10 cfs available for 100 days</td>
<td>1,983.5</td>
<td>0</td>
</tr>
<tr>
<td>Twin Lakes</td>
<td>2,967.7 storage right – 500 conservation pool – 10% conveyance loss</td>
<td>2,221.0</td>
<td>408.68 storage right – 69 conservation pool – 10% conveyance loss</td>
<td>306.0</td>
</tr>
<tr>
<td>Park Reservoir</td>
<td></td>
<td></td>
<td>180 – 10% conveyance loss</td>
<td></td>
</tr>
</tbody>
</table>
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**Sheridan Supplemental Supply Level II Study**

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### WATER RIGHT

<table>
<thead>
<tr>
<th>WATER RIGHT</th>
<th>City</th>
<th>JPB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CFS</td>
<td>Adjustments</td>
</tr>
<tr>
<td>Dome Lake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007 Purchases from Park and Dome</td>
<td>(50 X .67) – 10% conveyance loss</td>
<td>33.8</td>
</tr>
<tr>
<td>Subtotal</td>
<td>11,352.3</td>
<td></td>
</tr>
</tbody>
</table>

**Adjustment for Operational Conditions:** Minus 1 cfs for 100 days during irrigation season.**

**TOTAL AVAILABLE SUPPLY AT INTAKE**

<table>
<thead>
<tr>
<th></th>
<th>City</th>
<th>JPB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11,194</td>
<td>4,217</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>15,410</td>
<td>15,608.8</td>
</tr>
</tbody>
</table>

**Assumptions:**

1. City territorial direct flow right is not called out of priority.
2. Twin Lakes conservation pool is not depleted.
3. Big Goose is assumed to be unregulated 265 days per year.

* Direct flow rights can only be diverted when sufficient demand is present to do so. Unused direct flow rights bypass the Intake.
** Water released from storage can be diverted only when demand is present. 80% of loss assigned to City, 20% to JPB.

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In reality, not all the Available Water Supply can be put to use as some water bypasses the Intake when user demand does not require diversion. The amount of water that bypasses the Intake was quantified and the Practical Water Supply was determined to be 10,417 ac-ft/year. This is the amount of water that is actually usable to the water systems.

The following design criteria were developed to determine future water system needs:

#### Criteria for Future Supply Depletion Evaluation

<table>
<thead>
<tr>
<th>Irrigation Season Demand (Metered Account Usage)</th>
<th>Non-irrigation Season Demand (Metered Account Usage)</th>
<th>Growth Rate</th>
<th>2010 EDUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>City</td>
<td>520 gallons/EDU/day</td>
<td>200 gallons/EDU/day</td>
<td>2% per year</td>
</tr>
<tr>
<td>JPB</td>
<td>420 gallons/EDU/day</td>
<td>200 gallons/EDU/day</td>
<td>3% per year</td>
</tr>
</tbody>
</table>

Note: Metered account usage X 1.42 = Water to be diverted at the intake.

A projection was made to predict when the water supply would be depleted. The existing Practical Supply (10,417 ac-ft/yr) will likely be depleted in 2037, under the current operations. The Total Available Supply (15,410 ac-ft/yr) is projected to be depleted in 2055. Therefore, a Need exists for a supplemental supply. The study then defined and evaluated alternatives for a supplemental supply.

### 5.0 ALTERNATIVES FOR SUPPLEMENTAL SUPPLY

A list of supplemental supply alternatives was developed and included:

- **Conservation**
  - Reduce water use
  - Improve system efficiencies
  - Shared improvements with agriculture

- **Acquire existing water rights**
  - From lands that are annexed or come out of production
  - Senior direct flow rights on Big Goose Creek
  - Shares from existing mountain storage, including acquisition of Sawmill Reservoir

- **Enlarge existing storage facilities**
  - Twin Lakes
  - Sawmill Reservoir
  - Weston Reservoir
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- Develop new storage
  - In the Big Horn Mountains
  - Off channel, lower elevation sites
    - Owl Creek Drainage
    - Gillispie Draw
    - Little Goose Drainage
- Lake DeSmet
- Groundwater
- Other options brought to the project from interested parties

An assessment of the alternatives listed above was performed to determine which alternatives merited detailed study. Each alternative in the order listed above is discussed below.

**Conservation**
Water use has declined 28% and 17% by City and JPB customers, respectively, in the past 5 years and system operators strive to minimize water loss. These are typical reductions for an aggressive water conservation program. Therefore, conservation was not considered a viable means to reduce the long-term water demands on the systems.

Agricultural improvements that might benefit the water system were explored by talking to the Board of Control, agricultural water users and ditch companies. Ditch lining or piping was presented. There was little interest in pursuing these improvements. Irrigation improvements might include pivot sprinklers for lands which are flood irrigated. The Board of Control was concerned with lost return flows under this strategy and suggested that transfer of water rights to municipal use might be problematic. In addition, irrigators questioned whether significant reduction in water consumption would be realized.

**Acquire Existing Water Rights**
Acquiring water rights from lands being annexed or developed should always be considered. However, it is unlikely significant amounts of water usable in the potable water system can be realized. These rights may increase operational flexibility and provide raw water irrigation sources to offset peak demands.

There are 6 direct flow water rights on Big Goose Creek senior to the City. During dry years, these right holders could call for their water and deprive the City of its full right. The Points of Diversion for these senior rights are so far downstream from the Intake that a transfer to the Intake probably would not be approved.

Reservoirs in the Big Goose drainage are primarily used to store irrigation water, but permitted uses include municipal. These reservoirs discharge directly into Big Goose Creek upstream of the Intake, the permitted use includes municipal, and Sawmill Reservoir is known to be available for acquisition. Therefore, obtaining supplemental supply from existing reservoirs was evaluated in greater detail.

Storage also exists in the Little Goose drainage. The water in Big Horn Reservoir is tied to lands served by the Colorado Colony Ditch and is permitted only for irrigation. When shares are sold, they must first be offered to other shareholders and the Board approves transactions. This makes transfer of shares outside the current ownership unlikely. The transfer of water rights from this reservoir is unlikely to be approved by the Board of Control. Cross Creek Reservoir is situated upstream of Big Horn Reservoir and discharges to it. This reservoir is relatively small, with junior water rights. Therefore, Cross Creek and Big Horn Reservoirs were not considered viable long-term supplemental supplies.
Enlarge Existing Storage Facilities
Enlarging Twin Lakes, Sawmill or Weston Reservoirs was considered. Mountain reservoirs usually contain fen wetlands, a highly diverse ecosystem which is particularly difficult to mitigate. Permitting a facility which impacts fens is highly unlikely, so these enlargements were not considered further.

Develop New Storage
A new high altitude reservoir could deliver good quality water to the Intake. However, the Forest Service and Corps of Engineers are generally resistant to construction of new storage unless no other alternatives are available. Permitting new storage in the Bighorn National Forest was not considered further.

Storage locations were explored at lower elevations, along Owl Creek and Gillispie Draw. The Owl Creek Drainage has appropriate topography to accommodate water storage, however, a reconnaissance level geological investigation identified fatal flaws for Owl Creek and this location was not considered further.

Gillispie Draw has long been considered a good location for supplemental storage due to its proximity to existing infrastructure. Given the benefits of a Gillispie Draw reservoir location and a favorable preliminary review of site conditions, conceptual designs were completed and cost estimates prepared.

Water supply from the Little Goose drainage was studied during planning of the regional water system. Ultimately, Little Goose Creek was eliminated as a supply, due to limited water availability, better water quality in Big Goose and cost. These factors still exist and with the infrastructure being in the Big Goose drainage, infeasible costs are associated with developing a supplemental supply from Little Goose.

Lake DeSmet
In February 2001, the Lake DeSmet Counties Coalition Joint Powers Board (LDCC) acquired Lake DeSmet, including storage permits totaling 159,113 ac-ft, of which 5,000 ac-ft is designated for municipal use. Due to the abundant water available in Lake DeSmet and the allocation for municipal use, Lake DeSmet was included in the detailed evaluation of long-term water supplies.

Groundwater
The Sheridan area water system was constructed partially to resolve problems with groundwater supplied by wells. Exhaustive investigations proved that groundwater is not feasible as a source for this regional water system. Therefore, groundwater was not considered further for the needed supplemental supply.

Other Options From Interested Parties
Other water supply opportunities were discussed with the Cadiz Corporation for water in the Clark’s Fork and Clear Creek drainages, the Northern Cheyenne Tribe for water in the Tongue River and an abandoned oil and gas well in the Beaver Creek area. None of these opportunities were identified as meritng further study.

Summary of Alternatives for Further Study
- Acquire shares from existing mountain storage, including acquisition of Sawmill Reservoir
- Develop new storage in Gillispie Draw
- Lake DeSmet

6.0 SURFACE WATER AVAILABILITY AND SHORTAGES
Hydrologic computer modeling of the Little Goose and Big Goose drainages was conducted to determine water availability using the StateMod simulation model.

The StateMod model results important to this study are itemized below.
1. The areas identified as being water short in a normal year are Columbus Creek, Little Goose Creek, Little Tongue River, Rapid Creek, Smith Creek, Soldier Creek and Wolf Creek.

2. Modeling determined water is available in the Tongue River drainage for new storage.

3. The winter base flow in Big Goose Creek was estimated to be 15 cfs.

4. Big Goose Creek flows in excess of 15 cfs captured between October and April of each year would provide adequate water to maintain a 2,000 ac-ft reservoir in Gillispie Draw.

5. Regression equations estimate Sawmill Reservoir will fill each year to its 1,275 ac-ft capacity. The StateMod model, calibrated to historic data, indicates a firm yield of approximately 881 ac-ft.

6. The firm yield of Park Reservoir, under historic operation, is in the range of 7,500 – 7,800 ac-ft.

**Yellowstone River Compact**

The Compact divides water in the Yellowstone River Basin between Montana, Wyoming and North Dakota. In 2007, Montana filed suit against Wyoming, alleging Wyoming deprives Montana of water. Pending the outcome of this litigation, the affects of the Compact cannot be fully assessed. However, the Wyoming Attorney General’s Office has stated that existing storage within the Tongue River drainage will be unaffected by the Compact ruling as long as they are filled in priority.

### 7.0 DETAILED ANALYSIS AND PRIORITIZATION OF ALTERNATIVES

The criteria used for prioritization of alternatives are shown below.

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Availability</td>
<td>• Availability of shares or water rights for transfer or acquisition</td>
</tr>
<tr>
<td></td>
<td>• Hydrologic availability determined from basin modeling</td>
</tr>
<tr>
<td>Multiple Use Potential</td>
<td>• Ability to offer recreational or environmental benefits, in addition to water supply</td>
</tr>
<tr>
<td>Water Quality</td>
<td>• Type of treatment needed</td>
</tr>
<tr>
<td></td>
<td>• Consistency with existing treatment plant processes</td>
</tr>
<tr>
<td>Land Ownership</td>
<td>• Whether land acquisition is necessary</td>
</tr>
<tr>
<td></td>
<td>• Whether needed land is public or private</td>
</tr>
<tr>
<td>Geotechnical Issues</td>
<td>• Extent and complexity of unstable soil, landslides, groundwater, coal</td>
</tr>
<tr>
<td>Public Acceptance</td>
<td>• Public sentiment and comments received</td>
</tr>
<tr>
<td>Environmental Impacts</td>
<td>• Extent of environmental mitigation measures needed</td>
</tr>
<tr>
<td>Ability to Permit</td>
<td>• Difficulty to obtain necessary permits from various agencies</td>
</tr>
<tr>
<td>Cost</td>
<td>• Construction</td>
</tr>
<tr>
<td></td>
<td>• Operation and maintenance</td>
</tr>
<tr>
<td></td>
<td>• Annual dues/fees</td>
</tr>
<tr>
<td></td>
<td>• Availability of funding</td>
</tr>
<tr>
<td>Availability of Infrastructure</td>
<td>• The degree to which existing facilities can be used for implementation</td>
</tr>
<tr>
<td>Water Rights</td>
<td>• Difficulty to transfer or acquire water rights</td>
</tr>
<tr>
<td></td>
<td>• Impacts of the Yellowstone River Compact</td>
</tr>
</tbody>
</table>

These criteria were used to develop a numeric ranking from which the alternatives were prioritized. The numeric ranking is based on the qualitative discussion and evaluation of alternatives which follows.
Shares From Existing Mountain Storage (Park Reservoir)

- **Water availability:** Given the large number of shareholders, amount of water typically not used each year and the hydrologic likelihood of the reservoir filling in most years, water is available.
- **Multiple Use Potential:** Park Reservoir is accessible via public roads through the national forest, therefore the multiple use potential criteria for Park Reservoir is easily met.
- **Water Quality:** Water quality is expected to be as good as water quality from Twin Lakes.
- **Land Ownership:** Since no improvements are necessary to use Park Reservoir water, land ownership is not a concern. The reservoir is located on public land.
- **Geotechnical Issues:** Geotechnical issues are not a concern because no improvements are necessary to use Park Reservoir water.
- **Public Acceptance:** Changing water use from agricultural to municipal may not be agreeable to the ag community. Public acceptance is expected to be mostly positive, however.
- **Environmental Impacts:** Acquiring shares in Park Reservoir would require no improvements requiring environmental mitigation.
- **Ability to Permit:** No permitting, other than the transfer of shares, would be necessary to begin using water from Park Reservoir for municipal purposes.
- **Cost:** Shares were purchased from Park Reservoir and Dome Lake in 2007 at costs ranging from $3,333 to $4,071 per ac-ft. Stored water appears to be worth about $5,000/ac-ft currently.
- **Availability of Infrastructure:** The ability to use existing infrastructure is very favorable.
- **Water Rights:** Park Reservoir is currently permitted for domestic and municipal use and the water is not tied to specific lands. Therefore, no water rights transfers would be necessary.
- **Other Considerations:**
  - The City and JPB would have limited say in operation of the facility due to partial ownership.
  - Ensuring water is available to the municipal system during drought conditions, for example, is a major concern and would need to be addressed during the acquisition process.
  - An experienced water resources professional should be hired to negotiate acquisition.
  - This analysis includes only Park Reservoir due to its large size and numerous shareholders. Water may also be available from Dome Lake and Dome Lake Reservoir which should not be overlooked.

Purchase of Sawmill Reservoir

- **Water availability:** Sawmill has a storage capacity of 1,275 ac-ft and a firm yield of 881 ac-ft.
- **Multiple Use Potential:** Although Sawmill does have multiple use potential, it is somewhat less viable than other alternatives due to its small size and limited access.
- **Water Quality:** Water quality is expected to be equivalent to Twin Lakes and Park Reservoir.
- **Land Ownership:** Sawmill is located in the Bighorn National Forest and authorized by Special Use Permit. The Permit expires in 2023 and is not transferable so a new permit would be necessary.
- **Geotechnical Issues:** Geotechnical issues are not of major concern at Sawmill Reservoir. The facility is inspected annually and generally noted to be in good condition.
- **Public Acceptance:** By virtue of a heightened public process involved with getting a new Special Use Permit, acquisition of Sawmill may be less publically acceptable.
- **Environmental Impacts:** It may be necessary to create an access road, resulting in environmental impacts requiring mitigation. The impacts should be relatively small in scale and short-term.
- **Ability to Permit:** A new Special Use Permit would be required and appears feasible. Permitting by the Forest Service would be necessary to construct an access road, including compliance with the National Environmental Policy Act (NEPA). It appears an access road could be permitted, but may require a significant commitment of resources to do so.
- **Cost:** The value of the facility would have to be negotiated with the owner. WWDC staff suggested they would support a request for grant funding to assist with purchasing Sawmill Reservoir.
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- **Availability of Infrastructure**: Sawmill Reservoir is situated to use of the exiting Intake and water treatment plants. Improvements might include an access road and adding instrumentation so the facility could be monitored and controlled remotely.

- **Water Rights**: A petition to change use from irrigation to municipal would be necessary. A change in use was not expected to be difficult because this water is not tied to any lands and it was not expected that any water users could justifiably claim damage from such a transfer.

- **Other Considerations**:
  - An Emergency Action Plan (EAP) needs to be prepared for this facility.
  - Sole ownership of Sawmill provides a significant advantage over partial ownership at Park Reservoir, due to ensured access to water during drought conditions.
  - Consider contracting a water resources professional to negotiate acquisition.

**New Reservoir at Gillispie**
The facility analyzed is an earthen embankment in the channel near the SWTP. The reservoir would be filled from the existing 30-inch raw water main that supplies the plant when Big Goose Creek flows exceed the base flow of 15 cfs. The stored water would then be pumped into the plant when needed.

- **Water availability**: A firm yield of 2,000 ac-ft per year can be provided while maintaining a base flow in Big Goose Creek of 15 cfs.
- **Multiple Use Potential**: Gillispie Draw provides opportunity for a multiple use park.
- **Water Quality**: Stored water at this low elevation will increase its temperature. Other changes in water quality might occur due to algae growth or minerals from soils at the storage location.
- **Land Ownership**: A reservoir in Gillispie Draw would be situated on private land.
- **Geotechnical Issues**: A reconnaissance level evaluation identified complex geotechnical issues that result in a large dam footprint and more sophisticated design.
- **Public Acceptance**: Because of the close proximity to developed areas of town, a number of residents have expressed concern regarding safety.
- **Environmental Impacts**: A wetlands delineation identified wetlands requiring mitigation. The Game and Fish Department stated that diversion of winter flow is not desirable and would likely question diversion of the base flow.
- **Ability to Permit**: The Army Corps of Engineers stated a new reservoir in Gillispie Draw would be favorable only if the acquisition of water from existing facilities is deemed unfeasible.
- **Cost**: The cost per ac-ft for new storage in Gillispie Draw is comparable to the other alternatives however, the total cost is considerably higher. WWDC participation is certain with this alternative.
- **Availability of Infrastructure**: A Gillispie Draw reservoir could make use of the Intake, 30-inch raw water pipeline and the SWTP. Rerouting several pipelines at the storage location would be necessary. This water could not be treated at the BGWTP as Gillispie Draw is downstream, making this water unavailable to JPB users. Water destined for storage in Gillispie Draw would undergo pre-treatment at the Intake before storage, which is inefficient.
- **Water Rights**: Storage in Gillispie Draw would maximize use of direct flow water rights that now bypass the Intake.

**Lake DeSmet**
This study used the data collected from previous studies and focused on considering Lake DeSmet as a supplemental supply solely for the Sheridan area water system.

- **Water availability**: 2,500 ac-ft is available for the Sheridan area system.
- **Multiple Use Potential**: Lake DeSmet is currently a popular recreation destination which would not change should municipal water be used from it.
**Water Quality:** The water quality in Lake DeSmet is suitable for a drinking water supply.

**Land Ownership:** Public and private land would be impacted.

**Geotechnical Issues:** Numerous landslides and slope failures are present along pipeline corridors between the lake and Sheridan, which must be addressed during final design.

**Public Acceptance:** The public appears agreeable to use this water for municipal supply. However, this alternative includes many miles of pipeline and a water treatment plant, requiring easements. Acceptance of a project can diminish when landowners realize they must grant easements.

**Environmental Impacts:** Impacts are expected to be limited to construction and associated with erosion and dust control concerns.

**Ability to Permit:** Permitting is relatively straightforward. Facilities crossing state and/or federal land will necessitate compliance with the National Environmental Policy Act (NEPA) and may require inventories of cultural and historic sites, wildlife habitat assessments and wetlands delineations. There will likely be construction sequencing restrictions or special reclamation requirements.

**Cost:** The cost to construct a water treatment plant and a pipeline to the Sheridan area water system is estimated to be approximately $52,500,000, or $21,000 per ac-ft.

**Availability of Infrastructure:** There is no existing infrastructure to convey water from the lake into the existing water system so a water treatment plant and transmission pipeline would be necessary.

**Water Rights:** The 2,500 ac-ft allocation to Sheridan County is one of the senior rights, with a priority date of 1907. This is an excellent water right, unaffected by the Yellowstone River Compact.

### PRIORITIZATION OF ALTERNATIVES

The prioritization criteria were incorporated into a ranking matrix whereby numeric values were assigned to the qualitative discussion from the preceding section. The Alternatives Ranking Matrix is shown below.

<table>
<thead>
<tr>
<th>EVALUATION CRITERIA</th>
<th>Weights</th>
<th>Purchase Shares from Park Reservoir</th>
<th>Acquire Sawmill</th>
<th>New Storage in Gillispie Draw</th>
<th>Lake DeSmet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Availability</td>
<td>40</td>
<td>9</td>
<td>10</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Multiple Use Potential</td>
<td>20</td>
<td>10</td>
<td>8</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Water Quality</td>
<td>35</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Land Ownership</td>
<td>25</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Geotechnical Issues</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Public Acceptance</td>
<td>30</td>
<td>8</td>
<td>7</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Environmental Impacts</td>
<td>30</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Ability to Permit</td>
<td>40</td>
<td>10</td>
<td>8</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Cost ($)</td>
<td>35</td>
<td>8</td>
<td>6</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Availability of Infrastructure</td>
<td>20</td>
<td>10</td>
<td>9</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Water Rights</td>
<td>30</td>
<td>10</td>
<td>9</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

**TOTAL POINTS**

- Purchase Shares from Park Reservoir: 3,080
- Acquire Sawmill: 2,740
- New Storage in Gillispie Draw: 1,805
- Lake DeSmet: 1,990

**FINAL RANKING**

1. Purchase shares from Park Reservoir
2. Acquire Sawmill Reservoir
3. Develop Lake DeSmet
4. Construct new storage in Gillispie Draw
DISCUSSION OF PRIORITIZATION AND OTHER CONSIDERATIONS

Although the rating process is somewhat subjective, the final rankings clearly identify the better value of pursuing existing mountain storage alternatives for a supplemental supply before considering implementing projects which require construction.

This ranking process represents conditions at a single point in time. The ratings given today for any criterion relative to any alternative could change depending on economic, political or social conditions. For example, Lake DeSmet may become a more important supply alternative if interest develops for treated water within the community of Story.

Cost of Alternatives

It is of interest perhaps, to look strictly at the estimated cost of the various alternatives.

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>ESTIMATED SUPPLY AVAILABLE (AC-FT)</th>
<th>ESTIMATED COST/AC-FT</th>
<th>ESTIMATED TOTAL COST</th>
<th>RELATIVE OPERATION AND MAINTENANCE COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase shares from Park Reservoir</td>
<td>2,000</td>
<td>$5,000</td>
<td>$10 MM</td>
<td>Lowest</td>
</tr>
<tr>
<td>Acquire Sawmill Reservoir</td>
<td>1,275</td>
<td>$4,000 - $9,000</td>
<td>$5 MM - $11 MM</td>
<td>Low</td>
</tr>
<tr>
<td>Lake DeSmet</td>
<td>2,500</td>
<td>$21,000</td>
<td>$52.5 MM</td>
<td>Highest</td>
</tr>
<tr>
<td>New storage in Gillispie Draw</td>
<td>2,660 – 4,000</td>
<td>$6,000 - $7,400</td>
<td>$19.6 MM - $30 MM</td>
<td>High</td>
</tr>
</tbody>
</table>

\(^1\)Includes cost of improvements needed.

Implementation

An additional 2,000 ac-ft per year of supply increases the water supply depletion date by about 8 years, or to the year 2045. Given the close ranking of purchasing shares from Park Reservoir and acquiring Sawmill Reservoir, it is recommended these alternatives be pursued concurrently.

Water rights that are maintained for irrigation within new development or transferred for irrigation of open space will reduce demands on the treated water system and reduce the long-term supply needs. Therefore, the City and JPB should continue to examine water rights options when undeveloped land is annexed or subdivided.

All of the information integral to understanding the long-term water supply of the community is dynamic, therefore, the Depletion Evaluation should be renewed every few years.

Financial Considerations

As of June 30, 2010, the Long-term Water Supply account contained $4,056,858. Assuming the typical WWDC 67% grant participation, this account could result in a project valued at over $12 million with no new debt incurred by either the City of JPB.

Policy Issues

Water Development Office staff indicated they may be less likely to support funding requests for procurement of additional supply that benefit only the City or JPB. A joint application for a project that benefits the overall system is much more likely to garner support. This is important because purchasing shares from Park Reservoir or procuring Sawmill Reservoir are unconventional projects for WWDC, so all reasonable efforts should be made to present a unified application.
8.0 RECOMMENDATIONS

The following actions are recommended to fulfill the long-term water supply needs of the Sheridan area water system.

**Supplemental Supply Recommendations**

- Pursue purchasing shares from Park Reservoir or other mountain reservoirs and acquiring Sawmill Reservoir:
  - Enter into discussions with Water Development Office staff to facilitate staff support for Commission financial participation.
  - Consider an application to the WWDC to fund a Level II, Phase II project to determine the improvements needed at Sawmill Reservoir for appropriate ownership and operations of it by the City and JPB. A facility assessment of Park Reservoir should also be included to determine potential liability to the City and JPB for acquisition of shares. More detailed evaluation will refine costs for improvements, define permitting requirements, help establish the value of the water and facilities and aid in negotiations for acquisition.
  - Solicit the services of a specialist in water management and water rights to negotiate purchase and acquisition on behalf of the City and JPB.

**Operational Recommendations**

- The City and JPB should continue to evaluate water rights transfers when land is annexed into the City, is subdivided or otherwise comes out of agricultural production. Recognizing that water rights transfers are complex and not always achievable, pursue transfers or exchanges if beneficial to the system.

- Continue to encourage water conservation by users of the system, through operational practices and policies such as limiting outside water use.

- Continue open communication with senior direct flow water right holders on Big Goose Creek to preclude a call on the City's direct flow right during times of water shortage.

- Frequently update the water supply depletion evaluation using the latest growth and water consumption data.

- Maintain a relationship with the Lake DeSmet Counties Coalition, recognizing that Lake DeSmet provides the most viable long-term water supply for users outside the current City and JPB boundaries. If interest in treated water becomes apparent outside the current service areas, the prioritization of supply alternatives contained in this study may need to be re-evaluated.
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  Anchorage
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  Kodiak
  Palmer

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  Tempe
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  Billings
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  Great Falls
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Washington
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Wyoming
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  Lander
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  Sheridan