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I. INTRODUCTION

A. Authorization and Purpose

This Level II Report for the Kemmerer/Diamondville Joint Powers Water Board has been completed in accordance with a Contract between the Wyoming Water Development Commission and JFC Engineers & Surveyors of Rock Springs, Wyoming and dated June 3, 2010. The purpose of this project was to complete a study and develop a refined plan after evaluating the existing supply and distribution systems, and reviewing the recommendations of the Level I Master Plan report produced by Forsgren and Associates in October of 2009. Conceptual designs and cost estimates have been developed for the preferred alternatives.

B. Technical Team

The technical team assigned to this project consists of professional personnel from the following firms:

- JFC Engineers & Surveyors (JFC) Management/Prime Consultant
  Rock Springs, WY

- Hansen, Allen & Luce, Inc. (HAL) Water System Modeling

All abbreviations and technical terms can be referenced in the glossary at the end of this report.

C. Study Area

Kemmerer and Diamondville are located in Lincoln County in southwest Wyoming. The study area includes the City of Kemmerer, the Town of Diamondville, and the surrounding areas. Kemmerer’s population in the 2010 census was 2,656, up five people from the 2000 census. Diamondville’s population in the 2010 census was 737 individuals, up by 22 people from the 2000 census.

D. Water System

The existing water system for Kemmerer/Diamondville is owned by the Kemmerer/Diamondville Joint Powers Water Board (KDJPB). The KDJPB is currently replacing the water treatment plant which is feeding the system. The treatment plant delivers water to the system by pumping through a 24-inch diameter transmission line. The system consists of three different pressure zones. The Sorenson pumps feed water to the Green Hill Tank. Water from the Green Hill Tank is then fed into the upper pressure and mid-pressure zones. Five PRVs regulate water from the upper zones into the lower zones and Diamondville Tanks. Five tanks exist in the system with a total storage capacity of 4.6 million gallons. See Figure 1-1 on the following page showing the Existing Water System Schematic.

II. REVIEW OF EXISTING INFORMATION

To ensure a positive transition to the Level II Study, a substantial effort was involved in reviewing and evaluating information provided in the Level I Study. Site visits and discussions with the KDJPB staff assisted in the review of existing information vital for the Level II Study.
Below are specific items that required major review efforts and a summary of findings.

A. **Level I Study**
To better understand the specific issues involved with the water system and the recommendations, a full review of the Level I Study was required at the onset of this study. Support information incorporated in the Level I project notebook was utilized to identify needs and existing hydraulic information. The videos prepared of the Sorenson 1.5 MG Tank were also viewed to better understand the tank's roof concrete concerns.

B. **Existing Water System**
The existing water system piping, storage tank locations, pump station locations, and PRV station locations were studied. The existing system is comprised of three pressure zones, five tanks at three separate locations, five PRV stations, and a pipe network throughout Diamondville and Kemmerer. Figure 2-1 on the following page illustrates the existing water system with pressure zones. For further detail, please refer to the Level I Study.

C. **Existing Water Model and GIS Information**
The Level I water model and associated GIS were reviewed for discrepancies and to obtain an understanding of how the water system functions. Demand allocations and overall system capacities were reviewed within the model. This model was prepared with the Bentley WaterCAD V8 software in a static condition with a peak day demand scenario. The static model functioned properly and did not appear to have any issues during peak demands and during fire flow situations. The GIS system provided roads, pipe properties, demand nodes, and parcel outlines.

D. **Existing Water Production from Treatment Plant**
Daily water production data was provided over the period from January 2009 through June 2010. The data was reviewed against the data provided in the Level I Report. Water production during this time period did not deviate significantly from that provided in the Level I Report. It was determined that peak demands and water production rates introduced in the Level I Report were reliable and would be further utilized in this study.

E. **Level I Demand Information**
The following demand information was presented in the Level I Study and also incorporated into this study:

- **Existing Demands:**
  - Peak Summer Day Water Usage: 3,200,000 gpd
  - Peak Summer Day Demand per Connection: 2,222 gpd
  - Average Summer Day Water Usage: 1,300,000 gpd
  - Average Summer Day Demand per Connection: 900 gpd
  - Average Winter Day Water Usage: 720,000 gpd
  - Average Winter Day Demand per Connection: 500 gpd
  - Existing Connections: 1,440
Map is of Township 21 N Range 116 W
Future Demands:
- Peak Summer Day Water Usage: 4,600,000 gpd
- Average Summer Day Water Usage: 1,800,000 gpd
- Average Winter Day Water Usage: 1,000,000 gpd
- Future Connections: 2,040

F. Meter Readings from Previous Year
The KDJPB's staff provided meter readings for the purpose of checking the Level I demand information and distributing actual demands to corresponding nodes in the drinking water model. The provided data was collected over the period from October 2009 through September 2010. The meter readings included all meters within the system including city meters and those utilized for outdoor irrigation. A summary of the data is presented in the following Figure 2-2.

![Figure 2-2 Average Monthly Flows](image)

The average demand over the time period was 395 gpm. Flows were lowest during winter and spring before peaking during the summer. The lowest average monthly flow was 245 gpm, recorded during April 2010. The peak monthly flow occurred in July and reached 727 gpm.

G. Field Review of System & PRV Settings
A field reconnaissance of the system was conducted at the outset of this Level II Study. The pump stations, tanks and vaults, and the PRVs were visited. KDJPB's staff assisted with reading of pressures at the PRV sites. There were a number of inconsistencies with the pressure readings on the high pressure side of the PRVs and the expected pressures from the model. These slight inconsistencies were discussed with KDJPB staff. It was deduced that assumed elevation information found within the Level I model may not be correct for the tanks and other major facilities. It was determined that a survey would be required to correctly model the hydraulics of the system. This information was also vital to determine the operation of the Diamondville Tanks. The findings of the survey are provided in Section IV of this report.
H. Treatment Plant Pump Station
The KDJPB in 2010 began construction of a new culinary water treatment plant. As part of this study, the specifications for the Treatment Plant’s finished water pumps were requested from the design engineer. The pump specifications were then reviewed against the model to ensure compatibility with the design of the 3,200 gpm pump station. The pump specifications were verified as being compatible with future conditions.

III. WATER SYSTEM EVALUATION
A. EPANET Model
As mentioned earlier, the Level I Study utilized WaterCAD software to model the water distribution system. For the Level II Study, it was determined that EPANet software would be utilized to model the system. EPANet 2.0 is a computer program that models the hydraulic behavior of piping networks. The software was developed by the EPA and is freely available to the public. EPANet utilizes the same programming to perform calculations as the WaterCAD model and easily converts data back and forth between modeling software. The EPANet model was developed by starting with the distribution network model used for the previous Kemmerer/Diamondville Master Plan Level I Study. The model was then updated to reflect existing conditions based on GIS data provided by the City, survey data, and conversations with City personnel. Figure 1-1 provides a hydraulic schematic of the system with corrected elevations.

Computer models were developed for three phases of water system development. The first phase was the development of a model of the existing system (existing model). This model was used for calibration and also for identifying deficiencies in the existing system. A second model was developed which was used to identify those corrections necessary to improve existing system deficiencies (corrected existing model). The third phase was the development of a future model to indicate those improvements that will be necessary for the projected “build-out” condition (future model).

B. Extended Period Simulation
To enable a better analysis of the system, the existing static model was converted into an Extended Period Simulation (EPS) model. Evaluation of the system through the use of an EPS model has several advantages. The model allows for the evaluation of the system over days versus a brief moment in time. The EPS model also evaluates operation of the system’s pump stations and tank filling cycles. For example, the first time the KDJPB’s EPS model was run it was noted that the system was pumping water around in circles without the water being used because a PRV was set above the elevation of the Diamondville Tanks. This inefficiency was discovered quickly and reported to the KDJPB’s staff who could remedy the situation by adjusting the PRV settings. An EPS model allows for clearer evaluation of alternatives by looking at both sizing of components and guidelines for operation of the system.
C. Develop Diurnal System Demand Curve for Summer and Winter

Diurnal demand curves were used to describe daily demand variation for both summer and winter conditions. Typical summer and winter diurnal curves were applied to the Kemmerer water system model as shown in non-dimensional form in the following Figure 3-1.

![Figure 3-1 Diurnal System Demand Curve for Summer and Winter](image)

Using the diurnal curve, flow rates at a specific time can be determined by multiplying the relevant peaking factor by the average flow rate for the respective summer or winter period. Differences in summer and winter usage are reflected by the diurnal curves. During the summer, the primary peak occurs at about 6:00 a.m., before decreasing steeply until about mid-morning. The period with the lowest demand is between 9:00 a.m. and 11:00 a.m. Around mid-day, demand climbs steadily until reaching a secondary peak at about 8:30 p.m. The summer demand curve is heavily influenced by outdoor irrigation demands. In contrast, during the winter, demand is lowest throughout the night before rising sharply between 3:00 a.m. and 7:00 a.m. Daytime flows stay relatively high throughout the day dropping at around 11:00 p.m.

D. Develop Demands from Meter Readings from Previous Year

It was determined during the review of the system that a more appropriate demand allocation could be obtained with the use of actual meter locations. A demand distribution was performed using the provided meter data and GIS. First, the pipes and nodes in the EPANET 2.0 model were converted to shape files in GIS. Next, the meter data was sorted and organized into a format convenient for geocoding meter addresses. Geocoding is the process of matching an address to a physical location. This process provided a mapping of water demand data for the city of Kemmerer. The individual demands were then assigned to the nearest node within the water distribution network. The resulting nodal demand distribution was then input into the EPANET 2.0 model. The demand data provided consisted of monthly volumes expressed in gallons used during the meter period. The monthly volumes were converted to average volumetric flows, in gallons per minute (gpm), for each of the monthly periods. The demand
distribution utilized in EPANET was based on the August 2010 metered flows as a representative summer month. The August flows were multiplied by a scaling factor in order to convert the monthly flows into peak day flows. The scaling factor was determined by comparing the average flow rate during August 2010 to peak day design. Based on historical records and the previous master plan, a peak day design flow of 2,200 gpm was chosen. The average flow for the Aug-Sep data was approximately 665 gpm. Therefore, the August meter flows were scaled by a factor of 3.3 to create peak day demands.

E. Survey of Existing System

As discussed in the previous section, it was determined that a survey of the existing system’s major components was needed. All tank pump stations and PRV stations were surveyed and then compared with existing data from the Level I Study. It was found that the Sorenson Tanks and the Diamondville Tanks had approximately 6 feet of difference in overflow elevation versus 13 feet as believed previously. It was also determined that the PRV station elevations were not correct in the model and varied in their actual elevation. The surveyed elevations were used within the model to provide a more accurate hydraulic system. The survey data is found in the project notebook.

F. Calibration of Model

A water system computer model should be calibrated before it can be relied on to accurately simulate the performance of the distribution system. Calibration is a comparison of the computer results, field tests, elevations, and actual system performance. Field tests are accomplished by performing fire flow tests and pressure tests on the system. When the computer model does not match the field tests within an acceptable level of accuracy, the computer model is adjusted to match field conditions. The model was calibrated with the use of fire flow tests, pressure tests, and system performance information.

G. Updated GIS Map for Existing System

The data in the GIS was updated to the most current information as provided by the survey, and other data provided by KDJPB staff. Elevations, demands, and piping changes were all updated.

IV. HYDRAULIC MODELING AND MAPPING

A. Water System Evaluation

The peak day extended period model was used to model the water system performance over time. An extended period model is actually a static model run several times for each time period. For example, a movie is made up of individual pictures put together. The peak day extended period model was used to set system conditions for the static models, calibrate zone to zone water transfers, analyze system controls and the performance of the system over time, analyze system recommendations for performance over time, and analyze the water system for system optimization recommendations. The peak day extended period model was run for several days with the peak day demand curve repeating every 24 hours in order for the model to stabilize, which is indicated by the tanks filling and emptying in a consistent pattern without running empty. System recommendations, provided in the Level I Study, were reviewed for existing
conditions and future conditions at build out, and were checked with the extended period model to confirm adequacy.

The model was also manipulated to detail how much capacity the improvements or existing facilities would provide. This additional information will be helpful to determine when existing facilities have reached capacity.

Because the population of the Kemmerer/Diamondville area increased only 0.8% from the 2000 to the 2010 Census, the previous projected numbers for growth appear to not apply to the Kemmerer area. As build-out numbers are likely not to happen for many years, this report will define in Section V, existing capacity in percentages of major system components. This information will allow for planning as growth happens in the system over time.

B. Results

Generally speaking, the computer model showed that the distribution system performs quite well in both existing and future scenarios. The primary system deficiencies are generally related to fire flow and low pressures in a few areas. The system performed very well during most fire flow scenarios due to the looping of the water lines. However, as discussed in the Level I Study, fire flows were not adequate on the street to the east of the Kemmerer High School (3rd Avenue).

The EPS evaluation provided the ability to run an extended fire flow scenario and determine pressures during that interval. Low pressures were identified in the system during these fire flow events. Areas of concern had low pressures during both normal operation and fire flows. These low pressure areas are along 3rd Avenue, the Upper Zone areas of Diamondville, and at Del Rio Drive. The 3rd Avenue and Del Rio Drive areas may be remedied by modifications to zones and PRV stations. However, those areas in the Upper Zone cannot increase pressures without the addition of a booster pump. As a rule of thumb, it is advised that new development not build above 6,900 feet to ensure pressures above 50 psi.

The EPS evaluation along with the survey information detailed why the Diamondville Tanks have not been operating optimally during the winter, and provided an alternative for the Upper Diamondville area. The EPS evaluation also included reviewing all proposed improvements from the Level I Study along with the Sorenson Pump Stations capacity during peak day conditions. Specific recommendations along with capacity information is provided in the following improvements sections and shown in Figures 4-1 and 4-2 on the following page. Figure 4-1 details the overall system with improvements and new zone boundaries, while Figure 4-2 provides the proposed hydraulic grade schematic for the system. A portion of the evaluation also included the tank storage needs along with the Concrete Sorenson Tank roof repairs. These analyses are also discussed in the following sections.
Phase 2
18" Transmission from Treatment Plant
(See Paragraph D)

Phase 1 Option 2 - Redundant
18" Transmission Line
(See Paragraph D)

Phase 1 Option 1 - Redundant
18" Transmission Line
(See Paragraph D)

New 16" Transmission Line
to Northwest Area
(Parallel Ex. 12" Line)
(See Paragraph C)

New 1 MG
Green Hill Tank
(See Paragraph I)

New School District 8"
Line
(See Paragraph E)

New 8" Line & PRV on Canyon Rd
(See Paragraph F)

Close Valves
To Extended Mid Zone
(See Paragraph E)

New 10" Lines to
Increase Pressure
To Extended Mid Zone
(See Paragraph E)

New PRV & Check Valve
(See Paragraph F)

Close Pipe
(See Paragraph F)

Abandon Tank & Disconnect Transmission Lines at Nearest Connection
(See Paragraph F)

LEGEND
- Pump Station
- Tank
- PRV
- Lower Zone
- Mid Zone
- Upper Zone
- New Diamondville Zone
- Proposed Pipe Improvements
- Existing Pipes
- Proposed PRV
- Proposed Tank

Map is of Township 21 N Range 116 W
C. 16” Northwest Water Line

A new transmission line for the Northwest area was proposed in the Level I Study. This transmission line delivers water from the Green Hill/Upper Zone to the northwest area along Highway 30. The City in recent years has had many problems with breaks and believes the existing 12-inch diameter DIP line to be in very poor condition. The evaluation showed that for a peak demand along with a fire flow would not allow for pressures above 20 psi during an extended fire event. It is recommended that the existing 12-inch diameter line be upgraded to a 16-inch diameter line. A new 16-inch diameter line will have enough capacity for an additional 600 ERC (Equivalent Residential Connections) with the ability to provide sufficient fire flows for the area. Figure 4-3 on the following page shows the alignment of this upgraded line.

D. 18” Transmission Line from Treatment Plant

A new transmission line from the Treatment Plant to the distribution system was discussed in the Level I Study. This imperative line would provide transmission from the Water Treatment Plant to the system. The existing line is a 24-inch diameter DIP line and reported to have maintenance issues in some sections, likely due to corrosive soils. The evaluation for this line provided that a smaller 18-inch inside diameter (ID) line would be adequate to provide peak demands to the system through build out. The velocity of an 18-inch ID line currently is 4.0 fps during peak day conditions. For comparison, the velocity in the existing 24-inch diameter line is only 2.2 fps. Should 600 connections be added to the system during the life of the 18-inch ID water line, it would increase the velocity to 4.8 fps. A new line would also provide much needed redundancy for the system. Figure 4-4 (following Figure 4-3) shows two alignment and phasing options for this redundant line.

E. Extend Mid-Zone to 3rd Ave

An evaluation was performed on the Level I recommendation of extending the Mid-Zone near 3rd Avenue. A fire flow test along with modeling indicated that the hydrant in front of the Kemmerer High School and the LDS Chapel would only flow 700 gpm at 18 psi. Modeling also presented low pressures in the area because it is too high in elevation to be in the lower zone. Low flows are realized in the area due to 6-inch diameter lines and dead-end lines. To remedy the low flow and low pressures, it is recommended that a new 10-inch diameter line be extended into the area from the Mid-Zone along 3rd Avenue, and a small length of 10-inch diameter line also be installed along Elk Street from 3rd Avenue to the alleyway allowing for a loop. The Mid-Zone would then be extended to 1st Avenue and Moose Street to improve pressures and fire flows by isolating valves. Also at the time of this report, the school district was planning to construct an 8-inch diameter line around the Kemmerer High School and connect to the fire hydrant mentioned above. This line has been modeled, is sized adequately, and would provide Mid-Zone pressures to the area. Figure 4-5 (following Figure 4-4) shows this Mid-Zone Extension.

F. Diamondville Upgrades

The KDJPB's staff expressed concern that the Diamondville Tanks did not operate in the winter during low demands causing maintenance and water quality concerns. It was also noted that even during the summer the tanks did not assist a great deal with equalization because the tanks experience minimal draw-down and filling movement. The Level I Study hypothesized that this was due to the 15 feet of difference between the overflow elevations and the hydraulic losses.
All improvements are within Township 21 N Range 116 W

New 16" Transmission Line To Northwest Area Parallel Existing 12" Line (Length 8,406 Feet)

Connect to Existing 8" Line With New Tee and Valve

Connect to Existing 8" Line With New Tee and Valve

Connect to Existing 8" Line With New Tee and Valve

New Tee And Valves Connecting To Existing 16" Line To Green Hills Tank

LEGEND
- Tank
- Proposed Tank
- PRV
- Proposed PRV
- Proposed Valve Closure
- Proposed Pipes
- Existing Pipes
- Parcels

0 250 500 1,000 Feet

WYOMING WATER DEVELOPMENT COMMISSION
KEMMERER/DIAMONDVILLE LEVEL II STUDY

16" NORTHWEST WATERLINE

FIGURE 4-3
New Casing Across Hwy and Railroad And River
Connect To Existing 24" Line

Phase 1 Option 1 - Redundant 18" Transmission Line (Length 2,890 Feet)

Redundancy Option (Length 600 Feet)

Phase 1 Option 2 - Redundant 18" Transmission Line (Length 2,070 Feet)

New Casing Across Hwy and Union Pacific R.O.W.

New Casing Across Hwy
Connect To Existing Lines

Connect To Existing 24" Line

Phase 2 18" Transmission From Treatment Plant (Length 6,070 Feet)
New 10” PVC Line
To Increase Pressure
(Length 750 Feet)
New 8" Line & PRV (Length 2,340 Feet)

New 8" Line (Length 180 Feet)

Existing PRV To Provide Adequate Pressure For New Zone

Close Pipe To Isolate Zones

Redundant PRV May Be Opened

Abandon Existing Tanks

Disconnect Pipes from Tank @ Nearest Connection

LEGEND

Tank
Proposed Tank
PRV
Proposed PRV
Proposed Valve Closure
Proposed Pipes
Existing Pipes
Parcels

All improvements are within Township 21 N Range 116 W

WYOMING WATER DEVELOPMENT COMMISSION
KEMMERER/DIAMONDVILLE LEVEL II STUDY
DIAMONDVILLE ZONE IMPROVEMENTS

FIGURE 4-6
However, the survey performed as part of this study detailed that the overflows are only 6 feet apart.

Utilizing the new survey information for the PRVs and the EPS model, it was determined that the PRV settings were too high and causing water to feed into the lower pressure zone at pressures higher than the tank elevations could produce. This ‘bleeding’ from the upper zone would cause the tanks to not cycle. This situation also would cause excessive pumping at the Sorenson Pump Station.

The evaluation utilizing the new survey data also revealed that pressures were low in the Upper Diamondville area. To remedy the low pressure, a new Upper Diamondville Zone is recommended. This new pressure zone would have its water source provided by the Upper Zone/Green Hill Tank through the existing PRV-4 on US Hwy. 30. The setting could be maintained between 70-80 psi and provide higher pressure to the water users within this zone. See Figure 4-6 on the previous page.

The KDJPB staff has determined that the Diamondville Tanks will be decommissioned due to high maintenance costs and operational issues. The model provided recommended improvements to provide fire flow in the lower area of Diamondville once the tanks have been removed from the system. A new PRV/Check Valve Station will be needed on the existing line that runs between Frontier Street and Deal Alley. The existing line from Susie Avenue to Frontier Street will need to be closed in order to isolate the new Upper Diamondville Zone.

Another recommended improvement to assist with meeting Fire Flow Demands in the Lower Diamondville area is to connect the existing water line in Little Canyon Road to the main transmission line, as shown in Figure 4-6. To further assist with redundancy, it is recommended at some future date to complete the water looping in Canyon Road, with a PRV Station. It is also recommended that the Diamondville Tanks be decommissioned after the new Green Hill Tank is developed, due to the reduction in storage that will occur.

Table 4.1 - Recommended PRV Settings with New Diamondville Zone

<table>
<thead>
<tr>
<th>PRV</th>
<th>Location</th>
<th>PRV Setting Out</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hwy 189 (Near Chevron)</td>
<td>60 psi</td>
<td>Provide flow to New Upper Diamondville Zone</td>
</tr>
<tr>
<td>2</td>
<td>Hwy 189 (Near Energy Inn)</td>
<td>-</td>
<td>Redundant not needed anymore.</td>
</tr>
<tr>
<td>3</td>
<td>Little Canyon Rd.</td>
<td>60 psi</td>
<td>Provide Fire Flow into Lower Zone</td>
</tr>
<tr>
<td>4</td>
<td>Lincoln Height &amp; Elk St.</td>
<td>70 psi</td>
<td>Provide Flow to Mid-Zone</td>
</tr>
<tr>
<td>5</td>
<td>Garnet &amp; Sorenson</td>
<td>60 psi</td>
<td>Provide Flow to Mid-Zone</td>
</tr>
<tr>
<td>6</td>
<td>Deal Alley</td>
<td>40 psi</td>
<td>Provide Fire Flow to Lower Diamondville</td>
</tr>
</tbody>
</table>

Leaving the Diamondville Tanks in operation was also studied but it was decided that the maintenance and operational issues were of greater concern. The results of this option are made available in the project notebook.
G. Sorenson Pump Station

An EPS evaluation was performed for the Sorenson Pump Station that solely delivers water to the Green Hill Tank/Upper Zone. KDJPB's staff was concerned about the capacity of the pump station should new growth occur. The evaluation provided that with the current three pumps that another 100 ERC could be provided to the system by utilizing only two of the pumps with the third as a backup. Beyond 100 ERC, it is recommended that the pump station add a fourth pump. The pump could be added to the redundant side of the pump station piping that is not currently in service. This evaluation also assumed that a new tank was built in the zone and could assist with peaking. As noted in the Level I Study, there is space for six pumps, but only three pumps are currently functioning.

H. Tank Storage Analysis

With the revised demands provided by actual meter readings within the model, it was necessary to evaluate the required water storage for the system. The model analysis illustrated that the tanks are sized appropriately and function well during peaking and fire flow events. The analysis follows Section 13 of DEQ's requirements for water storage as providing 25% of the design maximum daily demand plus fire storage. The model assisted in providing a breakout of demand ratios for each zone. The future scenario assumed build out of the system along with the Mid-Zone Extension and new Diamondville Zone. The build-out scenario assumes 65% of additional taps would occur in the Upper Zone/Green Hill Tank area, and 35% of growth in the Lower Zone Sorenson Diamondville Tank areas. The Level I Study provided the maximum fire event of 3,000 gpm for three hours. The following summarizes the tank analysis by overall system, and upper and lower tanks.

Existing Storage Summary:

- 25% Maximum Day Demand: $25\% \times 3.2 \, \text{MGD} = 0.80 \, \text{MG}$
- Fire Storage: $3 \, \text{hrs.} \times 3,000 \, \text{gpm} = 0.54 \, \text{MG}$
- Total Required Existing Storage: $1.34 \, \text{MG}$

The total storage of the existing system is 4.6 MG (3.5 MG at Sorenson, 0.5 MG Green Hill, and 0.6 MG at Diamondville).

Existing Upper and Mid-Zone/Green Hill Tank

- 28% of 25% Max Day Demand: $28\% \times 25\% \times 3.2 \, \text{MGD} = 0.22 \, \text{MG}$
- Fire Storage: $3 \, \text{hrs.} \times 3,000 \, \text{gpm} = 0.54 \, \text{MG}$
- Total Required Existing Storage: $0.76 \, \text{MG}$

The existing storage required at the Green Hill Tank is more than the existing tank capacity of 0.50 MG.

Existing Lower Zone/Sorenson and Diamondville Tanks

- 72% of 25% Max Day Demand: $72\% \times 25\% \times 3.2 \, \text{MGD} = 0.58 \, \text{MG}$
- Fire Storage: $3 \, \text{hrs.} \times 3,000 \, \text{gpm} = 0.54 \, \text{MG}$
- Total Required Existing Storage: $1.12 \, \text{MG}$
The existing storage for the lower zone is more than sufficient at 4.1 MG.

**Future Storage Summary:**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>25% Maximum Future Day Demand:</td>
<td>25% x 4.6 MGD = 1.15 MG</td>
<td></td>
</tr>
<tr>
<td>Fire Storage</td>
<td>3 hrs. @ 3,000 gpm = 0.54 MG</td>
<td></td>
</tr>
<tr>
<td>Total Required Future Storage:</td>
<td></td>
<td>1.69 MG</td>
</tr>
</tbody>
</table>

There is ample storage in the system as a whole, but the majority of the storage is in the lower zones. The individual tank summary assists with storage by zone.

**Future Upper Zone/Green Hill Tank**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>65% of 25% Max Day Demand:</td>
<td>65% x 25% x 4.6 MGD = 0.75 MG</td>
<td></td>
</tr>
<tr>
<td>Fire Storage</td>
<td>3 hrs. @ 3,000 gpm = 0.54 MG</td>
<td></td>
</tr>
<tr>
<td>Total Required Future Storage:</td>
<td></td>
<td>1.29 MG</td>
</tr>
</tbody>
</table>

The demand analysis shows that in the future 65% of all demands will be within the Upper and Mid-Zones which include the proposed Upper Diamondville Zone.

The future storage required at the Green Hill Tank is more than the existing tank capacity of 0.5 MG.

**Future Lower Zone from Sorenson Tanks**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>35% of 25% Max Day Demand:</td>
<td>35% x 25% x 4.6 MGD = 0.40 MG</td>
<td></td>
</tr>
<tr>
<td>Fire Storage</td>
<td>3 hrs. @ 3,000 gpm = 0.54 MG</td>
<td></td>
</tr>
<tr>
<td>Total Required Future Storage:</td>
<td></td>
<td>0.94 MG</td>
</tr>
</tbody>
</table>

The demand analysis shows that in the future 35% of all demands will be within the Lower Zone. This is a decrease from the existing ratio due to most future development taking place in the Upper Zone and the addition of the Upper Diamondville Zone that will be supplied through the Upper Zone Tanks.

The future storage analysis requires a total of 1.7 MG of storage. Considering a new Green Hill Tank (1 MG), and the decommissioning of the 1.5MG Sorenson Tank and 0.6MG Diamondville Tanks, the system would have a total of 3.5MG of storage or almost twice the required DEQ amount. Though there is an abundance of storage in the overall system, the upper zone is deficient. This excess storage will be utilized for emergency, equalization, and operational storage in only the lower zone. However, this excess storage can not be utilized in the upper zone unless the system is fitted with expensive fire pumps, large on-site generators, and more peak day pumping capacity at the Sorensen Pump Station.
The KDJPB operates the existing Green Hill tank in the winter time to allow tank turnover. This maintains water quality. Adding an additional storage at this location will allow the operators to maintain water quality and fireflow, since they can now drop one tank at a time, while keeping one tank full for fire suppression.

I. Green Hill/Upper Zone Tank Storage

The Level I Study recommended a new storage tank within the Upper Zone. The analysis above demonstrates that indeed the zone needs additional storage to meet both existing and future equalization and fire flow storage requirements. A 1.0 MG tank is recommended for the zone to best serve existing and future demands. An evaluation of possible locations for the new tank confirmed the best option is next to the existing Green Hill Tank as discussed in the Level I Study. This location provides the best dispersal of stored water to the Upper and Mid Zones along with the newly created Upper Diamondville Zone. Correspondence with the owner of the property, Chevron, is documented in the Geotechnical report.

J. Sorenson 1.5 Tank Rehabilitation Analysis and Recommendation

The Level I Study identified that the existing Sorenson 1.5 MG Tank’s inverted pre-stressed, tee-roof deck is in need of repair. An investigational dive video revealed many sections of rebar showing and a large amount of concrete is spalling off the underside of the roof deck. A number of approaches were identified to rehabilitate the roof. This evaluation reviewed retrofitting with aluminum, fiberglass, and precast span deck. Costs for just the retrofit (not including demolition) ranged from $215,000 to $305,000. After evaluating the actual amount of water storage required in the system (as shown above), it was recommended that the KDJPB save the costs of the retrofit and place the money into a new tank for the Upper Zone. This new tank provides fire flow storage for all zones delivered through the PRVs. It was also determined that the 1.5 MG tank was in excess of what the system really requires for storage, and the 2.0 MG Sorenson Tank is more than adequate to meet existing and future storage requirements for the zone. The new treatment plant also provides great redundancy should the 2.0MG need to be taken out of service briefly. The model confirmed that with the treatment pumps and 1.5MG of storage on Green Hill, the system would function normally.

K. Transmission Line Pipe Material Recommendation

In discussions with KDJPB’s staff, a concern has been introduced regarding pipe selection for future projects. After a review of the soil types in the area, it appears that there are pockets of ‘Hot’, corrosive soil. This is likely the problem with the 12-inch diameter Northwest Pipelines maintenance issues. There are currently three typical types of pipe material that meet AWWA and NSF specifications and are typically used in culinary water systems. These material types are PVC, HDPE, and Ductile Iron Pipe (DIP). All have their respective advantages and disadvantages.

For the KDJPB system with corrosive soils and pressures less than 200 psi, PVC and HDPE would be typically specified. DIP with its iron constituents will deteriorate in a corrosive environment where PVC and HDPE will not. PVC is provided in lengths of pipe and connected at its joints, it is more rigid, lighter, and until recently less expensive than the other pipe
materials. Though it must be noted that PVC has very little tolerance to deflect at its joints and therefore requires DIP Bends that must be thrust blocked, restrained, and protected for corrosion.

HDPE is flexible, forgiving, non-corrosive, and is welded together to provide a restrained system not requiring thrust blocks. For the relatively low pressures and the terrain, HDPE is also a suitable pipe material for the KDJPB system.

V. POPULATION GROWTH AND WATER DEMANDS

As discussed in the previous section, the growth in the Kemmerer/Diamondville areas has been minimal at just 0.8% over the last ten years. Therefore, this report is not projecting numbers on new population growth, which has been inaccurate in past reports. It was determined for this report to not be so concerned with a 'Build-out Scenario' vs. understanding the capacity of some of the major facilities and when their capacity would be reached. The following is a summary of existing excess capacity and limitations in major system components.

- It is advised that new development not build above 6,900 feet to ensure pressures above 50 psi.
- The new proposed 16-inch diameter line in the Northwest Region will have enough capacity for an additional 600 ERC with the ability to provide sufficient fire flows for the area. This is a growth of 130% for the Upper Zone.
- Should these 600 connections be added to the system during the life of the 18-inch diameter water line from the treatment plant, it would increase the velocity to 4.8 fps during peak demands, which is acceptable for any transmission line.
- Any growth beyond the additional 100 ERC in the area serviced by the Green Hill Tank (12% growth in the proposed Upper Zones), a fourth pump would need to be added for redundancy at the Sorenson Pump Station.
- With the addition of a 1.0 MG Green Hill Tank, the water storage in the system would be sufficient for the design life of the tanks (typically 40-50 years design life) and beyond.

An official Kemmerer zoning map is shown in Figure 5-1 on the following page. This assumed growth within the service area occurs mostly in the Northwest with minor in-fill in the rest of Kemmerer/Diamondville. This assumed growth is not contrary to the existing zoning.

The zoning categories on Figure 5-1 are described as follows:

<table>
<thead>
<tr>
<th>A – Agricultural Combining District</th>
<th>CN – Commercial Neighborhood District</th>
<th>M-1 – Multi-Family Housing</th>
<th>R – Single Family Residential</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1 – Agricultural Holding District</td>
<td>C-H – Commercial Highway District</td>
<td>M-2 – Multi-Family Housing</td>
<td>R-a – Single Family Residential</td>
</tr>
<tr>
<td>C – Commercial District</td>
<td>I-1 – Light Industrial</td>
<td>M-3 – Multi-Family Housing</td>
<td>Rb – Single Family Residential</td>
</tr>
<tr>
<td>CB – Commercial Combining District</td>
<td>I-2 – Heavy Industrial</td>
<td>P – Public Use Zone</td>
<td>RC – Single Family Residential</td>
</tr>
</tbody>
</table>
VI. CONCEPTUAL DESIGNS, ALTERNATIVES, AND CONSTRAINTS

A. Redundant Transmission Line

As previously discussed, the existing water treatment plant serves the community through an existing 24-inch diameter DIP line that frequently has maintenance issues. To insure a safe and adequate water supply for the Kemmerer/Diamondville area, the Level I Study suggested a redundant water supply line from the treatment plant be developed to service the area in case of problems with the existing 24-inch diameter line.

The 24-inch diameter line appears to have slow velocities and is oversized for the usage in the area. Presently, the water treatment plant is not operated continually, especially in the winter time and therefore capacity in the existing 24-inch diameter line is abundant.

Proposed is an 18-inch ID HDPE redundant line. As previously discussed, the HDPE seems to be the preferred material due to corrosive soils in the area. The 18-inch ID line will still maintain relatively low velocities as previously discussed.

Figure 4-4 shows two alternatives for the 18-inch ID redundant line. Each Option can be developed in two Phases. Phase II is the same for both options. Option 1 shows 3490 feet of HDPE line. The first phase would tie into the 24-inch line around the south end of the golf course. Constraints to this alternatives show a bore with casing under Hwy. 189, a Ham’s Fork and wetlands crossing areas with a bore and casing, and a bore under the Union Pacific Railroad (UPRR) Right-of-Way.

This proposed UPRR Right-of-Way crossing location has an existing casing, though the size and exact location would have to be verified. This casing would more than likely be too small for the proposed line. The line would connect into existing 12-inch diameter and 8-inch diameter lines in the existing distribution system as shown.

Permits required would be from the Wyoming Department of Transportation, Army Corps of Engineers, UPRR Access, Wyoming Department of Environmental Quality (DEQ), and Lincoln County.

Option 2 proposes 2670 feet of line running along the Hwy. 189 Right-of-Way. This line would encounter up to 800 feet of wetlands and also require a bore in the Hwy. 189 Bridge area. It also requires another bore at the existing 24-inch diameter waterline crossing location where it is crossing the UPRR. Option 2 would tie into the existing 24-inch line at the same location as Options 1 to the north and it would be connected by valves into the existing 24-inch diameter transmission line near the intersections of US Hwy. 30 and Coral Street on its south end.

Phase II for both options adds 6070 feet of redundant line from north of the Hwy. 189 bridge to the treatment plant. It would be connected by valves into the existing 24-inch diameter transmission line near the intersections of US Hwy. 30 and Coral Street.
Permits required would be from the Wyoming Department of Transportation, Army Corps of Engineers, UPRR Access Permits, DEQ, and Lincoln County for Phase I Options. Phase II would require Wyoming Department of Transportation, DEQ, and Lincoln County permits.

Cost estimates for these alternatives can be found in Appendix A.

**B. Green Hill Storage**

After reviewing the system model, it was determined that storage capacity in the lower zones of the system was adequate and additional storage would be most useful to service the high zones of the system. The existing and proposed high zones will be served by the existing Green Hill Tank.

After reviewing the cost for refurbishing the existing Sorenson Tank roof, it was determined that the $200,000 to $300,000 in refurbishing costs would be applied to a new tank higher in the system. We are recommending abandoning the refurbishing of the Sorenson Tank.

As proposed in the Level I Study, the most optimum area for additional storage would be at the existing Green Hill Tank Site. A geotechnical investigation was performed at the possible Green Hill II Tank Site as discussed in the Geotechnical Report in Appendix B. The new Green Hill II Tank is proposed to be adjacent to the existing Green Hill location and the soils are suitable for an additional one million gallons in storage. Property would have to be acquired from the owner, Chevron Mining, to place the Green Hill II Tank at this location. Lincoln County and DEQ permits will be required.

Cost estimates for this tank are found in Appendix A.

**C. Create Diamondville Zone/Decommission Diamondville Tanks**

As previously noted, the KDJPB's staff expressed concern that the Diamondville Tanks did not operate in the winter during low demands causing maintenance and water quality concerns. It was also noted that even during the summer, the tanks did not assist a great deal with equalization with only minor water level movement. There are also maintenance issues with the tanks. It is therefore recommended that a new Mid-Diamondville Zone be created and the Diamondville Tanks decommissioned.

The model provided recommended improvements to provide fire flow in the lower area of Diamondville once the tanks have been removed from the system. A new PRV/Check Valve Station will be needed on the existing line that runs between Frontier Street and Deal Alley. The existing line from Susie Avenue to Frontier Street will need to be closed in order to isolate the new Upper Diamondville Zone. Another recommended improvement to assist with meeting Fire Flow Demands in the Lower Diamondville area is to connect the existing water line in Little Canyon Road to the main transmission line, as shown in Figure 4-6.

Also to further assist with redundancy, it is recommended to complete the water looping in Canyon Road, with 2340 feet of 8-inch line and a PRV Station.
Cost estimates for Diamondville Zone upgrades including the 8-inch line are shown in Appendix A.

D. **New 10" Lines to Increase Downtown Pressures**

As previously discussed, to remedy the low flow and low pressures in the Mid-Zone it is recommended that a new 10-inch diameter line be extended into the area from the Mid-Zone along 3rd Avenue, and a small length of 10-inch diameter line also be installed along Elk Street from 3rd Avenue to the alleyway allowing for a loop. These are shown in Figure 4-5. The Mid-Zone would then be extended to 1st Avenue and Moose Street to improve pressures and fire flows by isolating valves. Also at the time of this report, the school district was planning to construct an 8-inch diameter line around the Kemmerer High School and connect to the fire hydrant mentioned above. This line would provide Mid-Zone pressures to the area.

Cost estimates for these new 10-inch diameter PVC lines are shown in Appendix A.

E. **16" Line to Northwest Area**

A new transmission line for the Northwest area was included in the Level I Study. This transmission line delivers water from the Green Hill/Upper Zone to the northwest area along US Hwy. 30. The City in recent years has had many problems with breaks and believes the existing 12-inch diameter DIP line to be in very poor condition. The evaluation showed that for a peak demand along with a fire flow would not allow for pressures above 20 psi during an extended fire event. It is recommended that the existing 12-inch diameter line be upgraded to a 16-inch diameter PVC line. A new 16-inch diameter line will have enough capacity for an additional 600 ERC with the ability to provide sufficient fire flows for the area. The routing of this 16-inch diameter line would be in the existing 12-inch diameter line corridor as shown in Figure 4-3. It is assumed this would be a replacement project and the only permitting would be DEQ and Lincoln County permits.

Appendix A shows the cost estimate for this location.

F. **Sorenson Pump Station Upgrades**

In discussion with the KDJPB Staff and after site visits, it was determined that the Sorenson Pump Station was in need of improving aged equipment to meet the demands adequately. The pump station was built over 20 years ago and important equipment is near the end of its life cycle. Recently, new power lines were brought into the pump station along with installation of new Motor Control Centers (MCC). The recommended improvements for Phase I are new wiring and electrical from the MCC to the pumps and one 50-HP pump (with flow of 700 gpm and 182 TDH).

Phase II would be adding one additional 50-HP pump when 100 ERC occur in the upper zones.

VII. **SCHEDULE OF ACTIVITIES**

Figure 4-1 shows an overall map of the proposed improvements to the Kemmerer system.
Table 7.1 – Recommended System Improvement - Not Prioritized

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Hill 1 MG Tank</td>
</tr>
<tr>
<td>Diamondville Upgrade</td>
</tr>
<tr>
<td>16&quot; Northwest Waterline</td>
</tr>
<tr>
<td>3rd Avenue Mid-Zone Extension</td>
</tr>
<tr>
<td>18&quot; Redundant Line Option 1 – Phase 1</td>
</tr>
<tr>
<td>18&quot; Redundant Line Option 2 – Phase 1</td>
</tr>
<tr>
<td>18&quot; Redundant Line – Phase II</td>
</tr>
<tr>
<td>Sorenson Pump Station – Phase I</td>
</tr>
<tr>
<td>Sorenson Pump Station – Phase II</td>
</tr>
</tbody>
</table>

Table 7.2 – Estimated Project Costs

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Estimated Cost (Inclusive of Engineering and Contingency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Green Hill 1 MG Tank</td>
<td>$1,512,040</td>
</tr>
<tr>
<td>2</td>
<td>Diamondville Upgrade</td>
<td>$380,810</td>
</tr>
<tr>
<td>3</td>
<td>16&quot; Northwest Waterline</td>
<td>$1,231,485</td>
</tr>
<tr>
<td>4</td>
<td>3rd Avenue Mid-Zone Extension</td>
<td>$172,715</td>
</tr>
<tr>
<td>5a</td>
<td>18&quot; Redundant Line Option 1 – Phase 1</td>
<td>$1,604,369</td>
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<tr>
<td>5b</td>
<td>18&quot; Redundant Line Option 2 – Phase 1</td>
<td>$1,339,350</td>
</tr>
<tr>
<td>6</td>
<td>18&quot; Redundant Line – Phase II</td>
<td>$1,843,863</td>
</tr>
<tr>
<td>7</td>
<td>Sorenson Pump Station – Phase I</td>
<td>$36,719</td>
</tr>
<tr>
<td>8</td>
<td>Sorenson Pump Station – Phase II</td>
<td>$64,964</td>
</tr>
<tr>
<td>Item No.</td>
<td>Description</td>
<td>Estimated Project Cost</td>
</tr>
<tr>
<td>---------</td>
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</tr>
<tr>
<td>1</td>
<td>Green Hill 1 MG Tank</td>
<td>$1,512,040.00</td>
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<tr>
<td>2</td>
<td>Diamondville Upgrade</td>
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<td>3</td>
<td>16&quot; Northwest Waterline</td>
<td>$1,231,485.00</td>
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<td>4</td>
<td>3rd Avenue Mid-Zone Extension</td>
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<tr>
<td>5a</td>
<td>18&quot; Redundant Line Option 1 – Phase I</td>
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<td>5b</td>
<td>18&quot; Redundant Line Option 2 – Phase I</td>
<td>$1,339,350.00</td>
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<td>6</td>
<td>18&quot; Redundant Line – Phase II</td>
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<td>$36,719.00</td>
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<td>8</td>
<td>Sorenson Pump Station Upgrades – Phase II</td>
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<td><strong>TOTALS – OPTION 1</strong></td>
<td></td>
<td><strong>$6,846,965.00</strong></td>
</tr>
<tr>
<td><strong>TOTALS – OPTION 2</strong></td>
<td></td>
<td><strong>$6,581,946.00</strong></td>
</tr>
</tbody>
</table>
VIII. LIFE CYCLE COST ANALYSIS, FINAL COST ESTIMATES, AND WATER SYSTEM FINANCING

See detailed cost analysis, cost estimates, water system financing, and resulting end user cost worksheets in Appendix C.

IX. ENVIRONMENTAL IMPACT REPORT

Appendix D includes the complete Environmental Impact Report. Since the Project is to be broken up into several possible projects, the only project that may require further NEPA review is the 18-inch transmission line. If this line is run in areas close to the Ham’s Fork floodplain and wetlands, the US Fish and Wildlife Service may require further consultation and mitigation for Endangered Species, Wetlands, and Migratory Birds.

SHPO requires that a cultural resource survey will need to be conducted in any affected area that has not previously been disturbed. A consultant will need to be hired to produce a report detailing the results including researching historic properties, background research, consultation, consideration of visual effects, and sample field investigations or field survey.

The Army Corps of Engineers may require a Nationwide Permit 12 for dredging and fill of material into wetlands and other waters of the United States, if the 18-inch waterline is run in the floodplain and wetlands of the Ham’s Fork River.

If the KDJPB wishes to secure a DWSRF loan for 50% of the mid-zone extension, it will be necessary to get the project included on the DWSRF Intended Use Plan. A DWSRF loan will also require that an environmental assessment be conducted along with a public hearing/public notice and FNSI/Catex be issued for the proposed improvements funded with the DWSRF loan.
GLOSSARY OF TECHNICAL TERMS

**Average Daily Flow**: The average yearly demand volume expressed in a flow rate.

**Average Yearly Demand**: The volume of water used during an entire year.

**Build-out**: When the development density reaches maximum allowed by planned development.

**Demand**: Required water flow rate or volume.

**Distribution System**: The network of pipes, valves, and appurtenances contained within a water system.

**Drinking Water**: Water of sufficient quality for human consumption. Also referred to as Culinary or Potable water.

**Dynamic Pressure**: The pressure exerted by water within the pipelines and other water system appurtenances when water is flowing through the system.

**Equivalent Residential Connection**: A measure used in comparing water demand from non-residential connections to residential connections.

**Fire Flow Requirements**: The rate of water delivery required to extinguish a particular fire. Usually it is given in rate of flow (gallons per minute) for a specific period of time (hours).

**Head**: A measure of the pressure in a distribution system that is exerted by the water. Head represents the height of the free water surface (or pressure reduction valve setting) above any point in the hydraulic system.

**Headloss**: The amount of pressure lost in a distribution system under dynamic conditions due to the wall roughness and other physical characteristics of pipes in the system.

**Peak Day**: The day(s) of the year in which a maximum amount of water is used in a 24-hour period.

**Peak Day Demand**: The average daily flow required to meet the needs imposed on a water system during the peak day(s) of the year.

**Peak Instantaneous Demand**: The flow required to meet the needs imposed on a water system during maximum flow on a peak day.

**Pressure Reducing Valve (PRV)**: A valve used to reduce excessive pressure in a water distribution system.

**Pressure Zone**: The area within a distribution system in which water pressure is maintained within specified limits.

**Service Area**: Typically the area within the boundaries of the entity or entities that participate in the ownership, planning, design, construction, operation, and maintenance of a water system.
Static Pressure: The pressure exerted by water within the pipelines and other water system appurtenances when water is not flowing through the system, i.e., during periods of little or no water use.

Storage Reservoir: A facility used to store, contain and protect drinking water until it is needed by the customers of a water system. Also referred to as a Storage Tank.

Transmission Pipeline: A pipeline that transfers water from a source to a reservoir or from a reservoir to a distribution system.

Water Conservation: Planned management of water to prevent waste.

**ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ac-ft</td>
<td>acre-feet</td>
</tr>
<tr>
<td>DEQ</td>
<td>Wyoming Department of Environmental Quality</td>
</tr>
<tr>
<td>ERC</td>
<td>Equivalent Residential Connection</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>gpd</td>
<td>Gallons per Day</td>
</tr>
<tr>
<td>gpd/conn</td>
<td>Gallons per Day per Connection</td>
</tr>
<tr>
<td>gpm</td>
<td>Gallons per Minute</td>
</tr>
<tr>
<td>ID</td>
<td>Inside Diameter</td>
</tr>
<tr>
<td>KDJPB</td>
<td>Kemmerer/Diamondville Joint Powers Board</td>
</tr>
<tr>
<td>MG</td>
<td>Million Gallons</td>
</tr>
<tr>
<td>MGD</td>
<td>Million Gallons per Day</td>
</tr>
<tr>
<td>PRV</td>
<td>Pressure Reducing Valve</td>
</tr>
<tr>
<td>psi</td>
<td>Pounds per Square Inch</td>
</tr>
<tr>
<td>SCADA</td>
<td>Supervisory Control And Data Acquisition</td>
</tr>
<tr>
<td>DIP</td>
<td>Ductile Iron Pipe</td>
</tr>
<tr>
<td>AWWA</td>
<td>American Water Works Association</td>
</tr>
<tr>
<td>NSF</td>
<td>NSF International – National Sanitation Foundation</td>
</tr>
<tr>
<td>HDPE</td>
<td>High Density Polyethylene</td>
</tr>
<tr>
<td>PVC</td>
<td>Polyvinyl Chloride</td>
</tr>
<tr>
<td>MCC</td>
<td>Motor Control Centers</td>
</tr>
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**Opinion of Probable Construction Cost**  
Green Hill 1 MG Reinforced Concrete Tank

Preparation of Final Designs and Specifications  
Permitting and Mitigation  
Legal Fees  
Surveying and Legal Descriptions  
Acquisition of Access and Rights of Way

**PreConstruction Cost Total**  
$120,032

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**Total Project Cost (Present) Cost**  
$1,512,040
Opinion of Probable Construction Cost
Diamondville Upgrade

Preparation of Final Designs and Specifications $22,079
Permitting and Mitigation $2,000
Legal Fees $7,600
Surveying and Legal Descriptions
Acquisition of Access and Rights of Way
PreConstruction Cost Total $31,679

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Project Component Cost (Subtotal #1) $275,993

Construction Engineering Costs $27,599
Subtotal #2 $303,592

Contingency - Subtotal #2 x 15% $45,539

Subtotal #3 $349,131

Total Project Cost (Present )Cost $380,810
Opinion of Probable Construction Cost
16” Northwest Waterline

Preparation of Final Designs and Specifications .............................................................. $73,010
Permitting and Mitigation .............................................................................................. $4,000
Legal Fees ...................................................................................................................... $0
Surveying and Legal Descriptions ................................................................................ $0
Acquisition of Access and Rights of Way ...................................................................... $0
PreConstruction Cost Total ......................................................................................... $77,010

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Project Component Cost (Subtotal #1) .................................................................... $912,629
Construction Engineering Costs ................................................................................ $91,263
Subtotal #2 ............................................................................................................ $1,003,891
Contingency - Subtotal #2 x 15% ............................................................................ $150,584
Subtotal #3 ............................................................................................................ $1,154,475

Total Project Cost (Present )Cost ............................................................................ $1,231,485
Opinion of Probable Construction Cost
3rd Avenue Mid-Zone Extension

Preparation of Final Designs and Specifications $9,702
Permitting and Mitigation $2,000
Legal Fees $7,600
Surveying and Legal Descriptions Preconstruction Cost Total $19,302
Acquisition of Access and Rights of Way

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Project Component Cost (Subtotal #1) $121,275
Construction Engineering Costs $12,128
Subtotal #2 $133,403
Contingency - Subtotal #2 x 15% $20,010
Subtotal #3 $153,413

Total Project Cost (Present Worth) $172,715
Opinion of Probable Construction Cost
18" Redundant Line Option 1 - Phase 1

Preparation of Final Designs and Specifications $93,435
Permitting and Mitigation $5,000
Legal Fees $28,500
Surveying and Legal Descriptions
Acquisition of Access and Rights of Way
PreConstruction Cost Total $126,935

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Total Project Cost (Present Value) Cost $1,604,369
Opinion of Probable Construction Cost

18" Redundant Line Option 2 - Phase I

Preparation of Final Designs and Specifications .............................. $75,887
Permitting and Mitigation ......................................................... $10,000
Legal Fees ..................................................................................... $10,000
Surveying and Legal Descriptions .............................................. $53,500
Acquisition of Access and Rights of Way ................................. $75,887

Pre-Construction Cost Total ...................................................... $139,387

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Total Project Cost (Present Cost) ......................... $1,339,350

Total Project Cost (Future Cost including 5% inflation)
Opinion of Probable Construction Cost
18" Redundant Line Phase II

Preparation of Final Designs and Specifications $107,680
Permitting and Mitigation $5,000
Legal Fees $28,500
Surveying and Legal Descriptions
Acquisition of Access and Rights of Way

PreConstruction Cost Total $141,180

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Surveying and Legal Descriptions  
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**Total Project Cost (Present )Cost**                                  **$64,964**
APPENDIX B

Geotechnical Report
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# APPENDICES

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1. EXECUTIVE SUMMARY

The Kemmerer/Diamondville Joint Powers Board (KDJPB) and Wyoming Water Development Office (WWDO) enlisted the services of JFC Engineers & Surveyors (JFC) to perform a subsurface soils investigation for the Green Hill Water Tank Site in Kemmerer, Wyoming. The purpose of the investigation was to identify the soil and rock conditions found at the Site. To accomplish the investigation, seven boreholes were drilled. During drilling, samples were taken and reserved for further laboratory testing. The drilling and sampling was conducted on 2 June 2011.

The subsurface conditions were investigated using a standard drilling rig as outlined in 3.1. All of the holes with the exception of Borehole (BH)-7 were advanced to 26.5' below existing grade. BH-7 was advanced to 21.5' below existing grade. The soils found at the Site consisted predominantly of over consolidated clay and claystone with sand and gravel inclusions. A thick layer of sand was encountered in one borehole.

Based on the soils found at the Site, there is not likely to be an increased risk from seismic activity. The Site is most closely categorized as being in Seismic Region 2, Site Class B as defined by the IBC.

Based on the analyses of the data collected during the investigation, it is our opinion that it is possible to develop the Site as planned. It is our recommendation that the new structure be supported by a shallow foundation system.

It is not anticipated that conditions at the Site will adversely affect grading, filling, or excavation operations. Paving and flatwork sections should adhere to the following Section 5.5.

Specific recommendations for different aspects of the Project can be found in this report. This executive summary only gives a brief overview of the findings of the investigation and should not be used for design or construction without first studying and understanding the report in its entirety. This report is also subject to the limitations found in Section 6.2 of this report.
2. INTRODUCTION

2.1 Purpose and Scope of Investigation

This report presents the findings and results of the geotechnical investigation performed by JFC for KDJPB and WWDO for the Green Hill Water Tank Site in Kemmerer, Wyoming. A large area around the top of the hill was investigated. A total of seven boreholes were drilled and served as the subsurface investigation for the Tank Site.

The general purpose of the investigation was to evaluate and determine the general condition, nature, and engineering properties of the subsurface soils and rock at the Site and to provide recommendations for design, development, and construction of foundations for the new water storage tank that will be erected at the Site. The investigation included soil sampling and field testing, laboratory testing, data analysis, and preparation of the report.

The work performed for this investigation was authorized by KDJPB and WWDO and was conducted in accordance with applicable standards and accepted engineering methods.

2.2 Project Description

2.2.1 Proposed Construction

The geotechnical investigation was done as part of the Level II Study that encompasses upgrading several portions of the KDJPB Water System. One aspect of the study includes installing a new water storage tank at the existing Green Hill Tank Site. It is likely that the new storage tank would be either an above ground steel tank or above ground concrete tank. The tank volume would be on the order of one million gallons. A tank currently exists and is in service at the Site. This tank may be replaced by the new tank, or it may be left in service and used in conjunction with the new tank.

3. INVESTIGATIVE TECHNIQUES

3.1 Field Program

The subsurface program consisted of drilling seven boreholes at the Site in the vicinity of the existing tank. All of the boreholes except BH-7 were advanced to 26.5' below existing grade. BH-7 was advanced to 21.5'. BH-1, BH-2, and BH-3 were drilled south of the existing tank, BH-4 and BH-5 were drilled to the west, and BH-6 and BH-7 were drilled north of the existing tank. Logs of the conditions encountered at the time of drilling by JFC can be found in Appendix A. Approximate locations of the borings can be found in Appendix B, Figure 1.

Drilling was conducted with a Simco 2800 H/S truck mounted drilling rig and solid-stem flight augers. Standard Penetration Tests (SPT's) and soil samples were taken using a Standard Split Spoon Sampler with a 2" (nominal) outside diameter, which was driven by a 140-pound weight, free-falling a distance of 30". Sampling was conducted at 5' intervals in general accordance with ASTM D 1586-99. SPT's were used to produce Blow Counts (N-values) at these intervals. The raw N-values were then adjusted for energy losses to produce Corrected Blow Counts (N_{60}-
values). These $N_{60}$ values, along with soil types and information gathered from visual inspection and laboratory testing results, were used to produce anticipated bearing capacities. After visual identification of the various soil samples were made, the samples were transported to JFC’s Materials Laboratory.

The Bore Logs contain soil types, boring depths, groundwater elevations, and raw $N$-values found at the time of exploration.

4. SITE CONDITIONS

4.1 Surface Conditions

A large water storage tank currently occupies a portion of the Site. A service road provides access to the tank on the south side of the Site. The area around the tank has been graded and covered with gravel. Outside of the grading limits, a variety of desert grasses and shrubs cover the rest of the Site.

4.2 Subsurface Conditions

4.2.1 Soils

Based on observations made during drilling, the soils found at the Site are consistent. The materials found at the Site consisted of dry, overconsolidated clay and claystone. The material is layered in situ, and some layers contained gravel and sand inclusions. Some thin beds of sandstone were encountered at various depths while drilling. In BH-5, a thick layer of medium-dense to dense sand was encountered from 5' to 20' below grade. This material may have been filled from another area, but this could not be confirmed. Regardless, this was the only location where a thick sand layer was encountered.

4.2.2 Groundwater

The soils were dry from the surface to the extents drilled. No saturated soils or water table was encountered during drilling.

4.3 Geologic Conditions

The Site is located in the Hilliard Shale Formation. The basic geology of the area consists of dark gray to tan claystone, siltstone, and sandy shale. According to the International Building Code 2006, the soils found at the Site most closely approximate Seismic Region 2, Site Class B. Based on the condition that the soils are presently in, an increased risk from seismic activity is not likely to occur.

The Site is not known to have issues with abandoned mines, and no other geologic hazards are evident or are known to exist.
5. ANALYSIS & RECOMMENDATIONS

5.1 General Conclusions

Based on the conditions found at the Site and testing conducted in the field, it is our opinion that the Site can be developed as intended. The new storage tank can be supported on a shallow foundation system, mat foundation system, or slab-on-grade type foundation. The foundation may bear directly on native soils. The tank foundation should extend below frost depth to eliminate the occurrence of frost heave. It may also be possible to design the related piping in a manner which would allow movement of pipe joints so that they are not affected by movement caused by frost heave. The following sections present our recommendations regarding earthwork, foundation design, pavement design, and observations, and testing.

5.2 Earthwork

5.2.1 General Site Preparation and Grading, Filling, and Compaction

Before grading operations begin, construction areas should be stripped of vegetation, topsoil, loose fill, debris, and other deleterious material. It should be anticipated that 0" to 12" of material will need to be stripped from the areas. Local areas may require more stripping to remove deep root structures or debris. Any stripped material that contains organics and deleterious material should be removed from the Site or wasted in an area that will not be covered by structures or driving surfaces.

Once stripping and grubbing have been completed, the subgrade below any fill areas should be proof-rolled, using a steel smooth-drum roller, to determine any soils that will not be suitable to fill over. If any of these areas are detected after proof-rolling, they should be removed and replaced with competent site or structural fill. Fill can then be placed in these areas.

Materials used as fill, below and up to existing site grade, are defined as structural fill. Fill that is placed above existing site grade is defined as site fill. The Site and structural fill should be placed and compacted to 95% of the Standard Proctor, as determined by ASTM 698-00, within 2% of the optimum moisture for paving areas. Material placed in building areas should be placed in the same manner, but compaction should be increased to 98%.

Soils suitable for use as structural or site fill are those classified as GW, GP, SW, and SP in accordance with the Unified Soil Classification System. Production materials such as road base may also be used for this purpose. They should consist of 6" minus material with no more than 30% oversize (greater than \( \frac{3}{4} \) ) material, no more than 10% fines (less than #200) material, and placed in layers no greater than 8" compacted thickness.

If soft spots or anomalies are encountered during proof-rolling, filling, or grading, our office should be notified and specific recommendations can be given for problem areas.

5.2.2 Excavatability

The soils encountered during the exploration do not appear to offer increased difficulty to excavation. Typical construction equipment such as excavators, scrapers, and loaders should be adequate for excavation and earth moving operations.
Stability of the trenches and excavations is the responsibility of the contractor. Trenches and excavations should be properly benched and boxes should be used where necessary. All applicable OSHA and other governing agencies' Regulations should be followed.

5.3 Foundations

5.3.1 Shallow Foundations

Based on the results of the SPT's and soil conditions found during the excavation, it is our opinion that a shallow foundation system can be used to support the tank. Foundations can be constructed of a footing system, a mat foundation, or a slab-on-grade type foundation. Foundations should extend below frost depth to prevent heaving associated with frost. The average maximum frost depth for this region is 42". As an alternative, it may be possible to design flexible piping joints to allow the tank piping to accommodate movements that result from frost heaving.

A 12" thick layer of clean gravel should be placed below the foundation system to help facilitate drainage. The gravel layer can be placed directly on native soils or compacted fill (subgrade). If areas of the subgrade will be built with compacted materials, it should be treated as structural fill. Structural fill should be placed and compacted to 98% of the Standard Proctor, as determined by ASTM D 698-00, within 2% of the optimum moisture and should also conform to the recommendations found in Section 5.2 Earthwork of this report. Foundations should be designed to bear no more than 2,000 psf on the subgrade. Foundations should be constructed with concrete that obtains a 28-day break strength of 4,000 psi minimum. It is our recommendation that if a slab-on-grade type foundation is used that will allow portions of the foundation to be exposed; the concrete break strength should be increased to 4,500 psi for increased durability during freeze-thaw cycles.

If horizontal loads in open excavations will be resisted by friction, acting along the base of the footings, a coefficient of friction of 0.3 may be used with the dead load. Values given for foundation design may be increased by either 1/3, as allowed by the local building codes, or the current edition of the IBC, whichever is less, for transverse wind loads and seismic loads.

After construction of the foundation, it is imperative that proper drainage be constructed away from the foundation. A minimum slope of 5% (6" in 10') should be made for at least the first 10' away from the foundation in unpaved areas. A slope of 2% may be used for pavement and 1% may be used for concrete sections.

5.5 Pavement and Exterior Flatwork

Based on the results of the investigation and the condition of existing pavement and flatwork at the property, it is our opinion that some precautions should be made when constructing pavement and flatwork at the Site. The subgrade below asphalt paving should be proof-rolled prior to the placement of the base course. The pavement section should be comprised of 4" of asphalt paving over 8" of crushed base. The base course should be compacted to a minimum of 95% of the Standard Proctor as defined by ASTM D-698-00 and within 2% of optimum moisture. Asphalt should be compacted to a minimum of 92% and no more than 96% of the Marshall.
The subgrade below flatwork should be proof-rolled. Over the subgrade, 6" of road base should be placed and compacted in the manner described above. Flatwork can be constructed over this preparation. The concrete used for exterior flatwork should have a minimum total air content of 5% for durability during freeze-thaw cycles. The concrete should have a minimum 28-day break strength of 4,000 psi and 4,500 psi is recommended for exposed flatwork. Concrete should conform to the recommendations given in the section of this report entitled 5.7 Concrete. It is imperative that positive drainage be provided to discharge all exterior flatwork. It is our opinion that a minimum slope of 1% over the exterior flatwork should be used in the grading design to minimize the chance of ponding on or around the flatwork.

5.6 Backfill, Moisture Protection, and Surface Drainage

The maximum backfill material size should be 4". All backfill should be compacted in accordance with the specifications for engineered fill, except in those areas where future settlement is determined not to be a problem. Any material greater than 2" in diameter should not bear directly on concrete as it interferes with proper compaction. No brush, frozen material, sod, or any other deleterious or unsuitable material should be used for backfill. Backfill should not be placed on frozen or muddy ground.

It is imperative that positive drainage be made away from foundations and flatwork and that good drainage is provided across the Site and away from pavements. Wetting of the potentially expansive materials found at the facility can result in swell and heaving, resulting in the failure of pavements and flatwork.

Downspouts that discharge well beyond the perimeter of the buildings should also be used. Minimum slopes of 5% should be made for the first 10' away from the building in landscaped areas. A minimum slope of 2% may be used for paved areas and 1% may be used for concrete. Care should also be made when installing and backfilling utility trenches to avoid accidental leaks and future problems for the structures, pavements, and flatwork.

5.7 Concrete

The concrete should use Type V cement and can be batched using standard mix designs. This concrete should have a minimum total air content of 5.0% for exterior concrete. The concrete should have a minimum 28-day compressive strength of 4,000 psi and it is recommended that exposed concrete have a minimum 28-day compressive strength of 4,500 psi for durability during freeze-thaw cycles.

6. Closure

6.1 Conclusions

The recommended soil and rock bearing capacities for the Green Hill Water Tank Site in Kemmerer, Wyoming, have been explained in this report. It is our opinion that soils and rock found at this site should offer adequate bearing, if the recommendations of this report are followed.
Inspections of any foundation preparations should be done by a qualified Soils Engineer prior to the placement of any foundations on site. The inspection should verify that all loose, organic, frozen, and/or unsuitable material has been removed from structural areas and that there are no soft spots.

6.2 Limitations

This report is for use by our clients, KDJPB and WWDO, for the design and construction of the Green Hill Water Tank Site in Kemmerer, Wyoming. The recommendations submitted in this report are based on our field explorations, laboratory testing, and our understanding of the proposed construction. The subsurface data used in the preparation of this report was obtained from the boreholes drilled for this site. It is possible that variations in the soil and groundwater conditions could exist between and beyond the points explored. The nature and extent of these variations may not be evident until construction occurs. If any conditions are encountered at the Site that are different from those described herein, JFC should be notified immediately and additional or different recommendations maybe necessary. In addition, if the scope or location of the proposed construction changes from that described in this report or as explained to JFC at the start of the Project, our firm should also be notified as these recommendations may no longer be valid.

Our evaluation of subsurface conditions at the Site has considered subgrade soil and groundwater conditions present at the time of our field exploration. The influence(s) of post-construction changes to these conditions such as the introduction of water into the subsurface will likely influence the future performance of the Project. Whereas, our scope of services addresses present soil and groundwater conditions; future irrigation, broken pipes, etc. may adversely influence the Project and should be addressed and mitigated during design and construction.

This report was prepared in accordance with applicable ASTM Standards, ACI Guidelines, and generally accepted standard of practice at the time the report was written.

This report may be used only by the client for the purposes stated, within a reasonable timeframe of issuance. Land use, site conditions (both on site and off site), or other pertinent factors may change over time and additional work may need to be completed. Based on the intended use of this report, JFC may require that additional work be concluded and an updated report issued. Non-compliance with any of the given recommendations by the client or anyone else, unless specifically agreed to in advance by JFC in writing, will release JFC from any liability resulting from the use of this report by any unauthorized party.

It is our Client’s responsibility to see that all parties to the Project, including designers, contractors, subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the Contractor’s sole risk.
6.3 **Additional Services**

The recommendations given in this report assume that an adequate program of testing and observation will be made during construction to verify compliance with these recommendations. These tests and observations should include, at a minimum, the following:

1. Observations and testing during site preparation, earthwork, and fill placement.
2. Inspection of drilled shafts for plumb and bearing elevations.
3. Consultation as required during construction.

We also recommend that a Soils Engineer be engaged to inspect preparations below paving and flatwork and full-time inspection during the construction of drilled piers and/or piles. Additional information concerning the scope and cost of these services can be obtained from our office.

Report prepared by: Brandt D. Lyman, PE

Report reviewed by: Randy J. Hansen, PE
APPENDIX A

Bore Logs
**BORE LOG**

**PROJECT** 8358-10E

**LOCATION** SEE LOCATION MAP  **DATE** 06/02/11

**HOLE NO.** BH-1  **TYPE** SOLID-STEM  **EL.** UNK

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N=STANDARD PENETRATION NUMBER, UNCORRECTED
A.D.=AFTER DRILLING
W.D.=WHILE DRILLING
SS=SPLIT SPOON
ST=SHELBY SAMPLE (CALIFORNIA)
AU=AUGER SAMPLE

**JFC ENGINEERS SURVEYORS**

1515 NINTH STREET
ROCK SPRINGS, WY 82901
PHONE (307) 362-7519
FAX (307) 362-7569
http://www.jfc-wyo.com

BOREHOLES
GREEN HILL TANK SITE
KEMMERER, WY

OWN BY: DDL  SCALE:  NTS
DATE: 06/14/11  BH1
**BORE LOG**

**PROJECT**  
B3SB-10E

**LOCATION**  
SEE LOCATION MAP  
DATE 06/02/11

**HOLE NO.**  
BH-2  
TYPE SOLID STEM  
EL UNK

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W.D.=WHILE DRILLING  
SS=SPLIT SPOON  
ST=SHIELDY SAMPLE (CALIFORNIA)  
AU=AUGER SAMPLE
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N=STANDARD PENETRATION NUMBER, UNCORRECTED
A.D.=AFTER DRILLING
W.D.=WHILE DRILLING
SS=SPIT SPOON
ST=SHELFY SAMPLE (CALIFORNIA)
AU=AUGER SAMPLE
### Bore Log

**Project:** 8358-10E  
**Location:** See Location Map  
**Date:** 06/02/11  
**Hole No.:** BH-4  
**Type:** Solid Stem  
**El. Link:**

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N=standard penetration number, uncorrected  
A.D.=After Drilling  
W.D.=While Drilling  
SS=Split Spoon  
ST=Shelby Sample (California)  
AU=Auger Sample  

**File Name:** boreholes-388-11e  
**Engineers & Surveyors:**

JFC ENGINEERS SURVEYORS  
1515 Ninth Street  
Rock Springs, WY 82901  
Phone (307) 362-7519  
Fax (307) 362-7569  
http://www.jfc-wyo.com

**Boreholes:** Green Hill Tank  
Kemmerer, Wyoming  
**Date:** 06/14/11  
**Scale:** MTS  
**Hole:** BH4
**BORE LOG**

**PROJECT**: 8358-10F

**LOCATION**: SEE LOCATION MAP  
**DATE**: 06/02/11

**HOLE NO.**: BH-5  
**TYPE**: SOLID STEEL  
**EL.**: UNK

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N=STANDARD PENETRATION NUMBER, UNCORRECTED  
A.D.=AFTER DRILLING  
W.D.=WHILE DRILLING  
SS=SPLIT SPOON  
ST=SHELBY SAMPLE (CALIFORNIA)  
AU=AUGER SAMPLE

**ENGINEERS**: ROCK SPRINGS, WY 82066  
**SURVEYORS**: PHONE (307) 352-7519  
**FAX**: (307) 352-7589  
**http://www.jfc-wyo.com**

**BOREHOLES**  
**GREEN HILL TANK**  
**KEMMERER, WYOMING**  
**OWN BY**: BDL  
**SCALE**: NTS  
**DATE**: 06/14/11  
**BH5**
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N=STANDARD PENETRATION NUMBER, UNCORRECTED
A.D.=AFTER DRILLING
W.D.=WHILE DRILLING
SS=SPLIT SPOON
ST=SHELBY SAMPLE (CALIFORNIA)
AU=AUGER SAMPLE
# BORE LOG

**PROJECT**: 8358-10E

**LOCATION**: SEE LOCATION MAP  DATE 06/02/11

**HOLE NO.**: BH-7  **TYPE**: SOLID-STEM  **EL.**: UNK

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N=STANDARD PENETRATION NUMBER, UNCORRECTED
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**ENGINEERS SURVEYORS**
1515 NINTH STREET
ROCK SPRINGS, WY 82901
PHONE (307) 352-7519
FAX (307) 352-7580
http://www.jfc-wyo.com

**BOREHOLES**
GREEN HILL TANK
KEMMERER, WYOMING

**DWN BY**: BDJ  **SCALE**: NTS  **DATE**: 06/14/11  **BH 7**
APPENDIX B

Borehole Location Map
CHEVRON MINING
NW1/4, S22, T21N, R116W
39.48 AC.

EXISTING WATER TANK

BH-1
BH-2
BH-3
BH-4
BH-5
BH-6
BH-7
APPENDIX C

Vicinity Map
APPENDIX C

ASSUMPTIONS FOR CAPACITY DEVELOPMENT WORKSHEETS

For the financial capacity development worksheets, the dollar amounts were calculated using the following information:

1. Water revenues, line item expenses, and current reserve (cash on hand) totals were taken from the most recent end of year statements, projected budgets, year-to-date budgets, and the Level I Study Report prepared by Forsgren Associates, Inc. and furnished by the Wyoming Water Development Office (WWDO).

2. The future costs for the components of the Project were calculated using future value financial equations and assumed an inflation rate of 2.5% as directed by WWDO.

3. Principal loan amounts were calculated by determining the type of loan each component was eligible for. The projected debt service amounts for these loans were then amortized based on the loan structures currently in place for the type of loan the component was eligible for.

4. Operating and maintenance costs for each component were assumed to be 1% of the Project cost spread over the life of the component. Future O&M costs were then converted to a future value assuming an inflation rate of 2.5%.

5. Future water revenues were calculated using a fixed rate increase of 12.5% every five years.

6. Water user growth (total number of taps) was based on a 1% population growth rate for the service area.
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CAPACITY DEVELOPMENT WITH LOANS - OPTION 1
## CAPACITY DEVELOPMENT WITH LOANS - OPTION 1

### Capital Improvement Costs and Revenues

<table>
<thead>
<tr>
<th>Receipts</th>
<th>Present FY</th>
<th>FY 1</th>
<th>FY 2</th>
<th>FY 3</th>
<th>FY 4</th>
<th>FY 5</th>
<th>FY 6</th>
<th>FY 7</th>
<th>FY 8</th>
<th>FY 9</th>
<th>FY 10</th>
<th>FY 11</th>
<th>FY 12</th>
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<td>$1,209,200.00</td>
<td>$1,209,200.00</td>
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<td>$2,451,394.87</td>
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<td>$3,102,540.63</td>
<td>$4,395,364.95</td>
<td>$3,928,650.58</td>
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### Operating Expenses

1. **Salaries and Wages**
   - (268,822.00)  
   - (275,542.55)  
   - (262,431.11)
2. **Employee Pensions and Benefits**
   - (104,332.00)  
   - (107,145.33)  
   - (109,833.93)
3. **Purchased Power**
   - (569,727.00)  
   - (571,008.93)  
   - (572,194.12)
4. **Fuel For Power Production**
   - (266,606.95)  
   - (190,030.13)  
   - (191,505.56)
5. **Chemicals**
   - (577,631.00)  
   - (589,071.79)  
   - (604,548.67)
6. **Materials and Supplies**
   - (113,990.00)  
   - (113,938.39)  
   - (113,883.48)
7. **Rents**
   - (8,934.00)  
   - (8,967.35)  
   - (9,053.79)
8. **Non-Project Related Debt Service**
   - (86,147.13)  
   - (102,441.39)  
   - (266,888.81)
9. **Miscellaneous**
   - (7,859.00)  
   - (81,283.03)  
   - (83,354.94)
10. **Replacement, Instrumentation & Measurement**
    - (315,454.00)  
    - (316,955.33)  
    - (317,788.56)

**TOTAL O&M AND ADMIN. EXPENSES**

- (695,933.13)  
- (540,434.00)  
- (920,781.03)  
- (957,385.84)  
- (655,405.77)  
- (1,041,632.93)  
- (1,139,763.48)  
- (1,250,160.36)  
- (1,117,768.33)  
- (1,257,485.37)  
- (1,414,675.54)  
- (1,551,506.08)  
- (1,790,448.72)  
- (2,014,264.82)

### Debt Service

1. **Total Project Debt Service & O&M**
   - $0.00  
   - $0.00  
   - $0.00  
   - $0.00  
   - $0.00  
   - $0.00  
   - $0.00  
   - $0.00  
   - $0.00  
   - $0.00  
   - $0.00  
   - $0.00  
   - $0.00  

**Total Interest Payments**

- $868,935.13  
- $640,434.00  
- $614,589.60  
- $574,847.43  
- $516,846.27  
- $480,765.43  
- $452,112.27  
- $424,690.15  
- $397,789.33  
- $372,628.52  
- $349,367.87  
- $327,086.50  
- $305,743.21  

**Total Net Revenues**

- $512,864.87  
- $305,765.91  
- $258,418.97  
- $234,352.57  
- $250,781.83  
- $240,756.42  
- $242,112.27  
- $252,695.30  
- $262,919.98  
- $260,749.78  
- $272,799.15  
- $280,339.70  
- $288,760.45  

**Cash Coverages/Improvement Reserve Fund**

- $1,283,013.16  
- $1,651,770.07  
- $1,540,158.04  
- $1,274,550.62  
- $1,429,923.44  
- $2,839,877.88  
- $3,312,489.08  
- $3,839,398.33  
- $4,780,069.74  
- $5,852,973.89  
- $7,114,158.44  
- $8,542,847.84  
- $10,191,677.92  
- $12,102,537.94

**Total Customer Accounts**

- $1,440  
- $1,461  
- $1,462  
- $1,473  
- $1,484  
- $1,500  
- $1,520  
- $1,540  
- $1,560  
- $1,580  
- $1,600  
- $1,620  
- $1,640  
- $1,660  

**Average Annual User Fee**

- $939.72  
- $932.33  
- $827.96  
- $823.91  
- $916.69  
- $993.76  
- $1,082.83  
- $1,181.04  
- $1,289.36  
- $1,405.85  
- $1,540.68  
- $1,686.17  
- $1,845.75  
- $2,024.05

**Average Monthly User Fee**

- $69.98  
- $69.45  
- $68.92  
- $68.41  
- $76.39  
- $82.81  
- $90.24  
- $98.42  
- $107.45  
- $117.40  
- $128.39  
- $140.01  
- $153.90  
- $168.67
## Project: 1. Green Hill Tank
- **WWDC Grant - 67%**: $1,064,353.31
- **WWDC Loan - 4%, 30 yr.**: $524,233.72
- **Annual WWDC Loan Payment**: $1,180,316.09
- **Annual O&M**: $600,341.09
- **Subtotal Capital Improvement Costs and Revenues**: $1,588,587.03

## Project: 2. 16" Northwest Pipeline
- **WWDC Grant - 67%**: $1,030,430.53
- **WWDC Loan - 4%, 30 yr.**: $507,659.48
- **Annual WWDC Loan Payment**: $1,176,389.23
- **Annual O&M**: $600,341.09
- **Subtotal Capital Improvement Costs and Revenues**: $1,736,979.32

## Project: 3. 3rd Ave. Mid-Zone Extension
- **SLB Grant - 50%**: $90,729.35
- **SRF Loan - 4%, 20 yr.**: $87,676.29
- **Annual SRF Loan Payment**: $87,676.29
- **Annual O&M**: $600,341.09
- **Subtotal Capital Improvement Costs and Revenues**: $1,118,674.67

## Project: 4. Diamondville Upgrade
- **WWDC Grant - 67%**: $774,761.10
- **WWDC Loan - 4%, 30 yr.**: $63,529.61
- **Annual WWDC Loan Payment**: $87,676.29
- **Annual O&M**: $600,341.09
- **Subtotal Capital Improvement Costs and Revenues**: $1,410,090.72

## Project: 5. 18" Redundant Line, Opt. 2, Ph. 1
- **WWDC Grant - 67%**: $995,034.42
- **WWDC Loan - 4%, 30 yr.**: $75,582.04
- **Annual WWDC Loan Payment**: $75,582.04
- **Annual O&M**: $600,341.09
- **Subtotal Capital Improvement Costs and Revenues**: $1,442,333.46

## Project: 6. 18" Redundant Line, Ph. 2
- **WWDC Grant - 67%**: $1,745,671.20
- **WWDC Loan - 4%, 30 yr.**: $600,718.66
- **Annual WWDC Loan Payment**: $600,718.66
- **Annual O&M**: $600,341.09
- **Subtotal Capital Improvement Costs and Revenues**: $2,656,330.16

## Project: 7. Sorensen Pump Sta. Upgrade, Ph. 1
- **Cost**: $(29,542.35)
- **Annual O&M**: $(10,130.13)
- **Subtotal**: $(39,672.48)

## Project: 8. Sorensen Pump Sta. Upgrade, Ph. 2
- **Cost**: $(7,708.16)
- **Annual O&M**: $(2,972.97)
- **Subtotal**: $(10,681.13)

## Total Project Expenditures
- **WWDC Grants**: $0.00
- **WWDC Loans**: $(15,932.28)
- **Subtotal**: $(15,932.28)

## Total Loans and Grants
- **WWDC Grants**: $0.00
- **WWDC Loans**: $1,773,040.72
- **Subtotal**: $1,773,040.72

## Totals
- **WWDC Grants**: $0.00
- **WWDC Loans**: $1,773,040.72
- **Subtotal**: $1,773,040.72
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<th>FY 4</th>
<th>FY 5</th>
<th>FY 10</th>
<th>FY 15</th>
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**Operating Expenses**

1. Salaries and Wages
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

2. Employee Pensions and Benefits
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

3. Purchased Power
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

4. Fuel For Power Production
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

5. Chemicals
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

6. Materials and Supplies
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

7. Rents
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

8. Non-Project Related Debt Service
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

9. Miscellaneous
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

10. Replacement, Instrumentation & Measuring
    - Present FY
    - FY 1
    - FY 2
    - FY 3
    - FY 4
    - FY 5
    - FY 10
    - FY 15
    - FY 20
    - FY 26

**Total Operating Expenses**

<table>
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<th>Receipts</th>
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<th>FY 5</th>
<th>FY 10</th>
<th>FY 15</th>
<th>FY 20</th>
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**Capital Improvement Costs and Revenues**

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**Debt Service**

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   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

2. Total Expenditures
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

3. Total Net Revenue
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

4. Cash Carryover/Capital Improvement Reserve Fund
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

5. Total Customer Accounts
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

6. Average Annual User Fee
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26

7. Average Monthly User Fee
   - Present FY
   - FY 1
   - FY 2
   - FY 3
   - FY 4
   - FY 5
   - FY 10
   - FY 15
   - FY 20
   - FY 26
### Capacity Development Without Loans - Option 1

#### Capital Improvement Costs and Revenues

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## CAPACITY DEVELOPMENT WITHOUT LOANS - OPTION 2

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### Receipts

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APPENDIX D

Environmental Impact Report
ENVIRONMENTAL IMPACT REPORT
LEVEL II

FOR

Kemmerer/Diamondville
Joint Powers Water Board

Submitted to:
Wyoming Water Development Commission

January 2012
JFC Project No. 8358-10E
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1.0 PURPOSE AND NEED FOR THE PROJECT

1.1 Project Description and Project Purpose

The City of Kemmerer and the Town of Diamondville are two adjacent communities in southwestern Wyoming. The water system services both communities and is owned and operated by the Kemmerer/Diamondville Joint Powers Board (KDJPB). The Wyoming Water Development Commission, Level II Study, recommends several items for water system improvements and upgrades. The upgrades include a new 1,000,000-gallon water tank adjacent to the existing Green Hill Water Tank; new 8" transmission lines and PRVs to create a new pressure zone and decommission the Diamondville tanks; new 10" lines within the older area of the Towns to increase pressures; a redundant transmission line from the treatment plant into town; and a new 16" transmission line in the northwest area to increase pressure to replace the existing 12" line. The Project is depicted in Exhibit 1 – Vicinity Map. The Project's legal description is in Sections 1, 2, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26 and 27, T21N, R116W.

1.2 Purpose and Need for the Project

The purpose and need for the Project is to meet both the Wyoming Department of Environmental Quality (DEQ) Standards and EPA Drinking Water Regulations for the public drinking supply system with respect to water storage volume transmission line velocities and pressures, and a distribution system piping from both a hydraulic and water quality standpoint.

2.0 PREFERRED ALTERNATIVE AND ALTERNATIVES TO THE PROPOSED ACTION

The proposed system components consist of improvements to the KDJPB water system to increase water storage volume for emergency reserve; to improve system pressures to prevent back pressure issues; to have a backup water transmission line system; and to correct inadequacies in the distribution system piping from a hydraulic and water quality perspective in order to meet Wyoming DEQ and EPA requirements. The proposed Projects are to be developed on a Chevron Mining parcel, and in existing roadway easements and/or right-of-ways, and will also cross the Ham's Fork River floodplain and the Union Pacific Railroad Right-of-Way.

New Green Hill Storage Tank: A new 1,000,000-gallon, partially-below-grade water storage tank is proposed to be constructed on land owned by Chevron Mining adjacent to the existing Green Hill Storage Tank in order to provide adequate storage for existing and predicted future demands. The existing tank located on the same parcel is to remain active storage for the KDJPB.

Extend Mid-Zone to 3rd Avenue: New 750' of 10" PVC lines are proposed in the 3rd Avenue area to increase pressures. These lines will be placed within existing streets.

16" Northwest Water Line: A new 8,406' of 16" transmission line for the northwest area is proposed to replace the existing 12" so that 20 psi can be maintained during peak fire flow conditions. This line will be in the existing 12" waterline corridor.
Diamondville Zone Improvements: To provide more operational efficiency in the Diamondville zone, a new Upper Diamondville Zone will be developed. The zone will be supplied by water from the Upper Zone/Green Hill tank through the existing PRV-4 on Highway 30. The existing Diamondville tanks will be decommissioned and new PRV/Check Valve will be needed on an existing line that runs between Frontier Street and Deal Alley. A valve will be added on an existing line near Deal Alley to isolate this zone. To meet fire flow demands in this new zone, the area is to be connected by 180' of 8" line to the existing water line in Little Canyon Road and to assist with redundancy; loop the water line in Canyon Road with 2,340' of new 8" line; and install new PRV.

18" Redundant Transmission Line from the Treatment Plant: The Project proposes running a redundant 18" line from the treatment plant into the Towns' distribution system. This project will have two phases.

Phase I has two options. The first option for the Phase I corridor of the Project consists of 600' of redundant line and running 2,070' in the Highway 189 corridor, City streets, and crossing the Ham's Fork either on the existing Highway bridge or through a casing across the Ham's Fork River floodplain.

Option 2 for Phase I consists of the 600' of redundant line and an additional 2,890' of line running down existing City streets and running the line in a new casing across the Railroad and River.

Phase II of the Project involves 6,070' of 18" transmission line from the treatment plant to the proposed Phase I. See Figure 4-4 in the Level II Study report for the exact location of these alternatives.

3.0 AFFECTED ENVIRONMENT/ENVIRONMENTAL CONSEQUENCES

3.1 Land Use

General Land Use/Important Farmland, Prime Forest Land, and Prime Rangeland/Formally Classified Lands

The general land use classification for the Project area includes private land intended for commercial development and land that is encumbered by existing roadways and easements. Some land is within the Ham's Fork floodplain. The Natural Resource Conservation Service (NRCS) determined that the proposed action is not expected to involve the permanent conversion of irrigated agricultural land to non-agricultural use and consequently will not directly, indirectly, or cumulatively affect prime or unique farmlands. Prime forest land and rangeland or formally classified lands will remain unaffected as well. Prompt revegetation of the disturbed areas was recommended by the NRCS to minimize soil erosion and weed encroachment.

Flood Plains and Wetlands

The Project area is mostly located outside the 100-year floodplain of the Ham's Fork. A limited portion of the Project was predicted to be located across the Ham's Fork and adjacent wetlands.
Activities in these areas will fall under water of the United States and are likely to need authorization by Nationwide Permit (NP) 12 for Utility Line Activities, provided the permittee complies with all of the terms and conditions. A preconstruction notice (PCN) may also be needed.

### 3.2 Cultural Resources

#### Historic Properties

The Wyoming State Historic Preservation Office’s (SHPO) search showed that a cultural resource survey has not been conducted in the area of the potential projects. An outside consultant will have to be retained for any ground disturbing activities to perform a Class I cultural resource file search, and Class II and III field surveys as necessary. These will be provided at the Level III Construction Project.

#### Visual Aesthetics

Since the majority of the work will be below grade, with the exception of a new water storage tank, the proposed action is not expected to adversely affect (directly, indirectly, or cumulatively) visual aesthetics.

### 3.3 Biological Resources

#### Fish and Wildlife

The United States Department of the Interior, Fish and Wildlife Service, will review: 1) threatened, endangered and candidate species; 2) migratory birds; and 3) wetlands and riparian areas when a Level III construction project commences. They will provide recommendations for protective measures for threatened and endangered species in accordance with the Regulatory Acts for each review (see the attached letter for a description of each Act). They will also provide recommendations for migratory birds pursuant to the Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA). Wetlands are protected pursuant to Section 404 of the Clean Water Act with the goal of “no net loss of wetlands.”

The potential may exist that there may be impacts to resources under the Fish and Wildlife Service jurisdiction, and any additional field assessments will be completed under the initial construction phase of Level III.

#### Vegetation

Some vegetation will most likely be disturbed during construction. Disturbed vegetation will be re-established using native plant species in accordance with local physiographic and hydrologic conditions. As previously mentioned, prompt revegetation of any disturbed areas should help minimize soil erosion and weed encroachment; however, some minor short-term erosion may result from runoff from soils exposed to the course of construction and the area may need to be sprayed to eliminate noxious weeds.
3.4 Water Quality Issues

Surface Water
Surface hydrologic features that may be impacted by the proposed action consist of the Ham’s Fork River as described above. The proposed action is expected to have an effect on the Ham’s Fork and the adjacent wetlands, and will be mitigated in accordance with the Corps of Engineers permitting process.

Groundwater
The groundwater level will be evident in some of the proposed utility trenches. Dewatering will take place in the trenches during construction, and the placement of all dewatering operations will insure that the overall groundwater regime will not be affected by the construction operations.

3.5 Coastal Resources
Coastal Resources issues are not a factor in Wyoming.

3.6 Socio-Economic/Environmental Justice

Location
The Project is depicted in Exhibit 1 – Vicinity Map. The Project’s legal description is in Sections 1, 2, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26 and 27, T21N, R116W.

Environmental Setting
Kemmerer is surrounded by high desert and the Rocky Mountains. The Ham’s Fork River valley runs to the east of Kemmerer/Diamondville. The proposed tank site is located near the high point of and north-south trending ridge west of the main development in the area. The site is unimproved dry upland. Sagebrush and sandy soils cover most of the proposed site.

Climate
The climate of any area in Wyoming is largely determined by its latitude, altitude, and local topography. Together these factors influence airflow patterns, temperature variations, precipitation, and humidity brought in by the weather systems that migrate eastward. In winter, Wyoming is often beneath the jet stream, or north of it, which accounts for frequent strong winds, cold arctic air, and precipitation. In summer, the jet stream retreats northward, leaving the weather mild and pleasant throughout the south.

Precipitation levels are relatively steady throughout the year, with a total average annual precipitation of 10.88". May is normally the wettest month with 1.18", but most months normally have between 0.6" and 0.9" of moisture.

**Economy/Employment**

**Kemmerer**

Kemmerer’s population in the 2010 census was 2,656, up five people from the 2000 census. Census data is from: "US Gazetteer files: 2010, 2000, and 1990", United States Census Bureau, 2011-02-12, [http://www.census.gov/geo/www/gazetteer/gazette.html](http://www.census.gov/geo/www/gazetteer/gazette.html), retrieved 2011-04-23. The population breakdown is 1,034 households, and 695 families residing in the City. The population density was 359.7 people per square mile (138.9/km²). There were 1,208 housing units at an average density of 163.9 per square mile (63.3/km²). There were 1,034 households out of which 34.1% had children under the age of 18 living with them, 58.3% were married couples living together, 4.9% had a female householder with no husband present, and 32.7% were non-families. Of all households, 28.6% were made up of individuals, and 10.3% had someone living alone who was 65 years of age or older. The average household size was 2.53 and the average family size was 3.13.

In the City, the population was spread out with 28.4% under the age of 18, 71.1% from 18 to 24, 28.0% from 25 to 44, 25.7% from 45 to 64, and 10.8% who were 65 years of age or older. The median age was 38 years. For every 100 females, there were 103.9 males. For every 100 females age 18 and over, there were 102.0 males.

The median income for a household in the City was $47,353, and the median income for a family was $55,529. Males had a median income of $45,921 versus $23,382 for females. The per capita income for the City was $21,478. About 5.1% of families and 6.6% of the population were below the poverty line, including 7.1% of those under the age of 18 and 5.7% of those 65 and older.

**Diamondville**

Diamondville’s population in the 2010 census was 737 individuals, up by 22 people from the 2000 census. Census data is from: "US Gazetteer files: 2010, 2000, and 1990", United States Census Bureau, 2011-02-12, [http://www.census.gov/geo/www/gazetteer/gazette.html](http://www.census.gov/geo/www/gazetteer/gazette.html), retrieved 2011-04-23). The population breakdown is 304 households, and 199 families residing in the Town. The population density was 546.9 people per square mile. There were 322 housing units at an average density of 245.9 per square mile (94.9/km²). There were 304 households out of which 28.0% had children under the age of 18 living with them, 53.0% were married couples living together, 8.2% had a female householder with no husband present, and 34.5% were non-families. Of all households, 31.6% were made up of individuals and 14.1% had someone living alone who was 65 years of age or older. The average household size was 2.36 and the average family size was 2.93.

In the Town, the population was spread out with 26.4% under the age of 18, 5.6% from 18 to 24, 26.5% from 25 to 44, 28.5% from 45 to 64, and 13.0% who were 65 years of age or older. The
median age was 40 years. For every 100 females, there were 94.0 males. For every 100 females age 18 and over, there were 95.9 males.

The median income for a household in the Town was $39,333, and the median income for a family was $48,000. Males had a median income of $45,694 versus $26,250 for females. The per capita income for the Town was $21,696. About 10.6% of families and 12.5% of the population were below poverty line, including 16.1% of those under age 18 and 5.0% of those age 65 or over.

3.7 Miscellaneous Issues

Air Quality
The proposed action is not expected to directly, indirectly, or cumulatively affect air quality, and permitting is not expected to be required. The only possible adverse air quality impacts associated with the Project will be due to excessive dust during construction which will temporarily increase the ambient air particulate levels. Environmental planning and appropriate measures will be taken to reduce dust emissions during construction which will include effective dust control measures such as watering, covering haul trucks, and/or chemical stabilization of any exposed earth including stockpiles, according to the general opacity and public nuisance standards. Minimization of windblown dust off of exposed land will be accomplished by compactive efforts, mulching, and reseeding at the completion of construction. Mud, debris, garbage, or other materials tracked on to paved streets will be cleaned and removed promptly by brooming, watering, or other methods deemed necessary. No burning of waste materials will take place. The contractor will be required to abide by and comply with the Wyoming Air Quality Standards and Regulations at all times.

Transportation
There will be increased traffic in the immediate vicinity of the construction activities, which will not affect transportation in the Project area for the long term. After the Project is complete, maintenance of the new tank and new water lines will require the same number of vehicular site visits as are required for the existing tank and distribution system.

Noise
There will be minor, short-term increases in noise during construction which again is unavoidable during construction activities. However, the proposed action is not expected to directly, indirectly, or cumulatively affect the noise level in the Project area for the long term.

4.0 SUMMARY OF MITIGATION

The following mitigation measures were identified to minimize or eliminate adverse impacts resulting from the Project.

1. Use of routine mitigation techniques and Best Management Practices for limiting direct runoff from disturbed areas and dewatering conduits, including buffer zones, berms, sediment traps, silt fences, and disturbed area stabilization with mulch,
permanent or temporary vegetation, or sod, etc., which will be effective in limiting sediment into water courses.

2. Use of dust control measures if dust generated by construction activities becomes a nuisance.

3. Prompt revegetation of any disturbed areas to minimize soil erosion and weed encroachment.

4. Disturbed vegetation will be re-established using native plant species in accordance with local physiographic and hydrologic conditions.

5. Wildlife habitat mitigation measures will be implemented if they are deemed necessary.

6. Should any cultural materials be defined during a Class I Cultural review or during construction, a mitigation plan through an approved archaeologist will be implemented.

### 5.0 CORRESPONDENCE AND COORDINATION

All related correspondence from the following agencies is included in Exhibit 1:

1. Wyoming State Historic Preservation Office
2. US Army Corps of Engineers, Omaha District
3. USDA Natural Resources Conservation Service
4. Wyoming Game and Fish Department
5. US Fish and Wildlife Service
6. Wyoming DEQ, Air Quality Division

### 6.0 Landowner Consents

Chevron Mining has been contacted about the possibility of placing an additional tank on the existing Green Hill Site. They gave written permission to perform the Geotechnical Investigation on the proposed site. Negotiations will have to take place to acquire the land for this property. The property is located NW 1/4 Section 22, T21N, R116W.

### 7.0 FURTHER NEPA REQUIREMENTS

Since the Project is to be broken up into several possible projects, the only project that may require further NEPA review is the 18" transmission line. If this line is run in areas close to the Ham's Fork floodplain and wetlands, the US Fish and Wildlife Service may require further consultation and mitigation for Endangered Species, Wetlands, and Migratory Birds.

SHPO requires that a cultural resource survey will need to be conducted in any affected area that has not previously been disturbed. A consultant will need to be hired to produce a report detailing the results including researching historic properties, background research, consultation, and consideration of visual effects, and sample field investigations or field survey.
The Corps of Engineers may require a Nationwide Permit 12 for dredging and fill of material into wetlands and other waters of the United States, if the 18" waterline is run in the floodplain and wetlands of the Ham’s Fork River.

8.0 EXHIBITS

The following exhibits are found at the end of this report:

Exhibit 1 – Vicinity Map
Exhibit 2 – Correspondence with Agencies
EXHIBIT 1

Vicinity Map
EXHIBIT 2

Correspondence with Agencies
Dear Ms. Allen:

Thank you for your letter of February 22, 2011, received in our office on February 23, regarding the Kemmerer/Diamondville Water System Level II WWDC Study. The proposed project is located in Sections 13, 14, 15, 23, 24, 25, and 26 of T21N, R116W, Lincoln County, Wyoming. The project will include the construction of a new one-million gallon water tank, additional transmission lines from the water treatment plant on the Hams Fork, and additional transmission/distribution lines throughout the cities of Kemmerer and Diamondville.

Per your phone conversation with biologist Mark Bellis of my staff on March 15, 2011, it is understood that this project is in the second of three phases, with funding and construction the final phase, which may not take place for 2-3 years. During this second phase of the project, your company was looking for information regarding applicable authorities under the U.S. Fish & Wildlife Service's (Service) jurisdiction in order to be prepared for environmental review once funding is approved.

Federal Agency Responsibilities
The Service has responsibility, under a number of Federal laws, treaties, executive orders, and memoranda of agreement, for the conservation and management of fish and wildlife resources. Some of these same authorities also require other Federal agencies to consider, avoid, or prevent adverse impacts to fish, wildlife, and wetland resources. To ensure resources are afforded adequate consideration and protection, Federal agencies are often required to consult with the Service regarding potential impacts their actions may have on fish and wildlife resources.

When reviewing proposed actions of other agencies, this office normally focuses on three broad categories of trust resources: (1) threatened, endangered, and candidate species, (2) migratory birds, and (3) wetlands and riparian areas. The Service provides recommendations for protective measures for threatened and endangered species in accordance with the Act. Protective measures
for migratory birds are provided pursuant to the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703, and Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668. Wetlands are protected pursuant to Section 404 of the Clean Water Act, Executive Order 11990 (wetland protection) and Executive Order 11988 (floodplain management) with the goal of “no net loss of wetlands.” Other fish and wildlife resources are considered under the Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq, and the Fish and Wildlife Act of 1956, as amended, 16 U.S.C. 742a-742j.

Federal agency actions may range from small, site specific, short duration projects to expansive, long-term programs. Because of the wide range of possible actions, the Service provides the following comments with the understanding that this list of comments may not be all inclusive or may not be applicable for each Federal project.

Regulations implementing the Act at 50 CFR §402.12 require the preparation of a biological assessment for any Federal action that is a major construction activity to determine the effects of the proposed action on listed and proposed species. If a biological assessment is not required (i.e., all other actions), the lead Federal agency is responsible for review of proposed activities to determine whether listed species will be affected. If it is determined that the proposed activities may affect a listed species, you should contact the Service to discuss consultation requirements. If it is determined that any Federal agency program or project “is likely to adversely affect” any listed species, formal consultation should be initiated with this office. Alternatively, informal consultation can be continued so the Service can assist you in determining how the project could be modified to reduce impacts to listed species to the “not likely to adversely affect” threshold. If it is concluded that the project “is not likely to adversely affect” listed species, you should request that the Service review the assessment and concur with the determination. A list of endangered species in your county can be found on-line at:

http://www.fws.gov/wyominges/Pages/Species/Species_Endangered.html

For those actions where a biological assessment is necessary, it should be completed within 180 days of receipt of a species list. This deadline can be extended by mutual agreement between the lead agency and the Service. If the assessment is not initiated within 90 days of receipt of a species list, the list of threatened and endangered species should be verified with the Service prior to initiation of the assessment. The biological assessment may be undertaken as part of the agency’s compliance with section 102 of the National Environmental Policy Act (NEPA), and incorporated into the NEPA documents. We recommend that biological assessments include:

1. A description of the project.
2. A description of all areas that may be directly or indirectly affected by the project.
3. The current status and habitat use of threatened and endangered species in the project area.
4. A discussion of the methods used to determine the information in item 3.
5. The direct and indirect impacts of the project to threatened and endangered species or their designated critical habitat.
6. An analysis of the effects of the proposed action on listed and proposed species and their habitats including cumulative impacts (pursuant to the Act) from State or private projects in the area.
7. Measures that can potentially reduce or eliminate adverse impacts to threatened and endangered species.
8. The expected status of threatened and endangered species in the future (short and long term) during and after project completion.
9. A determination of “no effect”, “likely to adversely affect” or “not likely to adversely affect” for listed species and any designated critical habitat.
10. A determination of “likely to jeopardize” or “not likely to jeopardize” for proposed species. A determination of “likely to adversely modify critical habitat” or “not likely to adversely modify critical habitat” for proposed critical habitat.
11. A description of alternatives to the proposed action if considered by the Federal Agency, a summary of how impacts of those alternatives on listed and proposed species would differ from the proposed action, and the reasons for not selecting those alternatives.
12. Citations of literature and personal contacts used in the assessment.

Migratory Birds
Under the MBTA and BGEPA, the Federal agency has a mandatory obligation to protect the many species of migratory birds, including eagles and other raptors which may occur on lands under its jurisdiction. Of particular focus are the species identified in the Service’s Birds of Conservation Concern 2002. In accordance with the Fish and Wildlife Coordination Act, 16 USC 2912 (a)(3), this report identifies “species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing” under the Act. This report is intended to stimulate coordinated and proactive conservation actions among Federal, State, and private partners and is available at http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf.

In order to promote the conservation of migratory bird populations and their habitats, the Service recommends that the Federal agency implement those strategies outlined within the Memorandum of Understanding directed by the President of the U.S. under Executive Order 13186, where possible.

During project planning analysis of the following information is recommended to determine project effects to migratory birds:

1. The current status and habitat use of migratory birds in the project area. This may include number of individuals, breeding pairs, population trends, and active nests within and adjacent to the project area.

2. An analysis of the effects of the proposed action on migratory birds and their habitats. Measures that will reduce or eliminate adverse impacts to migratory birds, including protective buffers, seasonal restrictions, maintenance of habitat within the project area, raptor-proofing power lines, and netting of waste pits.

3. The projected short and long term impacts to migratory birds and their trends during and after project completion using monitoring, modeling and current literature.
Potential adverse effects to migratory birds from power lines should be identified and every attempt to mitigate such effects should be implemented. Structures that are identified as affecting birds should be made safe to prevent subsequent mortalities. If you determine that power poles and/or stretches of power line are resulting in electrocution of migratory birds, especially raptors, the Service requests that specific information be documented regarding these mortalities. Based on regulations pursuant to the MBTA and BGEPA, migratory bird carcasses may only be collected, possessed or moved by state game wardens, Service refuge officers, Service special agents, or persons holding a valid salvage permit issued by the Service and the applicable state. When a migratory bird mortality is observed the Service recommends that as much of the following information as possible be documented: legal location, GPS location, all identifying numbers from the nearest power pole, date of observation, species, photographs of pole (top section), and the dead bird, and directions to the scene. Please contact our office with the information and call or email Roy Brown of the Service’s Law Enforcement Office at 307-332-7607/Roy_Brown@fws.gov to report your observation and obtain further guidance. The Service appreciates your efforts to protect migratory birds. The Service appreciates your efforts to protect migratory birds.

In addition the Service has information regarding non-listed, species of concern available at http://www.fws.gov/wyominges/Pages/Species/Species_Concern.html. We appreciate your efforts to ensure the conservation of endangered, threatened, and candidate species and migratory birds. If you have questions regarding this letter or your responsibilities under the MBTA, please contact Mark Bellis of my staff at (307) 352-0377.

Sincerely,

R. Mark Sattelberg
Field Supervisor
Wyoming Field Office

cc: WGFD, Non-game Coordinator, Lander, WY (B. Oakleaf)
WGFD, Statewide Habitat Protection Coordinator, Cheyenne, WY (M. Flanderka)
Feb 28, 2011

Amy M. Allen
JFC Engineers
Project Manager
1515 Ninth Street, Suite A
Rock Springs, WY 82901

Re: Compliance with Federal Authorities to Obtain a State Revolving Fund Loan for Kemmerer/Diamondville Water System Level II WWDC Study (SHPO File # 0311JRD001)

Dear Mrs. Allen:

Thank you for consulting with the Wyoming State Historic Preservation Office (SHPO) regarding the above referenced undertaking.

A search of our records shows that a cultural resource survey has not been conducted in the area of potential effect. Following 36 CFR Part 800, and prior to any ground disturbing activities, we recommend the JFC Engineering carry out appropriate efforts necessary for identification of historic properties, which may include background research, consultation, consideration of visual effects, sample field investigations or field survey. The identification efforts must be conducted by a consultant meeting the Secretary of the Interior's Professional Qualification Standards (48 FR 22716, Sept. 1983). A report detailing the results of these efforts should be provided to SHPO staff for our review and comment.

We have enclosed a copy of a cultural resource consultants list for your use. Please refer to SHPO project control number #0311JRD001 on any future correspondence dealing with this undertaking. If you have any questions, please contact Joseph Daniele, Archaeologist/Review and Federal Consultation at 307-777-8793.

Sincerely,

Joseph Daniele
Wyoming State Historic Preservation Office
March 22, 2011

WER 12242
JFC Engineers Surveyors
Environmental Assessment
State Revolving Fund Loan
Kemmerer/Diamondville Water System
Level II WWDC Study
Lincoln County

Amy M Allen, PE
Project Manager
JFC Engineers Surveyors
1515 Ninth Street, Suite A
Rock Springs, WY 82901

Dear Ms. Allen:

The staff of the Wyoming Game and Fish Department has reviewed the Environmental Assessment for a State Revolving Fund Loan for the Kemmerer/Diamondville Water System Level II WWDC Study in Lincoln County. We have no terrestrial wildlife or aquatic concerns pertaining to this proposed project.

Thank you for the opportunity to comment.

Sincerely,

John Emmerich
Deputy Director

JE/mf/gb

cc: USFWS
Mark Zornes, Green River Region
Jeff Short, Green River Region
Robb Keith, Green River Region
March 21, 2011

JFC Engineers - Surveyors
Attn: Amy M. Allen, PE, Project Manager
1515 Ninth Street, Suite A
Rock Springs, Wyoming 82901

Dear Ms. Allen:

The Natural Resources Conservation Service (NRCS) has reviewed the proposal for the Kemmerer/Diamondville Water System Level II WWDC Study dated February 22, 2011.

The Agriculture and Food Act of 1981, (Public Law 97-98) containing the Farmland Protection Policy Act (FPPA)—Subtitle I of Title XV, Section 1539-1549, is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Projects are subject to FPPA requirements if they may irreversibly convert farmland (directly or indirectly) to nonagricultural use and are completed by a federal agency or with assistance from a federal agency.

It does not appear there will be any permanent conversion of irrigated agricultural land to non-agricultural use based on the information you provided. As such, we do not believe the work will adversely impact prime farmland.

If you have any questions, or need to discuss this comment, please contact Casey Sheley at (307) 233-6770.

Sincerely,

J. XAVIER MONTOYA
State Conservationist

Cc: DeMont Gandy, District Conservationist, Cokeville Field Office
    Geri Sullivan, Area Conservationist, Riverton Area Office

Helping People Help the Land
An Equal Opportunity Provider and Employer
February 28, 2011

Wyoming Regulatory Office

Ms. Amy Allen
JFC
1515 Ninth Street, Suite A
Rock Springs, Wyoming 82901

Dear Ms. Allen:

This letter is in response to a request we received from you on February 24, 2011, concerning information on a Department of the Army permit for construction on the Kemmerer/Diamondville Water System.

The U.S. Army Corps of Engineers (Corps) regulates the placement of dredged and fill material into wetlands and other waters of the United States as authorized primarily by Section 404 of the Clean Water Act (33 U.S.C. 1344). The term "waters of the United States" has been broadly defined by statute, regulation, and judicial interpretation to include all waters that were, are, or could be used in interstate commerce such as streams, reservoirs, lakes and adjacent wetlands. The Corps regulations are published in the Code of Federal Regulations as 33 CFR Parts 320 through 332. Information on Section 404 program requirements in Wyoming can be obtained from our website at http://www.nwo.usace.army.mil/html/od-rwy/Wyoming.htm.

Based on the preliminary information provided, the proposed project involves construction of a new water tank, installation of a series of distribution and transmission water lines in and around the Kemmerer/Diamondville area. One of the proposed transmission lines is planned to cross the Hams Fork River and adjacent wetlands. Activities in waters of the United States such as those described above are likely authorized by Nationwide Permit (NP) 12 for Utility Line Activities, as defined in Part II of the Federal Register published on March 12, 2007 (Vol. 72, No. 47), provided the permittee complies with all of the terms and conditions. Nationwide Permit 12, General Conditions and Regional Conditions can be found on our website.

We encourage you to review all the terms and general conditions of NP 12 to determine if any of the proposed activities trigger the need to submit a pre-construction notification (PCN). General Condition (GC) 27 defines the PCN procedure. A PCN is also required for any activity that involves discharge into wetlands, "may affect" threatened or endangered species as explained under GC 17, and any activity that has the "potential to cause effects" to any historic
properties within the “permit area” as explained under GC 18. The permit area is the aquatic habitat affected by the activity and immediately adjacent uplands, as further defined in the regulations at 33 CFR Part 325, Appendix C.

If a lead federal agency is involved in this project, the lead federal agency should follow its own procedures for complying with the requirements of the Endangered Species Act and Section 106 of the National Historic Preservation Act as defined under GC 17(b) and GC 18(b). The permittee shall not begin work until the lead federal agency has documented that the proposed activities will have “no effect” on listed species or critical habitat, or until Section 7 consultation has been completed.

If no PCN is required for the project, the permittee may elect to proceed under the current NP 12 authorization, provided that the permittee complies with all of the terms and conditions and construction is conducted in a manner which does not result in a violation of any applicable water quality standard. The permittee may also elect to request written verification of authorization under NP 12 from the Corps, once the project plans are completed.

Thank you for your interest in cooperating with requirements of the U.S. Army Corps of Engineers’ regulatory program. Please contact Mr. Kevin C. Little at (307) 772-2300 if you have any questions and reference file NWO-2011-00332.

Sincerely,

[Signature]

Kevin C. Little
Project Manager
Wyoming Regulatory Office
The Wyoming State Historic Preservation Office (SHPO) does not permit or license consultants and makes no endorsement of any particular consultant.

Jeffrey A. Adams  
Interior West Consulting, LLC  
P.O. Box 1331  
Manenos, CO 81328  
Phone: (970)882-1542  
Fax: (970)882-1505  
E-mail: jadams_co@yahoo.com

John P. Albanese  
P. O. Box 1397  
Casper, WY 82602-1397  
Phone: 307-234-1379  
Fax: 307-268-4709  
E-mail: albanese@bresnan.net

Alan L. Bartholomew  
Arrowhead Archaeology  
P. O. Box 601  
269 West Ivinson  
Laramie, Wyoming 82072  
Phone: 307-460-9408  
E-mail: arrowheadarch@yahoo.com  
Web: www.arrowheadarchaeology.com

Dulaney Barclay  
TEC Inc.  
1658 Cole Boulevard, Suite 190  
Golden, Colorado 80401  
Phone: (303)273-0231  
Fax: (303)273-0235  
Web: www.tecinc.com

Barbara Perry Bauer  
TAG Historical Research & Consulting  
P. O. Box 7333  
Boise, ID 83707-1333  
Phone: 208-338-1014  
Fax: 1-866-818-5092  
Web: www.taghistory.com

Steven Blondo  
Westwood Professional Services  
7699 Anagram Drive  
Eden Prairie, MN 55344-7310  
Direct Phone: 952-697-5709  
Main Phone: 952-937-5150  
Fax: 952-937-5822  
E-mail: steven.blondo@westwoodps.com  
Web: www.westwoodps.com

James M. Brechtel  
James Enterprises Inc.  
P. O. Box 1064  
Fort Collins, CO 80522  
Phone: 970-484-3335  
E-mail: jbjeil@mesanetworks.net

James A. Brunette  
Frontier Archaeology  
3630 West 46th Street  
Casper, WY 82604  
Phone: 307-234-5166  
Fax: 307-234-5133  
E-mail: frontierarch@bresnan.net

Allan R. Burns  
Terra Alta Archaeology  
902 14th Street  
Cody, WY 82414  
Phone: 307-587-8732  
E-mail: taas@vcn.com

Wade and Christina Burns  
Beaver Creek Archaeology, Inc.  
P. O. Box 489  
Lincoln, ND 58552  
Phone: 701-367-8993  
E-mail: wadeburns@beavercreekarchaeology.com

Kenneth P. Cannon, Ph.D.,  
Director, USU Archaeological Services  
P. O. Box 3385  
Logan, Utah 84323  
Phone: 435-797-3868  
Fax: 435-797-1240  
Cell: 303-590-4960  
E-mail: kenneth.cannon@usu.edu  
Web: www.usuax.com

John D. Cater  
Aztec Archaeological Consultants  
210 S. Main Avenue  
Aztec, NM 87410  
Phone: 505-334-6675
Susan M. Chandler
Alpine Archaeological Consultants, Inc.
P. O. Box 2075
Montrose, CO 81402
Phone: 970-249-6761
Fax: 970-249-8482
E-mail: susan_chandler@alpinearchaeology.com

Joanna Mettler-Chase
Mettler & Associates
P.O. Box 2118
Cody, WY 82414
Phone: 307-527-4654
Fax: 307-527-4654
E-mail: jechase4654@msn.com

Judy H. Cooper, RPA
C Dimensions
3913 Branch Hollow Dr
Plano, TX 75023
(972) 881-5577
cd_dimensions@tx.rr.com

Eben S. Cooper, MA, RPA
C Dimensions
3913 Branch Hollow Dr
Plano, TX 75023
(972) 881-5577
cd_dimensions@tx.rr.com

Stephanie Crockett
Cultural Resource Consulting
PO Box 126
Victor Idaho 83455
208-787-2315
crockett@silverstar.com

William Current
Current Archaeological Research
2901 Driftwood Lane
Rock Springs, WY 82901
Phone: 307-362-0561
Fax: 307-362-5894
E-mail: current@onewest.net

Mark DeHaven
ERO Resources Corp.
1842 Clarkson St.
Denver, CO 80218
Phone: 307-749-6446
E-mail: slamore@eroresources.com

Anne S. Dowd
Archaeologic USA
P.O. Box 2246
Pinedale, WY 82941-2246
Phone: 307-231-1572
Fax: 307-367-2364
E-mail: info@archaeologicusa.com

Ann Marie P. Doyon, MHP
P.O. Box 10296
Spokane, WA 99209
Phone: 509-533-9943
E-mail: annie.doyon@gmail.com

William Eckerle
Western GeoArch Research
P.O. Box 521124
Salt Lake City, UT 84152-1124
Phone/Fax: 801-533-0667
E-mail: wgresearch@qwest.net

Patricia Carender-Eggleston
High Country Archaeology
779 Cactus Road
Powell, WY 82435
Phone: 307-754-3426
Fax: 215-243-8308
E-mail: airedale@trite1.net

Richard D. Enders
Archaeological Energy Consulting
5925 Bell Valley Road, Alcova Rte.
Casper, WY 82604
Phone: 307-472-3969
Fax: 307-577-4903
E-mail: aec@wyoming.com

Dee A. Espinoza
Espinoza Cultural Services
P.O. Box 571
La Jara, CO 81140
Phone: 719-298-1780
Fax: 866-381-6973
Web: www.ecs-arch.com

David Ferguson
GCM Services, Inc.
PO Box 3047
Butte, MT 59701
Phone: 406-723-4387
Fax: 406-723-4388
E-mail: davegcm@montana.com

Jon and Elizabeth Frizell
North Platte Archaeology Services
940 South Center Street
Casper, WY 82601
Phone/Fax: 307-577-7442
E-mail: jonfrizell@hotmail.com

John G. Goss
Dust Devil Archaeology, Inc.
P.O. Box 1223
Casper, WY 82602
Phone: 307-232-8180
Fax: 307-234-4773
E-mail: dustdevi1arch@qwest.net
Adam C. Graves
ARCADIS U.S., Inc.
189 North Cedar Street
Buffalo, WY 82834
Phone: 307-684-5891
Cell: 307-680-3637
Fax: 307-684-5961
Email: Adam.Graves@arcadis-us.com

Dale Gray
Frontier Historical Consultants
24265 River Road
Grand View, ID 83624
Phone: 208-834-3061
Fax: 208-834-2452
E-mail: dalegray@mindspring.com

John & Mavis Greer
2599 South Paradise Drive
Casper, WY 82604
Phone: 307-473-2054
Fax: 307-473-1574
E-mail: mavis@greerservice.com

T. Weber Greiser
Historical Research Associates, Inc.
P.O. Box 7086
Missoula, MT 59807
Phone: 406-721-1958
Fax: 406-721-1964
E-mail: wygreiser@hrassoc.com

Sherri Gust
Cogstone Resource Management Inc.
1518 West Taft Avenue
Orange, CA 91016
Phone: 714-974-8300
Fax: 714-974-8303

Jennifer L. Harty
KL&J-Environmental Group
128 Soo Line Drive
Bismarck, ND 58501
Phone: 701.250.5912

Robyn Johnson
p.O. Box 217
Driggs, ID 83422
Phone: 208-859-9481
E-mail: hrdrobyn6@aol.com

Ted Hoefer
Cultural Resource Analysts, Inc.
421 21st Ave. Suite 8
Longmont, CO 80501
Phone: 303-772-8811
Cell: 720-901-4364
Fax: 303-772-8892
E-mail: thoefer@crai-ky.com
Website: www.crai-ky.com

Jeffrey Hokanson
Engineering-Environmental Management, Inc. (e2M)
9563 S. Kingston Court
Englewood, CO 80112
Phone: 303-754-4238
E-mail: jeffrey.hokanson@e2m.net

Shane Hope
Hope Archaeology, Inc.
2804 Louise Lane
Billings, MT 59102
Phone: 406-534-1640
Fax: 406-534-1773
E-mail: info@hopearchaeology.net

Mary Humstone
American Studies Program
University of Wyoming Dept 4036
1000 E. University Ave.
Laramie, WY 82071
Phone: 307-766-4600
Phone: 970-482-8939
Fax: 307 766-3700
E-mail: humstone@uwyo.edu

Elizabeth Jacox
TAG Historical Research & Consulting
P.O. Box 7333
Boise, ID 83707-1333
Phone: 208-338-1333
Fax: 1-866-818-5092
Web: www.taghistory.com

Russell L. Kaldeuberg
ASM Affiliates
453 Vandehei Avenue, Ste. 140
Cheyenne, WY 82009
Phone: 307-772-9317
Jack Savini
Llano Consulting
PO Box 50383
Casper, WY 82605
Phone/Fax: 307-235-4865
Email: llano@aol.com

Alan Schroedl
P-III Associates
2759 South 300 West, Suite A
Salt Lake City, UT 84115-2932
Phone: 801-467-5446
Fax: 801-467-9978
E-mail: alan_schroedl@P-III.com

Michael A. Schumacher
Arrowhead Archaeology
P.O. Box 601
1415 Kearney Suite B
Laramie, Wyoming 82073
Phone: 308-224-4780
E-mail: arrowheadarch@yahoo.com
Web: www.arrowheadarchaeology.com

Kurt P. Schweigert
TEC Inc.
1658 Cole Boulevard, Suite 190
Golden, Colorado 80401
Phone: (303)273-0231
Fax: (303)273-0235
E-mail: www.tecinc.com

Nancy Sikes
Cogstone Resource Management Inc.
813 Harbor Boulevard, #321
West Sacramento, CA 95691-2201
Phone: 916-288-8355
Fax: 530-231-6910

Ron Sladek
Tatanka Historical Associates Inc.
612 S. College Ave., Suite 21
P.O. Box 1909
Fort Collins, CO 80522
Phone: 970.221.1095
E-mail: tatanka@verinet.com

Christy J. Smith
Engineering-environmental Management, Inc. (e2M)
9563 S. Kingston Court
Englewood, CO 80112
Phone: 303-754-4259
Cell: 720-531-0744
E-mail: cjsmith@e2m.net

Craig Smith
Entrix
807 East South Temple
Suite 350
Salt Lake City, UT 84102
Phone: 801-363-0116
E-mail: csmith@entrix.com

Rusty Smith
North Wind, Inc.
P.O. Box 2345
Pinedale, WY 82941
Phone: 208-390-8297
Fax: 208-528-8714
E-mail: rsrnith@nwindenv.com

Carl Spáth, PhD
ARCADIS U.S.
630 Plaza Drive, Suite 100
Highlands Ranch, CO 80129
Phone: 303-471-3474
Fax: 720-344-0468
E-mail: Carl.Spath@arcadis-us.com

Anthony A. Swenson
Wind River Resource Management
1221 Coburn Avenue
Worland, WY 82401
Phone: 307-347-3658
Cell: 307-431-1416
Fax: 307-347-3658
E-mail: swen@rtconnect.net

Russell L. Tanner
Kyak Marook Heritage Research, LLC
745 Ridge Ave.
Rock Springs, WY 82901-5038
Phone: 307-382-5765
E-mail: rltanner@wyoaming.com

James A. Truesdale
An Independent Archaeologist
P. O. Box 153
Laramie, WY 82070
Phone: 307-745-4912
E-mail: ajarcheoc@aol.com

Roger L. Wardlow
Foothills Archaeological Consultants
P.O. Box 633
Story, WY 82842
Phone 307-683-2724
Cell: 307-751-1984
Fax: 307-683-2724
E-mail: foothillsarch@wbaccess.net
Cynthia Webb
Pochteca. Inc.
4217 Grays Gable Road
Laramie, WY 82072
Phone/Fax: 307-742-6791
E-mail: Pochteca1@aol.com

Jim Welch
Western Land Services, Inc.
1662 South Sheridan Avenue
Sheridan, WY 82801
Phone: 307-673-1817 ext. 164
Fax: 307-673-1823
Toll Free: 877-673-1817 ext. 164
Cell: 307-461-0123
E-mail: jim.welch@westernls.com

George Zeimens
Western Plains Historic Preservation Assoc., Inc.
2308 Highway 26
Lingle, WY 82223
Phone: 307-837-3052
E-mail: gqzzk@embarqmail.com

Christian Zier
Centennial Archaeology, Inc.
300 East Boardwalk, Building 4-C
Fort Collins, CO 80525
Phone: 970-225-6575
Fax: 970-225-6577
E-mail: centennial@centennialarch.com
February 25, 2011

Amy Allen, Project Manager
JFC Engineers
1515 Ninth Street, Suite A
Rock Springs, WY 82901

RE: Town of Kemmerer General Permitting Requirements

Dear Ms. Allen:

Regarding your 2/22/11 letter requesting a compliance determination for the Kemmerer/Diamondville Water System Level II project, the Air Quality Division has no concerns at this time and will not require any permitting. In order to maintain compliance with our general opacity and public nuisance standards, however, the contractor should be advised to minimize fugitive dust emissions during construction. This normally includes watering access roads and staging areas, particularly during dry, windy conditions. The burning of waste materials is prohibited without specific authorization from the Air Quality Division. This project is not located in the vicinity of an area where known violations of ambient air quality standards have occurred.

Demolition of buildings may require an asbestos inspection prior to demolition. Contact Linda DeWitt at (307) 777-7394 for questions regarding asbestos abatement.

Please call me at 307-332-6755 or email at greg.meeker@wyo.gov if you have questions concerning this matter.

Sincerely,

Greg Meeker
District 4 Engineer
Air Quality Division