Burlington Regional Master Plan

Prepared by

January 2007
February 4, 2007

Ms. Vicky Beckman
Wyoming Water Development Commission
6920 Yellowtail Road
Cheyenne, WY 82002

Re: Burlington Regional Master Plan
    Project No. 006-004

Dear Ms. Beckman,

We are pleased to submit the Final Report and the Executive Summary for the Burlington Regional Master Plan, Level II Study. I have noted to you before that the majority of the work for this project was completed by James Gores and Associates. Jim and his associates performed with unquestioned professional competence and deserve the recognition for their excellent work. It was through their efforts that the Project Team was able to complete the Scope of Services as defined within the Contract.

As always we have enjoyed working with the Wyoming Water Development Commission. We look forward to working with Commission and you on future projects.

If you have any questions please don’t hesitate to call.

Sincerely,

TST Inc. of Denver

Robert M. Takeda, P.E.

Enclosure(s): Final Report and Executive Summary– Burlington Regional Master Plan
BURLINGTON REGIONAL WATER MASTER PLAN
LEVEL II STUDY

For The:

Wyoming Water Development Commission
# 05SC0292696

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CONCLUSIONS AND RECOMMENDATIONS

The focus of the Burlington Regional Master Plan is to investigate the current water system and explore the possibility of a rural water system from the Greybull or Basin area to service the Burlington and Otto area. In the course of this planning effort, the following conclusions and recommendations have been reached.

Conclusions

**Burlington System**

*Demand*

- Burlington’s present water system adequately serves its 250 residents.
- Burlington’s population is projected to grow at a rate of 1.5% per year reaching a population of approximately 390 by the year 2035.
- With Burlington’s expected growth over the next 30 years its water demand will be approximately 136,500 gal/day by 2035.

*Water Supply*

- Burlington currently has two shallow alluvial wells for their water supply.
- Burlington’s wells are capable of meeting the projected demands for the next 30 years.
- Burlington’s water supply currently meets the EPA’s drinking water standards.
- Burlington’s wells have the potential of being classified by EPA as “groundwater under the influence of surface water”, triggering a requirement for filtration treatment.
- There is presently no identifiable alternate groundwater source in or near the Burlington area that would provide adequate quantities of acceptable quality potable water.
- The town’s wellhead protection plan has never been formally adopted by the Town Council.
Water Treatment

- Currently Burlington’s treatment with chlorination alone meets regulatory requirements.

Transmission System

- The town’s well house is located approximately 2 miles south of Burlington.
- The well pumps and tank level are adequately controlled by a radio link telemetry system.
- An 8-inch transmission line originates at the well house and extends to the town’s single storage tank approximately 1 mile north of Burlington. A return transmission line originates at the tank extending to town.
- The transmission lines have adequate capacity to meet both forecast fire suppression and peak hour domestic demands for the coming thirty years.
- Both of Burlington’s transmission lines are PVC, approximately 20 years old and in sound condition.

Distribution System

- The town’s distribution system, constructed of adequately sized PVC lines, is less than 20 years old and is in sound condition.
- The hand written method of gathering water readings is labor intensive and can introduce errors.

Storage System

- Burlington’s single 250,000 gallon water storage tank has adequate capacity to meet domestic demands, but not fire demands, for the coming thirty years.
- The present storage volume is approximately 150,000 gallons short of the recommended volume to meet the fire flow demand generated largely by the town’s school.

Rural Service Area including Burlington

The preferred alternative selected by Burlington and the rural area residents proposes to provide service to the Greybull Valley starting at Greybull and
extending to Burlington and would serve Burlington as well. Residents of the area struggle to provide their domestic water needs. Most wells in the area are of marginal quality and many residences have to haul potable water from either Greybull or Basin. Study of this area’s domestic water needs has yielded the following conclusions:

- The cost to provide a piped potable water system to this area will be approximately $130/month/residence.
- Significant additional construction grant assistance will be needed for the project to achieve the Big Horn Regional Joint Power’s Board (BHRJP) goal of offering a user rate of $50/month/residence.
- Minimal environmental issues accompany the implementation of the preferred alternative adopted by both Burlington and the rural representatives on March 14, 2006 and affirmed July 6, 2006 at those respective meetings.

**Demand**

- The current 2006 service population including Burlington is approximately 460 people, with a water demand of approximately 160,000 gal/day.
- By the year 2035, this population is estimated to grow to 720 people with an average demand of 220,000 gal/day.
- The proposed Dorsey Creek subdivision and perhaps other areas may become future subscribers on this system. These demands are discussed in the area water master plan later in this report.

**Water Supply**

- The BHRJP is the most favorable source of supply for this service area. No other economically feasible source of supply has been identified in the area.
- The BHRJP has expressed reservations as to whether this area’s demands can be accommodated through the regional system’s current wells.
- A study is currently underway to quantify the total supply capacity of all the wells feeding into the BHRJP system. Results of that study were not available as of September 2006.
Treatment

- If supply is obtained from BHRJP no additional treatment will be needed.

Transmission System

- A 22-mile long 12” PVC waterline served by three separate pump stations will be needed to transfer water from Greybull to Burlington and serve the intervening residences.

Distribution System

- Distribution systems off the main transmission line may be desirable at some time in the future. Because there was no clear indication from groups of residences requesting service away from the main transmission line, no local distribution systems were planned into the system. The single exception is a single loop of distribution line serving Otto.

Storage System

- A series of three separate 150,000 gallon storage tanks, accompanying the three pump stations, will be needed on the system.

Recommendations

Burlington

The following recommendations are made to meet Burlington’s potable water demands through the year 2035.

1. Install a rate-of-flow control valve on the feed water line for the lagoon chlorination system that will allow a maximum five (5) gpm flow through the chlorine injector. This will save the town substantial pumping costs by cutting the town’s current water production demand nearly in half during the two month-long lagoon discharge period.

2. Formally adopt the town’s already published Wellhead Protection Plan.

3. Improve the accuracy and automation of the water accounting system by adding automated meter reading technology to all service lines and the pump house master meters. This should increase revenues and allow identification of system water use anomalies and problems.

4. Preserve and extend the ditch water irrigation system in town. This will remove the irrigation load that would otherwise have to be supplied from the potable water system.
5. Develop a contingency plan for construction of a water filtration plant or tying into the Big Horn Regional system in the event that EPA classifies the town’s water supply as being groundwater under the influence of surface water.

6. Add an additional water storage tank of 150,000 gallons to provide recommended fire flow storage or work with the school district to add fire sprinklers to those portions of the school building that do not currently have them.

7. Replace the present well pumps when the town starts to experience water shortages due to lack of pump capacity.

**Implementation**

Implementation of the above recommendations will enhance Burlington’s capacity to meet potable water demands over the coming 30 years. The prioritized implementation of recommended improvements is given in Chapter 8.

**Rural Service Area**

The following are recommendations made to meet the rural area’s demands through the year 2035:

1. Burlington and Big Horn Regional Joint Powers Board come to agreement on granting Burlington a seat on the board by March 2007.

2. The residents along the proposed transmission line must become a legal entity either by forming a separate water district or joining the South Big Horn Water District (SBHWD) with that district’s concurrence. This action will require agreement on a proposed district boundary followed by a vote of those property owners within that boundary. It is recommended that this be accomplished by May 2007.

3. Identify a water supply of approximately 250,000 gallons per day that could be added to the BHRJP supply to augment the Burlington region’s demands.

4. By July 2007, identify and apply for any additional grant funding that could be brought into the project to bring resultant water rates closer to the targeted $50 per month.

5. By August 2007, apply to the Wyoming Water Development Commission and RUS for funding to design and construct the proposed system and develop its water supply.

6. Assuming the Wyoming Legislature appropriates funding to the project, select a design engineering firm by June 2008.
7. February 2008, hold bid opening for the project.

8. November 2008, complete construction and put system into service.
CHAPTER 2

SERVICE AREA IDENTIFICATION AND POTABLE WATER DEMAND FORECASTS

Introduction

West central Big Horn County, Wyoming is a sparsely populated area of irrigated agriculture land. Geologically, the area is a mix of ancestral river bottoms and terrace benches separated by badland erosion breaks. The river bottoms and benches are typically underlaid with alluvial gravel, which is covered with approximately two feet of clay loam topsoil. The arable lands lie mostly along the Greybull River Valley and on a plateau called Emblem Bench. Three small communities are in the area: Burlington, Otto, and Emblem. Figure II-1 shows a map of the area. With its population of about 250 people, Burlington is the largest community. It is also the only incorporated community in the area. Otto is the second largest community with a population of approximately 30 people. Emblem has less than ten people.

The area is roughly 20 miles east-west by 14 miles north-south. Potable water is obtained exclusively from shallow wells drilled into the underlying alluvial gravels. The geographic area initially considered for this planning effort was roughly bounded by the communities of Basin, Otto, Burlington, Emblem, and Greybull.

The objective of the Wyoming Water Development Commission (WWDC) in this planning project is twofold. First, Burlington needs a water master plan to address population growth and water supply issues faced by the town. Second, the WWDC wants to determine the feasibility of providing a central rural water system by extending the Big Horn Regional System to serve the Burlington/Otto area. It is assumed that the Big Horn Regional System has sufficient capacity to service the system alternatives (Alternatives 2, 3, and 4) as described in Chapter 4.

Identification of Service Area and Demand Projections

The first task of the planning team was to decide upon the area being studied. Once the geographic area was identified, the team started the task of estimating the potable water demand that needed to be met within the area. Quantifying the total demand first required determining the probable number of people that would be served in the coming 30 years. Second, the location and number of service connections had to be estimated. This information then allowed the project team to plan where potable service would be needed throughout the study area and to quantify the amount of water that is expected to be needed in the different segments of the service area. In short, the team determined how much service was needed and where.
Selecting Service Area to be Studied

Initial inquiries into the feasibility of serving the study area found that there was little interest in a central water system and very few potential subscribers in the Emblem area. As a result, it was decided that the planning effort would be focused on an area including Burlington and the eastern end of the Greybull River Valley. This represents an area of some 80 square miles of arable agricultural lands. The task then faced by the planning team was to determine the potential service population in this region. With the aid of data from the Big Horn County Planning Office, a population forecast approach was formulated as explained below.

Forecasting Population and Projecting Demand

Population forecasts for rural Big Horn County were determined by the Department of Administration and Information as well as information from two separate studies. The first study, prepared in 1996 by HKM Engineering, and the second study in 2004 by Peterson Planning Group, used a 1.5 percent annual growth rate to forecast Burlington’s population. This growth rate, originally forecast in 1996, has proven accurate over the last 10 years. Based on those studies and the proven historical growth rate, a 1.5 percent annual rate of growth was adopted for use in this planning study for both Burlington and the rural area covered by this study.

The planning team also needed to determine the current and future potable water demand within the selected planning area. With the mapping of the location of rural residences provided by the Big Horn County Planning Office, the team was able to determine the number of potential services along different water transmission line routes. These routes are:

1. Basin to Otto and then to Burlington, or
2. Greybull to Otto and then to Burlington.

These routes are described in detail in Chapter 4, Identification of Alternative Regional Solutions.

The forecasting of water demand was made for two entities: 1) Burlington itself, and 2) the rural region. Based on the population forecasts for these two entities, the planning team forecast total potable water demands for the region.

In addition, the mapping information from Big Horn County allowed potential transmission pipeline that would serve the greatest possible number of present-day subscribers along the two previously mentioned routes to be determined.

For planning purposes, a maximum day demand of 350 gallons per person was used throughout this report to quantify maximum day water demand. That demand level can vary greatly depending primarily on summer irrigation usage. Nonetheless, 350 gallons per day is characteristic of maximum day demands found on metered water systems in Wyoming. It bears mentioning that 350 gallons per day includes irrigation use in most areas. However, Burlington has an irrigation ditch system in place for watering lawns and gardens. The communities can recognize cost savings to the extent that they can keep the ditch irrigation in place.
The planning area has the potential of being served by a single system or some combination of systems. From a pipeline service viewpoint, five geographic sections within the planning area could each be separate service areas or be linked together in a combination of ways. Those geographic areas are:

- Greybull Valley from Greybull to Otto
- Basin to Otto
- Otto Only
- Greybull Valley from Otto to Burlington
- Burlington Only

The population and forecast water demands of each of these areas are discussed in the following paragraphs. For planning purposes, it is assumed that there is an average of three people per residence.

**Greybull Valley from Greybull to Otto**
The lowest end of the Greybull River Valley near the Town of Greybull is served by a small rural potable water system. In concept, that system could be extended upriver to Otto. There are 31 residences between the end of the present system and Otto. The potential service population is estimated to be 93 people, with a maximum day demand of 33,600 gallons. It is assumed that the Greybull system has sufficient capacity to handle this conceptual design.

**Basin to Otto**
An alternative to a line from Greybull could be a supply line beginning at Basin and extending to Otto. The first several miles of this route are largely uninhabited. However, in February 2006, Big Horn County approved a preliminary plat for a 135-lot subdivision known as the Dorsey Creek Ranch Subdivision. It is located approximately mid way along the highway from Basin to Otto. The subdivision occupies some of the Greybull River bottom north of Highway 30 just east of the Greybull River Bridge. At present, the subdivision has no occupants. Should this subdivision become fully occupied, it will be, by far, the largest number of service points in the area, rivaling the Town of Burlington.

At present, there are 11 residences between Basin and Otto, with an estimated service population of 33 people and a maximum day demand of 11,600 gallons.

**Otto**
The small community of Otto, located 12 miles west of Basin, is unincorporated. This community is comprised of approximately 12 homes, with a current estimated population of 36 people and a maximum day demand of 12,600 gallons.
Greybull Valley from Otto to Burlington
The sparsely populated Greybull Valley between Otto and Burlington along the conceptually routed pipeline has 27 residences with an estimated service population of 81 people and a maximum day demand of 28,000 gallons.

Burlington
In 2005, the Town of Burlington had 115 water service taps. Four of the 115 taps are the local school, and two more service the café and the town sewer lagoon. The remaining 109 taps serve the Town of Burlington’s residential population of 250. At a maximum day demand of 350 gallons per capita, the town’s water demand would be approximately 88,000 gallons.

The Town of Burlington encountered a demand for buildable lots in the town. Private development was not forthcoming. To accommodate demand for residential lots, Burlington itself platted town owned acreage on the northwest corner of town into 70 residential lots in 2004. The subdivision is named the Husky Addition. The first phase of the addition borders current developed lots on Farmers Street. The development will continue west in phases to meet demand for residential lots. The town is presently installing utilities in the first phase of that development. For purposes of this plan, it is assumed that the availability of this development will not stimulate growth in excess of the forecast annual growth rate adopted in this plan.

Total Forecast Population and Water Demand

Using the 1.5 percent population growth rate, the following service population and demand was projected:

Table II-1
Current and Forecast Year 2035 Potable Water Demand

<table>
<thead>
<tr>
<th>Area</th>
<th>2005 Population</th>
<th>2005 Maximum Day Demand (Gal.)</th>
<th>2035 Population</th>
<th>2035 Maximum Day Demand (Gal.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greybull to Otto</td>
<td>93</td>
<td>32,600</td>
<td>145</td>
<td>50,800</td>
</tr>
<tr>
<td>Basin to Otto</td>
<td>33</td>
<td>11,600</td>
<td>52</td>
<td>18,200</td>
</tr>
<tr>
<td>Otto</td>
<td>36</td>
<td>12,600</td>
<td>56</td>
<td>19,600</td>
</tr>
<tr>
<td>Otto to Burlington</td>
<td>81</td>
<td>28,400</td>
<td>127</td>
<td>44,500</td>
</tr>
<tr>
<td>Burlington</td>
<td>250</td>
<td>87,500</td>
<td>390</td>
<td>136,500</td>
</tr>
</tbody>
</table>

The pipeline will not be constructed from both Basin and Greybull; thus, only one of the first two demands listed in the table would be supplied. For planning purposes, the higher demand was used. As a result, the total demand in the year 2035 is forecast to be 251,400 gallons per day serving a total population of 720 people. These forecast populations and their associated potable water demands are used as the demand basis throughout the remainder of this report.
**Fire Flow Demands**

The Insurance Services Office (ISO) standards, under Wyoming DEQ regulations, are used to determine fire protection demands. Those standards are based on building size and type of construction. For Burlington, the highest demand and highest value building is the school. Its fire demand is approximately 3,000 gpm. This demand affects both water storage requirements and the needed line size from the town’s tank to the school. It does not significantly affect the quantity of water that the town needs to plan to provide on a daily basis.

Firefighting demand for the rural area is approximately 1,500 gpm. This demand is based on the flow needed to fight a typical residential fire. Neither Otto nor the rest of the rural area have structures that are significantly larger than or require greater fire flow capacity than does a private residence.

**Land Use Considerations**

**Zoning**

Big Horn County does not have an adopted land use zoning in the study area at this time. The County Planning Office said that there are no restrictions at this time regarding use of private land.

**Existing Land Use Plans**

The Big Horn County Planning Office was contacted regarding land use planning issues and any county zoning considerations that may influence this potable water master planning effort. Big Horn County has an adopted land use plan in place for western Big Horn County. The plan addresses basic land use issues such as mapping arable lands, categorizing present land uses, identification of known surface water and groundwater resources, identification of soils amenable with septic systems, and similar inventory type information. The land use plan does not place any known restrictions on implementation of any of the outcomes of this domestic water planning study.

**Summary**

In summary, the potable water demand for the study area is expected to be a maximum of approximately 0.25 million gallons per day at the year 2035.

Should the Dorsey Creek Ranch Subdivision fill with occupied homes before 2035, its demand could equal that of the Town of Burlington. Presently, however, there is no information to indicate that this is likely. For purposes of this study, the presence of this development (still in the platting stage) and Burlington’s 2004 platted Husky Addition are being treated as part of the source of the service area’s overall forecast growth rate of approximately 1.5 percent per year.

The next chapter discusses the Town of Burlington’s present water system and its operation and maintenance.
CH3TER 3

Evaluati0n of Burlington’s Existing System

System Overview

Burlington’s potable water system currently produces enough water to meet the needs of the town’s 250 people. Burlington will need to increase its water supply to meet the projected 2035 population of 390 people. The present combined pumping capacity of the town’s two wells is approximately 110 gpm. This quantity of water will supply approximately 380 people, assuming a 350 gallon per person per day maximum demand during summer months. To meet increased demand, the town’s well production could be increased with relative ease by simply installing larger pumps in the two town wells. The wells had a reported tested capacity of 300 gpm at the time the wells were drilled.

Burlington’s water supply currently meets EPA standards. Because the current supply is from shallow alluvial (river gravel deposit) wells, there is a potential that the supply may fall out of compliance in the future. The 35-foot depth of the wells provides a comparatively thin layer of protection between the ground surface and the water level of the wells. Compliance could be threatened in two ways: first, if a future microscopic particulate analysis (MPA) test were to show organic particles in the well water; and second, if nitrates were to become too high.

A positive MPA test could result from fragments of any organic material such as a microscopic organism, leaf fragment, or anything else that was once living. The threat is that microscopic pathogens could attach to the particles, fail to be killed by chlorination treatment, and cause a waterborne disease outbreak. If a positive MPA test occurs at some future date, this supply could be classified by EPA in the future to be “groundwater under the influence of surface water.”

Should this happen the town would have to either build a water treatment plant or find a new source of supply. The plant’s purpose would be to filter the water and remove all such material. This would be a complex and costly addition to the system reflected as a substantial rate increase to the users.

A second risk to Burlington’s water supply, again because it comes from a shallow alluvial aquifer, is the nitrate level in the groundwater. Nitrates can cause “blue baby” syndrome in infants, which can be deadly. Because agricultural fertilizers applied to the adjoining croplands contain nitrogen, the excess nitrogen could travel down through the soil and into the underlying gravels from which the town wells pump water. Should nitrates rise above EPA’s limit, as is now the case in some other nearby wells, it would render the town’s supply out of standards.

If Burlington’s water supply falls out of EPA compliance for nitrates in the future, it will have a major impact on the complexity of the town’s water treatment system. Because the required treatment system would be quite costly, the cost of supplying water for Burlington
residents would significantly increase. If the required water testing shows at some future time that either nitrates or organic contaminates exceed EPA standards, it could trigger a requirement to build a treatment plant to remove the offending contaminates. That would be very expensive, as discussed later in this report.

**Water Supply Capital Components**

Burlington’s current potable water system is made up of five components. These include:

- Two Shallow Alluvial Wells
- Pump House
- Chlorination Facilities
- Transmission System
- Water Storage Tank

**Wells**

Burlington’s two shallow alluvial wells (identified as Well No. 3 and Well No. 4) are located southwest of town. Both wells are cased with 7-inch diameter steel casing and have v-slot well screens, submersible pumps, and pitless adapters. Both wells produce from the Willwood formation. Based upon the December 1996 Final Report produced by HKM, Well No. 3 is 34.5 feet deep, and Well No. 4 is 36 feet deep. The wells are spaced so close together that the drawdown from either well affects the production of the other. In operation, the two wells could be considered one due to the direct influence each has on the other. Because of the close spacing of the wells, it is not efficient to run the pumps simultaneously.

**Pump House**

The pump house is situated between the two wells. It contains piping manifold, electrical control system, and radio controlled telemetry system. The radio controlled telemetry system relays the water level signal between the town’s water storage tank and the pump house. The electrical control panel operates both the pumps and the telemetry system. The control system also senses any problems within the system, such as a pump start failure or a chlorine gas leak. The set point to turn the lead well pump is set at 24 feet of storage in the water tank; the second pump comes on at 23 feet. The well pumps shut down when water level in the tank reaches 31 feet.

**Chlorination Facility**

Attached to the pump house is a small, package-type chlorination building. It houses a Scaletron chlorination system with two 150-pound bottles of chlorine gas. The building meets all requirements for handling chlorine gas, including being airtight and equipped with an exhaust system to remove any leaking chlorine gas.
Transmission Line

From the well site, an 8-inch PVC water transmission line moves water from the well house to the storage tank located approximately 2¼ miles north of the well house and 1¼ miles north of town. This line ties into the town water distribution system at Lane 38 and on Husky Avenue. This line was installed in 1997 to provide adequate chlorine contact time prior to water reaching the first town customer. The original 8-inch PVC transmission extends from the tank back to town along Highway 30 (Main Street).

Water Storage Tank

Burlington’s single water storage tank has a capacity of 250,000 gallons. It is above ground and stands 32 feet tall. It is of bolted construction and was manufactured by Peabody Tectank in 1989. The overflow elevation of the tank is 4,564.5 feet. Its normal operating elevation provides a static pressure of 52 to 66 psi to the Town of Burlington. Its capacity is sufficient to achieve a fire flow demand of 750-gpm for 2 hours.

Storage requirements are commonly calculated by summing:
1. one average day’s flow, plus
2. fire flow, plus
3. equalization demand for six hours.

The fire flow requirement for the Burlington school, however, is approximately 3,000 gpm, totaling 360,000 gallons for a two-hour fire. The present population of Burlington is 250 people, equating to an average day demand of 25,000 gallons. Equalization flow is estimated to be 16,000 gallons. This yields a total recommended storage volume of about 400,000 gallons. This is nearly three times the town’s current storage capacity. Recognizing that 90 percent of this demand is fire flow for the school, it may be advisable to explore options to reduce storage demand. Because buildings with fire sprinkler systems contribute little or no fire demand, it may warrant expanding the school’s fire sprinkler system to reduce demand.

System Operations

The Burlington system is well operated. The Town of Burlington staff is comprised of a full-time Public Works Director and part-time City Clerk. The Public Works Director is responsible for the potable water system, the wastewater system, street improvements, parks, and animal control. Based upon conversations with the town, the Public Works Director devotes approximately 30 percent of his time to the potable water system. This time is spent on maintenance of the system and making needed adjustments to the pumping and chlorination equipment. The well house, chlorination system, and water storage tank are very well maintained and orderly, demonstrating the degree of care given by the Public Works Director.

The Director also collects the monthly water service and pump meter readings. These readings are given to the City Clerk for entry into the water billing software. The City Clerk works half days, five days a week. Typical of small towns, the clerk handles utility billing
and all town administrative work such as general accounting, handling public inquiries, preparing for and keeping minutes of town council meetings, and public relations matters.

The recording and billing of the potable water utility is aided with the use of a proprietary utility billing software written by Cascell. The software is programmed with the town’s water rates and produces water bills based on usage. The clerk must input the parameters needed to compensate for meter readings on taps larger that ¾ inch, which record usage per 100 gallons by multiplying readings by a factor of 10.

Burlington’s average monthly water usage is 1.8 million gallons, based upon well production records for the fiscal year of 2004, which ended in April of 2005. The water consumption data obtained through the billing software was not used in its entirety because of skewed data from the meter at the town’s sewer lagoon. Instead, the well production records, because of their better accuracy, were used to determine the town’s average monthly water usage.

The engineer on this project spent a lot of time attempting to reconcile the total of all service meter readings with the well production records. It was eventually determined that a small number of meters (three or four) were being incorrectly interpreted in the water billing software due to misinformation entered in the software. The major finding was that the town’s wastewater chlorination system at the sewer lagoon was, and still is, using a very large volume of water. In some months, its usage nearly equaled that of the rest of the town. The town typically discharges and chlorinates only for a few months in the fall. Figure 3.1 graphically shows the usage spikes.

The billing software issues have been corrected. The town is also in the process of finding a more efficient means of chlorinating the wastewater lagoon discharge.

**Figure III-1**

![2004 Fiscal Year Produced Water](image)

**Burlington Regional Water Master Plan Level II Study**

III-4
Maintenance

The Town of Burlington handles all routine maintenance on its water system. The town’s maintenance program has been very effective, and has not had any major breakdowns of the system. However, the engineer preparing this report urges the town to keep more complete maintenance records. A working diary needs to be kept to record times and dates of equipment repairs and replacement. An equipment log would be an efficient way to record the vendor name, location, and address of purchased equipment and the price paid. The use of a written maintenance schedule is also encouraged so that anyone on the town staff could follow what has been done with the system and when. It would also set out a planned maintenance routine. Recording chlorination feed rates, residuals, and their corresponding dates is also encouraged.

With the documentation of these processes, the efficiency of the system can be increased through the ability to go back and see what has been done. These records would allow preventative maintenance activities to be accomplished that could reduce energy repairs, thereby providing an economic benefit.

Management

Currently, Burlington’s water system is well managed. The water rates are generating enough revenue to cover all water system expenditures. However, pump readings at the well house occur at times convenient to the operator. As stated earlier, it would be advisable to develop a schedule for reading the pump at the wells. This would enable the pump readings to coincide with the residential and commercial service meter readings. A precise and organized inventory of every meter, its brand, size and whether it reads in 10’s, 100’s, or 1000’s of gallons would also aid in accurate comparisons between the pump house and the service meter readings. This would give the town clerk a better understanding of when to apply the multiplying factor of ten to the water usage in the billing process also.
CHAPTER 4
IDENTIFICATION OF ALTERNATIVE REGIONAL SOLUTIONS

Introduction

In this chapter, the alternatives for supplying potable water to western Big Horn County are identified. These alternatives address the service needs identified in Chapter 2, “Identification of Service Area and Demands.” The general configurations of the systems needed to supply water are discussed. This includes line sizes, pumping requirements, and a map depicting each individual alternative. Alternatives for connecting into the Big Horn Regional Joint Powers Water System are included in these alternatives. In the next chapter, an evaluation of each of these alternatives, including their comparative costs and the resultant monthly water rates, is discussed.

The alternative system segments and geographic segments can be serviced with the following five alternatives:

1. Alternative No. 1 Burlington only
2. Alternative No. 2 Basin to Otto
3. Alternative No. 3 Greybull Valley from Greybull to Otto
4. Alternative No. 4 Greybull, Otto, and Burlington
5. Alternative No. 5 Burlington and Otto

These alternatives are more fully described in the rest of this chapter and are shown in the maps.

Alternative No. 1 – Burlington Only

Under this concept, Burlington would remain a stand-alone system serving the town’s population of 250. At a maximum day demand of 350 gallons per capita, the town’s water demand would be approximately 88,000 gallons per day. The town’s system serves a year 2005 population of 250 people. There are 115 services, 109 of which are residential. The remaining services are the school, businesses, Town Hall, and the town wastewater lagoon.

The system’s primary deficiency is adequate storage to provide recommended levels of fire flow storage, as discussed in Chapter 3. At present, the Burlington wells provide water meeting EPA drinking water standards. However, that supply is at possible risk of falling out of compliance at no fault of the town. Both the capital components of the Burlington system and its operation are discussed in some detail in Chapter 3 and will not be repeated here. If Burlington remains a stand-alone system, its operation will continue to be handled as it is now. Chapter 8 gives a Master Plan of Burlington’s future water system needs.
**Alternative No. 2 – Basin to Otto**

Under this alternative, a potable water system would connect to the Big Horn Regional Joint Powers System at Basin and serve Otto and the rural area west of Basin. In concept, a 12 mile-long 8-inch PVC transmission line would tie Basin to a 150,000-gallon storage tank placed near Otto.

There are two underground storage tanks on the Basin system, which are located approximately one mile west of town. They have a high water level (HWL) of 4,010 feet in elevation. In concept, the tank at Otto would be placed at an elevation of approximately 4,180 feet and would be 32 feet tall. The elevation at Otto is 4,160 feet. With the proposed tank in Otto placed at an elevation of 4,180 feet, this would give a HWL elevation of 4,210, creating a total static change in elevation of 200 feet above Basin’s system. With this elevation difference, the system’s pump station would have to produce a pressure of 80 pounds per square inch (psi) to fill the storage tank at Otto. This pressure would only be produced while pumping. The average pressure when the pump is off would be 50 to 60 psi, which is considered adequate for proper operation of modern water using appliances.

The system’s pump station would need to be placed where there is positive pressure in the transmission line. Conceptually, the pressure station would be placed near the existing tanks west of Basin on BLM land. Because of the length of required transmission line and required conveyance time between the tanks at Basin and Otto, it is assumed that a chlorinating booster station will be needed. The system would be controlled through a radio telemetry system.
Alternative No. 3 - Greybull Valley from Greybull to Otto

Capital Components

This alternative explores the possibility of tying into the Big Horn Regional Joint Powers System at the Town of Greybull’s south water tank located above the Greybull River. From there, water would be pumped to the community of Otto.

Greybull’s south tank is located approximately 1½ miles west of Greybull and is 32 feet high with a high water elevation of 3,983. A pump station would be built at a convenient location below this tank on BLM land and would pressurize the first leg of a 12-inch PVC water transmission line to Otto. It would then extend 12.5 miles along the Greybull River Road to Otto. Two pressure stations and two storage tanks have been included in the conceptual system, one being located in Otto on private land, and one located halfway between Greybull and Otto on BLM land.

Because of the 230 feet of elevation increase between Greybull and Otto, two tanks and pump stations are conceptually planned. This configuration provides normal service pressure. The two pump systems would each be required to pump to overcome the 115-foot elevation difference and would range from 20 to 25-horsepower (hp). Greybull’s above ground water storage tank has a high water level elevation of 3,980 feet. The conceptual tank for Otto would have a high water level elevation of 4,210 feet. The intermediate water storage tank would have a high water elevation of 4,095 ft. The total elevation was reduced by half to control the pressure within the system so that it would be suitable for residential homes. Because of the length of water transmission line, two chlorinating boosting stations were included along the water transmission line. The system would be controlled using radio telemetry.
Figure IV-3 Alternative No. 3 Greybull Valley, Greybull to Otto
Alternative No. 4 – Greybull, Otto, and Burlington

Capital Components

This alternative is an extension of Alternative 3 – Greybull to Otto. This is the most extensive conceptual system studied in this Master Plan. It services the entire rural population of 175 people along its route as well as the communities of Otto and Burlington with their populations of 36 and 250 respectively giving a total present service population of 460 people. It consists of a 22-mile, 12-inch PVC transmission line that extends from the Town of Greybull storage tank to Otto and on to Burlington. A 12-inch diameter was selected for the transmission line to reduce friction losses and pressures in the system. The total elevation difference between Greybull’s water storage tank and Burlington’s water storage tank is 580 feet. Two pressure stations and two storage tanks have been included in the conceptual system, one being located in Otto on private land, and one located halfway between Greybull and Otto on BLM land.

Conceptually, the elevation difference will be overcome by stepping through three pump stations as shown in the accompanying drawing. The elevation difference between each pressure station is approximately 185 ft. This would give a maximum pressure in each zone of 85 psi, which is an acceptable operating pressure for PVC pipe and for residential service. The pressure stations are planned to be located near each storage tank. Each tank would be above ground, have a height of 32 feet, and have a storage capacity of 150,000 gallons. It is estimated that the system would also require two chlorination-booster stations. The locations of these stations would require further analysis beyond the scope of this project. The system would be controlled with radio telemetry.
**Alternative No. 5 – Burlington and Otto**

Capital Components

Under the conceptual design of this system, water service from Burlington would be extended to Otto using Burlington as the source of supply. This system would incorporate the rural residences along the route between Burlington and Otto, about 80 people, as well as those in the community of Otto with about 36 people. The system is not as technically complex as the other alternatives since no pumping station would be required to deliver water downhill from Burlington to Otto. The system consists of a 10-mile long, 8-inch PVC water transmission line connecting the two communities, a pressure reducing station, a chlorination booster station, and a storage tank at Otto.

The high water elevation of Burlington’s water storage tank is at an elevation of 4,560 feet. The conceptual high water elevation for the tank in Otto would be 4,210 feet. The Otto tank would require being fitted with an altitude valve to control its level. The Burlington tank would be 350 feet higher than the one proposed near Otto. This creates positive flow to Otto and a pressure increase of approximately 150 psi. This pressure would be too high for residential homes, so a pressure-reducing valve (PRV) would be required to lower pressure to a manageable level. The PRV would need to be configured to provide a static pressure of 80 to 85 psi. This corresponds to a location along the transmission line that is half of the elevation difference between Burlington and Otto.

Burlington’s water is currently treated with chlorination. It is assumed that a chlorination boosting station would have to be included because of the line’s length and water’s travel time between Burlington and Otto. Little if any additional radio telemetry would be required to operate this system.

System Operation and Management

The conceptual management of this system does not include becoming part of the Big Horn Regional Joint Powers system. The current staff of Burlington would instead manage this system. The extra time that would need to be devoted to this system may require an additional part-time staff person to handle the increased size of the system. For planning purposes, it was assumed that Burlington would be responsible for billing, operation, and maintenance and would determine the water rates for all users.
The five alternatives identified in this chapter each have their own unique advantages and drawbacks. As discussed in this chapter:

- three of the alternatives rely on the Big Horn Regional Joint Powers Water System as their source of supply,
- Two alternatives rely on the existing Burlington system for a source of supply.
- The three systems relying on the Regional supply require pumping, and
- The two systems relying on Burlington’s supply require no pumping other than Burlington’s present well pumps.

Each alternative could meet the potable water supply needs on its respective service area. The question to be answered is which of these systems best meets the area needs and does so at the least cost. That question is answered in the next chapter.
Chapter 5

Evaluation of Alternatives

Evaluation Method

This chapter presents the evaluation of each of the five alternatives identified in Chapter 4. Each alternative project is a possible way to meet potable water needs of western Big Horn County. Each alternative will be discussed in the same order as it was presented in Chapter 4. The pros and cons of each alternative will be discussed on an individual basis, followed by, the number of households the alternative will serve, its total cost, and the estimated monthly cost per residence.

For consistency in the evaluation approach, services on pipeline alternatives Nos. 2, 3, & 4 would be provided only to those residences in the proximity of Wyoming Highway 30. This would provide the “backbone” for what may eventually become a more extensive system comprised of spur lines serving additional customers all fed from the transmission main. There is capacity in the planned system to provide that added service. However, for consistent analysis of costs among alternatives this basic assumption was made. There are simply too many “what if” possibilities to be able to consider those in a consistent and meaningful manner.

Financial Assumptions

At mid-point of this project, during the 2006 legislative session, the legislature revised the Wyoming Water Development Commission’s funding formula to provide funding on a 2/3 grant, 1/3 match basis. Prior to that, the funding level by WWDC was 60% grant. Funding estimates prior to early 2006 were presented to the residents of the Burlington region on a 60/40 funding basis. In spite of this funding shift the comparative ranking of the alternatives did not change.

The estimated user rates presented in this chapter are based on the following funding assumptions:

- Wyoming Water Development Commission grant funding 2/3 of costs.
- USDA Rural Development Services grant funding 20% of the remaining 1/3.
- A USDA Rural Development Services loan at 4½% for 30 years for the balance.

When applied to the total project cost this funding arrangement results in a total of 73.35% grant and 26.65% loan.

Other sources of funding may eventually be brought into the project to lower the cost to the users. Those sources and the estimated amounts of possible funding are discussed in Chapter 6. There is no assurance that any of the additional sources of funding will be available to the project. The WWDC and RUS funding shown above, however, are expected to be available.
Therefore, for the purposes of simply comparing the monthly water rates of one alternative versus any other, the above funding mix is used in this chapter. Should any additional funding be made available, it will lower the estimated cost to the users, but will not change which of the alternatives is less costly than another.

Comparison of Costs

Following is the evaluation of the alternatives identified in Chapter 4, and discussed in the same order. The advantages and disadvantages of each alternative are discussed. The conceptual cost estimate for each alternative is presented in 2005 dollars. These estimates are conceptual only and were prepared only with enough detail to competently rank the water rate outcome of the alternatives from most expensive to least expensive.

The costs given in this chapter are significantly below current costs because in mid-2006 pipeline construction costs escalated substantially. Still the comparative rank ordering of costs is valid. The escalation of costs experienced in 2006 was across the board and has not changed the comparison of which alternative is more or less expensive than any other.

Alternative No. 1 – Burlington Only

Burlington may remain a stand-alone system, which it can do if the supply remains in compliance with EPA drinking water standards, as discussed in the previous chapters. The town’s system serves a year 2005 population of 250 people. There are 115 services, 109 of which are residential. The remaining services are the school, businesses, Town Hall, and the town wastewater lagoon. At a maximum day demand of 350 gallons per capita, the town’s water demand is estimated to be approximately 88,000 gallons per day.

Burlington’s present water supply comes from shallow alluvial wells in the Greybull River alluvium (gravels). This supply currently meets the EPA standard for drinking water. Because of the shallow depth to the water table, only 20 feet, Burlington faces the possibility of having its water supply be categorized as “groundwater under the influence of surface water” under EPA criteria. Presently, the water supply is in compliance. Additionally the gravels in which the wells are drilled are very porous and may easily allow contaminants to reach the water. Should contamination be detected in the microscopic particulate analysis (MPA) tests that the community is required to regularly conduct, the town’s supply would be classified as “groundwater under the influence of surface water”. Under EPA rules, treatment would then be required just as if the water source were coming from the Greybull River itself. This would require the town to construct a water treatment plant to treat the well water.

The primary economy in the immediate area of Burlington is farming and ranching. With fertilizer use in the area to aid in crop production, nitrates can seep through the overlying soil and into the well water. One of the annual tests conducted for the EPA is for nitrates. Again, the town’s well supply meets EPA nitrate limits and nothing indicates that will change in the
foreseeable future. This risk is pointed out because the geology of the Burlington area alluvium lends itself to this possible contamination.

At today’s current prices, a water filtration treatment plant is estimated to cost $1.6 million dollars as can be seen in Table IV-1. This plant would remove particles from the water, to which bacteria could cling, thus eliminating the possibility of bacteria-related sickness.

If nitrate levels exceed EPA limits in the future, a different type of plant, a chemical removal plant would be required. The treatment plant would remove enough of the nitrates to bring the supply into EPA compliance. However, this process is very involved and generally creates a problem in disposing of the brine waste which the plant generates. Discharge of the plant waste would require a discharge permit much the same as does the town wastewater lagoon. This plant too is estimated to cost approximately $1.6 million dollars.

Either or both of these plants could be needed to meet EPA drinking water standards at some point in the future. It is not possible to assess the risk of either plant eventually being needed if the wells remain as Burlington’s water supply.

Staffing a water treatment plant in a small town is problematical. Operating a water treatment plant, depending upon the type of plant, generally requires a high level of certification for the operator. This is a major issue for small communities. With few exceptions, it is very difficult for a small community to recruit and retain operators with the license certification required to operate a plant. These people tend to prefer employment in larger communities where they can count on a better salary and scheduled work shifts.

It needs to be noted that the alternatives evaluation presented in this chapter considers only Burlington’s improvements in comparison to the regional system. Burlington’s other system needs are addressed in Chapter 8 – Town of Burlington Master Plan.

**Funding Considerations**

There are significant funding differences between this and the other alternatives. The WWDC does not fund treatment under its program. As a result the maximum grant level the Town of Burlington should expect is 50%, and that funding would come through the Wyoming State Lands and Investment Board (SLIB). There is a possibility that some additional funding might be available through other sources such as USDA Rural Utilities Services (RUS), but those sources are less assured than is SLIB funding. As a result, a greater portion of the project costs will be born by the users than would be under the other alternatives. Should a treatment plant be needed, the town residents should expect a water rate increase of $70 per month in addition to the present average rate of $45 to $48 per month. As is shown in Table V-2, below, this assumes the town would receive both a SLIB grant and a RUS grant.

So long as Burlington’s water source remains in compliance with EPA standards, the town can continue to operate as it does today with average water bills of about $48 per month. Table V-2 shows that, assuming one plant would become a requirement in the future, this
alternative will cost the Burlington residents an average of $70 more per month. In today’s dollars this would bring the average water charge to about $120 per month.
Table V-1

PRELIMINARY OPINION OF PROBABLE PROJECT COSTS

Alternative No. 1-Burlington Only

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<th>Project: Burlington Regional Master Plan</th>
<th>Date: 3/9/2006</th>
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<tr>
<td>Project No: 05-07-00-05</td>
<td>Estimate by: JAMES GORES &amp; ASSOC.</td>
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**Water Filtration Plant**

Preparation of Final Designs and Specifications $108,000
Permitting and Mitigation $-
Legal Fees $-
Acquisition of Access and Right of Way $-

**Cost of Water Filtration Plant**

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<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
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<td>1</td>
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<td>Mobilization</td>
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<td></td>
<td>Construction Costs Subtotal</td>
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<td>Engineering Costs</td>
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<td></td>
<td>Subtotal</td>
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<tr>
<td></td>
<td>Contingencies</td>
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<td>Project Cost Total-Water Filtration Plant</td>
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**TOTAL ESTIMATED PROJECT COST**

$1,474,200

Inflation over 2 years 10% $147,420

**TOTAL ESTIMATED PROJECT COST**

$1,621,620

---

**Nitrate Removal Plant**

Preparation of Final Designs and Specifications $108,000
Permitting and Mitigation $-
Legal Fees $-
Acquisition of Access and Right of Way $-

**Cost of Nitrate Removal Plant**

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<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Total Cost</th>
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<td></td>
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<td>Contingencies</td>
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**TOTAL ESTIMATED PROJECT COST**

$1,474,200

Inflation over 2 years 10% $147,420

**TOTAL ESTIMATED PROJECT COST**

$1,621,620

**TOTAL FOR BOTH PROJECTS**

$3,243,240
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<td>Total user O&amp;M per month</td>
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<tr>
<td>Per User O&amp;M Charge per month</td>
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<tr>
<td>Burlington No. of Users</td>
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<table>
<thead>
<tr>
<th>TOTALS</th>
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<tbody>
<tr>
<td>Total monthly cost per tap</td>
<td>$100 per month in addition to current charges</td>
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</table>
Alternative No. 2 Basin to Otto

Under this alternative only the area between Basin and Otto would receive service from the regional system. A 12 mile long 8” diameter PVC transmission line from Basin to Otto would be constructed to serve the area. As with the other pipeline alternatives, service would be provided only to those residences in the proximity of Wyoming Highway 30. Spur lines fed from this transmission main could eventually serve other residences.

This alternative would have a comparatively small service population of about 69 people. The cost of the system divided among so few people results in a quite high average monthly water rate of $311. Operation and Maintenance costs alone are expected to run $132 per month per service. To this cost the debt retirement and water supply charges has to be added.

If service charges for this area are to be in the $50 per month range the system will have to be 100% grant funded (an additional $661,400 above WWDC and RUS funding levels) plus a subsidy of $2,160 per month. The source of these funds is unidentified.

The service population is forecast to grow to approximately 108 people by the year 2035. A major new subdivision was platted at Dorsey Creek in 2006. This subdivision has 135 large rural lots. There is a potential that this subdivision could grow into a major water user on this system. For purposes of this study it as assumed that this subdivision will simply be a part of the expected service population growth from present 69 people to the forecast 108 people. Should the service population grow to a much larger population, the planned 8” transmission line would be able to supply the resultant demand.

This project would require a crossing of the Greybull River. This would add some expense to the project that the other alternatives would not have. The crossing would also require a Corps of Engineers 404 permit. It is expected that this permit would be granted if applied for. Other than this, the project would be a normal pipe installation project.

Right-of-way for this line will need to be acquired either from the WYDOT or from adjoining landowners. This project is expected to have approximately the same amount of right-of-way acquisition challenges as the other alternatives. The crossing of the Greybull River and its required 404 permit add to the environmental matters that must be addressed. The river crossing will also need to be coordinated with Wyoming Game and Fish to assure minimum disruption of fish habitat. That though, is expected to be a straightforward process. Addressing these requirements will add time and expense to the project. Neither of these environmental matters are an issue in the other alternatives.

The total estimated project cost of the system is $2,505,400 in 2005 dollars and includes engineering fees, a 15 percent contingency, and 10 percent inflation per year for two years. The assumed funding mix presented at the beginning of this chapter results in monthly debt retirement to the system of $3,384. Operation and Maintenance costs of the system per month are $3,042. Based upon an average water rate of $1.40 per 1,000 gallons in Big Horn Basin, the system’s monthly water charge supply would be $291. There are 23 users served under
this alternative and each would share in the system’s total monthly cost resulting in the average monthly water rate of $311. Individual costs for Operation and Maintenance, debt retirement, and water costs are given in Tables V-3 and V-4 at the end of this chapter.

**System Operation and Management**

Currently, Basin’s water service is part of the Big Horn Regional Joint Powers Board system. The Town of Basin handles the management of Basin’s system. It is assumed for planning purposes that the Operation and Maintenance of this system require a part-time operator provided by the Town of Basin.

**Construction and Cost Considerations**

The estimated construction quantities and their costs can be seen in Tables V-3 and V-4. The project’s main cost item is trenching, placement of the 8” diameter PVC water transmission line, and backfill. The pricing of this work was based upon 2004 and 2005 bid tabulations from work that had been done in or near the Big Horn Basin. Installation of the line is expected to be handled using conventional techniques.

The pump station construction is estimated to cost $50,000. The cost includes the control telemetry system and electrical panel to control the pumps. The pumps are shown as a separate line item in the cost estimate. They are estimated to cost $30,000 for both pumps. This concept is planned using a metal building. The building would be conventional construction. No environmental or unusual considerations are anticipated.

The water storage tank would have a capacity of 150,000 gallons, would be conventional above ground bolted or welded steel construction, and has no unusual considerations. The tank would sit on a conventional sand filled concrete ring wall foundation. The cost estimated cost is $200,000.
### Table V-3

**PRELIMINARY OPINION OF PROBABLE PROJECT COSTS**

**Alternative No. 2-Basin to Otto**

<table>
<thead>
<tr>
<th>Project: Burlington Regional Master Plan</th>
<th>Date:</th>
<th>3/10/2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project No: 05-07-00-05</td>
<td>Updated from:</td>
<td>8/22/2005</td>
</tr>
<tr>
<td>Estimate by: JAMES GORES &amp; ASSOC.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Preparation of Final Designs and Specifications $160,658
Permitting and Mitigation $8,000
Legal Fees $16,000
Acquisitions of Access and Rights of Way $60,700

#### Cost of Project Components

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mobilization, Bonds, and Insurance</td>
<td>1</td>
<td>LS</td>
<td>$97,000</td>
<td>$97,000</td>
</tr>
<tr>
<td>2</td>
<td>Transmission Line and Fittings</td>
<td>60,729</td>
<td>LF</td>
<td>$20</td>
<td>$1,214,580</td>
</tr>
<tr>
<td>3</td>
<td>Pump House</td>
<td>1</td>
<td>EA</td>
<td>$50,000</td>
<td>$50,000</td>
</tr>
<tr>
<td>4</td>
<td>Pump</td>
<td>2</td>
<td>EA</td>
<td>$15,000</td>
<td>$30,000</td>
</tr>
<tr>
<td>5</td>
<td>150,000 gal. Storage Tank</td>
<td>1</td>
<td>EA</td>
<td>$200,000</td>
<td>$200,000</td>
</tr>
<tr>
<td>6</td>
<td>Chlorinating Boosting Station</td>
<td>1</td>
<td>EA</td>
<td>$15,000</td>
<td>$15,000</td>
</tr>
</tbody>
</table>

Subtotal of Construction Costs $1,606,580

Construction Engineering 10% $160,658
Subtotal - Engineering and Construction $1,767,238

Contingencies 15% $265,086

**Total Construction Costs** $2,032,324

**TOTAL ESTIMATED PROJECT COST** $2,277,682

Inflation over 2 years 10% $227,768

**TOTAL ESTIMATED PROJECT COST** $2,505,450
### Table V-4
MONTHLY USER COSTS

Alternative No. 2-Basin to Otto

<table>
<thead>
<tr>
<th></th>
<th>Standard Financing</th>
<th>Financing to achieve a $50/mon. maximum charge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Loan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$2,505,450</td>
<td>$2,505,450</td>
</tr>
<tr>
<td>67 % Grant Amount</td>
<td>$1,678,651</td>
<td>$1,678,651</td>
</tr>
<tr>
<td>Secondary Grant Amount</td>
<td>$165,360</td>
<td>$826,798</td>
</tr>
<tr>
<td>Loan Amount</td>
<td>$661,439</td>
<td>$0</td>
</tr>
<tr>
<td>Interest rate</td>
<td>4.5%</td>
<td>4.5%</td>
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<tr>
<td>Period</td>
<td>30 years</td>
<td>30 years</td>
</tr>
<tr>
<td>Loan pmt per month</td>
<td>$3,384</td>
<td>$0</td>
</tr>
<tr>
<td>User Loan Charge per month</td>
<td>$147</td>
<td>$0</td>
</tr>
</tbody>
</table>

**O&M**

<table>
<thead>
<tr>
<th></th>
<th>Standard Financing</th>
<th>Financing to achieve a $50/mon. maximum charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator w/ Benefits</td>
<td>$25,000</td>
<td></td>
</tr>
<tr>
<td>Transportation, Office, equipment</td>
<td>$4,000</td>
<td></td>
</tr>
<tr>
<td>Fuel, etc.</td>
<td>$6,000</td>
<td></td>
</tr>
<tr>
<td>Electric</td>
<td>$1,500</td>
<td></td>
</tr>
<tr>
<td>Total user O&amp;M per month</td>
<td>$3,042 per month</td>
<td>$883 per month</td>
</tr>
<tr>
<td>Per User O&amp;M Charge per month</td>
<td>$132 per month</td>
<td>$38 per month</td>
</tr>
<tr>
<td>Secondary O&amp;M Contribution per month</td>
<td>$2,158 per month</td>
<td></td>
</tr>
</tbody>
</table>

**Water Charges**

<table>
<thead>
<tr>
<th></th>
<th>Standard Financing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burlington</td>
<td>0</td>
</tr>
<tr>
<td>Otto</td>
<td>12</td>
</tr>
<tr>
<td>Rural Area</td>
<td>11</td>
</tr>
<tr>
<td>Number of Properties</td>
<td>23 properties</td>
</tr>
<tr>
<td>Water use (gallons/mo)</td>
<td>190,440 gallons/month</td>
</tr>
<tr>
<td>Water cost</td>
<td>$267</td>
</tr>
<tr>
<td>(based on $1.40 per 1,000 gallons)</td>
<td>$267</td>
</tr>
<tr>
<td>User Water Charge per month</td>
<td>$12</td>
</tr>
</tbody>
</table>

**TOTALS**

<table>
<thead>
<tr>
<th></th>
<th>Standard Financing</th>
<th>Financing to achieve a $50/mon. maximum charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total monthly cost per tap</td>
<td>$291 per month</td>
<td>$50 per month</td>
</tr>
</tbody>
</table>
Alternative No. 3 Greybull to Otto

This alternative, like the Basin to Otto route, would be supplied water from the Big Horn Regional system. The route between Greybull and Otto will originate at Greybull’s south tank and follow the Greybull River Road to Otto. Conventional construction techniques are expected to be used to install the 12½ miles of 12" PVC transmission line. The line is planned to parallel the north and west side of the county road. There is not expected to be any significant environmental issues that require addressing or would add to the time line for this alternative.

This alternative would have a service population of about 125 people and have a total of 42 services. Dividing the cost of the pipeline and its Operation and Maintenance among this small number of people results in a comparatively high water rate. In the year 2035 the service population is forecast to be approximately 145 people. Present average day demand is estimated at 6,350 gallons.

Right-of-way for this line will need to be acquired either from Big Horn County or from the adjoining landowners.

The 12½ mile transmission line from Greybull to Otto is estimated to cost $3,109,960 in 2005 dollars. As with the estimates for the other alternatives, this cost includes engineering fees, 15 percent contingencies, and 10 percent inflation per year for two years. With an assumed financing explained at the beginning of this chapter, monthly debt retirement to the system is $6,364. The Operation and Maintenance of the system would cost $3,042 per month. Based upon an average water rate $1.40 per 1,000 gallons, the monthly water charge would be $498. There are 43 users involved with this alternative and each would share in the total monthly cost. The monthly cost to have service from this system is $230. Individual costs for Operation and Maintenance, the debt retirement, and water costs can be found in Tables V-3 and V-4.

If service charges for this area are to be in the $50 per month range the system will have to be 100% grant funded ($1,109,400 above WWDC and RUS funding levels described at the beginning of this chapter) plus a subsidy of $2,580 per month. The monthly subsidy for this system is larger because this system requires two pump stations and therefore higher O&M costs. The source of these subsidy funds is unidentified.

Conceptual System Operation and Management

For planning purposes, it is assumed that Greybull’s public works staff would operate and manage this system. The budget assumes that a part-time maintenance operator would be required to operate the system. The actual operation and management of the system is a matter that will have to be negotiated prior to implementing this alternative.

The transmission line’s estimated cost of $1,984,800 is based upon 2004 and 2005 bid tabulations from HKM Engineers at a unit cost of $30 per lineal foot for 12 inch PVC. This cost includes trenching, placement, bedding, backfill, and reclamation.
Two pump stations are required to move water from Greybull to Otto. As with the previous alternative these units are estimated to cost $50,000 each for a total of $100,000, including the controls and electrical system. The four pumps, two in each station, are expected to cost $60,000.

Two water storage tanks are needed to serve this system. They are planned at a capacity of 150,000 gallons each. The tanks would be bolted or welded steel construction sitting on a sand filled concrete ring wall. The unit cost per tank is $200,000 for a total cost of $400,000.

Two chlorinating booster stations are planned into this alternative at a cost of $15,000 each for a total of $30,000.
Table V-5

PRELIMINARY OPINION OF PROBABLE PROJECT COSTS

Alternative No. 3-Greybull Valley from Greybull to Otto

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mobilization, Bonds, and Insurance</td>
<td>1</td>
<td>LS</td>
<td>$171,000</td>
<td>$171,000</td>
</tr>
<tr>
<td>2</td>
<td>Transmission Line and Fittings</td>
<td>66160</td>
<td>LF</td>
<td>$30</td>
<td>$1,984,800</td>
</tr>
<tr>
<td>3</td>
<td>Pump House</td>
<td>2</td>
<td>EA</td>
<td>$50,000</td>
<td>$100,000</td>
</tr>
<tr>
<td>4</td>
<td>Pump</td>
<td>4</td>
<td>EA</td>
<td>$15,000</td>
<td>$60,000</td>
</tr>
<tr>
<td>5</td>
<td>150000 gal. Storage Tank</td>
<td>2</td>
<td>EA</td>
<td>$200,000</td>
<td>$400,000</td>
</tr>
<tr>
<td>6</td>
<td>Chlorinating Boosting Station</td>
<td>2</td>
<td>EA</td>
<td>$15,000</td>
<td>$30,000</td>
</tr>
</tbody>
</table>

Subtotal of Construction Costs $2,745,800

Construction Engineering 10% $274,580
Subtotal - Construction and Engineering $3,020,380

Contingencies 15% $453,057

Total Construction Costs $3,473,437

TOTAL ESTIMATED PROJECT COST $3,820,037

Inflation over 2 years 10% $382,004

TOTAL ESTIMATED PROJECT COST $4,202,041
<table>
<thead>
<tr>
<th></th>
<th>Standard Financing</th>
<th>Financing to achieve a $50/mo. maximum charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan</td>
<td>$4,202,041</td>
<td>$4,202,041</td>
</tr>
<tr>
<td>Construction Cost</td>
<td>$4,202,041</td>
<td>$4,202,041</td>
</tr>
<tr>
<td>67% Grant Amount</td>
<td>$2,815,367</td>
<td>$2,815,367</td>
</tr>
<tr>
<td>Secondary Grant Amount</td>
<td>$1,109,339</td>
<td>$0</td>
</tr>
<tr>
<td>Loan Amount</td>
<td>$1,109,339</td>
<td>$0</td>
</tr>
<tr>
<td>Interest rate</td>
<td>4.5%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Period</td>
<td>30 years</td>
<td>30 years</td>
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<tr>
<td>Loan pmt per month</td>
<td>$5,675</td>
<td>$0</td>
</tr>
<tr>
<td>User Loan Charge per month</td>
<td>$132</td>
<td>$0</td>
</tr>
</tbody>
</table>

**O&M**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator w/ Benefits</td>
<td>$25,000</td>
</tr>
<tr>
<td>Transportation, Office, equipment</td>
<td>$4,000</td>
</tr>
<tr>
<td>Fuel, etc.</td>
<td>$6,000</td>
</tr>
<tr>
<td>Electric</td>
<td>$1,500</td>
</tr>
<tr>
<td>O&amp;M per month</td>
<td>$3,042 per month</td>
</tr>
<tr>
<td>User O&amp;M Charge per month</td>
<td>$71 per month</td>
</tr>
<tr>
<td>Secondary O&amp;M Contribution per month</td>
<td>$2,581 per month</td>
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**Water Charges**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Burlington</td>
<td>0</td>
</tr>
<tr>
<td>Otto</td>
<td>12</td>
</tr>
<tr>
<td>Rural Area</td>
<td>31</td>
</tr>
<tr>
<td>Number of Properties</td>
<td>43 properties</td>
</tr>
<tr>
<td>Water use (gallons/mo)</td>
<td>356,040 gallons/month</td>
</tr>
<tr>
<td>Water cost</td>
<td>$498</td>
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<tr>
<td>(based on $1.40 per 1,000 gallons)</td>
<td>$498</td>
</tr>
<tr>
<td>User Water Charge per month</td>
<td>$12</td>
</tr>
</tbody>
</table>

**TOTALS**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total monthly cost per tap</td>
<td>$214 per month</td>
</tr>
<tr>
<td></td>
<td>$50 per month</td>
</tr>
</tbody>
</table>
Alternative No. 4 Greybull to Otto to Burlington

As with the previous alternative, this system would receive its supply at Greybull’s south tank. This alternative consists of a 22-mile transmission line that extends from Greybull to the Town of Burlington. It will serve approximately 210 people along its route plus Burlington’s 250 residents for a total service population of 460 people as of 2005. If it were presently in place, the system would be serving approximately 187 services including the Burlington school and a few businesses and churches in Burlington. The average day demand for this population is 51,300 gallons.

By the year 2035 the service population is expected to grow to approximately 720 people served from approximately 240 residential service taps. Additionally, the schools at Burlington and the area businesses would be served. This has the largest service population of all alternatives considered. This results in the system costs being shared by a greater number of services and results in the lowest monthly service rate of all alternatives.

While this results in the most extensive system of all alternatives, it also provides service to the greatest number of people and at the lowest cost per service. The cost to the Burlington residents would be virtually equal to the cost the residents would incur if their present wells were determined to be “groundwater under the influence of surface water” by EPA and the town had to put in a filtration treatment.

This system has a total project cost of $7,050,000 in 2005 dollars. Its monthly debt service cost is $11,180, assuming the funding sources given at the beginning of this chapter. The system Operation and Maintenance would cost $6,080 per month. Water supply charges from the Big Horn Regional Joint Powers would average $2,168 per month. The 2005 average monthly cost of residential service is estimated to be $95. Detailed cost estimates are given in Tables V-5 and V-6.

If service charges for this area are to be in the $50 per month range, the system will have to be 97% grant funded, $1,646,400 above WWDC and RUS funding levels described at the beginning of this chapter. The source of these subsidy funds is unidentified. Unlike the other alternatives, no monthly subsidy would be needed.

Conceptual System Operation and Management

All of the planned construction is expected to be achieved with common techniques. No unusual environmental issues are expected to need to be addressed. Right-of-way will need to be obtained from both Big Horn County and WYDOT assuming the line will be in the road right-of-way. Alternately it will have to be obtained from the adjoining land owners.

The 177,600 feet of 12” PVC water transmission line is the major part of the construction cost. The cost for trenching, installation, bedding, backfill, and surface restoration is $3,528,180.
The system requires the installation of three pump stations and two water storage tanks to move water from Greybull to Burlington. As with the previous alternatives, these stations are expected to cost $50,000 each for a total cost of $150,000. Each pump station will be fitted with two pump units estimated to cost $15,000 per unit, for a total cost of $90,000.

Two 150,000 gallon storage tanks are planned at a cost of $200,000 each for a total of $400,000. The tanks are planned to be configured the same as those discussed in the previous alternatives.

The other items of construction in this alternative are described in the cost estimate tables.

**Table V-7**

**PRELIMINARY OPINION OF PROBABLE PROJECT COSTS**

**Alternative No. 4-Greybull, Otto and Burlington**

<table>
<thead>
<tr>
<th>Project: Burlington Regional Master Plan</th>
<th>Date: 03/10/06</th>
</tr>
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</tr>
<tr>
<td>Project No: 05-07-00-05</td>
<td>Estimate by: JAMES GORES &amp; ASSOC.</td>
</tr>
</tbody>
</table>

Preparation of Final Designs and Specifications $450,200
Permitting and Mitigation $24,800
Legal Fees $50,000
Acquisitions of Access and Rights of Way ($/ft.) $118,000

**Cost of Project Components**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mobilization, Bonds, and Insurance</td>
<td>1</td>
<td>LS</td>
<td>$360,000</td>
<td>$360,000</td>
</tr>
<tr>
<td>2</td>
<td>Transmission Line and Fittings</td>
<td>117606</td>
<td>LF</td>
<td>$30</td>
<td>$3,528,180</td>
</tr>
<tr>
<td>3</td>
<td>Pump House</td>
<td>3</td>
<td>EA</td>
<td>$50,000</td>
<td>$150,000</td>
</tr>
<tr>
<td>4</td>
<td>Pump</td>
<td>6</td>
<td>EA</td>
<td>$15,000</td>
<td>$90,000</td>
</tr>
<tr>
<td>5</td>
<td>150000 gal. Storage Tank</td>
<td>2</td>
<td>EA</td>
<td>$200,000</td>
<td>$400,000</td>
</tr>
<tr>
<td>6</td>
<td>Chlorinating Boosting Station</td>
<td>2</td>
<td>EA</td>
<td>$15,000</td>
<td>$30,000</td>
</tr>
</tbody>
</table>

Subtotal of Construction Costs $4,558,180

Construction Engineering 10% $455,818
Subtotal - Construction and Engineering $5,013,998

Contingencies 15% $752,100

Total Construction Costs $5,766,098

TOTAL ESTIMATED PROJECT COST $6,409,098

Inflation over 2 years 10% $640,910

TOTAL ESTIMATED PROJECT COST $7,050,007

Burlington Regional Water Master Plan Level II Study
### Table V-8

**MONTHLY USER COSTS**

**Alternative No. 4-Greybull, Otto and Burlington**

<table>
<thead>
<tr>
<th>Loan</th>
<th>Standard Financing</th>
<th>Financing to achieve a $50/mon. maximum charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Cost</td>
<td>$7,050,007</td>
<td>$7,050,007</td>
</tr>
<tr>
<td>67 % Grant Amount</td>
<td>$4,723,505</td>
<td>$4,723,505</td>
</tr>
<tr>
<td>Secondary Grant Amount</td>
<td>$465,300</td>
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</tr>
<tr>
<td>Loan Amount</td>
<td>$1,861,202</td>
<td>$214,811</td>
</tr>
<tr>
<td>Interest rate</td>
<td>4.5%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Period</td>
<td>30 years</td>
<td>30 years</td>
</tr>
<tr>
<td>Loan pmt per month</td>
<td>$9,522</td>
<td>$1,099</td>
</tr>
<tr>
<td>User Loan Charge per month</td>
<td>$51</td>
<td>$6</td>
</tr>
</tbody>
</table>

**O&M**

- Operator w/ Benefits: $50,000
- Transportation, Office, equipment: $8,000
- Fuel, etc.: $12,000
- Electric: $3,000
- O&M per month: $6,083 per month ($6,083 per month)
- User O&M Charge per month: $33 per month ($33 per month)
- Secondary O&M Contribution per month: $0 per month

**Water Charges**

- Burlington: 115 properties
- Otto: 12 properties
- Rural Area: 60 properties

- Number of Properties: 187 properties
- Water use (gallons/mo): 1,548,360 gallons/month
- Water cost: $2,168 ($2,168)

- (based on $1.40 per 1,000 gallons)
- User Water Charge per month: $12 ($12)

**TOTALS**

- Total monthly cost per tap: $95 per month ($50 per month)
Alternative No. 5 Burlington to Otto

Under this alternative, Burlington’s wells would serve as the supply source for a transmission line extending to Otto. This 10 mile long line would serve the 81 people living between Burlington and Otto as well as the 36 people in Otto. This service population is forecast to grow from the current 117 to approximately 180 by the year 2035. Burlington itself is forecast to grow to a population of 390 by 2035. All total, Burlington’s system will have to provide service to a population of about 570 people. Burlington’s wells are capable of meeting this demand. Present average day demand is approximately 11,300 gallons.

This system will inherently have the same supply risk as Burlington’s remaining stand-alone system of their wells being classified by the EPA as “groundwater under the influence of surface water” should the wells ever fail a microscopic particulate analysis (MPA) test. If that were to happen, Burlington would then have to construct a filtration plant as discussed in Alternative No. 1. If a plant were required, it would add about $70 per month to the average water bill when shared by both Burlington and Otto’s residents.

If service charges for this area are to be in the $50 per month range the system will have to be 100% grant funded, $567,800 above WWDC and RUS funding levels described at the beginning of this chapter. Additionally a subsidy of $1,680 will be required. The source of these subsidy funds is unidentified.

Construction of this system can be accomplished using conventional methods. No environmental or other special considerations are expected to need to be addressed. Construction will require two crossings/bores of the state highway. Right-of-way for the transmission line will have to be acquired from WYDOT and the county. Alternately, right-of-way might be acquired from adjoining landowners.

The system from Burlington to Otto is estimated to cost $1,491,934. The monthly loan repayment would be $3,053. The system Operation and Maintenance is estimated at $3,042 per month. Water costs, based upon an average water charge of $2.04 per 1,000 gallons at cost from the Town of Burlington, would be $693 per month. There are approximately 41 residences that will be served under this alternative and each would share in the total monthly cost. The cost of service for the non-Burlington users would be $166 per month. If Burlington were required to install a filtration plant, the cost would increase to approximately $235 per month. Detailed cost estimates are presented in Tables V-7 and V-8.

Conceptual System Operation and Management

The 9.75 mile long 8” PVC transmission line would extend from the southern end of Burlington’s distribution system to the community of Otto. Because Burlington is higher than Otto this system can operate entirely by gravity flow. No pumping is needed. Because the pressure at the southern edge of Burlington is near a maximum service pressure, a pressure reducing valve (PRV) station will have to be installed near Burlington to cut pressure to a desirable level in the line to Otto. Also, the tank at Otto will have to be fitted with an altitude
valve to keep the tank from overflowing as it fills from Burlington. The expected cost of the transmission line is $1,028,920.

A water steel storage tank with a capacity of 150,000 gallons is planned on the system at an estimated cost of $210,000 including the altitude valve.

Because of the length of line and delivery time required from Burlington to Otto a chlorination booster station is planned into the system at an estimated cost of $15,000.

Operation of the system would have to be developed in coordination with the Town of Burlington. The estimate for Operation and Maintenance assumes a part-time operator will be needed for the system.
Table V-9

PRELIMINARY OPINION OF PROBABLE PROJECT COSTS

Alternative No. 5-Burlington and Otto

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mobilization, Bonds, and Insurance</td>
<td>1</td>
<td>LS</td>
<td>$125,400</td>
<td>$125,400</td>
</tr>
<tr>
<td>2</td>
<td>Transmission Line and Fittings</td>
<td>51,446</td>
<td>LF</td>
<td>$20</td>
<td>$1,028,920</td>
</tr>
<tr>
<td>3</td>
<td>150000 gal. Storage Tank &amp; Alt. Valve</td>
<td>1</td>
<td>EA</td>
<td>$210,000</td>
<td>$210,000</td>
</tr>
<tr>
<td>4</td>
<td>Chlorinating Boosting Station</td>
<td>1</td>
<td>EA</td>
<td>$15,000</td>
<td>$15,000</td>
</tr>
</tbody>
</table>

Subtotal of Construction Costs: $1,379,320

| Construction Engineering | 10% | $137,932 |
| Subtotal - Construction and Engineering |   | $1,517,252 |

Contingencies: 15% | $227,588 |

Total Construction Costs: $1,744,840

TOTAL ESTIMATED PROJECT COST: $1,955,140

Inflation over 2 years: 10% | $195,514 |

TOTAL ESTIMATED PROJECT COST: $2,150,654
Table V-10

MONTHLY USER COSTS

Alternative No. 5-Burlington and Otto

<table>
<thead>
<tr>
<th>Loan</th>
<th>Standard Financing</th>
<th>Financing to achieve a $50/mon. maximum charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Cost</td>
<td>$2,150,654</td>
<td>$2,150,654</td>
</tr>
<tr>
<td>67 % Grant Amount</td>
<td>$1,440,938</td>
<td>$1,440,938</td>
</tr>
<tr>
<td>Secondary Grant Amount</td>
<td>$141,943</td>
<td>$709,716</td>
</tr>
<tr>
<td>Loan Amount</td>
<td>$567,773</td>
<td>$0</td>
</tr>
<tr>
<td>Interest rate</td>
<td>4.5%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Period</td>
<td>30 years</td>
<td>30 years</td>
</tr>
<tr>
<td>Loan pmt per month</td>
<td>$2,905</td>
<td>$0</td>
</tr>
<tr>
<td>User Loan Charge per month</td>
<td>$71</td>
<td>$0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>O&amp;M</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator w/ Benefits</td>
<td>$25,000</td>
<td></td>
</tr>
<tr>
<td>Transportation, Office, equipment</td>
<td>$4,000</td>
<td></td>
</tr>
<tr>
<td>Fuel, etc.</td>
<td>$6,000</td>
<td></td>
</tr>
<tr>
<td>Electric</td>
<td>$1,500</td>
<td></td>
</tr>
<tr>
<td>Total user O&amp;M per month</td>
<td>$3,042 per month</td>
<td>$1,357 per month</td>
</tr>
<tr>
<td>Per User O&amp;M Charge per month</td>
<td>$74 per month</td>
<td>$33 per month</td>
</tr>
<tr>
<td>Secondary O&amp;M Contribution per month</td>
<td>$1,684 per month</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water Charges</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Burlington</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Otto</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Rural Area</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Number of Properties</td>
<td>41 properties</td>
<td></td>
</tr>
<tr>
<td>Water use (gallons/mo)</td>
<td>339,480 gallons/month</td>
<td></td>
</tr>
<tr>
<td>Water cost</td>
<td>$693</td>
<td>$693</td>
</tr>
<tr>
<td>(based on $2.04 per 1,000 gallons)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User Water Charge per month</td>
<td>$17</td>
<td>$17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TOTALS</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total monthly cost per tap</td>
<td>$162 per month</td>
<td>$50 per month</td>
</tr>
</tbody>
</table>

Summary

The evaluation of alternatives show that any of the alternatives explored in this chapter can deliver adequate potable water service to their respective area. Only Alternative 4, serving the entire Greybull Valley, Otto, and Burlington offers water service at a reasonable and unsubsidized rate. That rate is $95 per month. Key to this alternative, however, is having the Town of Burlington as a participant of the project. Without the town’s participation, water service becomes twice as costly to the remaining residents.

Should Burlington’s wells become classified by EPA as “groundwater under the influence of surface water” or fail to meet EPA standards in other ways, joining the Big Horn Regional Joint Powers System is the most cost effective alternate supply for Burlington. It is the only reasonably priced potable water supply alternative for the rest of western Big Horn County.
CHAPTER 6
ECONOMIC ANALYSIS AND PROJECT FINANCING

Introduction

In Chapter 5, the alternatives were evaluated based on their comparative advantages and drawbacks. The cost of the alternatives, estimated in early 2005, were presented as well. The area residents used much of the fall of 2005 and the spring of 2006 to come to a consensus of which alternative to select as the preferred alternative. Alternative No. 4, the Greybull Valley to Otto and Burlington, was selected. Since that time the project’s engineer has updated costs estimates. As was explained in Chapter 5, the pipe construction industry had a very steep price increase in late 2005 and the first half of 2006. The cost estimate presented in this chapter is updated to reflect construction costs as of the summer of 2006.

Getting potable water to the towns of Burlington and Otto as well as the western Big Horn County area is expected to cost approximately $13.9 million dollars in 2008. As mentioned in previous chapters, this area may be represented by the Big Horn Regional Joint Powers Board (BHRJPB), holding two seats on the board. The conceptual project financing for the improvements has been developed to take advantage of the funding sources that are customarily available to water improvement districts. These sources include:

- Wyoming Water Development Commission (WWDC)
- State Lands and Investment Board (SLIB)
- Rural Utilities Service - USDA (RUS)
- Wyoming Drinking Water State Revolving Fund Program - EPA (SRF)
- Abandoned Mine Lands Program - DEQ (AML)

The first three of these funding agencies offers typical grant loan percentages available to public entities such as BHRJPB. Funding is awarded based on the amount of funds the agency has available coupled with agency specific criteria. These criteria may include items such as the type of project being proposed, the median income levels of those being served, and regulations placed on the programs by statute.

The above agencies are the primary funding sources for grants and loans to public entities seeking to improve public health and safety. The only financial resources that the BHRJPB has available are from the sale of water to the local districts and towns. The Big Horn Regional Joint Powers Board currently does not assess a mill levy nor is it set up with the county to do so and, therefore, cannot approach the county for funds to pay for construction.

The financial plan presented in this chapter provides initial capital to pay for the project through grants available from the WWDC and RUS and a low interest loan from RUS. As explained in the beginning of Chapter 5 grants are estimated to cover approximately 73.35 percent of the total project cost. This funding level may change from year to year, depending on appropriations from the legislature and the number and priority of projects requesting funding. It is not anticipated that funding levels will be markedly changed prior to this
project being constructed in 2007.

The remainder of the project cost is expected to be paid for through a low interest loan provided by RUS. The loan costs will be paid through monthly water user fees by a district that is yet to be established. Discussions to date center on this being Burlington and an expansion of the South Bighorn Water District. The structure of the district and its representation on the Big Horn Regional Joint Powers Board is yet to be formulated.

Currently the BRJPB charges a wholesale water fee to each user of $1.40 per 1,000 gallons of water. As shown in Table V-6 the average water is 1,548,355 gallons per month for the preferred alternative system. Given a wholesale water charge of $1.40 per thousand gallons the water charge for each service is $11.60 per month based on 187 services system wide.

The conceptual funding plan shown below will provide the upfront capital need to complete the project.

**Financial Plan**

A summary of the proposed financing is shown below.

<table>
<thead>
<tr>
<th>Description</th>
<th>WWDC Grant</th>
<th>RUS Grant 7% of Sponsor</th>
<th>RUS Loan (Remaining Cost)</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permits, R-O-W, Legal, and Final Design</td>
<td>$668,727</td>
<td>$69,867</td>
<td>$259,506</td>
<td>$998,100</td>
</tr>
<tr>
<td>Construction Cost (2006)</td>
<td>$5,229,296</td>
<td>$546,344</td>
<td>$2,029,279</td>
<td>$7,804,920</td>
</tr>
<tr>
<td>Contingency</td>
<td>$884,708</td>
<td>$92,432</td>
<td>$343,320</td>
<td>$1,320,460</td>
</tr>
<tr>
<td>Construction Engineering Fee</td>
<td>$766,741</td>
<td>$80,107</td>
<td>$297,541</td>
<td>$1,144,390</td>
</tr>
<tr>
<td>Subtotal (2006)</td>
<td>$7,549,473</td>
<td>$788,751</td>
<td>$2,929,646</td>
<td>$11,267,870</td>
</tr>
<tr>
<td>Inflation 2 years at 15%/yr.</td>
<td>$1,769,403</td>
<td>$184,863</td>
<td>$686,634</td>
<td>$2,640,900</td>
</tr>
<tr>
<td>Total Estimated Cost (2008)</td>
<td>$9,318,876</td>
<td>$973,614</td>
<td>$3,616,280</td>
<td>$13,908,770</td>
</tr>
</tbody>
</table>

The operating district will be required to repay the loan over a maximum 30-year period with annual payments due in December of each year. The interest rate is assumed to be at the rate of 4.5 percent. These payments will be made through the collection of water user fees from each on-line customer. This cost to the users will remain fixed over the 30-year period at $51 per service per month.

Operation and Maintenance of the system will be the responsibility of as yet to be formed district or an extension of the South Big Horn Water District and paid for through water user fees. A monthly base user rate of at least $33 should be charged to service taps on the system to ensure sufficient revenue generation for operating and maintaining the system. The base rate provides the revenue needed for labor, maintenance, billing, depreciation, and system repairs.
The $1.40 per thousand gallons water usage charge is planned to be a pass-through rate resulting in $11.60 per month for water that the BHRJPB provides. Rates will have to be adjusted by the operating district as operations costs change in future years. When the three above costs are totaled, the estimated average service charge is $102 per month as shown in Figure VI-3 below.

A sample budget for the board is shown at the end of this chapter in Figure VI-3. The budget is expected to grow, but not in direct proportion to the service population. As additional users come on the system it should have the net effect of keeping rates constant or slightly reducing. As the system ages over 30 to 50 years it should be expected to need more maintenance and repairs.

An initial budget is shown, based on 187 service taps. It is structured to provide for the level of maintenance and repairs expected in the first 10 to 15 years. An ultimate budget is also shown, based on 2007 dollars, which provides a revenue and expenditure breakdown for the system. A repair and maintenance account and depreciation account are delineated in the budget as a source of funds to help maintain the system. This money, along with the line items for cash reserves, line repairs, equipment repairs, and equipment supplies, may be used for repairing and replacing system components in the future.
## Figure VI-2
### Monthly Water Service Costs

<table>
<thead>
<tr>
<th>Number of Taps and Monthly Water Demand</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Burlington</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Otto</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Rural Area</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Number of Properties</td>
<td>18 properties (taps)</td>
<td></td>
</tr>
<tr>
<td>Monthly Water use (gallons/mo)</td>
<td>1,548,360.0 gallons/month</td>
<td></td>
</tr>
</tbody>
</table>

### Loan

<table>
<thead>
<tr>
<th></th>
<th>Standard Financing</th>
<th>Financing to achieve a $50/mo. maximum charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Cost</td>
<td>$ 13,163,416.85</td>
<td>$ 13,163,416.85</td>
</tr>
<tr>
<td>WWDC 66.7% Grant Amount</td>
<td>$ 8,779,999.04</td>
<td>$ 8,779,999.04</td>
</tr>
<tr>
<td>RUS 6.6% Grant Amount</td>
<td>$ 868,785.51</td>
<td>$ 868,785.51</td>
</tr>
<tr>
<td>Joint Powers Grant Amount</td>
<td>$ -</td>
<td>$ 3,012,301.61</td>
</tr>
<tr>
<td>RUS Loan Amount</td>
<td>$ 3,514,632.30</td>
<td>$ 502,330.69</td>
</tr>
<tr>
<td>Interest Rate</td>
<td>4.5%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Period</td>
<td>30.00 years</td>
<td>30.00 years</td>
</tr>
</tbody>
</table>

### Monthly

| Monthly System Loan Payment        | $ 17,980.72        | $ 2,569.90                                  |
| Monthly Service Loan Charge        | $ 96.15            | $ 13.74                                     |

### O&M

| Operator w/ Benefits               | $ 50,000.00/year   | |
| Transportation, Office, Equip      | $ 8,000.00/year    | |
| Fuel, etc.                         | $ 12,000.00/year   | |
| Electric                           | $ 3,000.00/year    | |
| Total System O&M per year          | $ 73,000.00        | |

### Monthly

| Monthly System O&M                 | $ 6,083.33/month   | $ 6,083.33/month |
| Monthly Service O&M Charge         | $ 32.53/month      | $ 32.53/month   |

### Monthly Wholesale Water Charge from Joint Powers

| Monthly System Water Charge (based on $0.45 per 1,000 gal.) | $ 696.76 /month | $ 696.76 /month |
| Monthly Water Charge per Service   | $ 3.73 /month   | $ 3.73 /month   |

**TOTALS**

| Total Monthly per Service Cost      | $ 132/month   | $ 50.00 /month |

---

Burlington Regional Water Master Plan Level II Study  
VI-4
As can be seen from the above table, unsubsidized water rates will be about $132 per month. If water rates are to be in the range of $50 per month, a secondary grant of $3,000,000 will need to be brought into the project funding. The source for such additional grant funding has not been identified.

**Ability to Pay Analysis**

Ability-to-pay guidelines are used by some funding agencies, most notably RUS. The analysis gives a guideline to determine whether the recipient can handle debt service on the proposed loan amount. RUS also uses this information to determine whether the district is eligible for additional grant funding and the interest rate for proposed loans provided through RUS.

The loan portion of the RUS funding is made available at three different interest rates, depending on the criteria met. According to the RUS Water and Wastewater Disposal Programs Summary, the current poverty rate of 4.5 percent applies when:

- a) the primary purpose of the loan is to upgrade facilities or construct new facilities required to meet applicable health or sanitary standards; and
- b) the median household income (MHI) of the service area is below the poverty line for a family of four or below 80 percent of the Statewide Non-metropolitan Median Household Income (SNMHI).

The median household income for Bighorn County is $30,804 per year. This is above the poverty line of $19,350 and is 81.5 percent of the SNMHI of $37,769. This indicates that the RUS poverty rate will not apply to this project. The Intermediate Rate will apply to this project, which is half the difference between the Poverty Rate and the Market Rate, not to exceed 7 percent. Currently the intermediate rate for an RUS loan grant is at 4.5 percent.

In addition, RUS provides grant funding for projects where the debt service exceeds:

- a) 0.5 percent of the median household income for areas with a MHI equal to or below 80 percent of the SNMHI; or
- b) 1.0 percent of the median household income for areas with a MHI between 80 to 100 percent of the SNMHI.

Bighorn County meets the first criteria and should be eligible for grant funding from the RUS. The debt service for the project without grant monies is 2.0 percent. Even with the 20 percent possible grant by RUS, the debt service at $96 per month ($1,152/yr.) is 3.7 percent of the median household income in Big Horn County. This is well above the 0.5 percent threshold criteria for grant funding through RUS.
RUS Funding Requirements

Because there are only three commercial services in the Burlington/Otto area, the Equivalent Dwelling Units (EDU’s) for the selected preferred alternative are equal to the number of properties currently in Burlington, Otto, and the rural Bighorn area. Some water services that were installed in Burlington in the past are larger than the 3/4-inch standard for residential services. There are currently 115 properties connected to the existing Burlington water system. The district currently consists of 187 properties equivalent to 187 EDU’s. Average day demand is presently estimated to be 51,600 gallons.

The project debt that the district will be responsible to repay is estimated to total $3,514,632, and is to be paid back over 30 years at an interest rate of 4.5 percent. This corresponds to a debt service level of $96 per EDU (per property).

The yet-to-be-formed district will also be responsible for operation and maintenance of the proposed water system. It will also be responsible for determining a rate structure that allows them to cover the expense of a Level II operator, maintenance, operation, and system depreciation costs. This is detailed in the pro forma budget shown below.
<table>
<thead>
<tr>
<th>Account Number</th>
<th>Annual Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenues</strong></td>
<td></td>
</tr>
<tr>
<td>User Fees</td>
<td>$ 309,700.00</td>
</tr>
<tr>
<td>Tap Fees</td>
<td>$ 2,500.00</td>
</tr>
<tr>
<td>Interest Earnings</td>
<td>$ 1,000.00</td>
</tr>
<tr>
<td><strong>Total Water Revenues</strong></td>
<td>$ 313,200.00</td>
</tr>
<tr>
<td><strong>Water Expenditures</strong></td>
<td></td>
</tr>
<tr>
<td>Water Charge</td>
<td>$ 8,400.00</td>
</tr>
<tr>
<td>Operator Salaries &amp; Benefits</td>
<td>$ 50,000.00</td>
</tr>
<tr>
<td>Telephone</td>
<td>$ 840.00</td>
</tr>
<tr>
<td>Electricity</td>
<td>$ 4,800.00</td>
</tr>
<tr>
<td>Equipment Repairs</td>
<td>$ 5,000.00</td>
</tr>
<tr>
<td>Waterline Repairs (Contract Services)</td>
<td>$ 2,000.00</td>
</tr>
<tr>
<td>Office Operation (Salary, Supplies, Billing, Etc.)</td>
<td>$ 32,800.00</td>
</tr>
<tr>
<td>Cash Reserve</td>
<td>$ 10,000.00</td>
</tr>
<tr>
<td>Dep Reserve</td>
<td>$ 141,000.00</td>
</tr>
<tr>
<td>Vehicle</td>
<td>$ 10,500.00</td>
</tr>
<tr>
<td><strong>Total Water Expenditures</strong></td>
<td>$ 265,340.00</td>
</tr>
<tr>
<td><strong>Water Excess of Revenues over Expenditures</strong></td>
<td>$ 47,860.00</td>
</tr>
</tbody>
</table>
CHAPTER 7

ENVIRONMENTAL OVERVIEW

This chapter gives the reader a brief summary of the environmental considerations related to the preferred alternative. A full Environmental Report is presented in the appendices of this report. Readers wishing further environmental information are referred to the appendix. The report identified no significant environmental impacts resulting form the proposed action. All anticipated environmental consequences will be addressed by following best management practices.

The affected area’s primary land use is irrigated agriculture and livestock grazing, typical of land use in the Greybull River Valley. Therefore, the areas that will be disturbed by the project have been previously disturbed by irrigated agriculture.

The preferred alternative selected through this study is a water pipeline that will follow state and county road right-of-ways. Other system components such as pump stations and water storage tanks are planned to be placed on lands owned by the State of Wyoming or the federal government (BLM).

The environmental consequences of the preferred alternative are minor in nature. The soil and vegetation on the pipeline route will be temporarily disturbed for a few weeks, no longer than one growing season. These disturbances will have no permanent impact to the Greybull River area. In the final step of construction the native surface soils and vegetation will be replaced by reseeding with native vegetation.

During the trenching operation the integrity of the floodplain will be kept intact. Any storage of excess backfill material or any other construction materials will be stored out of the floodplain. Wetlands in the area are considered seasonally flooded and are not a permanent wetland area. There will be no definable effect on wetlands and all natural wetland areas will be avoided.

The project route has been heavily farmed for nearly 100 years. The potential for undisturbed cultural resources along the pipeline route are expected to be virtually non existent. Still the State Historic Preservation Office (SHPO) recommends that, prior to construction, a class II survey to be performed by a professional cultural resource firm. The survey would provide a plan of mitigation should any cultural resource be found.

The U.S. Fish and Wildlife service identifies the bald eagle and the black-footed ferret as proposed threatened and endangered species that may occur in Big Horn County. Bald eagles are year round residents and generally nest in large trees near streams. Black-footed ferrets inhabit prairie dog towns which do not exist on or near the project area. The preferred alternative will not affect any threatened or endangered biological resources in the area. Fish and other species, including the bald eagle, near the Greybull River will not be affected because of the distance between the project area and the Greybull River.
CHAPTER 8

TOWN OF BURLINGTON MASTER PLAN

The focus of this chapter is to give the Town of Burlington a plan for meeting future potable water delivery demands on their system. This chapter explores improvements that can be made in Burlington’s water system to assure the system meets future demands. It also provides a prioritized list of those improvements. Based upon the evaluation conducted in this planning process, the following information will provide a plan for Burlington for the next 30 years.

Burlington’s present water system is in sound condition and is quite well maintained. The largest risk the community faces is the continued viability of its water supply derived from shallow wells. There are only a few system upgrade needs. These are discussed at the end of this chapter.

The discussion of supply, given below, considers both Burlington as a stand-alone system and being supplied by the Big Horn Regional system.

Burlington currently serves 250 people within the town proper. This population is anticipated to grow at a rate of 1.5% over the next 30 years. The expected population for the year 2035 is 390 people, an increase of 140 people. With the increase in population Burlington’s maximum day demand will increase from 87,500 gallons/day to 136,500 gallons/day. This is an increase of 49,000 gallons/day.

**Water Supply**

Based upon information presented in Chapter 3, it is estimated that Burlington has enough pumping capacity to meet the demand for a population of 380 people. When Burlington’s population reaches that level the town will likely begin to notice sporadic periods of water shortage. That may occur near the year 2035 when it is expected to be 390 people. When that condition does occur, installation of larger pumps in the present wells will resolve the supply shortage.

As Burlington looks towards the future, their concerns also need to lie within their water quality. The potential exists for Burlington to not be in compliance with EPA standards. Based upon data found on pg. 36 of the 1996 Burlington Water Supply Project Phase II, Burlington faces the potential of their groundwater source being classified by EPA as under the influence of surface water. This, in turn, would require compliance with EPA’s surface water treatment regulations and would require a filtration plant.

The town had a well head protection plan developed, published, and implemented. The importance of protecting the town’s water supply is widely understood in Burlington and the surrounding community. The town’s operator reports that the surrounding land owners are diligent in informing the town as to when they are doing any agricultural spraying of other activities that might influence the wells. However, according to the Wyoming DEQ, the
Town Council has not formally adopted the plan as yet. To address the possibility of Burlington’s water source not being in compliance, there are two possible solutions. Burlington could either construct water treatment plants, or simply develop a new water source meeting EPA standards.

Burlington has the distinct advantage of having an irrigation system available to lots in town. Encouraging town residents to use this water source for irrigation of lawns and gardens saves a great amount of water and significantly reduces water system operation costs. Preserving and extending this ditch water system to areas not presently served will continue to save the town large sums of money in future years.

As stated in earlier chapters, the preferred alternative is for Burlington to join in the regional pipeline system. Through this alternative, Burlington would have a new water source. Also, through this connection Burlington would be able to meet their projected maximum day demand for the year 2035.

**Water Treatment**

As stated previously, Burlington is currently in compliance with EPA standards, and presently does not treat its water beyond chlorination. This treatment is adequate for Burlington’s current water well supply. As required by EPA, Burlington needs to sample and test their water twice a year, once in the summer during the maximum demand and once in the winter during the minimum demand.

**Transmission System**

The current transmission lines between the town wells and the tank in Burlington are adequate for the town’s demand through the year 2035. With the additional growth of 140 people by the year 2035, additional housing will be required within the town. This would require approximately 50 lots within the town. Currently, Burlington is developing the Husky Addition on the west side of town. This development would provide the residential lots needed to house these additional people. The transmission service for Burlington will need to be looped through the Husky Addition to provide water service to the new lots.

Fire flow demand is currently met by the transmission system. Since 1996, Burlington has added an additional 8-inch transmission line on the west side of town. This additional transmission line loops with the original transmission line along Highway 30 on the east side of town. These two lines provide adequate transmission for fire flow.

**Telemetry System**

Burlington’s current telemetry system between the wells and the tank is adequate. The system is a low wattage radio control system. The main control is located at the well house with water level sensors and transmitters at the tank. This system has been in place approximately 10 years. Because the system’s electronics will eventually become obsolete, Burlington should expect to replace the system in the next 15 years. The current control panel
that controls the pumps and the water level at the tank are adequate. An estimated cost for an upgraded telemetry can be found at the end of this chapter.

Storage System

Burlington currently has a 250,000 gallon storage tank. This storage volume currently meets the maximum demand for potable and irrigation water. It does not meet the recommended current fire storage demand. It is adequate for storage for potable water maximum day demand for a population of 400 people or more in the year 2035.

Currently, the paint on the roof on the tank is deteriorating. The tank roof should be repainted within the next two years. The interior of the tank appeared to be very clean and had minimal rust when inspected in 2005.

The estimated costs for the current storage tank’s roof to be repainted and to add an additional storage tank to the system can be found at the end of this chapter.

Fire flow demand has been estimated throughout the system. It was determined that Burlington’s storage capacity does not meet the recommended volume for fire protection at the school. The largest structure in Burlington is the school with total square footage of approximately 84,600 square feet. This translates to a total fire flow demand of 3,000 gallons per minute for a period of two hours based upon Insurance Services Office (ISO) guidelines for fire flow. This requires a total storage demand of 360,000 gallons. To achieve this storage, Burlington could erect another storage tank. This tank should be at the same elevation as the present tank and have a total storage capacity of 150,000 gallons. Alternately, the school could be retrofitted with a fire sprinkler system. Under ISO guidelines that would negate the additional storage volume shortage.

Operation and Maintenance

Burlington’s water system has been very well maintained. No significant changes in maintenance practices are recommended. Burlington currently has one operator who takes care of the entire system, as well as maintaining roads, sewer, and other municipal services. In the future, if Burlington installs a water treatment plant at least one additional operator will be needed.

The water accounting and water data collection needs to be improved. Currently, Burlington’s operator hand records meter readings at the well house. This data is not entered into the town’s computer based water accounting and billing program. In the future, Burlington should transfer all well production data into the water accounting and billing program if the software allows. This would give the town the ability to compare production volumes with metered sales and give an accounting of lost water, such as unmetered use at town parks and fire hydrant uses.

Because of inconsistencies in the town’s residential meter records, the only solid data used for this report was based upon the well house production records.
The town’s monthly water meter readings are taken by hand written methods. These hand written readings are then entered into the water accounting software by the town clerk. Based upon conversation with the town clerk, it was determined that a multiplying factor based on meter brand is applied to the meter reading by the software used to generate the total gallons of usage and a water bill. The original hand written meter recordings could not be found to compare to results from the billing software. However, it was found that some unresolved errors in the multiplying factor for a few services rendered the records unusable for comparing production and sales. The water accounting needs to be cleaned up and recorded in a manner that allows “checks and balances” in the system. Currently Burlington has no way of knowing if there are any leaks within the system, nor can they determine whether water is being used inordinately.

The Town of Burlington currently uses far too much potable water operating the chlorination system at the town’s sewer lagoon. The town operates the system in a batch process mode. For 10 months the town stores its wastewater flow and discharges for two months. The town chlorinates this discharge in order to meet DEQ permit limits. The chlorinator is fed by a three-inch potable water line which runs wide open, 24 hours a day for the two months. The meter at the lagoon shows more water usage than the entire rest of the town during those two months. The meter’s accuracy has been verified. Burlington needs to explore different methods of injecting chlorine into the wastewater discharge stream. The present practice is exceedingly wasteful of potable water.

CONCLUSIONS AND RECOMMENDATIONS

Through the evaluation of Burlington’s water system the following conclusions and recommendations have been reached.

Conclusions

General

• Burlington’s present water system adequately serves its 250 residents.

• Burlington’s population is projected to grow at a rate of 1.5% per year growing to an expected population of approximately 390 by the year 2035.

• With Burlington’s expected growth over the next 30 years its water demand in the 2035 will be 136,500 gal/day.

Water Supply

• Burlington currently has a shallow alluvial well system for their water supply.

• Burlington’s shallow alluvial well system is capable of meeting the projected peak day demands for the next 30 years.
• Burlington’s water supply currently meets the EPA’s drinking water standards.

• The wells have the potential of being classified by EPA as “groundwater under the influence of surface water”, triggering a requirement for filtration treatment.

• There is presently no identifiable alternate groundwater source in or near the area that would provide adequate quantities of acceptable quality potable water.

• The town’s wellhead protection plan has never been formally adopted by the Town Council.

**Water Treatment**

• Currently Burlington’s treatment with chlorination alone meets regulatory requirements.

**Transmission System**

• The town’s well house is located approximately 2 miles south of Burlington.

• The well pumps and tank level are adequately controlled by a radio link telemetry system.

• An 8-inch transmission line originates at the well house and extends to the town’s single storage tank approximately 1 mile north of Burlington. A return transmission line originates at the tank extending to town.

• The transmission lines have adequate capacity to meet both forecast fire and peak hour demands for the coming thirty years.

• Both of Burlington’s transmission lines are PVC, less than over 20 years old and in sound condition.

**Distribution System**

• The town’s distribution, constructed of adequately sized PVC lines, is less than 20 years old and is in sound condition.

  ○ The hand written method of gathering water readings is labor intensive and can introduce errors.
Storage System

- Burlington’s single 250,000 gallon water storage tank has adequate capacity to meet domestic demands for the coming thirty years.

- The present storage volume is approximately 150,000 gallons short of the recommended volume to meet the fire flow demand generated largely by the town’s school.

Recommendations

The following recommendations are made to resolve the present inadequacies of Burlington’s water system and to meet demands over the coming thirty year period to the year 2035.

7. Install a rate-of-flow control valve on the lagoon chlorination system that will provide a maximum five (5) gpm flow through the injector. This will save the town substantial pumping costs by cutting the town’s current water production demand in half during the two month lagoon discharge period.

8. Formally adopt the town’s already published Wellhead Protection Plan.

9. Improve the accuracy and automation of the water accounting system by adding automated meter reading technology to all service lines and the pump house master meters. This should increase revenues and allow identification of system water use anomalies and problems.

10. Preserve and extend the ditch water irrigation system in town. This will remove the irrigation load from the potable water system that would otherwise have to be supplied.

11. Develop a contingency plan for construction of a water filtration plant or tying into the Big Horn Regional system in the event that EPA classifies the town’s water as being groundwater under the influence of surface water.

12. Add an additional water storage tank of 150,000 gallons or work with the school district to add fire sprinklers to the portion of the school building that does not currently have them.

7. Replace the present well pumps when the town starts to experience water shortages.
Implementation

Implementation of the above recommendations will enhance Burlington’s capacity to meet potable water demands over the coming 30 years. Below is the estimated cost of implementing each of the recommendations and a recommended time line for doing so.

1. **Install flow control on the lagoon chlorination water supply**
   There are a few options for controlling the water flow rate through the chlorinator to bring consumption to five (5) gpm. A rate-of-flow control valve, such as those manufactured by Cla-Valve Company (www.cla-val.com) Model 40-01 or similar could be used. The quoted cost of the unit is approximately $800. Dole Valve Company makes a simple cone orifice fitting that will adequately pace flow. Cost of the unit is under $50. As an alternate, a simple ball valve can be used at about the same cost. It would have to be manually throttled to the desired flow rate. Any of these units could be installed by the town maintenance operator.

   Recommended date of installation: Fall 2006

2. **Formally adopt the town’s already published Wellhead Protection Plan**
   The Town Council’s adoption of the already developed and published wellhead protection plan will give the plan formal force of local authority. The plan then becomes an element of land use planning in the county. Since the present well site is the best available source of potable water in the Burlington area it warrants full protection. Should this source become unusable, replacing it could potentially cost the community several hundred thousand dollars. There is no cost associated with this action.

3. **Improve meter reading operations**
   The installation of automated water metering will require replacing approximately 90 original equipment Neptune brand residential water meters in town. It will also require purchase and installation of the needed meter reading equipment and software. There are two primary styles of automated reading equipment, direct contact and radio signal readers. The direct contact reading equipment is significantly less costly and is recommended. Installation may be done either by town staff or contractor. Total cost of the system is approximately $36,000.

   When in place, the system will allow town field staff to read meters by simply touching an outdoor sending unit with the reading device. The meter reading is automatically stored in a belt-carried data recorder. The data recorder is plugged into its charger stand which also serves as the data transfer interface with the computer on which the water billing software resides. There is no opportunity for errors in reading and writing down readings or in reading and entering the hand written readings into the computer. Time savings and accuracy are the main benefits. Statistical functions in the software also offer the ability to flag meters that are reading slow or exhibiting unusual behavior.
Recommended date of installation: 2008 or sooner if town budget will allow.

4. **Preserve and extend the ditch water irrigation system in town**  
   Presently, the town has a piped irrigation system that delivers ditch water to each lot in town. Preserving this system and extending it to new lots as they are added to the town will save the community an estimated 30% per year in the cost of producing potable water. No cost estimate has been prepared for this recommendation.

   Recommended date of implementation: continuous

5. **Develop a contingency plan for an alternate or treated water supply**  
   As explained in this and other chapters, the town’s present water supply is not assured of compliance with EPA regulations for the long range future. Recognizing this risk, the town needs to have a contingency plan in place and adopted, including the identification of funding sources, should the present well supply fall out of compliance with EPA standards at some date in the future.

   Recommended Date of implementation: 2007

6. **Add an additional water storage tank of 150,000 gallons**  
   To meet ISO standards for fire protection, the town needs to either add additional storage or work with the school district to install fire sprinkler systems in the those buildings which presently do not have fire sprinklers. This is not a health issue, but is a safety issue and a potential community/school district loss issue. The school district, which includes the town, is the entity at risk. It is recommended that these two governmental entities, the district and town, work together to solve this shortcoming. The cost of constructing an additional water storage tank of 150,000 gallons is approximately $200,000. Partial funding may be sought through the State Land and Investment Board (SLIB) or the Wyoming School Building Commission.

   Recommended Date of implementation: 2008

7. **Install larger pumps in the town wells**  
   Population forecasts developed in this study indicate that the town’s population will grow to approximately 390 people by the year 2035. It is also estimated that the present well pumps can serve 380 people. It is expected that as the town approaches that population that it will start to experience occasional water shortages, assuming that the town is still using its current wells as its supply. At the point in time that shortages begin to be noticed it is recommended that the town install larger pumps. Cost in 2006 dollars is estimated at $12,000.
CHAPTER 9

AREA WATER SUPPLY MASTER PLAN

This chapter presents a Master Plan for the entire Burlington region extending from Greybull to Otto and on to Burlington itself. Chapter 8 dealt with a Master Plan for Burlington only, based in the event the Burlington does not become a member of the Big Horn Regional Joint Powers Board water system.

The consensus reached at the March 14, 2006 public meeting held in Burlington, Wyoming, the preferred alternative will be to construct a transmission line from Greybull to Burlington. This alternative is to encompass as many rural residences as possible between the two communities, including Otto. The estimated monthly rate is $130. The area residents and the Big Horn Regional Joint Powers Board are exploring ways to reach a more desirable rate near $50 per month. The supplemental funding needed to reach that lower rate is discussed in Chapter 6. This preferred alternative would be implemented as a member of or a supply customer of the Big Horn Regional Joint Powers Board, which serves most of the Big Horn Basin.

**Service Population and Water Demand**

Potable water service demand has been projected for the service area over the coming 30 years, to the year 2035. These demands are summarized in Table 2.1 and a discussion of the demands is presented in Chapter 2. For planning purposes, maximum day demand was forecast at 350 gallons per person per day which includes irrigation demand. An occupancy rate of three persons per residence was also used. This may be more demand than is necessary given the service area’s availability of ditch water for irrigation use. Burlington and the entire proposed service area presently have ditch water available to all properties. The service area will realize a reduction in cost of service in proportion that they can keep irrigation demands out of the potable water system.

The current population of the Town of Burlington is 250 people, Otto is approximately 36 people and the rural service population is estimated to currently be 174 people. The demands of the service are summarized in Table IX-1.
Table IX-1
Population and Service Demand

<table>
<thead>
<tr>
<th>Area</th>
<th>2005 Population</th>
<th>Maximum Day Demand (Gal.)</th>
<th>2035 Population</th>
<th>Maximum Day Demand (Gal.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greybull to Otto</td>
<td>93</td>
<td>32,600</td>
<td>145</td>
<td>50,800</td>
</tr>
<tr>
<td>Otto</td>
<td>36</td>
<td>12,600</td>
<td>56</td>
<td>19,600</td>
</tr>
<tr>
<td>Otto to Burlington</td>
<td>81</td>
<td>28,400</td>
<td>127</td>
<td>44,500</td>
</tr>
<tr>
<td>Burlington</td>
<td>250</td>
<td>87,500</td>
<td>390</td>
<td>136,500</td>
</tr>
<tr>
<td>Total</td>
<td>460</td>
<td>161,000</td>
<td>720</td>
<td>216,000</td>
</tr>
</tbody>
</table>

**Water Supply Source**

The water source for the Big Horn Regional Joint Powers (BHJP) system is a series of deep Madison wells located along the western flank of the Big Horn Mountains. These wells characteristically are artesian. The yield capacity of these wells is under review by the WWDC. As yet it is unknown whether the present series of wells is adequate to supply the regional system. It is recommended that a supply well with a capacity of a quarter million gallons per day be developed in the same area and its flow carried by existing BHJP lines as a component of this project.

**Water Transmission**

Burlington’s storage tank is 580 feet higher than the Greybull tank and requires pumping to move water to Burlington. The pumping requirements to overcome 580 feet are too large to have a single pump station involved in the model and require high-pressure pipe. Additionally, the pressure is too high to serve spur taps along the transmission line route. The preferred alternative preliminary design has three pressure stations with three pressure zones. To keep enough volume and the pressure down to 60-90 psi, a 12-inch transmission line was chosen with two storage tanks. The two storage tanks are the divisions of zones. Their locations are based upon a chosen elevation along the planned route of transmission. The chosen elevation for the storage tanks was based upon dividing the 580 feet into thirds to have a stepped system.

The preferred alternative system transmission line is made of 12-inch PVC. It is planned to begin at Greybull’s potable water storage tank located approximately 2 miles west of Greybull and will end at the corner of Elm Street and Main Street in the Town of Burlington.

The preliminary design for the preferred alternative pump station consists of a pump house that will be a heated and insulated steel building of approximately 225 square feet. This building houses two pumps and motors of the same size and capacity that are in a looped system for ease of maintenance and staggered pumping. The building also houses telemetry equipment, electrical control panels, and a heater. The building floor is made of concrete to help support the pump house building.
The locations of these pump houses should be located close to the nearest paved road. They need to be very accessible, especially in the winter when snowfall is possible. The site of these pump stations needs to be graded to drain water away from the building and be secured with a chain link security fence.

Due to the remote location of these pressure stations, a recommended SCADA system needs to be incorporated. This will allow the operator to control the entire system from one central mainframe computer. In addition, due to the remote location of these pressure stations, operation and maintenance has the potential of being neglected on the western portion of the system near Burlington because of the long distance to the last pressure station. Therefore, the two leading bodies of the preferred alternative system (Burlington and the South Big Horn Water District) will have to make a decision on who will maintain certain areas of the system.

The two storage tanks proposed for the preferred alternative dividing each zone are sized to be 250,000 gallons each of storage. Each of these tanks would have their own site and would need to be secured with chain link fence around the site. These particular sites do not necessarily need to be readily accessible and only need to be located where the proper elevation can be achieved.

Chlorination or treatment of the preferred system would be housed within the pump station pump house. Currently under EPA’s groundwater rules, water age is not a factor for this type of system and chlorination or treatment would not be required. With new groundwater rules, it is unknown if chlorination will be required, but for master planning purposes chlorination is implemented into the preferred alternative system model. The type of chlorination planned for the preferred alternative system is a hypochloride system. This type of chlorination system feeds a liquid chlorine solution into the pipeline. The solution dosage is controlled by a metering pump that reads system pressure and chlorine residual. The system pressure is read because the metering pump has to overcome the system pressure in order to inject chlorine. The chlorine residual is read to monitor the amount of chlorine that needs to be fed to the system. The chlorine solution should be mixed and housed in a separate room from all electrical equipment. The separate room should be heated, airtight, free of any contamination, and vented. Also housed within this room would be drums for storage of salt and hypochlorite, which would be mixed in this room in a solution mixing chamber. Additional storage, an extra drum or tank, is recommended for any emergency spill or contamination problem. This additional storage can be placed underground at the pump station site.

Illustrations of the preferred alternative route, the pump stations, and storage tanks can be found at the end of this chapter.

**Preferred Alternative System Costs**

Illustrated in Chapter 5 of this report are cost estimates that show the number of potential taps for Burlington, Otto, and the rural area chosen. Burlington currently has 115 taps on their system, Otto has an estimated 12 taps, and the rural area has 60 potential taps. Therefore, monthly service tap costs were generated based upon spreading the cost equally
across 187 taps or services. The total estimated cost for the preferred alternative system is $13.1 million and estimated monthly user cost of $130 per month. As stated earlier in this chapter, the consensus of the parties involved in this project was to achieve a monthly user cost range of $50-$130 per month. Without knowing other potential users or other grant funding, this is the range that can be given.

**Recommended Plan**

To achieve full understanding of this preferred alternative system and narrow down the costs to each individual user, a consensus was achieved at a public meeting in Burlington held on July 6, 2006 to take the necessary steps toward a WWDC Level III study and design. In order for this to be achieved, Burlington needs to take the first necessary step and become a member of the Big Horn Regional Join Powers Board (BHRJPB). The South Big Horn County Water District (SBHWD), a member of the BHRJPB, needs to hold an election to vote to incorporate Otto and the rural area west of Basin and Greybull into the SBHWD. Once this has been achieved, the BHRJPB can represent all above mentioned parties involved with this preferred alternative system.

Based upon the planned route for the preferred alternative chosen, not all rural residences in the area have been considered. As mentioned above, only the residences at or near the planned route have been considered in the preferred alternative model. By moving to a WWDC Level III study and design, more rural residences can be considered, especially the Dorsey Creek Ranch subdivision, which has the potential for 173 lots. Based on those 173 lots and 2.5 people per residence, the population of Dorsey Creek has a potential population of 433 people. This would increase the total peak-day water usage by 237,000 gallons. Therefore, Dorsey Creek Ranch subdivision would increase system demand by 330 GPM. This increased demand would affect two zones within the system. Zone1 would have to increase pumping capacity by 20 horse power (HP) and Zone 2 would have to be increased by 12 HP. Thus, pump stations 1 and 2 would be required to have additional pumps housed within the pump station to provide additional pumping capacity for the Dorsey Creek Ranch demand. With providing additional pumping capacity, additional power use will be required, as well as additional equipment to the pump station, and require an additional cost to the system. For future planning, the BHRJPB will have to determine how these additional costs will be paid for and how much responsibility Dorsey Creek Ranch will have with the additional costs and maintenance.
CHAPTER 10
REGIONAL WATER SUPPLY OPERATION PLAN

This chapter considers the operation of the regional system and the matters that must be addressed to effectively operate and maintain a regional system serving the Greybull River Valley, Otto, and Burlington. The lines of authority for operation of the system will depend on the political structure of the eventual district. Once a district is formed and its membership determined, the structure and staffing of the district will be finalized. Regardless of how the district is organized, the systems operation and maintenance needs will have to be met.

**Day-to-day Operation**

**Field Activities**

The most obvious operational need will be handling day-to-day operation of the system. This includes checking the pump stations daily, the telemetry system, and checking the transmission lines for leaks or other abnormal conditions. Daily readings will have to be recorded either by hand or automatically through the SCADA system. That data will have to be periodically tabulated and put into permanent system record files.

The operation will need to meet other day-to-day system need such as installing requested water services, responding to customer concerns and inquiries, and other daily issues. It will also require handling less frequent operational activities such as checking the storage tanks and checking the cause of control system alarm conditions.

Staffing of the operator’s position must include planning for work day activities, required continuing education time for maintaining operator certification, vacation, holidays, and sick leave. It is recommended that the district work with the Big Horn Regional Joint Powers Board to plan for a backup operator to cover for the primary operator for these times and to provide additional manpower when a maintenance activity cannot be safely handled by just one person, such as water line repair. This staff position is expected to require 40 man-hours per week when combined with maintenance functions described below.

**Office Functions**

The district or operating entity will have to handle routine office functions of billing, collections, and bill payment. It will also need to organize and keep operational records and act as a repository for district historical records such as water use, power consumption, equipment maintenance, payroll, personnel, district elections, minutes of meetings and other similar district records. This staff position is expected to require approximately 20 man-hours per week.
**Maintenance of the System**

System maintenance will address keeping the system in good operating condition. This includes keeping pumps, motors, control valves, chlorination equipment, electrical equipment, SCADA system, and all other water transmission and storage equipment in good working order as well as performing recommended routine maintenance.

Likewise system maintenance entails keeping the district’s rolling equipment in good repair, including the maintenance vehicle(s), the backhoe, compactors, and any other excavation related equipment needed in the repair of the district’s lines. The maintenance program must also address the maintenance of miscellaneous equipment carried to the field, such as a pipe tapping machine, saws, power hand tools, dewatering pumps and similar tools.

The maintenance planning also must establish and maintain a parts inventory system for parts and repair materials. The system must address the storage, inventorying tracking and cataloging of those parts and materials. This includes items such as pipe repair clamps in appropriate sizes, curb stops, valve boxes, fire hydrant barrels, and the other items that can commonly get accidentally damaged by such activities as roadway snow removal and other causes.
Permitting required for the preferred alternative project is largely limited to obtaining a Permit to Construct from the Wyoming Department of Environmental Quality (DEQ) and the Wyoming Department of Transportation (WYDOT). A U.S. Army Corps of Engineers (COE) 404 Permit may be needed for construction near or crossing the Greybull River. A preliminary evaluation of permits for each of the recommended improvements is presented below.

**Water Transmission Line**

A DEQ Permit to Construct will be required to install the transmission line from the existing Greybull storage tank to the Town of Burlington. This is a requirement of Wyoming law.

An Army Corps of Engineers 404 permit will need to be obtained for construction across the Greybull River floodplain only if the Dorsey Creek segment of the system is to be constructed. No other lines will require a 404 permit because they are not in the floodplain.

Clearance from the Wyoming Game and Fish Department will need to be obtained for the construction of the preferred alternative. The main concern of the Wyoming Game and Fish is that there may be temporary impact to fish species in the river and game that live near the Greybull River.

Private landowner utility easements will need to be obtained if the transmission line is installed outside of the highway right-of-way. The easements may be labor intensive to obtain, but the temperament of the property owners are favorable after preliminary discussion of the project. It is preferable for the water lines to be located in a dedicated easement outside of the highway right-of-way. If the highway is widened in the future, it will be the responsibility of WYDOT to relocate the water line. Should the line be located in the highway right-of-way and the highway is widened the financial responsibility for relocating the line is that of the line owner.

A Wyoming Department of Transportation (WYDOT) Utility Permit will need to be obtained if the transmission line is installed within the highway right-of-way. Approval of the permit to install the transmission line is dependent on the location of the line and the planned improvements.

**Water Storage and Pump Stations**

A DEQ Permit to construct will be required to install a water storage system, pump stations, and the preferred alternative’s supply line.

A private landowner, State Land utility easement, or direct purchase of the land will be required to install both the supply line, water storage structure and pump stations.
An Application for Right-of Way (T-99) to the BLM will be required for the storage tanks, pump stations, and supply line that would be on Federal land.
CHAPTER 12
RESPONSE TO PUBLIC COMMENT

A final public meeting on the Burlington Regional Master Plan was held January 9, 2007 at the Burlington Town Hall. The meeting was held in conjunction with the town’s regularly scheduled Town Council meeting. Mr. Jim Gores of James Gores and Associates presented the major findings of the Level II study. Highlights of the presentation followed the handout contained on the last two pages of this chapter. The regional system map shown on page IV-8 was handed out to all meeting participants. A list of persons who attended the meeting is also included at the end of this chapter.

Presentation of Findings

The conclusions reached in investigating the Burlington system were first presented. This was followed by presenting the needs that will have to be met for a regional system to serve the Greybull Valley, starting at Greybull and extending potable water service to Otto and Burlington. This route could also serve users along the route.

In summary, it was discussed that Burlington could remain a stand-alone system for an indefinite time period, so long as the town’s unfiltered alluvial source remains in compliance with EPA regulations. A discussion was held as to the fact that the town runs a risk of having the water supply determined to be groundwater under the influence of surface water. It was also discussed that the level of that risk cannot be quantified but that, in general, the EPA is discouraging the use of unfiltered alluvial groundwater as sources for municipal potable water supplies. The town’s present system is in sound condition and has no major deficiencies. The other topics of discussion are noted in the presentation handout. Each recommendation contained in the Master Plan for the Burlington system was reviewed with the Town Council and the audience. Those recommendations are summarized in the meeting handout at the end of this chapter.

In discussing service to the rural Greybull Valley, it was discussed that there is no feasible water supply for this area other than the Big Horn Regional System. It was explained that in the preferred alternative of the master plan, service was being planned for the communities of Burlington, Otto, and those residences along the proposed transmission line route. The average monthly cost of service per residence is estimated to be approximately $130 per month.

Handling the comparative operation, maintenance, and regulatory compliance requirements was discussed, comparing Burlington as a stand-alone system versus the area being served by a regional system. It was stated that there are significant advantages of having those functions handled by a single regional water provider as opposed to smaller independent entities each handling these requirements as stand-alone water systems.
The conceptual funding plan for the regional system was reviewed with the audience. It was stated that using current standard loan and grant programs, the regional system will result in water rates of approximately $130 per month per residence.

**Public Questions and Responses**

Throughout the presentation, questions were welcomed from the audience and Town Council.

Councilperson Susan Davidson stated that the Town Council had adopted the town’s wellhead protection plan at the Council’s March 8, 2005 meeting. Mr. Gores stated that Wyoming DEQ was unaware of that, and it would clear the record to inform DEQ in writing of that adoption.

Councilman Ken Cook asked for clarification of what type of material found in the microscopic particulate analysis (MPA) test would cause the EPA to classify the town’s water source as groundwater under the influence of surface water. It was explained that any organic particle retained on the test filter could trigger that determination.

Councilman Ken Cook asked how the demand was estimated for the transmission line between Greybull and Burlington. Mr. Gores stated that the water demand was based on the Town of Burlington’s records. Those records were used to determine average day and maximum day water demand for the number of planned services both in Burlington and in the regional system.

Mr. John Joyce, Director of Big Horn Regional Joint Powers Board, asked for clarification of the estimated water rates shown in Chapter V versus Chapter VI. It was explained that the costs in Chapter V were developed in 2005 and used to rank the alternatives according to cost. Since then construction costs have escalated by 30% to 50%, but based on today’s costs the alternatives would still be cost rank ordered the same.

Councilperson Susan Davidson asked whether the regional system has the water supply capacity to supply the proposed Burlington Regional System. The reply was given that Weston Engineering is finalizing a report for Big Horn Regional Joint Power’s Board (BHRJPB) analyzing supply versus demand for the region. The study has determined that supply is adequate for supply through the year 2025. Mr. John Joyce added operational and water rights clarification to the reply.

It was explained that the funding of the project will need to be developed with the BHRJP in the coming year. Mr. John Joyce stated that BHRJPB would sponsor the project with support from Burlington and the rural residents. Mr. Joyce invited the Burlington officials and rural attendees to come the BHRJPB meeting the third Wednesday of each month. Mayor Hockley said he will plan on attending the board’s meeting January 17, 2007.
Councilperson Susan Davidson stated that the town is going to have to invest some of their funds from this time on to move the project forward. She asked to what extent the Regional Board could offer assurance that additional funding would be made available to bring rates below the $130 per month rage. Mr. Joyce responded that BHRJPB would sponsor the project and do what they could, along with Burlington and the rural residents, to get commitments from the funding agencies. Further, Mr. Gores stated that no one could today offer assurance for additional funding. All that can be done is to approach the agencies with the adopted master plan and request their support for a level of funding that would allow the system to make reasonable rates available to the users. Mr. Joyce gave examples of the successful funding of regional systems around the state. Ms. Vicki Winders of WWDC gave a summary of other regional systems in the state.

Mr. Joyce recommended that the rural area be incorporated into the Bighorn Regional System by joining the South Big Horn Water District. He recommended that the Town of Burlington join the regional system by requesting a seat on the Big Horn Regional Joint Powers Board. It was recommended to the Town Council that they formally pass a resolution that the town wishes to join the regional system and pursue funding for the system and an accompanying water supply.

Mr. Gores recommended an implementation schedule. This schedule proposes time line milestones for incorporating the Burlington regional area into the BRHJP system. It also identifies funding application deadlines for major sources of funding. That implementation schedule is presented at the end of this chapter.
1. **Burlington’s Current System:**

**Conclusions**

a. The system is well maintained.

b. The system is physically and operationally sound with no major deficiencies.

c. Water storage capacity is less than recommended for fire protection.

d. The town’s water supply is at risk of falling out of compliance with EPA drinking water standards because it comes from shallow alluvial wells. There is risk that microscopic organic particulates may get into the well’s source water. This would result in the water being classified by EPA as “Groundwater Under the Influence of Surface Water”. This would trigger a requirement for filtration treatment.

e. Burlington’s water supply is adequate to meet the expected demand for the next 30 years.

f. There is no identifiable alternate groundwater supply in the immediate Burlington area.

g. The town’s wellhead protection plan has not been formally adopted.

h. The town’s wastewater chlorination system consumes far too much water.

**Recommendations**

a. Install a rate-of-flow control valve on the wastewater chlorination system.

b. Formally adopt the town’s published wellhead protection plan.

c. Through automation, improve the accuracy and ease of water system production and billing.

d. Preserve the present in-town irrigation ditch system.

e. If the town is not to join the Big Horn Regional System, develop a contingency plan for filtration of the town’s well water.

f. Either add 150,000 gallons of storage or add fire sprinklers to the unsprinklered school buildings.
2. Rural Service Area Between Greybull and Burlington

Conclusions

a. The rural Greybull Valley residents either rely on shallow wells or haul domestic water from either Greybull or Basin.
b. The well water is generally of marginal quality for domestic uses.
c. There are approximately 210 residents along the planned transmission line route. By the year 2035 this population is forecast to be approximately 330 people.
d. Current maximum day domestic water demand is estimated to be about 74,000 gallons per day. By 2035, this demand is expected to be approximately 115,000 gallons per day.
e. Monthly water charges will average $132.00 per month if Burlington joins the Regional System.

3. Funding Scenarios

a. Wyoming Water Development Commission (WWDC) will fund 2/3 of the cost of the transmission and storage systems. Of the remaining 1/3, 20% may be funded by a USDA Rural Utilities Services (RUS) grant. The remaining requires funding could finances through a RUS 30 year loan at 4.5%.
b. If other grant funding can be obtained, the monthly user rates may be less.

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Your comments are welcomed and encouraged. Please send your comments to the above address.

__________________         Your name (optional)__________________________________
Recommended Implementation Schedule

a. The rural Greybull Valley area joins the South Big Horn Joint Powers Board. March 2007
b. Burlington requests and is given a seat on the Big Horn Regional Joint Powers Water Board from which to represent the area. April 2007
c. Open discussions with WWDC, RUS, State Revolving Loan Fund, SLIB, and others to formulate a funding strategy that will result in affordable water rates. April 2007
d. The South Big Horn District applies to the WWDC for funding to design and build the Burlington Regional system. August 2007
e. Apply to the RUS for matching funding. August 2007
f. Apply to WWDC and other identified or negotiated funding sources for supplemental funding above agency standard guidelines
g. Solidify all funding sources following 2008 Wyoming Legislature session. March 2008
h. Hold any needed referendum votes. May 2006
i. Begin design of system. Jun 2008
j. Open bids and begin construction. Fall 2008


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Public Hearing Participants
Burlington Regional Water System

Level II

DRAFT

September 2006

Technical Addendum II
Environmental Impact Report

Prepared by:

Leonard Rice Engineers, Inc.
For
TST Inc. of Denver and the Wyoming Water Development Commission
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1.0 Introduction and Project History

TST Inc. of Denver under contract with the Wyoming Water Development Commission (WWDC) has conducted a Level II water supply master plan study for the Town of Burlington, Wyoming. The report investigated 1) alternate water supply sources, 2) evaluated service options for rural residents outside the Burlington service area boundaries and 3) updated the system mapping and modeling of the existing Burlington water system. The project area is located in Big Horn County, Wyoming as shown in Figure 2.1 or the report.

In 1996, a Level II report was completed for the Burlington water system by MSE/HKM for the WWDC and in 1997 a Level III project was funded by the WWDC and U.S. Department of Agriculture, Rural Utilities Service (RUS) that made the following improvements to the water supply, transmission and treatment system:

1. A well head protection (WHP) plan to protect the area around the two existing Burlington municipal water supply wells was implemented. Burlington’s wells produce an adequate supply of water that meets Safe Drinking Water Act standards. However, because they are completed to a depth of only 35 feet with a static water level of less than 15 feet during the irrigation season, they are vulnerable to surface contamination. In addition, total dissolved solids (TDS) concentrations in the Burlington well water exceed the secondary standard of 500 mg/l. Because of the nature of the recharge area, little can be done to lower the concentration of dissolved salts in the existing water supply. The WHP included purchase of those properties most likely to pose a threat of contamination to the wells.

2. Constructed a larger (8”) pipeline from the wells to the tank. This eliminated a serious bottleneck in the system and enabled more efficient filling of Burlington’s water storage tank. This improvement also provided a redundant water main into town.

3. Replaced the existing pumps in the two production wells with larger capacity units. In conjunction with #2 above, this improvement enabled more efficient filling of the water storage tank and provided better water pressure during the irrigation season.

4. Installed a gas chlorination system to replace the old sodium hypochlorite system. This improvement enabled Burlington to more fully comply with the Safe Drinking Water Act and reduced corrosion problems in the well house.

5. Constructed separate irrigation wells and the needed infrastructure to irrigate parks with un-chlorinated water. Burlington installed piping and currently operates four non-potable irrigation wells that reduce potable water system demands.

These improvements were completed in 2000 and were financed with an appropriation of $360,000.00 (60% grand, 40% loan) from the WWDC. The RUS financed an additional $414,200.00 ($364,200.00 grand and $50,000.00 loan at 5⅛% for 30 years).

In 2003, a subsequent Level II study was completed by BRS, Inc. for the WWDC as part of the Big Horn Regional Water Supply project. The study examined the feasibility of expanding the joint powers service area in Big Horn County. Potential rural users who had shown interest in regional supply include Otto and Burlington.
In 2004, Burlington requested a Level II study to investigate alternate water sources, including the purchase of water from either the Big Horn Regional Joint Powers Board or the South Big Horn Regional Water Supply Joint Powers Board. The study began in 2005, was concluded in 2006 and recommended connection to the Big Horn Regional Joint Powers Board (BHRJPB) system.

The current population of the Town of Burlington is 250. Their current peak day of water demand is 87,500 gallons. Projecting a 1.5 percent annual growth rate to the year 2035, Burlington’s peak-day water use will rise to 136,850 gallons. Assuming 60 rural residences at or near the planned preferred alternative route and three people per residence, the rural peak-day water use in 2035 will be 98,474 gallons. Otto’s assumed population is 22 people and their peak day water use in 2035 is estimated to be 11,900 gallons. The U.S. Census Bureau reports a population of 684 in 226 housing units for the 102 square miles that encompass Burlington’s zip code (82411). The preferred system was modeled with a total peak-day water usage of 247,000 gallons and a system demand of 350 gallons per minute was calculated to meet 2035 demands in the expanded BHRJPB service area.

Otto, which is not an incorporated town, does not have a public domestic water supply. The residents of Otto and those dwelling in the rural areas surrounding Burlington and Otto rely on hauling water or private shallow alluvial wells with very poor water quality. The South Big Horn Joint Powers Water Board (SBHJPB) has 100gpm of water supply capacity reserved for Burlington. The SBHJPB is a subdivision of the BHRJPB. The SBHJPB system model has identified a node for a potential Burlington tap point.

During peak summer demand, the Burlington wells are currently capable of meeting existing water needs. Burlington’s wells are located approximately ½ mile south of town and are 34 feet deep with pumps set at 28 feet. The pumps draw the water level down to 21 feet. To date, water quality testing has shown no problems but the water is hard and the recent drought has caused static water levels to decline in winter. However, summer irrigation brings the static water level to within a few feet of the surface. The current supply provided by the two wells is adequate to accommodate future growth in Burlington.

In addition to updating the 1996 study of the town’s water system, Burlington requested that the 2006 study investigate the potential to expand treated water delivery to residents of surrounding rural areas not currently served by a central water supply.

2.0 Purpose and Need for the Project

2.1 PROJECT DESCRIPTION AND PROJECT PURPOSE

The purpose of the project is to provide a reliable water supply to the Town of Burlington, Wyoming. The preferred alternative is to construct a finished water transmission line from the existing potable water storage tank southwest of Greybull, Wyoming to Burlington, encompassing the unincorporated Town of Otto and as many rural residences as possible along the pipeline route. The calculated total peak-day water usage for the preferred alternative is 247,000 gallons with a system demand of 350 gallons per minute. The preferred alternative would be implemented as part of the Big Horn Regional Joint Powers Board system that already serves most of the eastern Big Horn Basin region. A map showing the project area and location of the proposed improvements is presented on page VI-8 of the report.
The water source for the Big Horn Regional System is supplied by deep wells located in or near the towns of Manderson, Greybull, Worland, and Basin. These wells are artesian, are supplied from the Madison aquifer, provide a plentiful, high quality water supply and have virtually no potential for contamination.

Due to the difference in elevation between Greybull’s storage tank and Burlington’s storage tank, Burlington cannot be served through a gravity transmission system from Greybull. Burlington’s storage tank is 580 feet higher than Greybull’s storage tank and requires pumping to move water to Burlington. The pumping requirements to overcome 580 feet of static head are too large to have a single pump station and requires high-pressure pipe. Additionally, the modeled pressure would be too high to serve spur taps along the transmission line route. The preliminary design of the preferred alternative incorporates three pressure stations with three pressure zones. To provide enough volume while keeping the pressure between 60-90 PSI, the system was configured with a 12-inch transmission line and two new finished water storage tanks. The two storage tanks divide the three pressure zones and their locations are based upon modeled elevations along the transmission route. The chosen elevation for the storage tanks was based upon dividing the 580 feet of elevation difference into thirds providing a stepped system.

The transmission line for the preferred alternative will be made of 12-inch PVC and is planned to connect at Greybull’s potable water storage tank located approximately 2 miles west of Greybull. It will end at the corner of Elm and Main Streets in the Town of Burlington.

The preliminary design of the pump stations consists of heated and insulated steel buildings approximately 225 square feet. The buildings will house two pumps and motors of the same size and capacity that will be configured in a looped system for ease of maintenance and staggered pumping. The buildings will also house telemetry equipment, electrical control panels, and a heater. The floors will be made of concrete to provide a solid foundation for the pump house buildings.

The pump houses will be located near paved roads to ensure accessibility during all kinds of weather. The pump station sites will be graded for water to drain away from the buildings and be secured with chain-link security fences. Due to the remote locations of these pump stations, SCADA systems have been incorporated into the design allowing the operator to control the entire system from a computer at a central location. Two 250,000 gallon storage tanks are proposed for the preferred alternative that will divide each pressure zone. The two tank sites will be secured with chain-link fence. It is not necessary for the tank sites to be readily accessible. They have been located at elevations that optimize system efficiency.

If needed, booster chlorination equipment will located within the pump station building. Currently, under EPA’s ground water rules, water age is not a factor and disinfection or treatment would not be required. With new groundwater rules, it is unknown if chlorination will be required, but for master planning purposes chlorination is implemented into the system model for the preferred alternative. The type of disinfection planned for the preferred alternative is a hypo-chloride injection system that feeds a liquid chlorine solution into the pipeline. The solution dosage is controlled by a metering pump that reads system pressure and chlorine residual. The chlorine solution will be mixed and housed in a heated, airtight, and vented room free of any contamination and away from all electrical equipment. Drums for storage of salt and hypochlorite, a solution mixing chamber, and an extra drum or tank for storage of emergency spills or contaminants will also be stored in the disinfection room. The room will be designed to contain any spills that may occur.
Burlington currently serves 115 taps, Otto has an estimated 12 taps, and the rural area has 60 potential taps. Therefore, monthly service tap costs were generated based upon spreading the cost equally across 187 taps. The total estimated cost for the preferred alternative system is $13.1 million with an estimated monthly user cost of $130 per month.

2.2 PURPOSE AND NEED FOR THE PROJECT

The project purpose has been described in Section 1.1 Project Description. The project is needed to address the following water supply deficiencies:

- The existing Burlington wells are shallow and the potential for contamination exists.
- There are very limited options to develop a groundwater supply in the Burlington area that is reliable and meets drinking water standards. Further, a water treatment plant would be costly to build and operate.
- The existing Burlington wells are not adequate to accommodate anticipated growth in Burlington and do not produce enough water to meet the needs of the surrounding rural area.

3.0 Preferred Alternative and Alternatives to the Proposed Action

Several alternatives were investigated to improve the water supplies for Burlington, Otto and the rural area between Greybull and Burlington via Otto. The Preferred Alternative (Alternative 4) combines the beneficial aspects of Alternatives 2 and 3. The individual project components and a comparison of alternatives are presented below.

The following geographic areas were considered for upgraded water service:

- Greybull Valley From Greybull to Otto
- Basin to Otto
- Greybull Valley from Otto to Burlington
- Burlington Only

The alternatives evaluated for addressing the water service needs of these distinct geographic segments are listed below:

- Alternative No. 1 Burlington Only
- Alternative No. 2 Basin to Otto
- Alternative No. 3 Greybull Valley from Greybull to Otto
- Alternative No. 4 Greybull Valley to Burlington via Otto (Preferred Alternative)
- Alternative No. 5 Burlington and Otto

In addition to the 5 alternatives noted above, Alternative No. 6, the “No Federal Action” alternative was also evaluated:

- Alternative No. 6 No Federal Action

Implementation of the Preferred Alternative will improve system reliability, reduce vulnerability, minimize potential risks to human health and provide service to areas without municipal water service. The Preferred Alternative would benefit the greatest number of residents and would
result in minimal disruption to the human environment and minimal damage to the natural environment.

The No Federal Action Alternative would either 1) maintain the status quo and no improvements to the Burlington water system and water supplies to rural residents would be constructed or 2) some or all of the project components would be constructed without any federal funding. The second No Federal Action scenario (Alternative 6.b.) is unlikely to be implemented because the cost to individual users would be much higher than $130.00/month. In all cases, the alternatives were evaluated based upon their technological feasibility, cost, and environmental impacts. Except for the first No Federal Action alternative (Alternative 6. a.), there are some environmental impacts associated with each of the other alternatives.

**Alternative No. 1 – Burlington Only**

Under this concept, Burlington would remain a stand-alone system. The system’s primary deficiency is assurance that the water will not need to be treated at future date to comply with the Surface Water Treatment Rule of the Safe Drinking Water Act. The existing Burlington wells produce enough volume to meet the current and foreseeable needs of the Town. At present, the Burlington wells produce water quality that meets EPA drinking water standards. However, the existing wells are shallow, the potential for contamination exists and the water system is at risk of falling out of compliance. Further, there are no other options for developing a local groundwater supply that is reliable and meets drinking water standards. In order to be certain that the Burlington system continues to comply with the provisions of the Safe Drinking Water Act, a water treatment plant would need to be constructed. For this reason, Alternative No. 1 was rejected.

If Burlington remains a stand-alone system, operation of the system will continue to be administered by the Town. *Figure 4.1* on page 4-2 shows the configuration of this alternative and the location of the proposed water treatment plant.

**Alternative No. 2 – Basin to Otto**

Under this alternative, a potable water system would serve Otto and the rural area west of Basin. Under this concept, the system would connect to the Big Horn Regional Joint Powers Board water system on the west side of Basin. In concept, an 8-inch, 12 mile-long PVC transmission line would be constructed from Basin to a 150,000-gallon storage tank located near Otto.

There are two underground storage tanks on the Basin system, which are located approximately one mile west of town. They have a high water level (HWL) of 4,010 feet in elevation. The tank at Otto would be placed at an elevation of approximately 4,180 feet and would be 32 feet tall creating a total change in static elevation of 200 feet. This elevation difference requires a pump station producing a pressure of 80 pounds per square inch (PSI) to fill the proposed storage tank in Otto. This pressure would only be seen at times of pumping and the average pressure of the line would be 50 to 60 PSI. The pressure (pumping) station would be placed where there is still positive pressure in the transmission line. Conceptually, the pressure station would be placed near the existing tanks west of Basin. Because of the length of transmission line required between the tanks at Basin and Otto, a chlorine boosting station would be needed. The system would be controlled through a radio telemetry SCADA system.
A distribution system would need to be constructed for Otto and individual users would need to be connected to the new transmission/distribution system at their own expense.

Currently, Basin’s water supply is provided by the Big Horn Regional Joint Powers Board. The Town of Basin operates and manages their water supply system. It is assumed for planning purposes that the operation and maintenance of this alternative would require an additional part-time operator provided by the Town of Basin. Figure 4.2 on page 4-6 shows the configuration of Alternative 2.

**Alternative No. 3 - Greybull Valley from Greybull to Otto**

This alternative explored the possibility of providing service to Otto from Town of Greybull’s south water storage tank near the Greybull River. Greybull’s water storage tank is located approximately 1.5 miles west of Greybull and stands 32 feet tall. A 12-inch PVC water transmission would be connected to the tank and would extend 12.5 miles along the Greybull River Road to Otto. Because the elevation of Otto is 230 feet higher than Greybull and rural users between the two communities could be served by this system, two pumping (pressure) stations and two storage tanks were included in the conceptual design. One tank would be located near Otto, and the other would be sited approximately halfway between Greybull and Otto. This configuration provides service pressure ranging between 40 and 80 PIS. The two pump stations required to overcome the elevation difference are in the range of 20 to 25-horsepower (hp). Greybull’s above-ground water storage tank has a high water level elevation of 3,980 feet. The new tank for Otto would have a high water level elevation of 4,210 feet. The new water storage tank located between Otto and Greybull would have a high water elevation of 4,095 ft. Both tanks would have a volume of 150,000 gallons. Because of the length of water transmission line, two chlorinating boosting stations were included along the water transmission line. The system would be controlled by a radio telemetry SCADA system.

A distribution system would need to be constructed for Otto and individual users would need to be connected to the new transmission/distribution system at their own expense.

Greybull is currently connected to the Big Horn Regional Joint Powers system. Therefore, this alternative would also be connected to the Big Horn Regional Joint Powers system and Greybull’s public works staff would manage this system. It is expected that an additional part-time operator would be required to maintain the system. The key components of this alternative are shown in Figure 4.3 on page 4-10.

**Alternative No. 4 – Greybull, Otto and Burlington (Preferred Alternative)**

This alternative expands upon Alternative 3 and was the largest regional system studied. Conceptually, it consists of a 22-mile, 12-inch PVC transmission line that extends from the Town of Greybull storage tank to Otto and on to Burlington. A 12-inch diameter PVC pipeline was selected for the transmission line to reduce friction losses and pressures in the system. As discussed in Alternative 2, the total elevation difference between Greybull’s water storage tank and Burlington’s water storage tank is 580 feet.

Conceptually, the elevation difference will be overcome by boosting pressure through three pump stations as shown in Figure 4.4 on page 4-14. The elevation difference between each pressure station is approximately 185 ft resulting in zone pressures of 85 PSI - an acceptable operating pressure for PVC pipe and residential service. The pumping (pressure) stations are
planned to be located near each water storage tank. Each tank would be above ground, 32 feet high with a storage capacity of 150,000 gallons. The system would also require two chlorine-boosting stations located in a separate room within the pump station buildings. A radio telemetry system would be installed to operate the system from a central location. The key components of this alternative are shown in Figure 4.2.

A distribution system would need to be constructed for Otto and individual users would need to be connected to the new transmission/distribution system at their own expense.

This alternative would be incorporated into the BHRJPB system and operated with their staff. It is expected that this portion of the system would require one fulltime operator to maintain the system. Additionally, administrative and technical staff would be needed to read meters, prepare billing statements and track revenue.

**Alternative No. 5 – Burlington and Otto (No Connection to the Regional System)**

This alternative evaluated a pipeline from Burlington to Otto. As in Alternative No. 1, Burlington would remain a stand-alone system unconnected to the Big Horn Regional Joint Powers Board system and the improvements previously described in Alternative No. 1 would also be constructed. Burlington’s wells would be used to supply water to the extended service area. This system would incorporate the rural residences along the route between Burlington and Otto as well as those in the community of Otto. The system is not as complex as the other alternatives since no pumping station would be required. The system consists of a 10-mile long, 8-inch PVC water transmission line that would connect the two communities, a pressure reducing station, a chlorination booster station, and a storage tank at Otto.

The high water elevation of Burlington’s water storage tank is at an elevation of 4,560 feet. The conceptual high water elevation for the tank in Otto would be 4,210 feet. The tank would require an altitude valve to control pressure in the system. The Burlington tank is 350 feet higher than the new tank proposed near Otto. This difference in elevation creates positive flow to Otto and a pressure increase of approximately 150 PSI. This pressure would be too high for residential homes, so a pressure-reducing valve (PRV) would be required to lower pressure to a manageable level. The PRV would need to be configured to provide a static pressure of 80 to 85 PSI to the residents who would be served by the extended Burlington water supply system. This corresponds to a location along the transmission line that is half of the elevation difference between Burlington and Otto. The key components of this alternative are shown in Figure 4.5 on page 4-18.

Burlington’s water is currently treated with chlorine. Because of the length of the pipeline needed to serve Otto from Burlington, a chlorine boosting station is required to meet at-the-tap residual chlorine levels of 0.02 mg/l in the Otto area. Minimal radio telemetry to monitor water levels in the tank, residual chlorine levels and pressure in the pipeline would be required to operate this system.

The conceptual management of this system does not include becoming part of the Big Horn Regional Joint Powers system. The current staff of Burlington would instead manage this system. The extra time that would need to be devoted to this system may require an additional part-time staff person to handle the increased size of the system. For planning purposes, it was assumed that Burlington would be responsible for billing, operation, and maintenance and would determine the water rates for all users.
Alternative No. 6 – No Federal Action

There are two possible scenarios that were considered under the no federal action alternative:

6.a. *No Federal Action Alternative Scenario a.* No improvements to the Burlington water system would be constructed and no rural water users would be connected to a regional system, and

6.b. *No Federal Action Alternative Scenario b.* Improvements to the Burlington water system and/or rural water system would be constructed but no federal funding would be sought. However, depending on the alternative selected, location of facilities and construction methods, federal permits/approvals (if a 404 permit is needed) and rights-of-way (if project components are located on BLM lands) may be required.

4.0 Affected Environment/Environmental Consequences

4.1 LAND USE

4.1.1 Affected Environment

Agriculture is the primary land use in the project area. Livestock grazing is the principal agricultural use on the uplands and irrigated agriculture is the dominant land use along the Greybull River and adjacent benches. Because rainfall in the area averages less than 7 inches annually, dry land farming is not feasible.

The proposed project will be constructed on previously disturbed lands between Greybull and Burlington. To the greatest extent possible, the facilities will be located in transportation and utility corridors within existing easements of rights-of-way. Depending upon topography and the final pipeline alignment, some system components such as pumping stations and water storage tanks may be located on lands owned by the State of Wyoming, the federal government (BLM) or private landowners. The Wyoming State Lands & Investment Board responded to the project in a letter dated July 21, 2006 and included a package of their regulations and applications for obtaining easements and leases for non-highway projects (*Exhibit 7.1*).

4.1.2 Environmental Consequences

Under the preferred alternative, installation of the new waterlines will cause temporary disturbance to vegetation, soil and transportation (construction will require trenching adjacent to existing roadways). No permanent impacts to soil and vegetation are expected. Disturbed areas will be returned to their previous condition after construction of all the facilities is completed. Soils in the project area are classified as fine of coarse loams on floodplains and river terraces. Soils on the uplands are classified as fine sandy loams. Vegetation in the project area consists of a willow, buffalo berry and cottonwood riparian community interspersed with non-native Russian olive and salt cedar (tamarisk) with an understory of grasses, sedges and rushes adjacent to the river. Upland areas are dominated by various species of grasses and forbs. Within the Towns of Burlington and Otto, the uplands outside the riparian corridor have been landscaped with non-native and native grasses, forbs and shade and ornamental trees. There are no important farmlands, prime forest or rangelands, or formally classified high value agricultural lands within the
project area. The project will not directly affect current land use or zoning within the corporate limits of Burlington and Otto.

The Big Horn County Commissioners, the Big Horn County Emergency Management Director, the Director of the Big Horn Regional Joint Powers Board and the Mayor of Burlington were notified of the proposed action and had no comment regarding potential impacts to land use.

4.1.3 Mitigation

Reclamation of disturbed areas with native plant species adapted to the site will begin as soon as possible during and/or following construction to reduce the possibility of erosion and invasion of noxious weeds and to replace vegetation impacted by construction. Appropriate erosion controls will be used and maintained in effective operating condition during construction.

4.2 FLOODPLAINS

4.2.1 Affected Environment

The affected environment includes the floodplain associated with the Greybull River and its’ tributaries in the project area.

4.2.2 Environmental Consequences

According to the National Flood Insurance Program Community Panel Number 560004-0022 A, some of the facilities will be placed within the 100-year floodplain of the Greybull River and its’ tributaries. Under the Preferred Alternative, activities within the floodplain would be limited to installation of buried water transmission main. Stream crossings of the pipeline would be accomplished by either directional drilling or cut and cover (trenching, bedding, installing pipe and covering) that would restore the ground surface to the existing elevation. The Big Horn County Commissioners, the Big Horn County Emergency Management Director and the Mayor of Burlington were notified of the proposed action and had no comment regarding potential impacts to floodplains.

4.2.3 Mitigation

Any excess material excavated during construction will not be placed within the floodplain. Proper erosion control methods will be observed within the floodplain. Disturbed areas within the floodplain will be reclaimed and returned to their pre-construction condition.

4.3 WETLANDS

4.3.1 Affected Environment

There are numerous riverine and palustrine wetlands in the project area. Some of these have been created by irrigation return flows, roadway construction and other modification of the natural environment by human activities. No wetlands present within the project area will be permanently affected by the proposed project. Wetlands in the project area exist as narrow fringes adjacent to the Greybull River, in roadway borrow ditches and
sub-irrigated areas adjacent to irrigated lands, irrigation canals and irrigation drains. Most of the naturally occurring wetlands are classified as seasonally flooded lower perennial riverine wetlands on unconsolidated shore.

4.3.2 Environmental Consequences

Wetlands may be temporarily disturbed during construction of the new water line. However, directional drilling under these features or avoiding them entirely during construction is often more efficient and less costly than trenching and mitigation. If the Preferred Alternative is constructed, no permanent impacts to wetlands or riparian habitats will occur. The U.S. Army Corps of Engineers (ACOE) regulates the placement of dredged and fill material into wetlands and other waters of the United States. Mr. Matt Bilodeau of the ACOE Wyoming Regulatory Office was contacted regarding the project. He reviewed the project and determined that the project will probably not require processing of an individual permit because impacts to wetlands and waters of the U.S. would be minor (Exhibit 7.2). The activities most likely qualify for authorization under Nationwide Permit (NWP) 12 as defined in Part III of the Federal Register published on March 9, 2000 (Volume 65, No. 47). Authorization under NWP 12 assumes full compliance with the permit conditions (Exhibit 7.2).

4.3.3 Mitigation

All activities undertaken to construct the project must comply with the General Conditions described in the attached NWP 12 fact sheet (Exhibit 7.2). To further minimize any temporary impacts to wetlands, all disturbed wetland areas where impacts cannot be avoided, will be re-seeded with native wetland seed and/or plants adapted to the site.

4.4 CULTURAL RESOURCES

4.4.1 Affected Environment

The affected environment includes the proposed pipeline route, rural properties adjacent to the pipeline route, the corporate limits of the Town of Burlington and all areas of surface disturbance and appropriate buffer areas around ground disturbance activities. Virtually all of the project area has previously been disturbed.

4.4.2 Environmental Consequences

Historical/Prehistoric Resources

In correspondence dated August 7, 2006 (Exhibit 7.3), the State Historic Preservation Office (SHPO) reviewed the project and determined that the proposed project area has not been surveyed for cultural resources and impacts to archeological or historic sites may occur. The SHPO letter also stated “...prior to any ground disturbing activities, we recommend the lead agency carry out appropriate efforts necessary for identification of historic properties, which may include a file search, background research, consultation, consideration of visual effects, field investigations or field survey...” As previously noted, the proposed project is in a previously disturbed area and the probability of locating surface archeological or historic manifestations is low. However,
the SHPO has concluded that a Class III cultural resource survey may be warranted. Prior to construction a professional cultural resources firm should be hired to conduct a Class II survey, define the Area of potential effect (APE) and evaluate the need to conduct more intensive surveys and determine mitigation requirements.

Visual Aesthetics

There are no visually sensitive areas in the project area. Two new tanks and two new pump station buildings capable of changing the aesthetics of the project area have been proposed as part of the project. In addition, some minor short-term visual impacts will result from ground disturbance associated with construction; however, successful reclamation and repaving of disturbed areas will remove these visual impacts.

4.4.3 Mitigation

As directed by the SHPO, a Class II cultural resources survey will be conducted to historical and archaeological resources in the project area and APE. If any undocumented archeological/cultural resources are uncovered during construction, work in the area will halt immediately and the RUS staff and SHPO staff must be contacted. Work in the area may not resume until the materials have been evaluated and adequate measures for their protection or collection have been taken. All disturbed areas will be reclaimed using native vegetation as soon as practical following construction.

4.5 BIOLOGICAL RESOURCES

4.5.1 Affected Environment

The affected environment includes vegetation and wildlife within or adjacent to the project area.

4.5.2 Environmental Consequences

Threatened and Endangered Species

According to U.S. Fish and Wildlife Service correspondence (Exhibit 7.4), threatened, endangered and proposed species that may occur in Big Horn County include the bald eagle (Haliaeetus leucocephalus), black-footed ferret (Mustela nigripes), and Ute ladies’ tresses orchid (Spiranthes diluvialis). Bald eagles are year around residents in Big Horn County and nest in large trees. Black-footed ferrets inhabit prairie dog towns, which do not exist on or near the project area. Ute ladies’ tresses inhabit wet meadows and precautions will be taken to avoid disturbance in wet meadow habitats (see also the wetlands discussion in Section 3.3). The project is not likely to adversely affect any of the terrestrial threatened or endangered animals and plants occurring in Big Horn County.

Fish and Wildlife Resources

On a scale of 1 to 5, with one being the best, the Greybull River within the project area was classified as a Class 4 trout stream. This classification means that the Greybull River near Burlington and Greybull is low biomass trout water with a fishery that may be locally important, but generally incapable of sustaining substantial fishing pressure (WGFD 1991). The Greybull River from Meeteetse, Wyoming to the confluence with
the Bighorn River is impacted by irrigation de-watering and irrigation return flows in the summer during the irrigation season. In addition to brown and rainbow trout, the lower Greybull may provide habitat for other species of game fish and other fish species of concern to the Wyoming Game and Fish Department:

- Sauger (Sander canadense)
- Burbot (Lota lota)
- Shovelnose sturgeon (Scaphirhynchus platorynchus)
- Sturgeon chub (Macrohybopsis gelida)
- Western silvery minnow (Hybognathus argyritis)
- Plains minnow (Hybognathus placitus)

Riparian habitats are used by many species of wildlife including migratory songbirds, deer, waterfowl, small mammals and game birds. Impacts to fish and wildlife are expected to be minor, and the Wyoming Game and Fish Department has stated that they have no terrestrial or aquatic concerns associated with the project (Exhibit 7.5). No significant impacts to wildlife are anticipated for any of the alternatives considered.

**Vegetation**

The riparian vegetation adjacent to the Greybull River and in the project area is dominated by plains cottonwood trees and Russian olive with an understory of several species of willow, tamarisk, grasses and forbs. Upland areas are grassland with a mixture of rabbitbrush, sagebrush, and forbs. Because of the sparse rainfall (Less than 7” annually) and clay soils that predominate in this area of the Big Horn basin, much of the uplands are sparsely vegetated. Impacts to vegetation will be minor where the construction of new pipelines is planned and impacts to vegetation will be minimal. Greater disturbance to vegetation and wildlife will occur where the pump stations and finished water tanks will be constructed but the total surface disturbance associated with the construction of these components will total less than two acres. Most impacts to vegetation will be associated with construction of the new water lines.

There would be no project related vegetation impacts under the No Federal Action Alternative (Scenario a.) because new water lines and new tanks would not be built. However, if a project is constructed without federal funding (No Federal Action Alternative - Scenario b.) the impacts would be the same as the preferred alternative.

**4.5.3 Mitigation**

Proper site management will be used to prevent petroleum products and/or sediment-laden water from entering the Greybull River. If any alternative is selected, including No Federal Action – Scenario b., all disturbances to stream banks will be reclaimed. All areas of disturbance, especially within the riparian zone, will be limited to the minimum area required to meet project objectives. The areas of disturbance will be reclaimed and re-seeded with native plant species immediately following construction. Construction may occur during the winter to minimize any impacts to the Greybull River.
4.6 WATER QUALITY ISSUES

4.6.1 Affected Environment

The affected environment is that portion of the Greybull River, its’ tributaries and watershed within and downstream from the project area.

4.6.2 Environmental Consequences

There is minimal potential to impact water quality in the Greybull River because the project components are located some distance from the mainstem channel. There is very minor potential for construction related sediment-laden runoff or petroleum products to enter the drainage. Stream disturbances to the mainstem channel of the Greybull River will not occur if any of the alternatives are selected. All equipment staging areas will be located at least 300 feet away from the Greybull River to reduce the potential for fuel spills to enter the river. Provided the proper site management is employed to prevent sediment-laden water from entering the drainage, minimal water quality impacts are expected.

Potential impacts to water quality would be the same for all of the alternatives because construction would not occur in the river and no water line would be built. Potential effects on water quality would be similar between the preferred alternative and the other alternatives.

4.6.3 Mitigation

Mitigation will include implementation of standard erosion control measures where practical, including: 1) sediment detention ponds intercepting discharges where construction related sediment-laden runoff will occur, 2) timely reclamation of disturbed areas, and 3) compliance with all pertinent permits. The Wyoming DEQ Water Quality Division may require three Water Quality Division permits:

- A Temporary Discharge Permit is required for any discharges to “waters of the state.” These discharges are permitted under the National Pollution Discharge Elimination System (NPDES).
- If the project will result in clearing, grading, or otherwise disturbing five or more acres, a Storm Water Associated with Construction Activities permit will be required.
- Whenever a public water or waste system is constructed, installed or modified, a “Permit to Construct” is required. Adherence to required permits will minimize any impacts on water quality.

4.7 COASTAL RESOURCES

There are no coastal resources in the project area.
4.8 SOCIO-ECONOMIC / ENVIRONMENTAL JUSTICE

4.8.1 Affected Environment

The affected environment includes the entire pipeline corridor, the Towns of Burlington and Otto, and all residents served by the Big Horn Regional Joint Powers Board municipal water supply system.

4.8.2 Environmental Consequences

All residents of Burlington, potentially Otto, and landowners along the pipeline route are potential beneficiaries of the proposed project. Improvements to the water supply will improve the quality of life for all residents served by the expanded Big Horn Regional Joint Powers Board municipal water supply system.

No known business or industrial expansion is expected as a result of the project. The mayor of the Town of Burlington has reviewed the project and stated that the Town has no environmental or other concerns with the proposal. The Burlington water supply project has been authorized by the Wyoming Water Development Commission (WWDC) and the state legislature. The project is authorized under the Water Development Program for the purpose of improving a sponsor’s water supply. The WWDC has stated that this project does not compete with any other WWDC projects that are in progress in the Greybull River valley.

4.8.3 Environmental Justice Considerations

On February 11, 1994, President Clinton issued Executive Order 12989 requiring federal agencies to incorporate environmental justice considerations into the NEPA process. The purpose of this order was to ensure that low-income households, minority households, and minority businesses do not experience a disproportionate share of adverse environmental effects resulting from any given federal action. There are no known minority households, minority businesses, or low-income households which would be disproportionately affected by the proposed action. The proposed project will benefit all citizens of the Town of Burlington, and potentially Otto, served by the expanded water supply project.

4.8.4 Mitigation

No mitigation is required for socio-economic or environmental justice issues in the proposed project area.

4.9 MISCELLANEOUS ISSUES

4.9.1 Affected Environment

The affected environment includes the project construction area from Greybull, Wyoming and nearby areas to the Town of Burlington.

4.9.2 Environmental Consequences

Air Quality
Air quality will be lowered slightly in the project area during construction due to dust and exhaust from construction equipment. These impacts should be short term, localized and are dependent on weather conditions during the construction period. After construction, air quality is expected to return to pre-construction levels. The Air Quality Division of the Wyoming Department of Environmental Quality has reviewed the proposed project (Exhibit 7.6) and noted that three sections of the Wyoming Air Quality Standards and Regulations (WAQSR) apply to the listed projects. These sections are WAQSR Chapter 3, Section 2(f) regarding fugitive dust control, Chapter 3, Section 8 regarding asbestos removal, and Chapter 10, Section 2 regarding open burning.

Transportation

No public roads pass through the project area. During construction, traffic on local roads may be increased slightly. The project will not have any impacts on transportation.

Noise

Noise impacts in the project area will be temporary and will consist of increased noise levels associated with construction activities. Regular maintenance and upkeep of construction equipment will minimize noise impacts. After construction is complete, noise levels are expected to return to pre-construction levels.

Solid Waste Management

Solid waste resulting from the project is expected to consist of normal construction debris and must be disposed of in the approved landfill operated by the Town of Burlington.

4.9.3 Mitigation

Mitigation for temporary air quality impacts during construction will include: 1) spreading water on work areas and other areas of exposed soil to suppress fugitive dust emissions, 2) maintenance of construction equipment and heavy machinery to minimize exhaust emissions, and 3) revegetation of disturbed areas as soon as practical. Solid waste accumulated as a result of the construction process must be contained in covered containers on site and removed to an approved landfill upon completion of the project. If construction work is conducted during normal working hours, noise impacts, especially to nearby residents, can be alleviated.

5.0 Summary of Mitigation

Land Use – Reclamation of disturbed areas with native plant species adapted to the site will begin as soon as possible during and/or following construction to reduce the possibility of erosion and invasion of noxious weeds and to replace vegetation impacted by construction. Appropriate erosion, silt and runoff controls will be used and maintained in effective operating condition during construction.

Floodplains – Materials excavated during the construction will not be placed within the floodplain. Proper erosion control methods will be observed within the floodplain. Disturbed areas within the floodplain will be reclaimed and returned to their pre-construction condition.

Wetlands – All activities undertaken to construct the project must comply with the General Conditions described in the attached NWP 12 fact sheet. To further minimize temporary impacts
to wetlands, all disturbed areas will be re-seeded with native wetland seed, and/or plants adapted to the site.

**Cultural Resources** – If any archeological/cultural resources are uncovered during construction, work in the area will halt immediately and the RUS staff and SHPO staff must be contacted. Work in the area may not resume until the materials have been evaluated and adequate measures for their protection or collection have been taken. To reduce impacts to aesthetics, all disturbed areas will be reclaimed using native vegetation as soon as practical following construction.

**Biological Resources** – Proper site management will be used to prevent petroleum products and/or sediment-laden water from entering the North Platte River. Fish passage will be maintained at all times during construction so as to not disturb spawning or other fish movements. Any disturbance to stream banks will be reclaimed. All areas of disturbance will be limited to the minimum area required to meet project objectives. The areas of disturbance will be reclaimed and re-seeded with native plant species immediately following construction.

**Water Quality Issues** – Mitigation will include implementation of standard erosion control measures where practical, including: 1) sediment detention ponds intercepting discharges where construction related sediment-laden runoff will occur, 2) timely reclamation of disturbed areas, and 3) compliance with all pertinent permits. According to the Wyoming, DEQ Water Quality Division, three Water Quality Division permits may be required. A Temporary Discharge Permit is required for any discharges to “waters of the state.” These discharges are permitted under the National Pollution Discharge Elimination Systems (NPDES). If project will result in clearing, grading, or otherwise disturbing five or more acres, a Storm Water Associated with Construction Activities permit will be required. Finally, any time a public water or waste water system is constructed, installed or modified, a “Permit to Construct” is required.

**Air Quality Issues** – Fugitive dust will be controlled per DEQ requirements. If asbestos concrete pipe is found in the distribution system, the pipe will be left in the ground and larger pipe will be installed at a reasonable offset to avoid breaking the pipe during removal.

**Socioeconomic/Environmental Justice Issues** – No mitigation measures are required for socioeconomic or environmental justice issues in the proposed project area.

**Miscellaneous Issues** – Mitigation for temporary air quality impacts during construction will include: 1) spreading water on work areas’ access roads, haul roads, gravel processing sites, and areas of exposed soil to suppress fugitive dust emissions, 2) maintenance of construction equipment and heavy machinery to minimize exhaust emissions, and 3) revegetation of disturbed areas as soon as practical. Solid waste accumulated as a result of the construction process must be contained in covered containers on site and removed to an approved landfill upon completion of the project. Impacts from noise can be alleviated if construction work is done during normal working hours.

### 6.0 Correspondence and Coordination

Initial consultation letters requesting comments relating to environmental concerns related to the proposed project were sent to the state, federal, and local government agencies listed on the following pages. The general form of the letter is presented in *Exhibit 7.8*.

Of the 15 agencies contacted, 7 responded with specific concerns that have been addressed in this document. Agencies not responding include the U.S. Environmental Protection Agency.
(EPA), Big Horn Platte County Commissioners, and the Wyoming State Lands and Investment Board. Each of these agencies was contacted by phone to determine if they intended to respond and no further response was received.
Agencies that were notified of the project on July 13, 2006 and were requested to provide their input are listed below. Agencies that responded are shown in **Bold**.

The Honorable Mayor Randall Gormley  
PO Box 38  
Burlington, WY  82411

Mr. John Joyce, Director  
Ms. Mindy C. Mohr  
Drinking Water Program  
U.S. EPA, Region 8  
999 18th Street  
Suite 500  
Denver, CO  80202-2466

**Big Horn Regional Joint Powers Board**  
PO Box 25  
Manderson, WY  82432

**Emergency Management Director & Big Horn County Commissioners**  
**Big Horn County Courthouse**  
420 West C Street  
Basin, WY  82410

Mr. John Wagner, Administrator  
Water Quality Division  
Wyoming Department of Environmental Quality  
Herschler Bldg 4-W  
122 West 25th Street  
Cheyenne, WY  82002

Mr. David A. Finley  
Air Quality Division  
Wyoming Department of Environmental Quality  
Herschler Bldg 4-W  
122 West 25th Street  
Cheyenne, WY  82002

Mr. Brian Kelly, Field Manager  
U.S. Fish and Wildlife Service  
Ecological Services  
5353 Yellowstone Road, Ste 308A  
Cheyenne, WY  82001

**Mr. Vern Stelter**  
Statewide Coordinator  
Wyoming Game and Fish Department  
5400 Bishop Blvd  
Cheyenne, WY  82006

**Division of Cultural Resources**  
Wyoming State Historic Preservation Office  
2301 Central Avenue  
Barrett Bldg, 3rd Floor  
Cheyenne, WY  82002

Mr. Matt Bilodeau  
Cheyenne Regulatory Office  
U.S. Army Corps of Engineers  
2232 Dell Range Blvd  
Suite 210  
Cheyenne, WY  82009

Mr. Patrick Tyrrell, P.E.  
State Engineer’s Office  
Herschler Bldg 4-East  
122 West 25th Street  
Cheyenne, WY  82002

Ms. Janet Hallsted  
District Conservationist  
408 Greybull Avenue  
Greybull, WY  82426

**Mr. Brad Miskimins, Assistant Director**  
Wyoming State Lands & Investment Board  
Herschler Bldg 3-East  
122 W 25th  
Cheyenne, WY  82002

cc:  Mr. Jim Whalen, Assistant Director  
Wyoming State Lands & Investment Board  
Herschler Bldg 3-East  
122 W 25th  
Cheyenne, WY  82002

Mr. Mike Besson, Director  
Wyoming Water Development Commission  
5920 Yellowtail Road  
Cheyenne, WY  82007
7.0 References


8.0 Exhibits

7.1 Letter from Wyoming State Lands and Investment Board
7.2 Letter from U.S. Army Corps of Engineers and Nationwide Permit 12 and Permit Conditions
7.3 Letter from Wyoming SHPO
7.4 Letter from U.S. Fish and Wildlife Service
7.5 Letter from Wyoming Game and Fish Department
7.6 Letter from Wyoming Department of Environmental Quality, Air Quality Division
7.7 Letter from Natural Resources Conservation Service, State Conservationist
7.8 Example letter of transmittal from Leonard Rice Engineers to the recipients listed in section 5.0 Correspondence And Coordination