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Funding for WRDS and the creation of this electronic document was provided by the Wyoming Water Development Commission (http://wwdc.state.wy.us)
Riverton-Mountain View Acres

WWDC
Level II Study
Executive Summary

Project 105048-000
August 2008

KELLER associates
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Executive Summary

1.1 Purpose

In June of 2005 the Wyoming Water Development Commission, with authorization from the Wyoming legislature, contracted with Keller Associates, Inc. to conduct a two Phase Level II study of the City of Riverton and Mountain View Acres’ potable water systems.

The City of Riverton is located in Fremont County in west central Wyoming. Founded in 1906, Riverton is situated near the junction of the Little Wind River and Big Wind River on land ceded from the Wind River Indian Reservation. Riverton is completely surrounded by the Reservation and is approximately 25 miles from Lander, the county seat. Riverton is the largest community in the county with an estimated population of 9,310 (2000 Census). The Mountain View Acres subdivision is located on the west side of Riverton, Wyoming. Mountain View Acres has an approximate population of 160.

The primary purpose of this project was to evaluate both the Mountain View Acres and City of Riverton’s systems and determine the feasibility of incorporating the two into one. The study was structured in two phases comprised of tasks resulting from recommendations in the previous level II study.

Under Phase I, Keller Associates, Inc. conducted an evaluation of the Mountain View subdivision’s two wells, transmission lines, and distribution system for their potential inclusion into the Riverton water system while simultaneously identifying any repairs, rehabilitation and/or replacement needs of the components should it remain a separate system. Keller Associates also tested and evaluated the Mountain View Well #1 long term ability to serve as a municipal supply well to be included in Riverton’s existing supply system. Third, Keller evaluated potential storage sites, pipeline routes, and necessary system improvements to supply additional storage to West Riverton and the Mountain View Acres subdivision upon integration of the two systems.

Phase II of the project allowed construction of a new Well, based on the Phase I determination that Well #1 was incapable of providing a sufficient long term water source for the West Riverton/ Mountain View areas. The Phase II consultant tasks covered all aspects of well construction including design, bidding, construction services, testing, and project summary reports and presentations.

1.2 West Riverton Evaluation

Riverton’s water system is made up of a complex network of six water pressure zones supplied by 13 wells and 5 reservoirs. The lower pressure zone provides water to East Riverton, while West Riverton receives water from the remaining five pressure zones. The boundary between East and West Riverton as defined by the pressure zones is complex but can be generalized as extending north and south along North 8th Street, as shown in Figure 3-1 Existing Pressure Zones & Supply. As can be seen in Figure 3-1 Existing Pressure Zones & Supply, the five zones in West Riverton generally provide water to those portions of the City along and north of Main Street, along Riverview Road, the Country Club and golf course, and on top Airport Hill.
In West Riverton there are several subdivisions that border the corporate boundaries of the City, including Mountain View Acres, Raintree Subdivision, and residents along Fairway Drive, west of Country Club Drive. These subdivisions do not currently receive water from the City’s water system; however their proximity to City services makes them prime candidates for inclusion into the system. In addition to the needs of subdivisions outside of the City’s corporate boundaries, the airport also has water limitations. Currently these zones have sufficient water to meet current demands but water supplies are not sufficient to meet future growth demands.

Previous studies regarding Riverton’s water system have identified several projects that would improve the capacity and reliability of the West Riverton potable water system. In these studies water quality, quantity, storage, and pressure were addressed. In 2000, Nelson Engineering completed a Level II, Phase II water study which identified the need for an additional water source and recommended sites for development of a new groundwater well. The proposed well has been constructed as part of this study (see Chapter 5). Keller Associates, Inc is also currently completing a water study for the City of Riverton. The study, titled City of Riverton, Wyoming: Big Wyoming Subdivision Water Master Plan (BWS study), addresses low water pressure in the Big Wyoming Subdivision (BWS) and increasing the water storage available to West Riverton. This study also identified a need for additional storage capacity to serve the western portions of Riverton, including Mountain View Acres. Keller Associates, Inc. evaluated potential tank sites, investigated pipeline routes, and identified other necessary components to incorporate additional storage into the water system, solve low water pressure problems, and improve the capabilities of the water system in West Riverton.

The evaluation of potential improvements to the West Riverton system as discussed in this study identifies a series of five different groups of improvements. Each addresses a separate portion of the system and, therefore, the City can evaluate each improvement on an individual basis without affecting the implementation of the other proposed alternatives. The exception to this evaluation strategy is that Improvements 2-5 build on the assumption that Improvement #1 carries the highest priority and will be implemented first. The five improvements are summarized below. Detailed cost estimates can be found in Appendix A.

1.2.1 West Riverton Master Plan Improvement #1 – New Reservoir

The preferred alternative presented in City of Riverton, Wyoming: Big Wyoming Subdivision Water Master Plan is to construct a water storage reservoir at the Section 20 site on Airport Hill and install a transmission pipeline and booster station to feed the storage reservoir from the existing storage reservoir at the water treatment plant. The new storage reservoir would be connected to the distribution system near the college via a transmission line down Airport Road. Figure 3-4 shows the location of the new well, storage reservoir, piping, and other system components that have been proposed or are being developed. An opinion of Probable Project Costs for Improvement 1 is presented in Table 3-2.

When locating alternative tank sites in west Riverton, Airport Hill became the primary option due to the elevation difference between the hill and surrounding subdivisions. It is proposed to locate a new 2.0 MG reservoir at the Section 20 site adjacent to Well #17 that was constructed in conjunction with this study. The elevation difference (approximately
160 ft at the College and greater in other areas of West Riverton) between the proposed tank location and surrounding service areas would provide a significant increase in water pressure.

Water will be supplied to the storage reservoir via approximately 5,100 feet of 20 inch transmission piping and a booster station from the existing 2.0 MG storage reservoir at the water treatment plant. Water will be supplied to the distribution system from the new Airport hill storage reservoir via approximately 5,650 feet of 20 inch transmission piping that will connect to the distribution system near the College water storage reservoir.

Due to the increase in pressure, reducing stations will also be installed on Hill Street south of Main Street, on West Sunset Drive east of Elm Street, on West Park Avenue east of Major Avenue, and on Main Street at Major Avenue. This system improvement will hydraulically link the college (blue, Figure 3-1 Existing Pressure Zones & Supply) and upper (green, Figure 3-1 Existing Pressure Zones & Supply) pressure zones and will create two new pressure zones, one along West Riverview Road (dark blue, Figure 3-5) and one between North Major Avenue and North 8th Street (yellow, Figure 3-5).

There are numerous benefits to the City’s water system and West Riverton residents that will result from implementation of these improvements. The portion of the water system serving West Riverton will benefit from increased system redundancy, improved pressure, increased reliability, improved water quality in the distribution system, and the ability to meet future demand as the City expands towards the west and near the airport. West Riverton residents will experience improved water pressure at the tap, which will ultimately decrease the number of resident complaints regarding the City’s water system.

1.2.2 West Riverton Improvement 2 – Well #17 Supply

This option proposes equipping Well #17 with the necessary pumps, piping, and valving to pump directly into the new 2.0 MG storage reservoir which will be connected to the distribution system near the College. This option will increase the City’s ability to provide redundant storage and pumping capacity by having two water sources supplying the storage reservoir. Additionally by having Well #17 supply the storage reservoir, the size of the booster station proposed under Improvement 1 can be decreased. Table 3-3 shows the estimated capital cost of the improvements proposed under this option.

Before this improvement can be implemented, ownership of the well will have to be transferred from the WWDC to the City of Riverton. The City will be required to apply for a Level III Study to purchase the well at 33% of the final construction costs. The $89,367 required to purchase the well will be a capital cost in addition to those shown in Table 3-3.

1.2.3 West Riverton Improvement 3 – Airport Booster Station

This option proposes constructing a booster station adjacent to the proposed 2.0 MG storage reservoir located at the Section 20 site. The booster station will connect and supply water from the new storage reservoir to the transmission line along Airport Road. Connecting the storage reservoir to the airport transmission line via a booster pump
would augment the water supply to the lower airport pressure zone. This would also increase water availability at the airport allowing growth and expansion in one of Riverton’s active light industrial zones. This improvement option will provide system redundancy for the upper and lower airport pressure zones by providing an additional water source, increased pumping capacity, and increased storage. Table 3-4 shows the estimated capital cost of this option.

1.2.4 West Riverton Improvement 4 - Stagner Drive/Riverview Road Loop

As depicted in Figure 3-4, this improvement option recommends running a 12 inch line parallel to the existing Stagner Drive water distribution line, across Leclair Canal to Mountain View Drive, north of Mountain View Acres Subdivision. The line would then run down Mountain View Drive to Riverview Road where it would reconnect to the City’s distribution system at Temple Peak Drive. Additionally, an 8 inch water distribution line will be run down Raintree Drive and connect to the existing City line in Raintree Drive. Approximately 1800 feet of the existing City line from the connection point to the south end of Raintree Drive will likely also require replacement and has been included in the cost estimates for this improvement. Fire hydrants will be installed on these lines according to Wyoming and International Fire Code standards. A pressure reducing station (PRV) will be installed in the intersection of Country Club Drive and Riverview Road.

Funding for this improvement should be provided by both the City and the residents of the subdivisions that will be serviced by this improvement. Because some of the improvements included in this option will occur outside of the City limits, the City should consider annexing those areas that will have the benefit of receiving City services. Table 3-5 represents construction costs and fees typical of the industry. This improvement is discussed in more detail in Section 3.4 and also expanded in Section 4.2 as an upgrade alternative for Mountain View Acres Subdivision.

1.2.5 West Riverton Improvement 5 - Riverview Road Upgrade

The water main that runs down Riverview Road is not uniform in size. It consists of 14, 8, and 6 inch pipe. This improvement option would upsize all water mains 8 inches or smaller located in Riverview Road to 12 inches. Approximately 1,900 ft of existing pipe would be replaced along Riverview Road between Temple Peak Drive and Country Club Drive, and approximately 630 ft of new pipe would be installed between Country Club Drive and Windsong Drive. Figure 3-4 illustrates this improvement and Table 3-6 shows the estimated cost of the option.

1.3 Mountain View Acres Evaluation

Mountain View Acres Subdivision (MVA) is located west of Riverton just north of Riverview Road. MVA is located outside of Riverton City limits but the eastern portion of the subdivision borders the City limits. The subdivision is governed by a Home Owners Association (HOA) which operates both potable water and irrigation supply and distribution systems. This subdivision is of particular concern because of the deteriorated condition of the water system.
The MVA potable water system consists of two groundwater wells and a distribution system. The City of Riverton maintains water distribution lines that terminate on Raintree Drive and Temple Peak Drive within MVA but does not provide any service connections to residents of MVA or inter-ties with the MVA system. The MVA-HOA also operates an irrigation system in addition to its potable drinking water system. Water for the irrigation system is pumped from the LeClair Canal which is located north of the subdivision. The MVA water system is illustrated in Figure 4-1.

1.3.1 System Evaluation

As required in the scope of work, Keller Associates, Inc. conducted an evaluation of both wells supplying the MVA system and the distribution piping. The wells date from the late 1970’s and are constructed of materials that do not meet current standards. Further, a draw down test was conducted on Well #2 which indicated the flow characteristics were not sufficient for inclusion into the City of Riverton water system.

The water distribution system in MVA contains approximately 1.1 miles of pipe, consisting primarily of 4 inch asbestos concrete pressure pipe (ACP). The system also contains 2 inch polyvinyl chloride (PVC) pipe. The irrigation water system consists of 10, 6, and 4 inch PVC pipe. MVA water system has approximately 50 water service connections. There are no fire hydrants in MVA. Due to the material of construction, the piping is brittle and susceptible to breaks. There are also concerns that the system is not capable of handling pressures in excess of current pressures in the system, which range between 20 psi and 60 psi. Further, because the system contains ACP, system repairs and potential pipe removal present a hazardous materials issue. It is recommended that, if replaced, the old system should be abandoned in place.

When analyzed for inclusion into the City of Riverton water system, it was determined that the MVA system would not meet the City’s standards for inclusion. Specifically, the majority of the lines do not meet the required minimum of 6-inches; the existing system has no means of providing fire flow; there are no backflow preventers installed on the connections and it is anticipated the system can not handle the pressures created by the City’s system.

There exist several alternatives to address the deterioration of the water system in MVA. The following sections summarize the specific alternatives developed to deal with the specific deficiencies within MVA. Alternatives 1 & 2 address improving the reliability of the water supply in MVA and Alternatives 2 & 3 address improving the integrity of the distribution system. Detailed cost estimates are included in Appendix A.

1.3.2 MVA Alternative 1 – Connection to the City – Bulk water User

Under this alternative the City of Riverton would supply bulk water to MVA. The City’s distribution system would be connected to the MVA system as the water source for the subdivision. The wells that MVA currently relies on would be abandoned, used for irrigation, or deeded to the City of Riverton for the City to rehabilitate and use. The connection between MVA’s water system and the City’s system would be metered and protected with a backflow prevention device to prevent the City’s system from potential
contamination due to breaks or back-siphonage in the MVA water system. Increased pressures in the MVA system induced by the City system would be mitigated by installation of a Pressure Reducing Valve (PRV) in conjunction with the meter. Connection to the City's water system should be made at the termination of the 8 inch line that the City owns on Temple Peak Drive. It is recommended that the City adopt West Riverton Improvement 5 – Riverview Road, if Riverton chooses to supply water to MVA to ensure the city has sufficient pipeline capacity to provide water to MVA.

This alternative would provide residents of MVA with a reliable source of high quality water. All maintenance to the MVA water distribution system would remain under the control of the HOA. However, this alternative does not address the needed improvements to the MVA water distribution system. More specifically this alternative raises concerns because it is unknown how the MVA water system would respond to the increased water pressures that the system may be exposed to from the City's water system.

1.3.3 MVA Alternative 2 – City Upgrade of MVA Water System

This alternative proposes that the City replace the existing water system within MVA, assume ownership, and take responsibility for maintaining and operation of the system. Because MVA is outside City limits, the City of Riverton would likely annex MVA if this alternative is implemented. This alternative would also include placing the transmission line loops presented as West Riverton Improvement 4. Funding of this alternative would be a joint effort between the City and subdivision residents. Figure 4-2 illustrates this improvement and Table 4-3 shows the estimated cost of the alternative.

This alternative presents many advantages to both residents of MVA and residents in surrounding subdivisions that are connected to the City’s water system. Residents in MVA would be connected to a water system that would be able to provide sufficient water pressure, reliable quality water, fire flows, and a reliable distribution system. The City’s system would benefit by introducing a loop in the system which will improve the quality of water in West Riverton. Additionally, the City would be less susceptible to water outages due to breaks or maintenance.

1.3.4 MVA Alternative 3 – HOA Upgrade MVA Water System

Under this alternative the MVA HOA would construct a new water distribution system at their own expense and continue to operate the system. This alternative addresses system reliability by replacing the old system, including replacing all water lines with 6-inch PVC and re-drilling Wells #1 and #2 to improve the reliability of the system water supply. The City of Riverton would not assume responsibility for the distribution or supply system for MVA. This alternative would provide residents of MVA autonomy from the City and allow the HOA association to completely control the operation and maintenance of the water system. Residents of MVA would benefit from improved water system reliability but the subdivision would continue not to have sufficient water flow to provide fire protection. To supply fire-flow, the HOA will need to consider construction of a water storage reservoir and booster station or connect to the City’s water system.
Construction of a sufficiently sized storage reservoir would be cost-prohibitive to residents of MVA.

1.3.5 MVA Preferred Alternative

Through this evaluation, the alternative that appears to be the best apparent alternative is Alternative 2, in which the City participates in upgrading the MVA water system. However, it is anticipated that the MVA-HOA may prefer to maintain their autonomy from the City. As discussed above, implementing either Alternative 1 or 3 by itself does not address all of the issues facing the MVA water system. Keller Associates, Inc. recommends, if the MVA-HOA and the City do not reach an agreement to implement Alternative 2, that MVA-HOA implement both Alternatives 1 & 3.

1.4 Well #17 Construction

As discussed in other sections of this study, the evaluation of the Mountain View Acres Well #1 determined the well would not provide a sufficient long-term supply to the Riverton water system. Based on this conclusion, WWDC approved construction of the well initially proposed by Nelson Engineering in the Level II study. A detailed discussion of the well construction processes is included in Chapter 5 and Appendix G. A brief summary of well construction and a description of the well as built is included below.

Final Design Documents for Well #17 were approved in Spring 2007 and bids were solicited in June 2007 that resulted in Nucor, Inc., a drilling company based in Riverton, being awarded the project. This project was conducted under separate contract between Keller Associates and NUCOR with Keller Associates, Inc. acting as the owner. Construction on the well began August 29, 2007 with the setting of 50 feet of surface casing. A 7 7/8” diameter borehole was then drilled to a depth of 1020 feet below ground surface. Zone tests were conducted at two intervals during the drilling process for the purposes of testing the water bearing sands from 605 to 631 feet bsl and 835 to 960 feet bsl. These tests showed good water quality and indicated that well drilling had terminated in the targeted middle layer of the Wind River Aquifer.

Utilizing information collected during the drilling process, a preliminary design of screen intervals was developed. Collaboration between Nucor, Clearwater Geosciences, and Keller Associates, Inc. finalized the casing and screen design and screens were ordered October 5, 2007. Delivery of the materials resulted in several weeks of delay and well construction was not resumed until October 25th. Nucor reamed the borehole to a final diameter of 13 ¾” to the full depth of 1020 feet and then installed the casing and screens according to the approved design. After the well column was grouted and sealed, the well was developed by air lifting for a total of 19 hrs. With the completion of development on November 9th, the well was ready for pump testing.

On Monday November 26, 2007 NUCOR’s subcontractor, Ward’s Pump Service mobilized to the site and began installing the test pump with plans to initiate pump testing the well. As the contractor was installing the test pump, the support cable reportedly failed and the entire assembly fell to the bottom of the well. Efforts ensued to retrieve the equipment and also video log the well to determine the extent of any damage. The well was video logged to a depth of 830 feet with no damage observed. Due to poor visibility, an additional 24 hours of development
was approved and conducted. Successful development indicated that the uninspected screen intervals were likely not damaged and the decision was made to resume the pump test.

Before the pump test could be conducted, coordination of a new discharge site was required. The extra development efforts and concurrent cold temperatures resulted in the original discharge basin being full of ice. After several months of discussion and coordination, it was agreed that pumping up Airport Hill and discharging to the old stock car track on City property, was most beneficial. City approval was acquired and the pump test started on February 13, 2008. A 24-hour step test and a 168-hour (7 day) pump test were both conducted under the supervision of Dr. Tom Wood. Water samples were collected at the middle and end of the 7-day test and sent to a local laboratory for analysis. Dr. Wood’s report discussing the well construction and water quality results is included in Appendix G.

To ensure the quality of the well, WWDC requested that the video inspection be completed to the full depth of the well. The video inspection took place March 17, 2008 and confirmed assumptions that the remaining screens were intact. A steel well cap was welded to the top of the casing and the site cleaned up, effectively completing the construction contract.

It is our opinion that the findings discussed in the previous sections and presented in Dr. Tom Wood’s report indicate that Well #17 is of sufficient quality for inclusion into the City of Riverton water system. The well and well site are prepared for the next steps of pump and well house design. These design processes should also consider the placement of the new tank and pipeline routes proposed in Chapter 3, Improvement 1.

1.5 Water Quality

Upon reviewing the analytical reports for the tested water samples, it can be observed that the water in Well #17 is of generally good quality. The TDS and sulfate concentrations are lower than other wells on the City of Riverton system and the anticipated production of 325 gpm would make this well one of Riverton’s largest producing wells. Further, the water quality greatly exceeds the initial goal of tapping a water bearing zone with TDS of less than 500 mg/L, set prior to drilling Well 17. The Laboratory Analytical Reports outlining the results of the water sampling are contained in Attachments #7-10 of Dr. Tom Wood’s Construction and Pump Test Report, which is included in its entirety in Appendix G.

As outlined in Dr. Wood’s report, the water samples collected during the pump test meet all the primary and secondary standards set forth by the EPA, with one exception. Only pH at 8.52 to 8.92 was marginally above it’s SMCL of 8.5. As a secondary standard, an exceedance of the SMCL is not hazardous to human health but may cause tastes, odor, color, staining, or other conditions that affect drinking water aesthetics. Effects of pH above 8.5 include slippery feel, soda taste and deposits.

The recommended treatment requirements are chlorine disinfection to address the issues of bacterial growth, water stagnation, and high pH. Chlorine dosing typically creates slightly acidic conditions in the water which will act as a buffer to the existing basic conditions of Well #17. However, the dose of chlorine is not anticipated to be enough to lower the pH significantly below the SMCL of 8.5.
1.6 New Service Areas & Demands

When analyzing the existing pressure zones (Figure 3-1 Existing Pressure Zones & Supply), it became apparent that there is significant development potential in western Riverton, near to and/or surrounded by existing zones, which could be incorporated into the system. Also, the topography of the area indicates that expansion of these zones is possible and population projections indicate future development is probable. To serve these development areas in the future, the corresponding pressure zones have been expanded as shown in Figure 6-1 and described in Section 6.3.

As shown in later sections, there is significant room for growth in these areas. The majority of open ground, however, is currently outside city limits. For these zones to expand as shown, the city will need to annex more ground and/or provide water to more subdivisions outside its corporate limits.

To determine the extent future development would impact the West Riverton system, Keller Associates researched historical population growth trends and then projected growth for each of the areas. According to our analysis outlined in Section 6.4, the key development areas identified in Figure 6-5 contain enough acreage to accommodate all growth for the next 20 years, and at current densities. The projected 2027 populations were then utilized to estimate future water demands in West Riverton, and more specifically, those flows affecting the Improvements and Alternatives presented in this study. The analysis indicates the proposed improvements have been adequately designed in concept to allow growth in the identified areas for the 20-year design horizon of this study.

1.7 Economic Analysis

When a municipality performs water system upgrades that require loans for capital payment, rate increases should be considered to generate funds to payback the necessitated loans. Loan payback could be split among users for whom the project benefits (if the project only benefits a small number of users) or it could be split among all users in the system. If repayment is split among a portion of the users, the formation of a Local Improvement District is needed. Funding sources that could provide financing or grant monies to help pay for these improvement include:

1. Wyoming Water Development Commission
2. Wyoming Department of Environmental Quality – State Revolving Fund
3. State Loan and Investment Board
4. Abandoned Mine Lands
5. Rural Utilities Service
6. Community Development Block Grant

Table 1-1 Economic Rate Analysis illustrates the anticipated increase in operations and maintenance costs associated with each improvement and the necessary monthly user debt service charge that would be needed to make the required loan payment for scenarios of 0% grant, 25% grant, 50% grant, and 67% grant funding. Rates are based upon having only the users that would benefit from the improvement pay for the improvement. This approach of assessing localized rate increases would require the formation of Local Improvement Districts.
Tables
Table 1-1 Economic Rate Analysis

Priority 1 Improvements – West Riverton Improvements 1 and 2  
Residents Served – City of Riverton

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Residents Served – City of Riverton

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Priority 2 Improvements – West Riverton Improvements 4 and 5  
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Priority 3 Improvement – Mountain View Acres Alternative 2  
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<th>0% Grant</th>
<th>25% Grant</th>
<th>50% Grant</th>
<th>67% Grant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Loan Payment</td>
<td>$46,430</td>
<td>$34,823</td>
<td>$23,215</td>
<td>$0</td>
</tr>
<tr>
<td>Annual O&amp;M</td>
<td>$4,500</td>
<td>$4,500</td>
<td>$4,500</td>
<td>$4,500</td>
</tr>
<tr>
<td>Total Annual Cost</td>
<td>$50,930</td>
<td>$39,323</td>
<td>$27,715</td>
<td>$50,930</td>
</tr>
<tr>
<td>Associated Rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase per Customer</td>
<td>$84.88</td>
<td>$65.54</td>
<td>$46.19</td>
<td>$84.88</td>
</tr>
</tbody>
</table>

1WWDC will fund projects related to developing water sources, transmission, and storage. This portion of the project cost funds those portions of the project.

2The City portion is for portions of the project that are not related to water source development, transmission, and/or distribution. In this analysis it is assumed that the no additional grant monies will be acquired for the portion of the project that is not funded through WWDC. Therefore the rate increase could likely decrease with the acquisition of additional grant monies.
### Table 3-2 Estimate of Probable Project Costs, West Riverton Improvement 1

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Final Designs and Specifications</td>
<td>$414,000</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
<td>$414,000</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>$41,000</td>
</tr>
<tr>
<td>Acquisition of Access and Rights of Way</td>
<td>$25,000</td>
</tr>
</tbody>
</table>

#### Cost of Project Components

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 Million Gallon Concrete Reservoir</td>
<td>$2,340,000</td>
</tr>
<tr>
<td>Transmission Piping</td>
<td>$1,099,000</td>
</tr>
<tr>
<td>20&quot; Water Transmission Main</td>
<td>$16,000</td>
</tr>
<tr>
<td>20&quot; Fittings</td>
<td>$49,000</td>
</tr>
<tr>
<td>Fire Hydrants</td>
<td>$20,000</td>
</tr>
<tr>
<td>Surface Repair</td>
<td>$190,000</td>
</tr>
<tr>
<td>Traffic &amp; Utility Coordination</td>
<td>$20,000</td>
</tr>
<tr>
<td>Misc. Piping &amp; Hardware</td>
<td>$16,000</td>
</tr>
<tr>
<td>Pressure Reducing Station</td>
<td>$211,000</td>
</tr>
<tr>
<td>Pressure Reducing System</td>
<td>$2,000</td>
</tr>
<tr>
<td>Misc. Piping &amp; Hardware</td>
<td>$7,000</td>
</tr>
<tr>
<td>Booster Pump Station</td>
<td>$57,000</td>
</tr>
<tr>
<td>Booster Pump</td>
<td>$57,000</td>
</tr>
<tr>
<td>Piping, Fittings, &amp; Valves</td>
<td>$15,000</td>
</tr>
<tr>
<td>Emergency Generator</td>
<td>$64,000</td>
</tr>
<tr>
<td>Building</td>
<td>$34,000</td>
</tr>
</tbody>
</table>

**Construction Costs Subtotal** | $4,140,000 |

**Engineering Costs (10%)** | $414,000 |

**Subtotal** | $4,554,000 |

**Contingency (15%)** | $684,000 |

**Construction Cost Total** | $5,241,000 |

**Project Cost Total** | $6,135,000 |

**2010 Project Cost Total** | $6,779,000 |

---

### Table 3-3 Estimate of Probable Project Costs, West Riverton Improvement 2

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Final Designs and Specifications</td>
<td>$26,000</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
<td>$26,000</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>$3,000</td>
</tr>
<tr>
<td>Acquisition of Access and Rights of Way</td>
<td>$0</td>
</tr>
</tbody>
</table>

#### Cost of Project Components

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well #17 Pump and Connection</td>
<td>$51,000</td>
</tr>
<tr>
<td>Pump</td>
<td>$97,000</td>
</tr>
<tr>
<td>Piping, Fittings, &amp; Valves</td>
<td>$112,000</td>
</tr>
<tr>
<td>Building (30’ x 20’)</td>
<td>$5,000</td>
</tr>
</tbody>
</table>

**Construction Costs Subtotal** | $263,000 |

**Engineering Costs (10%)** | $26,000 |

**Subtotal** | $289,000 |

**Contingency (15%)** | $43,000 |

**Construction Cost Total** | $332,000 |

**Project Cost Total** | $387,000 |

**2010 Project Cost Total** | $428,000 |
### Table 3-4 Estimate of Probable Project Costs, West Riverton Improvement 3

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Final Designs and Specifications</td>
<td>$15,000</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
<td>$15,000</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>$2,000</td>
</tr>
<tr>
<td>Acquisition of Access and Rights of Way</td>
<td>$0</td>
</tr>
</tbody>
</table>

**Cost of Project Components**

- **Booster Pump** $38,000
- **Piping, Fittings, & Valves** $15,000
- **Generator** $64,000
- **Building** $32,000
- **Surface Restoration** $1,000

**Construction Costs Subtotal** $151,000

**Engineering Costs (10%)** $15,000

**Subtotal** $166,000

**Contingency (15%)** $25,000

**Construction Cost Total** $191,000

**Project Cost Total** $223,000

**2010 Project Cost Total** $246,000

---

### Table 3-5 Estimate of Probable Project Costs, West Riverton Improvement 4

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Final Designs and Specifications</td>
<td>$143,000</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
<td>$143,000</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>$14,000</td>
</tr>
<tr>
<td>Acquisition of Access and Rights of Way</td>
<td>$25,000</td>
</tr>
</tbody>
</table>

**Cost of Project Components**

- **Water Transmission Main**
  - 12" Water Main Piping $639,000
  - 12" Fittings $13,000
  - 12" Valves $17,000
  - 8" Water Main Piping $231,000
  - 8" Valves $3,000
  - Water Meters $5,000
  - Fire Hydrants $89,000
  - Misc. Pipe & Hardware $36,000
  - Boring Under LeClair Canal $7,000
  - Utility & Traffic Coordination $24,000
  - Surface Repair $255,000
- **Pressure Reducing Stations**
  - Pressure Reducing System $41,000
  - Misc. Pipe & Hardware $2,000
  - Surface Repair $1,000

**Construction Costs Subtotal** $1,425,000

**Engineering Costs (10%)** $143,000

**Subtotal** $1,568,000

**Contingency (15%)** $235,000

**Construction Cost Total** $1,803,000

**Project Cost Total** $2,128,000

**2010 Project Cost Total** $2,351,000
### Table 3-6 Estimate of Probable Project Costs, West Riverton Improvement

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Final Designs and Specifications</td>
<td>$25,000</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
<td>$25,000</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>$3,000</td>
</tr>
<tr>
<td>Acquisition of Access and Rights of Way</td>
<td>$0</td>
</tr>
</tbody>
</table>

#### Cost of Project Components

- **Riverview Road Water Main Upgrade**
  - **12" Water Main Line** | $177,000 |
  - **12" Fittings** | $5,000 |
  - **Surface Restoration** | $64,000 |
  - **Utility & Traffic Coordination** | $7,000 |

- **Construction Costs Subtotal** | $252,000 |
- **Engineering Costs (10%)** | $25,000 |
- **Subtotal** | $277,000 |
- **Contingency (15%)** | $42,000 |

**Construction Cost Total** | $319,000 |
**Project Cost Total** | $372,000 |
**2010 Project Cost Total** | $411,000 |

### Table 4-3 Estimate of Probable Project Cost, MVA Alternative 2

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preparation of Final Designs and Specifications</td>
<td>$185,000</td>
</tr>
<tr>
<td>Permitting and Mitigation</td>
<td>$185,000</td>
</tr>
<tr>
<td>Legal Fees</td>
<td>$19,000</td>
</tr>
<tr>
<td>Acquisition of Access and Rights of Way</td>
<td>$25,000</td>
</tr>
</tbody>
</table>

#### Cost of Project Components

- **Water Transmission Main**
  - **12" Water Main Line** | $639,000 |
  - **12" Fittings** | $13,000 |
  - **12" Valves** | $17,000 |
  - **8" Water Main Line** | $499,000 |
  - **8" Fittings** | $6,000 |
  - **8" Valves** | $14,000 |
  - **Water Meters** | $16,000 |
  - **Fire Hydrants** | $122,000 |
  - **Surface Repair** | $363,000 |
  - **Misc. Pipe and Hardware** | $41,000 |
  - **Boring under LeClair Canal** | $7,000 |
  - **Utility & Traffic Coordination** | $25,000 |

- **Pressure Reducing Station**
  - **Pressure Reducing System** | $41,000 |
  - **Misc. Pipe and Hardware** | $2,000 |
  - **Asphalt Surface Repair** | $1,000 |

- **Construction Costs Subtotal** | $1,854,000 |
- **Engineering Costs (10%)** | $185,000 |
- **Subtotal** | $2,039,000 |
- **Contingency (15%)** | $306,000 |

**Construction Cost Total** | $2,345,000 |
**Project Cost Total** | $2,759,000 |
**2010 Project Cost Total** | $3,049,000 |
Figures