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FINAL REPORT
FREEDOM HILLS IMPROVEMENT AND SERVICE DISTRICT
Gillette Regional Connections 2, Level II Study

August, 2013

Submitted To: Wyoming Water Development Commission
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Freedom Hills Improvement and Service District- Level II Study

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1. Introduction and Project Description

1.1 Background

The Freedom Hills Improvement and Service District (ISD) owns and operates a rural water system located east of the corporate limits of Gillette, Wyoming and north of I-90, as shown in Figure 1.1. The Freedom Hills ISD contains 160 lots ranging in size from 2.48 Acres to 13.97 Acres. The original water system for the Freedom Hills ISD was permitted by the WDEQ in 1980 as permit number 80-382. The Freedom Hills ISD was formed to own and operate the water system as well as the roadways within the District.

The Freedom Hills ISD currently serves 160 customers. None of the customers are metered. The Freedom Hills water system consists of two groundwater wells, Freedom Hills #1 and Freedom Hills #2, a single storage tank, gaseous chlorine treatment, a small booster pump, 6” Perma-Strand water mains, 4” polyethylene well lines, 2” low pressure polyethylene mains, ½” low pressure polyethylene service lines. Supply water is pumped from supply wells Freedom Hills #1 and Freedom Hills #2 to an above ground 75,000 gallon bolted steel finished water storage tank. The storage tank provides a gravity supply to the booster pump which supplies water to the entire district. The Freedom Hills water system has an EPA designation of WY5600789.

The water supply and distribution system for Freedom Hills is in good condition. The main lines do not experience breaks; however the service lines have been repaired several times in the past few years due to system pressures exceeding 100 psi. The service lines are constructed of low pressure polyethylene. The main concerns of the Freedom Hills water system are the low pressure service lines, unknown location, condition and remaining life of the main lines, a lack of back-up supply, lack of mainline valving, and water quality concerns with occasionally elevated Fluoride concentrations. Since 2008, two annual samples have been reported with Fluoride levels ranging from 2.5 mg/l to 2.8 mg/l, which is less than the Maximum Contaminant Level (MCL) of 4 mg/l, but exceeds the secondary contaminant level of 2.0 mg/l. These levels of Fluoride can cause tooth issues in children.
FIGURE 1.1
FREEDOM HILLS ISD
DISTRICT VICINITY MAP
This report provides an evaluation of the overall existing water system and provides recommendations for improvements related to improving the reliability of the water distribution system, providing a back-up source of water, and to resolving the water quality issues documented in the supply wells. A main focus of this study was evaluating the possibility of a connection to the Gillette Regional Water System for blending with the current supply wells as well as a full time connection.

Over the past several years, numerous studies have been completed for a Regional water system in the Gillette area. In 2007, a Long-Term Water Supply Study was completed for the City of Gillette which established a program of improvements to meet the City of Gillette’s long term needs. This study included a preliminary investigation into providing service to limited rural areas. In 2009, HDR Engineering, Inc. completed the Gillette Regional Master Plan Level I Study for the WWDC. This 2009 Study was undertaken to provide a more comprehensive regional study to determine the needs to meet the long-term water supply for the growth area surrounding Gillette, which included the Freedom Hills ISD. This 2009 Study has provided the basis for WWDC funding applications for Regional Water System Improvements. Funding has been allocated for the Gillette Madison Pipeline Project which will provide the additional water supply and conveyance facilities to deliver water to the Gillette Regional Area.

Following the 2009 Study, the City Gillette and Campbell County contracted with HDR Engineering, Inc. to complete the Regional System Potential Participant Connections Study, which was completed in May, 2010. The purpose of this 2010 Study was to develop estimated construction costs for each Improvement and Service District that may potentially connect to the Regional System, and for use in the development of a Joint Powers Agreement (JPA). In December, 2010 the City of Gillette and Campbell County entered into a Joint Powers Agreement based on the results of this study. The JPA identifies a designated service area, organizational structure, financial strategies and governance methods for the future management of the Gillette Regional Water Supply System.

In August, 2011 the City of Gillette applied to the WWDC to assist with the Regionalization project for $60,000,000 to be appropriated in $8,000,000 increments over a 5-year period to assist with funding for the district extensions. The funding consists of a 67% ($40,000,000) grant from the WWDC with a 33% ($20,000,000) local match. As
planned, the local match will be provided from revenues received though a $20,000,000 Specific Purpose Excise Tax (Capital Facilities Tax) which was approved by the Campbell County Voters on May 3, 2011. Collections for this 1% Specific Purpose Excise Tax began October 1, 2011.

The concepts identified in the 2010 Study served as the basis for determining cost estimates for providing service to the 42 potential regional system participants using various water delivery systems extending from the Regional Water System. This 2010 Study along with the 2011 District Questionnaires also helped to prioritize these District Extensions for WWDC funding. In order to help determine District connection priorities and further determine estimated costs for the District extensions, Districts were encouraged to apply for a WWDC Level II study to perform detailed evaluations of possible regional connections as well as to help identify other possible deficiencies within their water systems.

The Freedom Hills ISD applied to the WWDC for funding to complete a Level II study. In June of 2012, WLC Engineering, Surveying and Planning (WLC) was hired by the WWDC to complete this Level II study. The Freedom Hills ISD is primarily interested in utilizing Regional water for blending to mitigate the slight water quality issues with their current supply wells and as a back-up supply.

The primary focus of this study was to evaluate options for a regional connection and provide recommendations and costs (capital and operating) for connecting to the regional system. In addition, WLC evaluated the functionality of the Freedom Hills ISD water system as a whole. It is the goal of this Level II Study to develop a plan that will guide the Freedom Hills ISD with funding and options to maintain a reliable water system into the future.

From the WWDC scope of work for the Level II study, specific project objectives included:

- Inventory and evaluate the existing Freedom Hills infrastructure to determine existing system deficiencies.
- Inventory and evaluate the existing Freedom Hills infrastructure to determine the ability to connect to the regional system.
  - Determine the best location for the connection to take place.
  - Determine any improvements necessary to complete the connection.
Freedom Hills Improvement and Service District- Level II Study

- Provide a Level II construction cost estimate for the connection to the Regional System and other possible improvements.
- Prepare detailed construction cost estimates and funding recommendations for all identified improvements.
- Construct and calibrate a hydraulic model of the existing and proposed systems to evaluate the adequacy of the system to meet current and future pressure and flow requirements.
  - Run a water age analysis to determine any areas of poor water quality.
  - Run a fire flow analysis to determine maximum flow from the hydrants in the system.
- Create a GIS Database for the Freedom Hills Water System.

1.2 Study Purpose

The purpose of this study was to provide a detailed evaluation of a connection to the Gillette Regional System, to evaluate the water supply wells, evaluate the current water distribution system, and provide an overall evaluation of the current Freedom Hills Water System as a whole.

This Study is divided into Twelve Sections, and is intended to follow the usual WWDC study format, and address items normally required by various funding agencies. The Twelve Sections of the Study are highlighted as follows:

- Section 1 – Introduction & Project Description
- Section 2 – Water Usage
- Section 3 – Hydraulic Analysis
- Section 4 – GIS Development
- Section 5 – Water System Operations
- Section 6 – Water Supply Analysis
- Section 7 – Proposed System Improvements
- Section 8 – Project Funding Sources
- Section 9 – Financial Evaluation and Funding Recommendations
- Section 10 – Permits Required for Construction
- Section 11 – Conclusions and Recommendations
- Section 12 – References
1.3 Acknowledgements

WLC would like to thank the people who assisted with the completion of this Level II Study. Without their assistance, this study would be incomplete and inaccurate.

- Jodie Pavlica – WWDC Project Manager
- Freedom Hills ISD – Eddie Morgan and the other Board Members
- Duaine Faucett, Operator – The Water Guy
- Mike Cole, PE – Utilities Project Manager, City of Gillette Public Utilities
- Kevin King, P.E. and Clark Melinkovich, P.E. – Campbell County Engineering
2. Water Usage

2.1 Historical and Current Use

To determine current water use, water meter readings were obtained from the system operator, the Water Guy (Duaine Faucett), for the Freedom Hill ISD over a three year period from January 2009 to December 2011. The records contained the monthly usage figures for the master water meter located in the pump house. The records were entered into a database in order to allow for demand calculations for the model.

Based on conversations with the system’s operator, it was determined that the Freedom Hills water system operates as one zone which is pressurized via the head elevation of the tank and a 7.5 HP booster pump located in the pump house. The booster pump serves to provide required pressures for the highest lots located adjacent to the tank parcel. Figure 2.1 presents the overall water system identifying the lots served by the Freedom Hills ISD.

From the monthly water usage reports provided by the operator, a total water usage was calculated for each year and the three corresponding amounts were averaged to create an average year demand in gallons. Table 2.1 presents the total year demands for 2009, 2010 and 2011, and the average year demand.

<table>
<thead>
<tr>
<th>Year</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>23,940,000</td>
</tr>
<tr>
<td>2010</td>
<td>22,962,000</td>
</tr>
<tr>
<td>2011</td>
<td>26,202,000</td>
</tr>
<tr>
<td>Average</td>
<td>24,368,000</td>
</tr>
</tbody>
</table>

The “Average Daily Demand” (ADD) was then calculated by dividing the year demand by 365 days in a year. This number was used to populate the water model for the “Average Day” scenario. Table 2.2 shows the average daily water use by system.
2.2 Peaking Factor

The Peak Daily Demand (PDD) was also determined from the master meter data by averaging the two peak demand months for 2009, 2010 and 2011 and dividing by the corresponding days in the month. Table 2.3 shows the peak monthly demand for each year and the respective month in which it occurred.

Table 2.3: Peak Month Demand (Gallons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>August</td>
<td>3,519,000</td>
</tr>
<tr>
<td>2010</td>
<td>August</td>
<td>3,487,000</td>
</tr>
<tr>
<td>2011</td>
<td>August</td>
<td>4,296,000</td>
</tr>
<tr>
<td>Average</td>
<td>--</td>
<td>3,767,333</td>
</tr>
</tbody>
</table>

From the table the peak month demand is determined to be 3,767,333 gallons. Dividing this number by 31 days in August the “Peak Day Demand” (PDD) is calculated to be 121,527 (84.39 gpm). The PDD to ADD ratio is then calculated by dividing the PDD by the ADD to come up with approximately 1.82. To be conservative and for the purposes of populating the water model, this ratio was rounded up to 2.0 giving a PDD of 92.78 gpm. This ratio can be used to help determine future peak demands.

The current Peak Hour Demand (PHD) was determined from the model using diurnal demand patterns and running an extended period simulation (EPS); this is discussed further in Section 3. From the model, the current PHD is 200,405 gpd (139.17 gpm).

2.3 Per Capita Water Use

The current ADD of 66,798 gpd and a population of approximately 400 (from District records), creates a per capita average water use of 167 gallons per person per day. During the peak month the per capita water use is determined to be 334 gallons per person per day.
2.4 Future Water Use

Future water use is not expected to increase. All lots within the Freedom Hills ISD are developed and additional growth is not expected. The current estimated demands are utilized for all analysis.
3. Hydraulic Analysis

3.1 Model Physical Parameters

The layout for the current water system was determined using a combination of existing plans, collected field survey data, and information from the system operator. This information was compiled and a layout was developed using Bentley WaterCAD V8i modeling software. In addition to the physical layout, it was necessary to add parameters including; pipe roughness coefficients, pump head curves, and tank operating levels into the model.

3.1.1 Pipe Roughness Coefficients

The model uses the Hazen-Williams equation to calculate head loss in a pipe for the given flow using a roughness coefficient “C” that varies with pipe material and age. There are default “C” values in WaterCAD for each type of material which are automatically assigned to each pipe when the material is selected. Head loss calculations, however, are dependent on pipe diameter and the default diameters assigned by the model are nominal diameters, not actual diameters. Actual inside pipe diameters were determined from pipe specifications from the manufacturers for the pipe type. To account for differing pipe diameters, the “C” values for each pipe material were adjusted by calculating the head loss for a length of pipe with the default diameters (2”, 4”, 6” etc..) and “C” values, then adjusting the “C” values until the same head loss was observed for the actual pipe diameters. Table 3.1 shows the default and adjusted “C” values. The higher the “C” value the smoother the pipe and therefore the lower the head loss. The “C” value for the both the polyethylene and fiberglass wrapped PVC pipe increased because the actual diameters are larger than the nominal default diameters.

Table 3.1: Pipe Roughness Coefficients

<table>
<thead>
<tr>
<th>Pipe Material</th>
<th>Default C Value</th>
<th>Diameter Adjusted C Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiberglass Wrapped PVC</td>
<td>150</td>
<td>157</td>
</tr>
<tr>
<td>Polyethylene</td>
<td>150</td>
<td>165</td>
</tr>
</tbody>
</table>
3.1.2 Pumps/Storage Tank Operation

A pump curve for the existing booster pump had to be determined in order to define the pump within the system. This was obtained by looking up the pump make and model from the manufacturer’s website. This curve was inserted into the model for the pump characteristics.

The storage tank size and operating levels were determined from existing system plans and information provide by the system operator. The tank diameter is 21’ with a standard maximum operating level of 28’. The well pump is set to turn on when the water level in the tank drops to 23’. This operational data was entered into the model to provide for analysis such as water age and system pressures which are discussed in Section 3.3.

3.2 Demand Allocation

After the development of the existing model layout, demands were allocated for the average and peak day use. From Section 2.1 the current ADD and PDD were determined and used to populate the model.

3.2.1 Current Average Day Demand Allocation

Nodes were identified throughout the model which allow for a demand to be placed. The ADD for water system was divided by the number of nodes in the water model to determine the demand at each node. See the attached model input/output tables for the demand node labels. This assumes that the demand distribution throughout the area is even which is a safe assumption as the district is comprised mostly of residential users. The ADD per node is shown in Table 3.2.

<table>
<thead>
<tr>
<th>Area</th>
<th>System ADD (gpm)</th>
<th>No. of Demand Nodes in the model</th>
<th>Demand/Node (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freedom Hills ISD</td>
<td>46.39</td>
<td>23</td>
<td>2.02</td>
</tr>
</tbody>
</table>
3.2.2 Current Peak Day Demand Allocation

With the demand patterns in place, a model of the existing system was ready for calibration. This represents the base model from which other scenarios can be produced.

In order to model the system with PDD, a PDD scenario was created from the base model after calibration by replacing the ADD with the PDD for each node. The PDD applied to each node is shown in Table 3.3.

<table>
<thead>
<tr>
<th>Area</th>
<th>Area PDD (gpm)</th>
<th>No. of Nodes</th>
<th>Demand/Node (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freedom Hills ISD</td>
<td>92.78</td>
<td>23</td>
<td>4.04</td>
</tr>
</tbody>
</table>

3.2.3 Demand Patterns

With the model developed and populated with demands, the next step included applying a demand pattern to each node to account for diurnal variation in the water use. The daily demand is spread equally over 24 hours, and then a multiplier is applied to each hour’s demand. A typical demand pattern from AWWA Manual M32 was used which has a maximum peaking factor of 1.75 at 8 p.m. This accounts for increased water use in the mornings and evenings while accounting for a decrease during the early morning hours when people are normally asleep. The sum of the factored hourly demands is equal to the daily demand by ensuring the multipliers add up to 24. Figure 3.1 shows the hourly demand multipliers. From this pattern a peak hour demand can be determined which represents the highest hour demand for the entire day. This demand can then be applied over the entire day to obtain a Peak Hour Daily Demand scenario. Table 3.4 shows the demand allocation for this scenario.
After the base model is set up and ready to run the next step is to calibrate the model to ensure it is an adequate representation of actual conditions within the water system. If there is a significant difference between the model results and what is tested in the field then the model is not a good representation of the system. Adjustments will then have to be made to fine tune the model and bring it closer to actual conditions. These adjustments should be realistic and not made solely to bring the model in line.

### 3.3.1 Flow Test and Results

One way to produce known conditions in the water system is to perform a hydrant flow test. One hydrant is selected as the flow hydrant and typically another nearby hydrant is selected as the residual hydrant. A pressure reading with the hydrant closed is first obtained at the flow hydrant. The flow hydrant is then fitted with a hose which connects to the flow trailer enabling a digital reading of the flow as well as a pressure reading. Typically the residual hydrant is fitted with a pressure gauge and the reading is recorded.
while the flow hydrant is open. However, due to the limited number of hydrants in the Freedom Hills ISD it was not possible to obtain residual hydrant readings as the hydrants are too far apart and none are located on the same leg of the distribution system. Performing a residual reading under these circumstances would not produce valid readings. As such, only pressures and flows at the flow hydrant were collected.

WLC performed the flow tests at two hydrants. Table 3.5 lists the locations of the hydrant tests and Figure 3.2 shows the locations. The results of the tests are given in Table 3.6.
Table 3.5: Flow Test Locations

<table>
<thead>
<tr>
<th>Test</th>
<th>Location</th>
<th>Flow Hydrant No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Freedom Rd and Meadowlark Rd.</td>
<td>Hyd-2</td>
</tr>
<tr>
<td>2</td>
<td>Blackbird Rd and Partridge Dr</td>
<td>Hyd-4</td>
</tr>
</tbody>
</table>

Table 3.6: Flow Test Results

<table>
<thead>
<tr>
<th>Test</th>
<th>Measured Pressure (psi)</th>
<th>Flow (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>107</td>
<td>1320</td>
</tr>
<tr>
<td>2</td>
<td>110</td>
<td>1110</td>
</tr>
</tbody>
</table>

The flows for the hydrants were measured for a period of 60 seconds and the final reading was recorded. The flow readings at this time were still declining but due to concerns over potential flooding of residences near the hydrant from the discharging water, the tests were ended at this time. Had the test been continued for a longer time period the flows would have continued to decrease due to the restriction of the 4” pipe in the pump house and the capacity of the booster pump. Since the flows do not need to comply with fire protection codes it was deemed unnecessary to continue the test past the 60 second time. Figure 3.3 presents the model layout with the junctions and nodes.
3.3.2 Modeling Flow Tests

The flow test measured pressures were compared to the ADD model pressures at the corresponding hydrant node to determine model accuracy. Table 3.7 presents the results model and flow test pressures.

<table>
<thead>
<tr>
<th>Test Locations</th>
<th>Test Measured Pressure (psi)</th>
<th>Model Reported Pressure (psi)</th>
<th>Pressure Difference (psi)</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freedom Rd and Meadowlark Rd</td>
<td>107</td>
<td>109</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td>Blackbird Rd and Partridge Dr</td>
<td>110</td>
<td>108</td>
<td>2</td>
<td>1.9</td>
</tr>
</tbody>
</table>

From this table, it can be seen that the modeled reported pressure are nearly identical to the actual field measured pressures. It can be expected to typically see the model results as higher than the field test in the range of 5% due to small leaks and minor head losses through valves and fittings that are not included in the model. These results are acceptable and no additional calibrations or alterations are necessary.

3.4 Analysis of Current System Model

The next step was to analyze the model to check its performance under various conditions to determine any problems with pressures or flows and recommend any improvements required.

The model was run during the peak hour scenario which represents the worst case demand. From Section 2, the peak hour demand was 162.37 gpm. The resulting data from this model indicates that the lowest pressure is located at the property immediately adjacent to the pump house, which is expected as this is the highest point in the system. The corresponding pressure at this location is 47.8 psi. This indicates that the pressures being supplied from the system are acceptable for all users in the district. The highest pressure was recorded at the west end of E Court with a value of 123.9 psi. Higher
pressures would have be observed at the far end of Blackbird Rd but a pressure reducing valve was recently installed on the 2.0” service line near the intersection of Blackbird and Patridge Dr to eliminate issues with high pressures causing water breaks in the area. The PRV is set at approximately 80 psi resulting in pressures of 95.0 psi at the East end of Blackbird.

A flow analysis was run at each hydrant to provide information on the capabilities of the system. The analysis was run for each hydrant to determine flow while maintaining a minimum residual pressure of 20 psi at the hydrant and throughout the system. The analysis was run with the booster pump being bypassed as it would limit the maximum flows available. The maximum flow reported stabilized at 1,250 gpm at Hyd-2 and the minimum was 873 gpm at Hyd-3. These flows would only be available for a short time as the tank would empty in less than 60 minutes and the wells can only produce water at a rate of 85 gpm each. If any hydrant is open and flowing full, the pressures and flows available throughout the remainder of the system would be drastically lowered.

### 3.4.1 Water Age

Water quality in a distribution system tends to deteriorate when the retention time is increased. Water quality was therefore modeled to ensure there are no locations in the system where retention time is drastically higher. The analysis was performed at various locations throughout the model, specifically at the tank and the dead end lines.

To determine the water age within the system an EPS scenario was run over a period of 31 days (744 hours) to represent a typical month. A worst case scenario using the lowest demand month during the winter was used for this analysis since water moves through the system slower with lower demand. Table 3.8 shows the calculated demand for the lowest water use month of December. The results of the analysis are shown in Figures 3.4 through Figure 3.7. A review of the results shows that the worst case water age of approximately 149 hours (6.21 days) was located at the East end of Bluebird Rd. The analysis indicates that at no point in the system is water retention time alarmingly high. It is recommended however, that chlorine residual be measured at this location to ensure proper levels at the furthest point of study from the application point.
# Table 3.8: Minimum Demand Month (Gallons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>February</td>
<td>1,077,000</td>
</tr>
<tr>
<td>2010</td>
<td>April</td>
<td>1,155,000</td>
</tr>
<tr>
<td>2011</td>
<td>March</td>
<td>1,375,000</td>
</tr>
<tr>
<td>Average</td>
<td>--</td>
<td>1,202,333</td>
</tr>
</tbody>
</table>

![Figure 3.4 Water Age - Freedom Hills Tank](image-url)
Figure 3.5 Water Age- End of G Ct.

Figure 3.6 Water Age- End of Moran Ranch Rd
As part of the 2010 USEPA sanitary survey completed on the Freedom Hills water system, chlorine residual was measured at the point of application and found to be 0.2 mg/L. A residual was not reported at any point within the distribution system, however, as the water system is relatively small in size, it can be assumed that the residual at the end of the system would measure similar to that at the point of application and no further analysis was deemed necessary. It is recommended however, that chlorine residual be measured at this location in future studies to ensure proper levels at the furthest point of study from the application point.

### 3.4.2 Model Results

The analysis of the Freedom Hills water distribution system shows that the system is adequately sized to provide necessary flows and pressures for the current demands required. Water age throughout the system is observed to be good as there are no areas of high retention time which would reduce the chlorine residual in the water.
4. Geographic Information System (GIS) Development

4.1 Overview

This section of the study details the creation of the Geographic Information System (GIS) database for the Freedom Hills ISD Level II Study. The GIS database is a tool to be used by the Freedom Hills ISD for viewing their water system, and as a valuable tool for documenting the ongoing maintenance and operation of the system. The GIS database includes all of the water features that were able to be surveyed in the system including valves, flushing hydrants, tank, wells, etc. with specific information regarding each feature including material type, size, and references to photographs.

The following components are included in the GIS database to provide the Freedom Hills ISD with a solid base of geospatial data for their water system and to provide a platform to further develop the GIS database in other areas of critical infrastructure management. The components included in the GIS database include:

1. Geodatabase – A geodatabase is a database specifically designed to support the collection, maintenance, analysis and visualization of spatial data. The geodatabase developed for this project was designed to store water system features and to support the implementation of recommended water system improvements identified in this Level II Study document.

2. Aerial Photography – high spatial and temporal accuracy aerial imagery provides a consistent backdrop for the production of mapping products as well as serving as a valuable resource for further spatial data development. Aerial imagery was obtained from the USDA Farm Service Administration for the study area.

These two components form the foundation of a GIS system that will provide the Freedom Hills ISD and the WWDC with a living extension to the Level II Study. Presented in the following narrative, is a detailed breakdown of the development of these components.

4.2 Geodatabase Development

Construction of the geodatabase deliverable began WLC completed its preliminary water
Freedom Hills Improvement and Service District- Level II Study

model. These initial water data exports were received in shapefile format and contained attributes from the WaterCAD modeling software. Prior to use, these data were visually inspected for completeness and assigned the NAD83(86) Wyoming State Plane East Zone (4901) projection. Following inspection and projection assignment, each shapefile’s structure was modified to match the structure needed for importation into the project geodatabase. These modifications involved the creation of new fields within each shapefile with the names and data types. Once the new fields were created, each was populated with the values found in the raw WaterCAD export fields. For attributes using domain values, the raw WaterCAD export field values were translated to their corresponding domain value. Examples of these translations can be seen with pipe materials. Material types exported from WaterCAD were represented by text fields. A text value, such as ‘PVC’ was translated to the corresponding domain value of ‘0’ and entered into the new attribute fields for importation.

Following modification, the shapefiles were imported into a file geodatabase feature classes using ArcInfo data import tools. After importation each feature class was inspected to ensure all records were correctly loaded and that all significant digits were preserved. The completely loaded water system features were then used to construct a topology feature class within the geodatabase. This topology feature class was used to inspect the geometric integrity of the features.

Following the completion of location attributes was metadata production. All geospatial datasets are constructed with accompanying eXtensible Markup Language (XML) files that contain information on how a particular dataset was developed. The inclusion of high quality and complete metadata is critical to the long term utility of a given dataset, as metadata describes how the data was constructed and what methods were employed in its development. All datasets prepared by WLC were given complete metadata. These metadata include much of the narrative here as well as additional information regarding domain translations. The importance of domain translations in the metadata can not be understated, as feature classes exported from a geodatabase to shapefile format do not retain the domain values. An example of this would again be found with pipe materials. In the geodatabase ‘PVC’ is displayed to the user as text, but the value ‘0’ is stored in the pipe material attribute field for that record. Without metadata, a third party user given a shapefile export from the geodatabase would see the integers in the pipe material attributes and think that an error had been made and attempt to recreate the materials in a new field. This would be an unnecessary manipulation of the dataset that the metadata
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seeks to circumvent.

Following the completion of the supporting metadata each feature class in the geodatabase was reviewed by another GIS Specialist at WLC to ensure that each was complete and fully documented. After this review, the geodatabase and shapefile exports of the feature classes were packaged in a final GIS deliverable package.

4.3 Aerial Photography

Aerial imagery for the project area was obtained from the USDA Farm Service Administration. These data were current as of June 2012. These imagery were referenced to the following horizontal and vertical datums:

*Horizontal Datum:* North American Datum 1983 / NAD83(86)

*Vertical Datum:* North American Vertical Datum 1988 / NAVD88

4.4 Conclusion

In the previous narrative, we have provided a detailed account of the development and acquisition of GIS materials for the Freedom Hills ISD Level II Study. Through a deliberate and thoughtful process, WLC has developed a set of GIS deliverables that will work efficiently and effectively with the Level II Study document. These deliverables will provide the Freedom Hills ISD and the WWDC with a living extension of the Level II Study document that will assist these organizations as they implement improvement schedules over the lifespan of the Level II Study plan and beyond.
5. Water System Operations

5.1 Water System

5.1.1 Raw Water Supply

The Freedom Hills Improvement District currently gets its raw water from two groundwater supply wells; Freedom Hills #1 which is located near the storage tank and treatment building off Mallard Drive, and Freedom Hills #2 which is located northwest of the storage tank off Meadowlark Road. Freedom Hills #1 was drilled in 1981 to a depth of 1,560’ with the pump set at 920’, while Freedom Hills #2 was drilled in 1982 to a depth of 1,254’. The combined pumping rate of the two wells is approximately 200 gpm. While on-site, WLC and WESTON staff observed a combined pumping rate of 191 gpm. When Freedom Hills #1 was turned off, the pumping rate was 88 gpm. Therefore, the pumping rate of Freedom Hills #1 was observed to be 103 gpm, and the pumping rate of Freedom Hills #2 was observed to be 88 gpm.

A water meter inside the pump house measures the amount of water produced from the wells. The pump turns on and off depending on the level of water in the tank using Murphy pressure switches. When the water level in the tank drops below 23’ the pressure switch sends a signal to start the well pumps until the tank fills to 28’.

The raw water from Freedom Hills #1 and Freedom Hills #2 has been found to have slightly elevated Fluoride concentrations. A detailed analysis of the existing water supply is included in Section 6 and Appendix A of this study.

5.1.2 Water Treatment and Storage

A chlorine gas disinfecting system is used to treat the raw water prior to entering the storage tank. The chlorination system is controlled by the well pumps turning on and off. When the wells turn on, a solenoid valve is energized allowing chlorine gas to be injected in the water supply. The chlorine gas is located in a separate room of the pump house. The chlorine is applied at a target dosage of 0.5 ppm and the residual is measured directly out of the tank using a HACH Colorimeter. A measurement is taken weekly and the dosage is manually controlled based on the measured residual. Figure 5.1 presents the piping layout of the pump house.
Treated water is pumped into the storage tank by the well pumps. The tank was put into service in 1981. It is a ground level 21’ diameter bolted steel tank with a base elevation of 4597.50 ft and a height of 28’. The tank provides a total capacity of 75,000 gallons. The low level ‘pump on’ elevation is 4620.50, which is a 23’ water column. The tank is reportedly in good condition with minimal leaks or deterioration. The tank was last inspected in 2010 by inland marine divers. The storage tank is able to provide adequate storage to meet the ADD of 66,798 gallons. The tank has the capacity to provide water for approximately one day at the average summer day demand and two days at the average winter day demand should the water supply be disconnected. The tank can not feasibly be taken out of service for cleaning or coating due to the lack of contact time for chlorine in the distribution system alone. A back-up connection to regional water would allow the tank to be taken out of service for an extended period of time for maintenance.

5.1.3 Distribution

Water from the tank is distributed to the system via a booster pump located in the pump house adjacent to the tank. The booster pump configuration consists of a single 7.5 hp pump. The system is capable of delivering the required demands to the district at pressures ranging from 40 to 110 psi. Internal piping in the pump house consists of mainly 3” iron pipe before it is upsized to 6” Perma-Strand Pipe within the distribution system. No back-up power supply is in place for this system. In the event of power loss all users will experience reduced pressures especially those near the tank as the system will rely on only the head pressure from the tank water level, until power is restored.

Based on minimal records we were able to locate in an extensive search, WLC has determined that the distribution piping consists of approximately 15,570 lineal feet of 6” Perma-Strand Pipe installed in the early 1980’s. WLC hired DRM to performed soft dig potholing at the locations of the three known valves. The purpose of the potholing was to visually observe the distribution piping to confirm size, material type, and condition. This potholing confirm that the distribution pipe is 6” Perma-Strand and appears to be in good condition. Perma-Strand Pipe was used only for a short period of time. Perma-Strand Pipe consists of fiberglass wrapped thin walled PVC. Once in place and left undisturbed, Perma-Strand Pipe is relatively stable and reliable. However, it is fragile and if disturbed will collapse rather easily. Additionally, if failures occur Perma-Strand Pipe can be difficult to repair. Cast Iron mechanical fittings can be used; however PVC stiffeners have to be installed inside the pipe to prevent collapse when the fittings are
Freedom Hills Improvement and Service District- Level II Study

tightened. The stiffeners are typically not readily available. Fortunately, the Freedom Hills operator has reported no breaks since he began operating the system in 1999, and has not had to expose the main line at all.

Branching from the main are several small distribution mains. These mains are estimated to be 2” diameter based on repairs that have been made by the system’s operator. These mains consist of a low pressure polyethylene material that frequently breaks due to line pressures in these areas exceeding 100 psi. A pressure reducing valve (PRV) has been installed on the 2” line located in the southeastern part of the District on Moran Ranch Road. Additional PRV’s should be installed in the system to reduce line pressures in an effort to minimize line ruptures.

Figure 2.1 presents the approximate location of the existing Freedom Hills mains. These locations are based on three valves that were located in conjunction with limited records showing the water mains. Due to limited records and the fact that leaks have not occurred, the location of the mains is truly unknown and nearly impossible to determine without extensive exploratory efforts. Extensive exploratory excavation is beyond the scope of work for this project. Tracer wire was not installed so locating equipment cannot be utilized. WLC made exhausting efforts to locate as-built drawings, but was unable to locate any. WLC also made efforts to field locate additional valves to help identify main line locations, but again was unsuccessful. The operator has located three mainline valves over the years, and these valves provide the only known locations of the mains in the entire District. As such, the true locations of the distribution system piping are mostly unknown. The design drawings from the original WDEQ permit were located, but field observations and the locations of the three known valves do not agree with the design drawings.

Individual services are tapped on the 6” and 2” distribution mains. These services are believed to be all ¾” polyethylene piping based on operator records. None of the individual services are metered. Water meters will be required by the various funding agencies to ensure conservation and the ability to track water usage and system loss.

Meters and backflow preventers should be installed on all the individual service connections. Ideally, meter pits with meters, back flow preventers, and PRV’s should be installed on each service line at the property lines adjacent to the road easements. New curbstops should also be installed upstream of the meter pits. The locations of the service...
taps are not known. Few service line curbstops have been located and most are well within the individual properties and not near the main lines. Installation of new meter pits will require extensive effort to locate service lines for meter pit installation.

The distribution system is lacking main line valves that would allow better isolation of sections during repairs. The operator is only aware of three (3) mainline valves on the 6” distribution system. It may be that other valves are present, but are buried below grade. Several new 6” isolation valves should be cut in on the 6” main line throughout the system to allow isolation of sections to occur. This will also take substantial exploratory effort to locate the main lines to install the valves. However, this effort to locate the line and install valves will provide the district with better information to map the location of the main line.

5.2 Operation and Maintenance Recommendations

A few items have been identified within the system which can help with the operation and control of the system. The proposed recommendations are summarized below:

- **Well Equipment**
  As detailed above, the well pumps are operated based on Murphy Pressure switches which turn the well on and off depending on the tank level. A new supervisory control and data acquisition (SCADA) system with a programmable logic controller (PLC) and pressure level transducers are recommended to replace these switches. The transducers will accurately report the level in the tank and send a signal to the PLC which controls the off/on cycle for the pump. The SCADA system could also be linked remotely to the regional water system in the future using radio. A back-up power supply such as a generator is also recommended to ensure continued operation of the well pump(s) and booster pumps in the event of a prolonged power outage. This would also prevent the operator from having to reset equipment in such an event. In addition it is recommended that the chlorinator be upgraded for the system. A new chlorination system such as the Regal Series Smart Valve should be installed to control the application rate. The Regal Valve responds to the on/off signals from the supply pump and automatically adjusts to apply the desired amount of chlorine.
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• **Tank Inspection**
  The district has regular inspections performed on the storage tank. The tank is inspected every five years with the last inspection performed in 2010. The district is encouraged to continue with this inspection and cleaning schedule. EPA recommends inspecting the tanks every three years. Cleaning and coating can only be done if the tank can be taken out of service. At this time, that is not possible. A back-up connection to regional would allow the tank to be maintained properly.

• **Hydrant Flushing**
  The flushing hydrants are currently flushed once a year to ensure proper operation and to maintain water quality in the system. The district is encouraged to continue with this flushing program. Metering of the flushing operations is recommended to keep track of the amount of water used each year for record keeping purposes.

• **Meter Installation**
  Individual water meters should be installed on each service. Funding agencies will require that individual water meters be installed before funding other improvements. Due to the importance of installing water meters, WLC has developed a detailed cost estimate and funding recommendations which are presented in Section 7 of this report.

• **PRV Installation**
  To reduce pressures in the lower elevation areas of the system, WLC recommends the installation of two (2) Pressure Reducing Valves on the 6” distribution line on Mallard Drive. Installation of PRV’s will help to prevent line failures on the low pressure piping. The PRV installation is discussed further in Section 7 of this report.

• **Mainline Valve Installation**
  The few valves in the system currently do not allow the operator to isolate sections of the system when leaks occur on the 2” lines. Several mainline valves should be installed on the 6” line to allow isolation and limit the amount of customers who are out of service during repairs. The mainline valve installation is discussed further in Section 7 of this report.
6. Water Supply Analysis

The Freedom Hills ISD is currently supplied by the supply wells Freedom Hills #1 and Freedom Hills #2 which both produce water from the Fort Union Formation. A detailed analysis of the information and data gathered for Freedom Hills #1 and Freedom Hills #2 is presented in the Technical Memorandum included in Appendix A of this study. The following is a summary of the well analysis.

**Freedom Hills #1**

Freedom Hills #1 is currently equipped to produce approximately 103 gpm and serves as approximately 54% of the water supply for the Freedom Hills ISD. Water level data for Freedom Hills #1 is limited which prevents a detailed analysis. A water level measurement was taken by the system operator on December 13, 2011 at 530 feet below ground level. A water level measurement was taken by WESTON staff on April 12, 2013. The water level reading at that time was 645 feet below ground level. Based on the limited data, it appears that water level elevations are higher than when the well was first drilled, which was recorded to be 650 feet below ground level. It is recommended that Freedom Hills ISD collect water levels from the well’s airline before and after the summer season of each year to allow identification of water level trends in the well.

**Freedom Hills #2**

Freedom Hills #2 is currently equipped to produce approximately 88 gpm and serves as approximately 46% of the water supply for the Freedom Hills ISD. Water level data for Freedom Hills #2 is limited which prevents a detailed analysis. A water level measurement was taken by the system operator on December 13, 2011 at 587 feet below ground level. A water level measurement was taken by WESTON staff on April 12, 2013. The water level reading at that time was 633 feet below ground level. Based on the limited data, it appears that water level elevations are similar to when the well was first drilled, which was recorded to be 600 feet below ground level. Again, it is recommended that Freedom Hills ISD collect water levels from the well’s airline before and after the summer season of each year to allow identification of water level trends in the well.

Limited water quality data is available for Freedom Hills #1 and Freedom Hills #2. The only available data was the 2011 Consumer Confidence Report, and a few samples provided by the system operator. Water quality samples are combined samples of the water supply, and not specific to Freedom Hills #1. A fluoride sample collected May 6,
2008 indicated a result of 2.5 mg/l and a sample from March 21, 2013 indicated a result of 2.8 mg/l. A sample was also collected for this project and analyzed on June 21, 2013 for the domestic suite of parameters. The results of this sampling are presented in the WESTON Technical Memorandum included Appendix A of this report. This sample indicated a fluoride result of 2.5 mg/l. Although these levels are below the Maximum Contaminant Level (MCL) of 4.0 mg/l, they do exceed the secondary MCL of 2.0 mg/l and could still cause tooth discoloration. Meeting the secondary MCL is an EPA recommendation to protect children from tooth discoloration and/or pitting while teeth are forming. However, meeting the secondary MCL is not enforceable. No additional water quality parameters appear to be a concern at this time.

It is anticipated that the Freedom Hills #1 and #2 wells will be able to meet the future demands of the system. Although the Freedom Hills wells do not appear to be influenced from the pumping of the Fort Union Aquifer by the City of Gillette wellfield, the District should be vigilant about potential water level declines in the future. Regularly scheduled water level measurements need to be obtained from the Freedom Hills #1 and #2 wells to comply with the State Engineers Office (SEO) conditions and limitations on the well permits. The data should be reviewed and plotted to observe long-term trends in water levels that may impact well productivity.

The District should continue to monitor fluoride concentrations annually. Blending with regional water should be considered to reduce fluoride concentrations. Recent water quality data obtained from two new Gillette Madison Limestone Test wells were obtained by the WWDC. Select water quality data and the estimated production capacities of the Gillette Madison wells, as provided by Gillette Madison Pipeline Technical Memorandum #5 by Burns & McDonnell dated July 20, 2010 are presented in Table 6.1. Assuming that the new Gillette Madison wells are pumped in proportion to their reported production capacity, the concentrations of fluoride, TDS, sulfate, hardness, and sodium will be similar to the values presented in the bottom row of Table 6.1. It is understood that actual operations of the Gillette Madison wellfield will vary and may change on a regular basis. The values presented in Table 6.1 are used in this analysis for planning purposes only.
TABLE 6.1
GILLETTE MADISON WELLFIELD
PRODUCTION CAPACITY AND WATER QUALITY DATA

<table>
<thead>
<tr>
<th>Well No.</th>
<th>Yield (gpm)</th>
<th>Fluoride (mg/L)</th>
<th>TDS (mg/L)</th>
<th>Sulfate (mg/L)</th>
<th>Hardness (mg/L)</th>
<th>Sodium (mg/L)</th>
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<tr>
<td>M-1</td>
<td>569</td>
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<td>672</td>
<td>314</td>
<td>500</td>
<td>9.8</td>
</tr>
<tr>
<td>M-2</td>
<td>805</td>
<td>0.66</td>
<td>624</td>
<td>260</td>
<td>476</td>
<td>5.4</td>
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<td>M-3</td>
<td>932</td>
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<td>590</td>
<td>257</td>
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<td>M-4</td>
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<td>478</td>
<td>5</td>
</tr>
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<td>2.2</td>
<td>817</td>
<td>390</td>
<td>600</td>
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<td>TW-2</td>
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<td>1.9</td>
<td>760</td>
<td>324</td>
<td>690</td>
<td>13</td>
</tr>
<tr>
<td>TOTAL</td>
<td>10,534</td>
<td>1.26</td>
<td>674</td>
<td>299</td>
<td>528</td>
<td>7.25</td>
</tr>
</tbody>
</table>

Freedom Hills could blend water from their own wells with water from the Gillette Regional Madison wellfield to obtain a fluoride concentration that is below the secondary standard of 2.0 mg/L. However, water from the Gillette Madison wellfield has elevated TDS, hardness, and sulfate concentrations. The predicted blended TDS concentration of water from the Gillette Madison wellfield is slightly elevated at 674 mg/L and the water is very hard at 528 mg/L. The predicted blended concentration of water from the Gillette Madison wellfield will exceed the standard for sulfate of 250 mg/L. Hardness concentrations higher than 150 mg/L can lead to deposition of calcium carbonate on plumbing fixtures and encrustation of heating elements in hot water heaters, dishwashers, coffee makers, etc. Many homeowners install water softening systems if the hardness is higher than 200 mg/L. Hard water also tends to increase soap consumption. Sulfate concentrations greater than 250 mg/L tends to have a laxative effect on people not accustomed to the water.
If the fluoride concentration of the Freedom Hills water is 2.8 mg/L then the blending ratio must be 41 percent water from Freedom Hills and 59 percent from the Gillette Madison wellfield to achieve a fluoride concentration of 1.9 mg/L. The predicted water quality of the blended water at a 41:59 ratio is presented in Table 6.2. Blending water at a ratio of 41:59 will significantly increase both the TDS and hardness. At this blending ratio, residents may still wish to install water softeners. The sulfate concentration will be higher, but acceptable. One benefit of blending the Freedom Hills water with water from the Gillette Madison wellfield will be a decrease in the sodium concentration, which will also lower the sodium adsorption ratio. The blending analysis should be reviewed after the new Gillette Madison wells are constructed and water quality results are known.

<table>
<thead>
<tr>
<th>Dissolved Constituent</th>
<th>Freedom Hills Concentration (mg/L)</th>
<th>Gillette Madison Wellfield Concentration (mg/L)</th>
<th>Blending Ratio (FH : GMW)</th>
<th>Resulting Blended Concentration (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoride</td>
<td>2.8</td>
<td>1.26</td>
<td>41 : 59</td>
<td>1.9</td>
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<tr>
<td>TDS</td>
<td>466</td>
<td>674</td>
<td></td>
<td>589</td>
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<tr>
<td>Sulfate</td>
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<td></td>
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<td>Hardness</td>
<td>12</td>
<td>528</td>
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<tr>
<td>Sodium</td>
<td>196</td>
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<td>84</td>
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</tbody>
</table>

Alternatively, if Freedom Hills wishes to blend with the Gillette Madison wellfield water to reduce their fluoride concentrations as much as possible while still maintaining a “soft” water (Hardness < 200 mg/l), the required blending ration would be 64% Freedom Hills water and 36% Gilette Madison Water. As shown in Table 6.3, a blending ratio of 64:36 is predicted to result in Flouride concentrations fo 2.2 mg/l, which is less than currently observed in the Freedom Hills water, but only slightly greater than the secondary MCL. Again, this anaylsis is based on the Burns &McDonnell tech memo, initial watr quality results from the two new Test Wells in the new wellfield, and estimated pumping rates of the existing and new wells. The blending analysis should be reviewed after the
new Gillette Madison wells are constructed and water quality results are known.

### TABLE 6.3
**PREDICTED WATER QUALITY FROM BLENDING FREEDOM HILLS WATER TO ACHIEVE A HARDNESS VALUE OF LESS THEN 200 MG/L**

<table>
<thead>
<tr>
<th>Dissolved Constituent</th>
<th>Freedom Hills Concentration (mg/L)</th>
<th>Gillette Madison Wellfield Concentration (mg/L)</th>
<th>Blending Ratio (FH : GMW)</th>
<th>Resulting Blended Concentration (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoride</td>
<td>2.8</td>
<td>1.26</td>
<td></td>
<td>2.2</td>
</tr>
<tr>
<td>TDS</td>
<td>466</td>
<td>674</td>
<td>64 : 36</td>
<td>541</td>
</tr>
<tr>
<td>Sulfate</td>
<td>0</td>
<td>299</td>
<td></td>
<td>108</td>
</tr>
<tr>
<td>Hardness</td>
<td>12</td>
<td>528</td>
<td></td>
<td>198</td>
</tr>
<tr>
<td>Sodium</td>
<td>196</td>
<td>7.25</td>
<td></td>
<td>128</td>
</tr>
</tbody>
</table>
7. Proposed System Improvements

Based on our evaluation, the Freedom Hills water system is in good to fair condition. The supply wells Freedom Hills #1 and Freedom Hills #2 provide a consistent quantity of water with slightly elevated fluoride concentrations. Since one well alone cannot meet the peak demands of the District, the system lacks a redundant supply. Little is known about the existing water distribution system. The only leaks that have been reported are on the smaller diameter lower pressure pipe at the ends of the distribution system. These breaks are attributed to high line pressures (greater than 100 psi) at the lower elevations of the District. Pressure reducing valves should be installed at various locations in the system to reduce the likelihood of leaks in the smaller diameter distribution lines. When line breaks do occur, the operator has limited ability to isolate areas due to the lack of mainline valves. New valves should be installed to allow better operation of the system. The lack of water meters is also a deficiency in the system. Water meters should be installed on all individual services to assist with water conservation and equitable cost distribution to the systems users. Many funding sources will require the installation of meters before considering funding for major improvements.

The following Alternatives have been considered to address the Freedom Hills ISD current deficiencies.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Connect to the Gillette Regional Water System and Discontinue use of the Existing Wells</td>
</tr>
<tr>
<td>2</td>
<td>Connect to the Gillette Regional Water System and Blend with Water from Freedom Hills #1 and #2.</td>
</tr>
<tr>
<td>3</td>
<td>Install Water Meters, PRV’s and Mainline Valves</td>
</tr>
<tr>
<td>4</td>
<td>Connect to the Gillette Regional Water System, upgrade existing distribution system with pipe sizes and requirements meeting City standards.</td>
</tr>
<tr>
<td>5</td>
<td>Do Nothing</td>
</tr>
</tbody>
</table>
7.1 Alternative 1 – Connect to the Gillette Regional Water System as a Wholesale Water Customer and Discontinue use of the Existing Wells

One of the main focuses of this study is to evaluate the feasibility of a regional connection. Based on conversations with Mike Cole, the Regional Water System does not have the supply available to currently take on “new” customers at this time except as an emergency back-up connection. The Regional Water System is able to make exceptions to this policy and accommodate a District if it is currently in an emergency situation either due to a failing water supply source, or other issues such as an EPA Administrative Order for not meeting water quality standards. At this time and based on water level and water quality data for Freedom Hills #1 and #2, it is not believed that Freedom Hills will be facing an emergency situation in the near future. This alternative is being presented to evaluate cost comparisons to operate the existing wells versus purchasing wholesale water from the Regional system. This will assist the District in making decisions related to well replacement as the life cycle of the existing wells approaches.

The Madison Wellfield and Transmission Main Project is expected to be completed in 2016 and will provide additional supply to serve the Freedom Hills ISD and other Districts in the area. The May 2010 HDR report, Regional System Participants Connection Study was a planning level study identifying preliminary feasibility and costs for transmission lines to serve this area and costs associated with District connections. The Design of the Madison Transmission Main Project has been completed by Burns and McDonnell and Morrison Maierle, Inc and is set to be bid out this summer. The transmission main design drawings along with the 2010 HDR report were used to prepare cost estimates for the Regional Connection.

The proposed Regional Connection will involve a connection to both the existing 30” Madison Transmission Main as well as the proposed new 42” Madison Transmission Main located along Highway 51 south of I-90 at Moran Ranch Road. The dual connection will allow flexibility in operation of the regional system and allow either of the lines to be out of service while still providing a water supply. From the connection point, a main line extension will be required to extend water north across I-90 to the District. This extension is referred to as Meadow Springs Line 1.
Freedom Hills Improvement and Service District- Level II Study

Figure 7.1 presents the alignment of the existing and proposed Madison Transmission Mains and presents the interconnection between the two mains. Figure 7.2 presents the alignment for the proposed 12” diameter Meadow Springs Line 1. Meadow Springs Line 1 is proposed to cross Highway 51, the Burlington Northern Santa Fe Railroad, as well as both lanes of Interstate 90. It will then extend up Moran Ranch Road, then east on Blackbird Road, and then north on Mallard Road to the Freedom Hills tank location. This line would eventually continue north from the Freedom Hills tank location to serve additional Districts in the area.

The existing and proposed Madison Transmission Mains are expected to deliver similar pressure. Based on hydraulic grade lines (HGL) presented in the Madison Transmission Main 90% Drawings, the hydraulic grades at the connection point of the Meadow Springs Line 1 are 4775 and 4840 for average day and peak hour scenarios, respectively. Based on these HGL’s and an approximate ground elevation at the Tank of 4597.50, static pressures at Freedom Hills connection point near the tank will vary from 77 psi to 105 psi.

The Meadow Springs Line 1 and the connection to Freedom Hills will require the installation of approximately 7,200 feet of 12” PVC water main and 50 feet of 4” PVC, numerous fittings and several road bores. An above ground precast concrete meter/control building would be installed south of the Freedom Hills Tank. This building would contain a water meter, a reduced pressure backflow preventer, an emergency bypass, a pressure reducing valve and SCADA equipment.

The Gillette Regional Water System will own and operate all of the facilities up to and within the meter building. The proposed connection to the Gillette Regional Water System is shown in Figure 7.3. A conceptual design of the items in the meter building is also presented in Figure 7.3. Approximately 60 feet of 4” main will be required from the meter building to the connection point at the existing pump house building. The piping from the meter building to the connection at the existing distribution piping would be owned and operated by the Freedom Hills ISD. The Freedom Hills ISD would be defined as a consecutive water system and would remain responsible for meeting EPA National Drinking Water Standards. For this alternative, the tank, treatment facilities and booster pump are still planned to be utilized to provide chlorine disinfection and contact time. The Regional System is required to maintain chlorine residual within its water transmission system to assure the absence of coliform bacteria. The City of Gillette must
maintain these residuals over a large length of pipe. This will allow the tank to be bypassed if necessary for maintenance purposes and still have a supply of treated water.

For this alternative, Freedom Hills ISD would become a wholesale water customer of the Regional System. Freedom Hills ISD would continue to provide retail water service to its residents, and would maintain ownership and maintenance responsibilities of the distribution system. Table 7.1 presents a Level II cost estimate for the portion of the Alternative 1 to be owned and operated by the Regional Water System. Table 7.2 presents a Level II cost estimate for the District’s portion of Alternative 1. As shown in Table 7.1, the capital costs include the meter/control building, internal piping, flow meter, backflow preventer, pressure reducing valve, and SCADA equipment. The SCADA equipment will allow the City of Gillette to monitor the metering site. The costs to connect from the meter building to the Freedom Hills system shown in Table 7.2 include the piping from the meter building to the connection point.

The water from the Gillette Regional Water System is expected to have hardness values of near 500 mg/l as CaCO₃, since it will consist solely of Madison water at this location. These levels of hardness can result in the buildup of scale on the interior of pipes and water heaters. Residents will likely need to install in-home water softeners to reduce the hardness. Irrigation systems could be kept on the harder water. In-home water softeners are estimated to cost $1,500 each to purchase and install. Monthly operating costs of $15-$20 can also be expected to replace the salt in the softener and electrical costs.
### TABLE 7.1

WHOLESALE REGIONAL CUSTOMER, DISCONTINUE USE OF EXISTING WELLS

#### REGIONAL PORTION CONSTRUCTION COST ESTIMATE

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREPARATION OF FINAL DESIGN AND SPECIFICATIONS</td>
<td>$90,585.90</td>
</tr>
<tr>
<td>PERMITTING AND MITIGATION</td>
<td>$10,000.00</td>
</tr>
<tr>
<td>LEGAL FEES</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>ACQUISITION OF RIGHT OF WAY</td>
<td>$30,000.00</td>
</tr>
</tbody>
</table>

#### CONSTRUCTION COSTS

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit</th>
<th>Estimated Quantity</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOBILIZATION AND BONDS</td>
<td>LS</td>
<td>1</td>
<td>$54,159.00</td>
<td>$54,159.00</td>
</tr>
<tr>
<td>ROAD SURFACING REPAIR</td>
<td>SY</td>
<td>13000</td>
<td>$6.00</td>
<td>$78,000.00</td>
</tr>
<tr>
<td>12&quot; PVC OR 18 C-900 WATER PIPE</td>
<td>LF</td>
<td>7240</td>
<td>$45.00</td>
<td>$325,800.00</td>
</tr>
<tr>
<td>12&quot; PVC FITTINGS</td>
<td>EA</td>
<td>11</td>
<td>$1,200.00</td>
<td>$13,200.00</td>
</tr>
<tr>
<td>12&quot; ISOLATION VALVE</td>
<td>EA</td>
<td>6</td>
<td>$3,000.00</td>
<td>$18,000.00</td>
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<tr>
<td>8&quot; ISOLATION VALVE</td>
<td>EA</td>
<td>1</td>
<td>$2,500.00</td>
<td>$2,500.00</td>
</tr>
<tr>
<td>4&quot; PVC C-900 WATER PIPE</td>
<td>LF</td>
<td>50</td>
<td>$18.00</td>
<td>$900.00</td>
</tr>
<tr>
<td>4&quot; ISOLATION VALVE</td>
<td>EA</td>
<td>1</td>
<td>$1,400.00</td>
<td>$1,400.00</td>
</tr>
<tr>
<td>12&quot; BORE WITH CASING PIPE</td>
<td>LF</td>
<td>700</td>
<td>$350.00</td>
<td>$245,000.00</td>
</tr>
<tr>
<td>OPEN CUT STEEL CASING</td>
<td>LF</td>
<td>140</td>
<td>$175.00</td>
<td>$24,500.00</td>
</tr>
<tr>
<td>HOT TAP TO EXISTING 30&quot; REGIONAL LINE</td>
<td>EA</td>
<td>1</td>
<td>$10,000.00</td>
<td>$10,000.00</td>
</tr>
<tr>
<td>12&quot; AIR VALVE ASSEMBLY</td>
<td>EA</td>
<td>1</td>
<td>$7,500.00</td>
<td>$7,500.00</td>
</tr>
<tr>
<td>CONNECT TO FREEDOM HILLS PIPING</td>
<td>EA</td>
<td>1</td>
<td>$2,500.00</td>
<td>$2,500.00</td>
</tr>
<tr>
<td>PRE-CAST CONCRETE BUILDING</td>
<td>LS</td>
<td>1</td>
<td>$55,000.00</td>
<td>$55,000.00</td>
</tr>
<tr>
<td>FOUNDATION</td>
<td>LS</td>
<td>1</td>
<td>$20,000.00</td>
<td>$20,000.00</td>
</tr>
<tr>
<td>MECHANICAL EQUIPMENT</td>
<td>LS</td>
<td>1</td>
<td>$5,000.00</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>ELECTRICAL EQUIPMENT</td>
<td>LS</td>
<td>1</td>
<td>$5,000.00</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>2&quot; FLOWMETER</td>
<td>EA</td>
<td>1</td>
<td>$3,000.00</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>2&quot; REDUCED PRESSURE BACKFLOW PREVENTER</td>
<td>EA</td>
<td>1</td>
<td>$3,000.00</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>2&quot; PRESSURE REDUCING VALVE</td>
<td>EA</td>
<td>1</td>
<td>$2,500.00</td>
<td>$2,500.00</td>
</tr>
<tr>
<td>MISCELLANEOUS 2&quot; AND 4&quot; PIPING AND FITTINGS (INTERNAL)</td>
<td>LS</td>
<td>1</td>
<td>$15,000.00</td>
<td>$15,000.00</td>
</tr>
<tr>
<td>4&quot; DRAIN LINE</td>
<td>LF</td>
<td>40</td>
<td>$35.00</td>
<td>$1,400.00</td>
</tr>
<tr>
<td>SCADA TO CITY SYSTEM</td>
<td>LS</td>
<td>1</td>
<td>$10,000.00</td>
<td>$10,000.00</td>
</tr>
<tr>
<td>RECLAMATION</td>
<td>LS</td>
<td>1</td>
<td>$2,500.00</td>
<td>$2,500.00</td>
</tr>
<tr>
<td><strong>TOTAL ESTIMATED COST OF PROJECT COMPONENTS</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$905,859.00</strong></td>
</tr>
<tr>
<td>CONSTRUCTION ENGINEERING (PROJECT COMPONENTS X 10%)</td>
<td></td>
<td></td>
<td></td>
<td><strong>$90,585.90</strong></td>
</tr>
<tr>
<td>COMPONENTS AND ENGINEERING COSTS</td>
<td></td>
<td></td>
<td></td>
<td><strong>$996,444.90</strong></td>
</tr>
<tr>
<td>INFLATION TO 2016 CONSTRUCTION (3% PER YEAR)</td>
<td></td>
<td></td>
<td></td>
<td><strong>$92,397.35</strong></td>
</tr>
<tr>
<td>CONTINGENCY (COMPONENTS AND ENGINEERING X 15%)</td>
<td></td>
<td></td>
<td></td>
<td><strong>$149,466.74</strong></td>
</tr>
<tr>
<td><strong>TOTAL CONSTRUCTION COST</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$1,238,308.98</strong></td>
</tr>
<tr>
<td>TOTAL PROJECT COST (TOTAL CONSTRUCTION COST + PRE-CONSTRUCTION COST)</td>
<td></td>
<td></td>
<td></td>
<td><strong>$1,373,894.88</strong></td>
</tr>
<tr>
<td>67% WWDC GRANT FUNDING</td>
<td></td>
<td></td>
<td></td>
<td><strong>$920,509.57</strong></td>
</tr>
<tr>
<td>33% MATCH FROM CAPITAL FACILITIES TAX</td>
<td></td>
<td></td>
<td></td>
<td><strong>$453,385.31</strong></td>
</tr>
</tbody>
</table>
TABLE 7.2
WHOLESALE REGIONAL CUSTOMER, DISCONTINUE USE OF EXISTING WELLS
DISTRICT PORTION CONSTRUCTION COST ESTIMATE

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>ESTIMATED QUANTITY</th>
<th>UNIT COST</th>
<th>TOTAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOBILIZATION AND BONDS</td>
<td>LS</td>
<td>1</td>
<td>$450.10</td>
<td>$450.10</td>
</tr>
<tr>
<td>CONNECT TO EXISTING WATER MAINS</td>
<td>EA</td>
<td>1</td>
<td>$5,000.00</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>4” PVC WATER</td>
<td>LF</td>
<td>60</td>
<td>$18.00</td>
<td>$1,080.00</td>
</tr>
<tr>
<td>4” PVC FITTINGS</td>
<td>EA</td>
<td>2</td>
<td>$350.00</td>
<td>$350.00</td>
</tr>
</tbody>
</table>

TOTAL ESTIMATED COST OF PROJECT COMPONENTS $6,880.10
CONSTRUCTION ENGINEERING (PROJECT COMPONENTS X 10%) $668.01
COMPONENTS AND ENGINEERING COSTS $7,568.11
INFLATION TO 2016 CONSTRUCTION (3% PER YEAR) $761.77
CONTINGENCY (COMPONENTS AND ENGINEERING X 15%) $1,135.22

TOTAL CONSTRUCTION COST $9,405.09
TOTAL PROJECT COST (TOTAL CONSTRUCTION COST + PRE-CONSTRUCTION COST) $22,905.09
66% WWDC GRANT FUNDING $15,270.06
33% FROM SYSTEM DISTRICT RESERVES $7,635.03
7.2 Alternative 2 – Connect to the Gillette Regional Water System as a Wholesale Water Customer and Blend with Water from Freedom Hills Wells

Alternative 2 proposes using a regional connection to supplement and blend with water from wells Freedom Hills #1 and #2. This blending would provide a means to reduce fluoride levels to below the secondary standard of 2.0 mg/l. Freedom Hills ISD would become a wholesale customer for the water purchased for blending. As discussed in Section 6 and in Appendix A of this report, a blending ratio of 59% Regional Madison water and 41% Freedom Hills water would be required to reduce the Freedom Hills fluoride levels to just below the secondary MCL. This ratio is based on water quality from the existing Madison Wellfield and initial water quality from the two new Madison Test Wells. This ratio also assumes a water quality of 2.8 mg/l in the Freedom Hills water supply which is the highest measured concentration. This is a conservative approach to ensure that the secondary standard for fluoride of 2.0 mg/l is not exceeded. Another option for the District is to blend with a lower ratio of Madison water and a higher ratio of Freedom Hills water to reduce Fluorides as much as possible while keeping the Hardness value less than 200 mg/l. For either blending alternative, routine monitoring of fluoride and hardness concentrations will be required and blending adjusted accordingly. The Madison Wellfield project is still under construction and limited water quality data is currently available. Further analysis on blending ratios should be performed as new water quality data from the new Madison Wellfield becomes available.

Alternative 2 will require the same regional components as Alternative 1. The Gillette Regional Water System would own and maintain all piping and appurtenances up to and including the meter building and all appurtenances inside. From a point just outside and downstream of the meter building, the Freedom Hills ISD would assume ownership and maintenance responsibilities. For Alternative 2, a blending valve vault would be installed just downstream of the meter building. The blending valve vault would consist of 4” piping from the meter building and 4” piping from each of the Freedom Hills wells. A manual control valve would be installed on each line, and a blending valve would be installed on the line from the regional connection. The blending valve would reduce the pressure of the regional supply equal to that of the Freedom Hills supply so that the control valves could distribute from the desired percentages of each supply source. Analyzers or colorimeters would need to be installed in the blending vault on both supply...
Freedom Hills Improvement and Service District- Level II Study

lines as well as the blended line. The analyzers would need to monitor Hardness as well as Flouride. These analyzers would allow the operator to adjust the blending valves accordingly to achieve the desired blended concentrations. The automatic analyzers would not be eligible for WWDC funding as they are considered to be related to treatment. The increased monitoring and will result in increased operator costs.

The proposed meter building and blending valve vault are shown in Figure 7.4. The Gillette Regional Water Supply pressure at the meter building and vault is estimated to be 77-105 psi. The blending valve would reduce this pressure so that it is equal to the pressure from the Freedom Hills supply well pumps.

For Alternative 2, the Freedom Hills ISD would become a wholesale City of Gillette customer. Freedom Hills ISD would continue to provide retail service to its customers, and would maintain ownership responsibilities of its distribution system. Chlorination of the blended water would be necessary to ensure a chlorine residual in the blended supply water.

Table 7.3 presents a Level II cost estimate for the portion of the Alternative 2 to be owned and operated by the Regional Water System. Table 7.4 presents a Level II cost estimate for the District’s portion of Alternative 2. As shown in Table 7.3, the capital costs include the meter building, internal piping, flow meter, backflow preventer, pressure reducing valve, and SCADA equipment. The SCADA equipment will allow the City of Gillette to monitor the metering site. The costs to connect from the meter building to the blending valve vault, the cost of the vault and materials in the vault, and the costs to connect from the blending vault to the existing treatment building are considered District costs. These costs are presented in Table 7.4. The blending ratio selected to achieve the District’s goals will not affect the costs presentd in Table 7.4.

All of costs in Tables 7.3 and 7.4 are eligible for WWDC funding with the exception of the automatic analysers. These costs are listed in Table 7.4 as ineligible costs. These costs could be eligible for other funding sources such as SRF, SLIB or the Campbell County District Support Grants. Only those costs associated with the Regional Water System Components will be eligible for the Capital Facilities Tax funds for local match of WWDC grant funds.
# TABLE 7.3

**WHOLESALE REGIONAL CUSTOMER FOR BLENDING WITH FREEDOM HILLS #1 AND #2**

## REGIONAL PORTION CONSTRUCTION COST ESTIMATE

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREPARATION OF FINAL DESIGN AND SPECIFICATIONS</td>
<td>$90,585.90</td>
</tr>
<tr>
<td>PERMITTING AND MITIGATION</td>
<td>$10,000.00</td>
</tr>
<tr>
<td>LEGAL FEES</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>ACQUISITION OF RIGHT OF WAY</td>
<td>$30,000.00</td>
</tr>
<tr>
<td><strong>CONSTRUCTION COSTS</strong></td>
<td></td>
</tr>
<tr>
<td><strong>ITEM</strong></td>
<td><strong>UNIT</strong></td>
</tr>
<tr>
<td>MOBILIZATION AND BONDS</td>
<td>LS 1</td>
</tr>
<tr>
<td>ROAD SURFACING REPAIR</td>
<td>SY 13000</td>
</tr>
<tr>
<td>12&quot; PVC DR 18 C-900 WATER PIPE</td>
<td>LF 7240</td>
</tr>
<tr>
<td>12&quot; PVC FITTINGS</td>
<td>EA 11</td>
</tr>
<tr>
<td>12&quot; ISOLATION VALVE</td>
<td>EA 6</td>
</tr>
<tr>
<td>8&quot; ISOLATION VALVE</td>
<td>EA 1</td>
</tr>
<tr>
<td>4&quot; PVC C-900 WATER PIPE</td>
<td>LF 50</td>
</tr>
<tr>
<td>4&quot; ISOLATION VALVE</td>
<td>EA 1</td>
</tr>
<tr>
<td>12&quot; BORE WITH CASING PIPE</td>
<td>LF 700</td>
</tr>
<tr>
<td>OPEN CUT STEEL CASING</td>
<td>LF 140</td>
</tr>
<tr>
<td>HOT TAP TO EXISTING 30&quot; REGIONAL LINE</td>
<td>EA 1</td>
</tr>
<tr>
<td>12&quot; AIR VALVE ASSEMBLY</td>
<td>EA 1</td>
</tr>
<tr>
<td>CONNECT TO FREEDOM HILLS PIPING</td>
<td>EA 1</td>
</tr>
<tr>
<td>PRE-CAST CONCRETE BUILDING</td>
<td>LS 1</td>
</tr>
<tr>
<td>FOUNDATION</td>
<td>LS 1</td>
</tr>
<tr>
<td>MECHANICAL EQUIPMENT</td>
<td>LS 1</td>
</tr>
<tr>
<td>ELECTRICAL EQUIPMENT</td>
<td>LS 1</td>
</tr>
<tr>
<td>2&quot; FLOWMETER</td>
<td>EA 1</td>
</tr>
<tr>
<td>2&quot; REDUCED PRESSURE BACKFLOW PREVENTER</td>
<td>EA 1</td>
</tr>
<tr>
<td>2&quot; PRESSURE REDUCING VALVE</td>
<td>EA 1</td>
</tr>
<tr>
<td>MISCELLANEOUS 2&quot;, AND 4&quot; PIPING, AND FITTINGS (INTERNAL)</td>
<td>LS 1</td>
</tr>
<tr>
<td>4&quot; DRAIN LINE</td>
<td>LF 40</td>
</tr>
<tr>
<td>SCADA TO CITY SYSTEM</td>
<td>LS 1</td>
</tr>
<tr>
<td>RECLAMATION</td>
<td>LS 1</td>
</tr>
<tr>
<td><strong>TOTAL ESTIMATED COST OF PROJECT COMPONENTS</strong></td>
<td>$905,859.00</td>
</tr>
<tr>
<td>CONSTRUCTION ENGINEERING (PROJECT COMPONENTS X 10%)</td>
<td>$90,585.90</td>
</tr>
<tr>
<td>COMPONENTS AND ENGINEERING COSTS</td>
<td>$996,444.90</td>
</tr>
<tr>
<td>INFLATION TO 2016 CONSTRUCTION (3% PER YEAR)</td>
<td>$92,397.35</td>
</tr>
<tr>
<td>CONTINGENCY (COMPONENTS AND ENGINEERING X 15%)</td>
<td>$149,466.74</td>
</tr>
<tr>
<td><strong>TOTAL CONSTRUCTION COST</strong></td>
<td>$1,238,308.98</td>
</tr>
<tr>
<td><strong>TOTAL PROJECT COST (TOTAL CONSTRUCTION COST + PRE-CONSTRUCTION COST)</strong></td>
<td>$1,373,894.88</td>
</tr>
<tr>
<td>67% WWDC GRANT FUNDING</td>
<td>$920,509.57</td>
</tr>
<tr>
<td>33% MATCH FROM CAPITAL FACILITIES TAX</td>
<td>$453,385.31</td>
</tr>
</tbody>
</table>

**Proposed System Improvements**

7-12
**Proposed System Improvements**

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**Freedom Hills Improvement and Service District - Level II Study**

**TABLE 7.4**

**WHOLESALE REGIONAL CUSTOMER FOR BLENDING WITH FREEDOM HILLS #1 AND #2**

**DISTRICT PORTION CONSTRUCTION COST ESTIMATE**

<table>
<thead>
<tr>
<th>Services</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREPARATION OF FINAL DESIGN AND SPECIFICATIONS</td>
<td>$11,704.73</td>
</tr>
<tr>
<td>PERMITTING AND MITIGATION</td>
<td>$1,500.00</td>
</tr>
<tr>
<td>LEGAL FEES</td>
<td>$500.00</td>
</tr>
<tr>
<td>ACQUISITION OF RIGHT OF WAY</td>
<td>$10,000.00</td>
</tr>
</tbody>
</table>

**CONSTRUCTION COSTS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Item Description</th>
<th>Unit</th>
<th>Estimated Quantity</th>
<th>Unit Cost</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOBILIZATION AND BONDS</td>
<td>LS</td>
<td>1</td>
<td></td>
<td>$7,657.30</td>
<td>$7,657.30</td>
</tr>
<tr>
<td>CONNECT TO EXISTING WATER MAINS</td>
<td>EA</td>
<td>3</td>
<td></td>
<td>$2,500.00</td>
<td>$7,500.00</td>
</tr>
<tr>
<td>20X14 CONCRETE VAULT</td>
<td>EA</td>
<td>1</td>
<td></td>
<td>$25,000.00</td>
<td>$25,000.00</td>
</tr>
<tr>
<td>ELECTRICAL COMPONENTS</td>
<td>LS</td>
<td>1</td>
<td></td>
<td>$8,500.00</td>
<td>$8,500.00</td>
</tr>
<tr>
<td>2&quot; BLENDING VALVE</td>
<td>EA</td>
<td>1</td>
<td></td>
<td>$5,000.00</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>2&quot; WATER METER</td>
<td>EA</td>
<td>1</td>
<td></td>
<td>$3,000.00</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>2&quot; REDUCED PRESSURE BACKFLOW PREVENTER</td>
<td>EA</td>
<td>3</td>
<td></td>
<td>$3,000.00</td>
<td>$9,000.00</td>
</tr>
<tr>
<td>MISCELLANEOUS PIPING AND FITTINGS (INSIDE VAULT)</td>
<td>EA</td>
<td>6</td>
<td></td>
<td>$3,000.00</td>
<td>$18,000.00</td>
</tr>
<tr>
<td>4&quot; PVC WATER OUTSIDE VAULT</td>
<td>LF</td>
<td>230</td>
<td></td>
<td>$18.00</td>
<td>$4,140.00</td>
</tr>
<tr>
<td>4&quot; PVC FITTINGS</td>
<td>EA</td>
<td>10</td>
<td></td>
<td>$450.00</td>
<td>$4,500.00</td>
</tr>
<tr>
<td>4&quot; ISOLATION VALVE</td>
<td>EA</td>
<td>6</td>
<td></td>
<td>$1,400.00</td>
<td>$8,400.00</td>
</tr>
<tr>
<td>4&quot; THROTTLING VALVE</td>
<td>EA</td>
<td>2</td>
<td></td>
<td>$1,400.00</td>
<td>$2,800.00</td>
</tr>
<tr>
<td>4&quot; DRAIN LINE</td>
<td>LF</td>
<td>30</td>
<td></td>
<td>$35.00</td>
<td>$1,050.00</td>
</tr>
<tr>
<td>RECLAMATION</td>
<td>LS</td>
<td>1</td>
<td></td>
<td>$2,500.00</td>
<td>$2,500.00</td>
</tr>
</tbody>
</table>

**TOTAL ESTIMATED COST OF PROJECT COMPONENTS**   $117,047.30

**CONSTRUCTION ENGINEERING (PROJECT COMPONENTS X 10%)** $11,704.73

**NON-ELIGIBLE COMPONENTS** $18,000.00

**COMPONENTS AND ENGINEERING COSTS** $118,752.03

**INFLATION TO 2016 CONSTRUCTION (3% PER YEAR)** $10,269.70

**CONTINGENCY (COMPONENTS AND ENGINEERING X 15%)** $16,612.80

**TOTAL CONSTRUCTION COST** $137,634.54

**TOTAL PROJECT COST (TOTAL CONSTRUCTION COST + PRE-CONSTRUCTION COST)** $161,339.27

**66% WWDC GRANT FUNDING** $107,559.51

**33% WWDC LOAN FUNDING (20 YEARS AT 4%)** $53,779.76
7.3 Alternative 3 – Install Water Meters, PRV’s and Mainline Valves

Alternative 3 consists of the installation of water meters at each of the 160 individual water service locations, installation of Pressure Reducing Valves at specific locations throughout the District, and installing mainline valves throughout the 6” system for better isolation. As discussed in Section 5, none of the individual water services are metered. Installation of water meters will allow a means of equitable water service billing to each property owner, as well as provide a means to implement tiered water rates to promote water conservation. Water conservation will reduce water consumed and reduce the amount of water purchased from the Regional Water System if a connection is made. In addition, funding sources will likely require water meters to be installed before recommending funding for any other significant improvements.

Since little is known about the locations of mains and service lines throughout the District, installing new meter pits and curbstops on the existing services near property lines will be difficult and costly. The service line locations will have to be determined. One method could be accessing the service line at the structure and pushing fish tape into the service lines. The fish tape could be forced through the service line and traced to the main. This method of locating is expected to be problematic with respect to accessing services and fishing the tape all the way through a service line. This will also require substantial time to accomplish for each service. The other means for locating services would be excavating along property lines adjacent to the roadways to physically locate services. This method could result in damage to service lines and possible unnecessary damage to main lines and service taps that will require repair. Assumptions are made in the cost estimate in Table 7.5 to account for the time and effort required to locate the service lines. Once the lines are located, new curbstops and meter pits equipped with remote read meters and backflow preventors could be installed at the property lines. The meter pits could also be equipped with individual pressure reducing valves.

WLC recommends installing two (2) 6” pressure reducing valves on the mainline. These valves would reduce pressures throughout the district to prevent over pressuring of the lines at the lower elevations. Adequate pressures would still be maintained throughout higher elevations in the system. These PRV’s would be installed on Mallard Drive as shown on Figure 7.5.

Also presented on Figure 7.5 are the proposed mainline valves to be installed. The
installation of 6 additional mainline valves as shown will allow the operator to isolate specific sections of the system when repairs need to be made. This will prevent large numbers of customers from being out of service during repairs. The efforts to install meters, PRV’s and mainline valves will be extensive due to unknown locations of lines, but will result in being able to develop accurate maps of the system components and locations.

Table 7.5 below presents a Level II construction cost estimate for installing the water meters and PRV valves. These costs would not be eligible for WWDC funding, but would be eligible for other funding sources such as the State Reveolving Fund (SRF), State Loan and Investment Board (SLIB), the Campbell County District Support Grants Program, or Rural Utilities Service (RUS).

<table>
<thead>
<tr>
<th>TABLE 7.5</th>
<th>INSTALL WATER METERS, PRV'S AND MAINLINE VALVES CONSTRUCTION COST ESTIMATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREPARATION OF FINAL DESIGN AND SPECIFICATIONS</td>
<td>$56,039.00</td>
</tr>
<tr>
<td>PERMITTING AND MITIGATION</td>
<td>$1,500.00</td>
</tr>
<tr>
<td>LEGAL FEES</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>ACQUISITION OF RIGHT OF WAY</td>
<td>$10,000.00</td>
</tr>
<tr>
<td>CONSTRUCTION COSTS</td>
<td></td>
</tr>
<tr>
<td>MOBILIZATION AND BONDS</td>
<td>LS 1</td>
</tr>
<tr>
<td>ROAD SURFACING REPAIRS</td>
<td>SY LS</td>
</tr>
<tr>
<td>LOCATE EXISTING MAIN LINES AND SERVICES</td>
<td>LS 1</td>
</tr>
<tr>
<td>INSTALL WATER METER PITS WITH DOUBLE CHECK VALVES ON EXISTING SERVICES</td>
<td>EA 160</td>
</tr>
<tr>
<td>INSTALL 6&quot; PRESSURE REDUCING VALVES</td>
<td>EA 2</td>
</tr>
<tr>
<td>INSTALL 6&quot; ISOLATION VALVES</td>
<td>EA 6</td>
</tr>
<tr>
<td>RECLAMATION</td>
<td>LS 1</td>
</tr>
<tr>
<td>TOTAL ESTIMATED COST OF PROJECT COMPONENTS</td>
<td></td>
</tr>
<tr>
<td>CONSTRUCTION ENGINEERING (PROJECT COMPONENTS X 10%)</td>
<td></td>
</tr>
<tr>
<td>COMPONENTS AND ENGINEERING COSTS</td>
<td></td>
</tr>
<tr>
<td>INFLATION TO 2015 CONSTRUCTION (3% PER YEAR)</td>
<td></td>
</tr>
<tr>
<td>CONTINGENCY (COMPONENTS AND ENGINEERING X 15%)</td>
<td></td>
</tr>
<tr>
<td>TOTAL CONSTRUCTION COST</td>
<td></td>
</tr>
<tr>
<td>TOTAL PROJECT COST (TOTAL CONSTRUCTION COST + PRE-CONSTRUCTION COST)</td>
<td></td>
</tr>
</tbody>
</table>
7.4 Alternative 4 – Upgrade the Existing Distribution System with Pipe Sizes and Requirements Meeting the City of Gillette Standards

The existing system appears to be in good condition due to the lack of main breaks, with the exception of the low pressure lines. However, the main lines consist of obsolete pipe material consisting of fiberglass wrapped thin walled PVC (Perma-Strand). This pipe material is easily damaged and difficult to repair. The life cycle of this pipe material is not known, and the concern exists that failures may become common at some point in the future. In addition, the location and true condition of the existing main lines is unknown. This Alternative 4 consists of completely replacing the existing distribution system with new C-900 PVC pipe meeting City of Gillette Standards. With these upgrades the system could operate with the two existing wells, blended with Regional water or as a full Regional connection. With a full connection to the Regional System, fire flows could also be met. The existing 6” system would be upsized to 8” mains with new service connections throughout. With these improvements, the District could consider turning the system over to the City of Gillette and becoming a Gillette retail costumer.

Table 7.6 below presents a Level II cost estimate for a full upgrade of the system to City of Gillette standards. Figure 7.6 presents the layout of the proposed upgrades. These system upgrade costs would not be eligible for WWDC and Capitol Improvements Tax funding. The District would be responsible for the costs associated with the system upgrade. These costs are estimated to total approximately $3,000,000. Due to the very large costs associated with these improvements and the fact that water rates would be likely be more than the wholesale rates for a Regional Customer, this option is not considered to be feasible at this time.
TABLE 7.6
FULL SYSTEM UPGRADE FOR DEQ SYSTEM
DISTRICT PORTION CONSTRUCTION COST ESTIMATE

<table>
<thead>
<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>ESTIMATED QUANTITY</th>
<th>UNIT COST</th>
<th>TOTAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOBILIZATION AND BONDS</td>
<td>LS</td>
<td>1</td>
<td>$139,958.00</td>
<td>$139,958.00</td>
</tr>
<tr>
<td>ROAD SURFACING REPAIR</td>
<td>SY</td>
<td>20000</td>
<td>$6.00</td>
<td>$120,000.00</td>
</tr>
<tr>
<td>CONNECT TO EXISTING WATER MAINS</td>
<td>EA</td>
<td>1</td>
<td>$5,000.00</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>DIRECT CONNECT TO REGIONAL BYPASS LINE WITH VALVING</td>
<td>LF</td>
<td>31000</td>
<td>$32.00</td>
<td>$992,000.00</td>
</tr>
<tr>
<td>8&quot; PVC C900 WATER</td>
<td>EA</td>
<td>58</td>
<td>$1,800.00</td>
<td>$104,400.00</td>
</tr>
<tr>
<td>8&quot; ISOLATION VALVE</td>
<td>EA</td>
<td>1</td>
<td>$3,000.00</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>8&quot; PRV</td>
<td>EA</td>
<td>66</td>
<td>$4,500.00</td>
<td>$297,000.00</td>
</tr>
<tr>
<td>FIRE HYDRANT ASSEMBLY</td>
<td>EA</td>
<td>40</td>
<td>$500.00</td>
<td>$20,000.00</td>
</tr>
<tr>
<td>8&quot; FITTING</td>
<td>EA</td>
<td>160</td>
<td>$2,800.00</td>
<td>$448,000.00</td>
</tr>
<tr>
<td>RECONNECT SERVICES WITH WATER METERS</td>
<td>LS</td>
<td>1</td>
<td>$10,000.00</td>
<td>$10,000.00</td>
</tr>
<tr>
<td>TOTAL RECLAMATION</td>
<td></td>
<td></td>
<td></td>
<td>$2,139,358.00</td>
</tr>
<tr>
<td>CONSTRUCTION ENGINEERING (PROJECT COMPONENTS X 10%)</td>
<td></td>
<td></td>
<td></td>
<td>$213,935.80</td>
</tr>
<tr>
<td>COMPONENTS AND ENGINEERING COSTS</td>
<td></td>
<td></td>
<td></td>
<td>$2,353,293.80</td>
</tr>
<tr>
<td>INFLATION TO 2015 CONSTRUCTION (3% PER YEAR)</td>
<td></td>
<td></td>
<td></td>
<td>$143,315.59</td>
</tr>
<tr>
<td>CONTINGENCY (COMPONENTS AND ENGINEERING X 15%)</td>
<td></td>
<td></td>
<td></td>
<td>$352,994.07</td>
</tr>
<tr>
<td>TOTAL CONSTRUCTION COST</td>
<td></td>
<td></td>
<td></td>
<td>$2,849,603.46</td>
</tr>
<tr>
<td>TOTAL PROJECT COST (TOTAL CONSTRUCTION COST + PRE-CONSTRUCTION COST)</td>
<td></td>
<td></td>
<td></td>
<td>$3,071,539.26</td>
</tr>
</tbody>
</table>
7.5 Alternative 5 – Do Nothing

A “do nothing” should be considered as an alternate. With this alternate, no improvements would be made and the system would continue to be operated as it currently does. The major concern with this option is the frequent line breaks and continually increasing operating expenses. In addition, the fluoride concentrations above the secondary MCL will continue to be a problem. Without installing water meters, the ability to secure additional funding is greatly hindered.

7.6 Recommended Alternatives

Of the five alternatives evaluated, Alternatives 1 or 2 are recommended due to available funding and the ability to utilize regional water to reduce the fluoride concentrations. In order to implement Alternatives 1 or 2, Alternative 3 must also be implemented. Alternative 3 is recommended to encourage water conservation, reduce the frequency of line repairs on the low pressure piping, and provide better system isolation during repairs. These alternatives are evaluated in more detail further in this study.
8. Project Funding Sources

Typically, four sources of financing have been available for cooperatively financing the design and construction of rural water supply projects. The four funding programs are as follow:

- **WWDC** – The WWDC currently provides grant and loan funding in a 67:33 grant-loan ratio. Loans are typically available at an interest rate of 4% for a term that is dependant on the life of the components. For projects with mechanical components such as pumps, the term is typically 20 years. For projects without mechanical components such as piping, the term can be as high as 50 years. Eligible water system components typically include water transmission pipelines, booster stations, water supply wells, and water storage tanks. For many of the improvements in this study, the WWDC grant funding is eligible in conjunction with the Capital Facilities Tax to offset the 33% loan portion.

- **State Revolving Fund Loan (SRF)** – This program is known as the Wyoming Drinking Water State Revolving Fund. The program receives money from the Federal Government and is administered by the State Loan and Investment Board (SLIB), and has historically only been a loan fund. Recently this program has allowed for principal forgiveness loans for qualified applicants based upon Annual Median Household Income. Special Districts in the Campbell County are eligible to receive principal forgiveness of up to 25% of the project cost. This fund can be used for all components of a water system. Currently, loans are available at an interest rate of 2.5% for a term of up to 20 years and are subject to a 0.5% loan origination fee.

- **State Loan and Investment Board (SLIB)** – The SLIB is composed of the five state-wide elected officials. The SLIB currently provides grant and loan funding in a 50:50 ratio. Loans are currently available at an interest rate of 4.89% for a term of up to 40 years; however, the loan terms are typically limited to the economic life expectancy of the project as a whole. Eligible water system components typically include all portions of the water system including fire hydrants, water services, meter pits, and service meters.
Freedom Hills Improvement and Service District- Level II Study

- Rural Utilities Service (RUS) – RUS is a department of the US Department of Agriculture. The RUS provides funding for all portions of water supply projects. The RUS typically provides grants and loans based upon the income of the area and the water rates of the applicant compared to similar systems. Depending on the median income, the District may qualify for loan funding from RUS, with interest rates depending on the prevailing federal bank rates.

- Campbell County District Support Grant Program – The Campbell County District Support Grants are available to cover all system components. Grants can be as much as 33% of any remaining project budget shortfall up to a maximum amount of $75,000. Grant applications are available from Campbell County.

- The Wyoming Business Council is not considered a viable funding source for any improvements identified in the study as its programs are limited to either further economic development goals, such as business development, recruitment or expansion, or to aid low to moderate income persons. Neither of which appear to be applicable for this project.
9. Financial Evaluation and Funding Recommendations

This section presents possible funding options and a debt repayment analysis for possible improvements. Three factors must be considered in the financial analysis of a public water system.

1) Expenses of the system operation.
2) Revenue generated by water sales; typically in the form of water rates charged to customers.
3) Payment of debt incurred to finance major system improvements.

For this Level II Study, each of these factors has been quantified. This study has considered two viable alternatives for a full or blended connection to the Regional System. Financial evaluations were performed for the two regional connections as well as other system improvements.

The cost estimates presented in Section 7 are prepared based on 2013 construction costs. It is assumed for this study that any improvements would be constructed in 2015 or later (2016 for regional connections). An escalation factor of 3% per year was applied to the estimates in Section 7 to estimate future Construction Costs.

9.1 Existing Operating Budget and Water Rates

Table 9.1 presents the current Operating Budget for the Freedom Hills ISD as it relates to the water system. The Freedom Hills ISD also provided sanitation services and road maintenance. Currently the District’s budget is not broken down to show income and expense for each service provided. Income for the District is generated by an assessment income of $1,020/year ($85/month) for each property in the District (160 total). This income offsets the expenses for the water system, sanitation service and road maintenance. The District provided a copy of their annual budget which includes sufficient information to determine the approximate costs directly related to operations of the water system. We prepared the budget breakdown in Table 9.1 based on the water system expenses in the District’s current budget. It was assumed that 80% of the actual cost of some of the common items such as insurance, office expenses, professional fees and uncategorized expenses was related to the water system operations.

The budget breakdown in Table 9.1 is based on assumptions by WLC. The Freedom
Hills ISD will have to prepare a detailed budget breakdown with separate maintenance funds specifically allocated to water system operations and maintenance to pursue WWDC and other funding sources.

As shown in Table 9.1, $31 of the monthly individual property assessment total of $85 is needed to cover water system expenses. Operating Expenses consist of operator expenses, materials, utilities, water quality tests, insurance, and repairs and maintenance. Based on information provided by the Freedom Hills ISD, the District also has a reserves balance of approximately $185,398.

| Table 9.1 | Freedom Hills Improvement and Service District  
| Water Fund Operating Budget FY 2012-2013 |

| Operating Income | Estimated Budget |
| Assessment Income Assigned to Water System ($31/month/residence) | $59,520.00 |
| Interest Income | $200.00 |
| **Total Income** | **$59,720.00** |

| Operating Expenses and Debt Service | Estimated Budget |
| Liability Insurance | $5,800.00 |
| Office Expenses | $850.00 |
| Professional Fee | $5,204.00 |
| Uncategorized Expenses | $800.00 |
| Water Operator | $7,164.00 |
| Water Testing | $1,200.00 |
| Chemicals | $2,500.00 |
| Electricity | $15,000.00 |
| Miscellaneous System Repairs and Equipment | $9,947.00 |
| Sinking Fund ($5/month per tap) | $9,600.00 |
| **Total Operating Expenses and Debt Service** | **$58,065.00** |

| Income Less Expenses | $1,655.00 |
| Total Reserves as of July 2012 | $185,397.64 |

### 9.2 Financing and Funding for a Regional Connection

It has already been established that regional connections would likely be funded by WWDC funding. For Alternative 1, the portion of the improvements from the regional main to the master meter and through the meter/control building would be funded at 67% grant and 33% local match funded by the revenues of the Capital Facilities Tax. The portion of the improvements from the exit of the meter/control building downstream to
Freedom Hills Improvement and Service District- Level II Study

the connection to the District’s system would be funded at 67% grant and 33% local match (responsibility of the District).

For Alternative 2, the portion of the improvements from the regional main to the master meter and through the meter/control building would be funded at 67% grant and 33% local match funded by the revenues of the Capital Facilities Tax. The portion of the improvements from the exit of the meter/control building downstream to the connection to the District’s system would be funded at 67% grant and 33% local match (responsibility of the District). These improvements would include the blending vault, and all piping and appurtenances associated with the blending.

At this time, wholesale water rates to individual Districts have not been established. These costs will be determined in upcoming years as the costs to operate and maintain the regional system are determined. At this time, the City of Gillette has told WLC that wholesale water rates could range from $4 to $16 per thousand gallons. WLC has developed several budget scenarios for Alternative 1 based on wholesale water rates of $5, $10, and $15 per thousand gallons to evaluate end user costs for this Alternative.
Freedom Hills Improvement and Service District- Level II Study

**Alternative 1 – Operating Budgets**
The following Table 9.2 presents a possible funding scenario for Regional Connection Alternative 1. WLC has assumed that the 33% match portion for the District’s Improvements would be funded out of Freedom Hills ISD reserves.

<table>
<thead>
<tr>
<th>Item</th>
<th>WWDC Grant</th>
<th>WWDC Loan</th>
<th>Specific Purpose Excise Tax</th>
<th>Freedom Hills Reserves</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Portion of Connection</td>
<td>$920,510</td>
<td>$0</td>
<td>$453,385</td>
<td>$0</td>
<td>$1,373,895</td>
</tr>
<tr>
<td>District Portion of Connection</td>
<td>$15,270</td>
<td>$0</td>
<td>$0</td>
<td>$7,635</td>
<td>$22,905</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>$935,780</strong></td>
<td><strong>$0</strong></td>
<td><strong>$453,385</strong></td>
<td><strong>$7,635</strong></td>
<td><strong>$1,396,800</strong></td>
</tr>
</tbody>
</table>

Note: 2013 Estimated Construction Costs are Escalated by 3% Per Year to Estimate 2016 Values.

Tables 9.3, 9.4 and 9.5 present projected operating budgets for Freedom Hills ISD for Alternative 1 based on wholesale water rates of $5, $10, and $15 per thousand gallons, respectively. As shown on Table 9.3 below, a one-time cost of $7,635 is shown as an expense for the Freedom Hills ISD match for the improvements necessary to connect from the meter/control building to the Freedom Hills ISD system. This one-time cost is planned to be funded by an income transfer from reserve accounts. Overall expenses increase as compared to current expenses due to the wholesale water purchase at $5/thousand gallons. Total annual expenses are shown to increase by approximately $112,000. It is estimated that monthly assessments related to water service would have to be increased by 174% from approximately $31/property/month to $85/property/month in order to generate sufficient revenues to operate the system. This increase of $54/property/month would be on top of the current assessment of $85/property/month.
Operating Income Estimated Budget
Assessment Income Assigned to Water System (Increase Water Rates by 174% from $31/month to $85/month) $163,200.00
One Time Transfer from Freedom Hills Reserves $7,635.00
Interest Income $200.00
Total Income = $171,035.00

Operating Expenses and Debt Service Estimated Budget
Liability Insurance $5,800.00
Office Expenses $850.00
Professional Fee $5,204.00
Uncategorized Expenses $800.00
Water Operator $5,000.00
Water Testing $1,200.00
Chemicals $2,500.00
Electricity $3,500.00
Water System Repairs and Equipment $6,500.00
Sinking Fund ($5/month per tap) $9,600.00
One Time Expense for Freedom Hills Portion of Regional Connection $7,635.00
Wholesale Water Purchase (100% annual usage at $5/Thousand) $121,840.02
Total Operating Expenses and Debt Service = $170,429.02

Income Less Expenses = $605.98

Table 9.4 below presents the project operating budget for Alternative 1 based on a wholesale water rate of $10/thousand gallons. As shown, total annual expenses are shown to increase by approximately $234,000. It is estimated that monthly assessments related to water service would have to be increased by 381% from approximately $31/property/month to $149/property/month in order to generate sufficient revenues to operate the system. This increase of $118/property/month would be on top of the current assessment of $85/property/month.
Table 9.4
Freedom Hills Improvement and Service District
Alternative 1 Regional Connection
Water Fund Operating Budget FY 2016/2017
100% Regional Water at $10/Thousand Gallons

<table>
<thead>
<tr>
<th>Operating Income</th>
<th>Estimated Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Income Assigned to Water System (Increase Water Rates by 381% from $31/month to $149/month)</td>
<td>$286,080.00</td>
</tr>
<tr>
<td>One Time Transfer from Freedom Hills Reserves</td>
<td>$7,635.00</td>
</tr>
<tr>
<td>Interest Income</td>
<td>$200.00</td>
</tr>
<tr>
<td><strong>Total Income =</strong></td>
<td><strong>$293,915.00</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating Expenses and Debt Service</th>
<th>Estimated Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liability Insurance</td>
<td>$5,800.00</td>
</tr>
<tr>
<td>Office Expenses</td>
<td>$850.00</td>
</tr>
<tr>
<td>Professional Fee</td>
<td>$5,204.00</td>
</tr>
<tr>
<td>Uncategorized Expenses</td>
<td>$800.00</td>
</tr>
<tr>
<td>Water Operator</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>Water Testing</td>
<td>$1,200.00</td>
</tr>
<tr>
<td>Chemicals</td>
<td>$2,500.00</td>
</tr>
<tr>
<td>Electricity</td>
<td>$3,500.00</td>
</tr>
<tr>
<td>Water System Repairs and Equipment</td>
<td>$6,500.00</td>
</tr>
<tr>
<td>Sinking Fund ($5/month per tap)</td>
<td>$9,600.00</td>
</tr>
<tr>
<td>One Time Expense for Freedom Hills Portion of Regional Connection</td>
<td>$7,635.00</td>
</tr>
<tr>
<td>Wholesale Water Purchase (100% annual usage at $10/Thousand)</td>
<td>$243,680.04</td>
</tr>
<tr>
<td><strong>Total Operating Expenses and Debt Service =</strong></td>
<td><strong>$292,269.04</strong></td>
</tr>
</tbody>
</table>

**Income Less Expenses =** **$1,645.96**

Table 9.5 below presents the project operating budget for Alternative 1 based on a wholesale water rate of $15/ thousand gallons. As shown, total annual expenses are shown to increase by approximately $356,000. It is estimated that monthly assessments related to water service would have to be increased by 584% from approximately $31/property/month to $212/property/month in order to generate sufficient revenues to operate the system. This increase of $181/property/month would be on top of the current assessment of $85/property/month.
### Table 9.5

| Freedom Hills Improvement and Service District | Alternative 1 Regional Connection |
| Water Fund Operating Budget FY 2016/2017 |
| 100% Regional Water at $15/Thousand Gallons |

#### Operating Income Estimated Budget

<table>
<thead>
<tr>
<th>Item</th>
<th>Estimated Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Income Assigned to Water System</td>
<td>$407,040.00</td>
</tr>
<tr>
<td>(Increase Water Rates by 584% from $31/month to $212/month)</td>
<td></td>
</tr>
<tr>
<td>One Time Transfer from Freedom Hills Reserves</td>
<td>$7,635.00</td>
</tr>
<tr>
<td>Interest Income</td>
<td>$200.00</td>
</tr>
<tr>
<td><strong>Total Income</strong></td>
<td><strong>$414,875.00</strong></td>
</tr>
</tbody>
</table>

#### Operating Expenses and Debt Service Estimated Budget

<table>
<thead>
<tr>
<th>Item</th>
<th>Estimated Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liability Insurance</td>
<td>$5,800.00</td>
</tr>
<tr>
<td>Office Expenses</td>
<td>$850.00</td>
</tr>
<tr>
<td>Professional Fee</td>
<td>$5,204.00</td>
</tr>
<tr>
<td>Uncategorized Expenses</td>
<td>$800.00</td>
</tr>
<tr>
<td>Water Operator</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>Water Testing</td>
<td>$1,200.00</td>
</tr>
<tr>
<td>Chemicals</td>
<td>$2,500.00</td>
</tr>
<tr>
<td>Electricity</td>
<td>$3,500.00</td>
</tr>
<tr>
<td>Water System Repairs and Equipment</td>
<td>$6,500.00</td>
</tr>
<tr>
<td>Sinking Fund ($5/month per tap)</td>
<td>$9,600.00</td>
</tr>
<tr>
<td>One Time Expense for Freedom Hills Portion of Regional Connection</td>
<td>$7,635.00</td>
</tr>
<tr>
<td>Wholesale Water Purchase (100% annual usage at $15/Thousand)</td>
<td>$365,520.06</td>
</tr>
<tr>
<td><strong>Total Operating Expenses and Debt Service</strong></td>
<td><strong>$414,109.06</strong></td>
</tr>
</tbody>
</table>

**Income Less Expenses = $765.94**

### Alternative 2 – Operating Budgets

The following Table 9.6 presents a possible funding scenario for Regional Connection Alternative 2. WLC has assumed that the 33% match portion for the District’s Improvements would be funded by a WWDC loan to Freedom Hills ISD at term of 4% interest for 20 years. Based on a loan amount of $53,780 the annual repayment amount would be $3,957. Funds to repay the loan would be generated by increased assessment amounts.

### Table 9.6

<table>
<thead>
<tr>
<th>Item</th>
<th>WWDC Grant</th>
<th>WWDC Loan</th>
<th>Specific Purpose Excise Tax</th>
<th>Freedom Hills WWDC Loan</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Portion of Connection</td>
<td>$920,510</td>
<td>$0</td>
<td>$453,385</td>
<td>$0</td>
<td>$1,373,895</td>
</tr>
<tr>
<td>District Portion of Connection</td>
<td>$107,560</td>
<td>$0</td>
<td>$0</td>
<td>$53,780</td>
<td>$161,339</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>$1,028,069</strong></td>
<td><strong>$0</strong></td>
<td><strong>$453,385</strong></td>
<td><strong>$53,780</strong></td>
<td><strong>$1,535,234</strong></td>
</tr>
</tbody>
</table>

Note: 2013 Estimated Construction Costs are Escalated by 3% Per Year to Estimate 2016 Values.
Tables 9.7, 9.8 and 9.9 present projected operating budgets for Freedom Hills ISD for Alternative 2 based on wholesale water rates of $5, $10, and $15 per thousand gallons, respectively at a blending ratio of 59% regional water and 41% Freedom Hills water. This blending ratio is believed to be conservative to reduce fluoride concentrations. However, at this time the eventual water quality of the Regional water is not yet known, and actual ratios may be different once the system is constructed.

As shown in Table 9.7, overall expenses are expected to increase due to the wholesale water purchase at $5/thousand gallons. Total expenses are shown to increase by approximately $88,000. It is estimated that monthly assessments related to water service would have to be increased by 145% from approximately $31/property/month to $76/property/month in order to generate sufficient revenues to operate the system. This increase of $45/property/month would be on top of the current assessment of $85/property/month.
Table 9.7

<table>
<thead>
<tr>
<th>Operating Income</th>
<th>Estimated Budget</th>
</tr>
</thead>
</table>
| Assessment Income Assigned to Water System  
(Increase Water Rates by 145% from $31/month to $76/month) | $145,920.00 |
| Interest Income | $200.00 |
| **Total Income =** | **$146,120.00** |

<table>
<thead>
<tr>
<th>Operating Expenses and Debt Service</th>
<th>Estimated Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liability Insurance</td>
<td>$5,800.00</td>
</tr>
<tr>
<td>Office Expenses</td>
<td>$850.00</td>
</tr>
<tr>
<td>Professional Fee</td>
<td>$5,204.00</td>
</tr>
<tr>
<td>Uncategorized Expenses</td>
<td>$800.00</td>
</tr>
<tr>
<td>Water Operator</td>
<td>$15,000.00</td>
</tr>
<tr>
<td>Water Testing</td>
<td>$3,600.00</td>
</tr>
<tr>
<td>Chemicals</td>
<td>$2,500.00</td>
</tr>
<tr>
<td>Electricity</td>
<td>$16,500.00</td>
</tr>
<tr>
<td>Water System Repairs and Equipment</td>
<td>$9,947.00</td>
</tr>
<tr>
<td>Sinking Fund ($5/month per tap)</td>
<td>$9,600.00</td>
</tr>
<tr>
<td>Annual Expense for Freedom Hills Portion of Regional Connection (WWDC 20 YR Loan @ 4.0%)</td>
<td>$3,957.00</td>
</tr>
<tr>
<td>Wholesale Water Purchase (59% annual usage at $5/Thousand)</td>
<td>$71,885.61</td>
</tr>
<tr>
<td><strong>Total Operating Expenses and Debt Service =</strong></td>
<td><strong>$145,643.61</strong></td>
</tr>
</tbody>
</table>

**Income Less Expenses =** $476.39

Table 9.8 below presents the project operating budget for Alternative 2 based on a wholesale water rate of $10/thousand gallons. As shown, total expenses are shown to increase by approximately $159,000 above current expenses. It is estimated that monthly assessments related to water service would have to be increased by 268% from approximately $31/property/month to $110/property/month in order to generate sufficient revenues to operate the system. This increase of $79/property/month would be on top of the current assessment of $85/property/month.
Table 9.9 below presents the project operating budget for Alternative 2 based on a wholesale water rate of $15/thousand gallons. As shown, total expenses are shown to increase by approximately $231,000 above current expenses. It is estimated that monthly assessments related to water service would have to be increased by 387% from approximately $31/property/month to $151/property/month in order to generate sufficient revenues to operate the system. This increase of $120/property/month would be on top of the current assessment of $85/property/month.
The above budgeting scenarios assume a blending ratio of 59% Regional water and 41% Freedom Hills water to reduce fluoride concentrations to 1.9 mg/l. As discussed earlier, the District may choose to reduce the amount of Regional water used to maintain a Hardness value below 200 mg/l. A blending ratio of 64% Regional water and 36% Freedom Hills water is estimated to achieve this goal. This will result in slightly reducing the observed fluoride concentrations in the system. Budgets were prepared based on this lower blending ratio, but detailed spreadsheets were not included in this report. Table 9.10 below includes a summary of the resulting estimated water rates based on this reduced ratio.
The following table summarizes the current water assessment per property for Freedom Hills ISD customers and the projected water assessments for Alternatives 1 and 2 for the range of wholesale water rates presented above. Figure 9.1 below presents a comparison of projected operating expenses for Alternatives 1 and 2 based on the range of wholesale water rates.

<table>
<thead>
<tr>
<th>Current Monthly Assessment Applied to Water Rates</th>
<th>$23.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projected Assessment for Regional Connection Alternate 1 (Use 100% Regional Water at $5/Thousand Gallons)</td>
<td>$85/month for Water $139/month Total</td>
</tr>
<tr>
<td>Projected Assessment for Regional Connection Alternate 1 (Use 100% Regional Water at $10/Thousand Gallons)</td>
<td>$149/month for Water $203/month Total</td>
</tr>
<tr>
<td>Projected Assessment for Regional Connection Alternate 1 (Use 100% Regional Water at $15/Thousand Gallons)</td>
<td>$212/month for Water $266/month Total</td>
</tr>
<tr>
<td>Projected Water Rates for Regional Connection Alternate 2 (Use 59% Regional Water at $5/Thousand Gallons)</td>
<td>$76/month for Water $130/month Total</td>
</tr>
<tr>
<td>Projected Water Rates for Regional Connection Alternate 2 (Use 59% Regional Water at $10/Thousand Gallons)</td>
<td>$110/month for Water $164/month Total</td>
</tr>
<tr>
<td>Projected Water Rates for Regional Connection Alternate 2 (Use 59% Regional Water at $15/Thousand Gallons)</td>
<td>$151/month for Water $205/month Total</td>
</tr>
<tr>
<td>Projected Water Rates for Regional Connection Alternate 2 (Use 36% Regional Water at $5/Thousand Gallons)</td>
<td>$62/month for Water $116/month Total</td>
</tr>
<tr>
<td>Projected Water Rates for Regional Connection Alternate 2 (Use 36% Regional Water at $10/Thousand Gallons)</td>
<td>$85/month for Water $139/month Total</td>
</tr>
<tr>
<td>Projected Water Rates for Regional Connection Alternate 2 (Use 36% Regional Water at $15/Thousand Gallons)</td>
<td>$107/month for Water $161/month Total</td>
</tr>
</tbody>
</table>

The budgets and funding scenarios presented above are based on average current non-metered water usages. It is expected that once meters are installed, water consumption will decrease; thereby decreasing water purchase from the Regional Water System for each alternative. Additionally, the above analysis is based on preliminary blending ratios based on information that is available at this time. Once the Madison Wellfield is
completed and additional water quality data is available, the blending ratios should be revisited. If less Regional water is required to reduce fluoride concentrations, then the expenses associated with Alternative 2 will be less.

**Alternative 3 – Operating Budget**

WLC recommends pursuing an SRF Loan for funding of Alternative 3. Assuming a loan for the full amount of the project ($818,973) at a term of 20 years with an interest rate of 2.5%, the annual payment amount to service the loan would be $52,535 per year. It is possible to receive up to 25% principal forgiveness through the SRF program; however, to be conservative, no forgiveness was considered. Table 9.11 below presents a budget showing sufficient assessment income to cover these additional expenses. As shown in the Table, it is estimated that monthly assessments related to water service would have to be increased by 87% from approximately $31/property/month to $58/property/month in order to generate sufficient revenues to cover the new debt for the meter installation. This is a monthly increase per property of $27. If this Alternative is pursued along with either Alternatives 1 or 2, an additional $27/month should be added to the assessment amounts in Table 9.10.
### Freedom Hills Improvement and Service District- Level II Study

#### Financial Evaluation and Funding

**Table 9.11**

<table>
<thead>
<tr>
<th>Freedom Hills Improvement and Service District</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 3 Water Meters, PRV’s and Mainline Valves</td>
</tr>
<tr>
<td>Water Fund Operating Budget FY 2014/2015</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating Income</th>
<th>Estimated Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment Income Assigned to Water System (Increase Water Rates by 87% from $31/month to $58/month)</td>
<td>$111,360.00</td>
</tr>
<tr>
<td>Interest Income</td>
<td>$200.00</td>
</tr>
<tr>
<td><strong>Total Income</strong></td>
<td><strong>$111,560.00</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating Expenses and Debt Service</th>
<th>Estimated Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liability Insurance</td>
<td>$5,800.00</td>
</tr>
<tr>
<td>Office Expenses</td>
<td>$850.00</td>
</tr>
<tr>
<td>Professional Fee</td>
<td>$5,204.00</td>
</tr>
<tr>
<td>Uncategorized Expenses</td>
<td>$800.00</td>
</tr>
<tr>
<td>Water Operator</td>
<td>$7,164.00</td>
</tr>
<tr>
<td>Water Testing</td>
<td>$1,200.00</td>
</tr>
<tr>
<td>Chemicals</td>
<td>$2,500.00</td>
</tr>
<tr>
<td>Electricity</td>
<td>$15,000.00</td>
</tr>
<tr>
<td>Miscellaneous System Repairs and Equipment</td>
<td>$9,947.00</td>
</tr>
<tr>
<td>Sinking Fund ($5/month per tap)</td>
<td>$9,600.00</td>
</tr>
<tr>
<td><strong>Annual Expense for Water Meters, PRV’s and Valves Project (SRF 20 YR Loan @ 2.5%)</strong></td>
<td><strong>$52,535.00</strong></td>
</tr>
<tr>
<td><strong>Total Operating Expenses and Debt Service</strong></td>
<td><strong>$110,600.00</strong></td>
</tr>
<tr>
<td><strong>Income Less Expenses</strong></td>
<td><strong>$960.00</strong></td>
</tr>
</tbody>
</table>
10. Permits and Easements Required for Construction

- **Campbell County**
  Prior to construction or modification of the water system for a regional connection or transmission main installation, a Permit to Construct must be filled out and approved through the Campbell County engineering department.

- **WYDEQ**
  A Storm Water Permit is required through DEQ for any construction activities that result in the disturbance of one or more acres. A WYDEQ Permit to Construct is required for any modifications to the existing water supply sources or treatment processes.

- **Easements**
  Easements will be required for the Regional line between Highway 51 and the Railroad Row. Easements within the District will also be required along existing roadways and at the tank site to provide room to install the improvements.
11. Conclusions and Recommendations

The Freedom Hills water system is in good condition and provides a reliable source of water to its customers. The system’s main deficiencies at this time are slightly elevated fluoride concentrations, lack of individual meters, high pressures at the lower elevations, and the lack of sufficient main line valves.

Several alternatives were investigated in this study to mitigate these deficiencies. Alternative 2, blending Regional water with the water from Freedom Hills #1 and #2 wells at a 59:41 (Regional:Freedom Hills) ratio is expected to reduce fluoride concentrations to below the secondary MCL of 2.0 mg/l. Blending at this ratio however will result in hardness values of around 316 mg/l as CaCO₃. At this value, water softeners will likely be desired by the District’s customers. The blending ratio is based on projected pumping rates along with recent water quality data from the new Madison Wells and will require further analysis once the wells are all completed and water quality and quantity results are available. Blending at this ratio results in a significant wholesale purchase of Regional water. This purchase will result in significant increased assessment amounts to the District residents. The eventual wholesale cost of Regional water is yet to be established. The wholesale cost will way heavy on the decision to connection to the Regional system. A reduced blending ratio of 36:64 (Regional:Freedom Hills) will reduce fluoride levels slightly to approximately 2.2 mg/l from 2.8 mg/l, and is estimated to maintain hardness below 200 mg/l. This reduced blending ratio would substantially reduce the wholesale purchase of water from the Regional system.

WLC recommends that the Freedom Hills ISD proceed immediately with pursuing funding for all or a portion of Alternative 3 – Meter Pits, PRV’s and Mainline Valves. This project should be added to the SRF Intended Use Plan. The District will need to apply in January of 2014 to get on the Intended Use Plan, and then apply again in June 2014 for funding. This project will improve the overall operation of the system. Installation of meter pits and instituting a tiered rate will promote conservation of water. Conservation of water will result in lower water usage and decreased costs associate with Alternative 2. Additionally, funding agencies will require water meters to be installed before considering funding for other improvement projects. By the time Alternative 3 is completed, more information should be known on the wholesale costs and water quality for blending. At that time, the District will be able to make a more informed decision on whether or not to pursue funding for the Regional connection and blending vault.

Conclusions and Recommendations 11-1
12. References


2.) Regional System Potential Participant Connections, HDR, May 2010.


6.) Mike Cole, City of Gillette Regional Water System Project Manager, personal communication.

TECHNICAL MEMORANDUM
FREEDOM HILLS #1 AND #2 WELL ASSESSMENTS

Freedom Hills Improvement and Service District (Freedom Hills) is a public water system providing potable water to approximately 170 residential lots. The EPA water system identification for Freedom Hills is WY5600789. Water for the District is supplied by two water wells, Freedom Hills #1 and #2 which are completed in the Fort Union Formation. The locations of the wells and the boundary of the District are shown on Figure 1. This technical memorandum provides an analysis of the condition of the wells and their ability to meet the water supply demands of the District.

Permitting

The State Engineers Office (SEO) permit number for Freedom Hills #1 is U.W. 85154 and Freedom Hills #2 is U.W. 85155. According to a May 7, 1991 letter from the SEO, no permits had been issued for the two Freedom Hills water wells at the time they were drilled. Applications for Permit to Appropriate Ground Water were filed for the wells and given a priority date of April 12, 1991. The water rights for both wells are fully adjudicated. Conditions and limitations of the permits for both wells are as follows:

1. A water meter acceptable to the State Engineer is required to accurately measure the total quantity of water produced from the well.
2. An annual report shall be submitted to the State Engineer no later than February 15 of each year stating the total amount of water produced from this well each month during the previous January 1 to December 31, twelve (12) month period.
3. The report shall identify the well by name, location, permit number and shall identify the type of meter used for the measurement.
4. The report shall contain at least two (2) semi-annual measurements of the pumping water level in the well as measured after a minimum of twenty-four (24) consecutive hours of pumping. The dates the measurements were obtained and period of time the well was pumped prior to obtaining the measurements must be specified.
5. The report shall contain at least two (2) semi-annual measurements of the static water level in the well as measured twenty-four (24) consecutive hours after pumping has ceased. The dates the measurements were obtained and the period of time the well was "shut-in" prior to obtaining the measurements must be specified.
6. The State Engineer may, upon written request, waive all or any portion of these conditions and limitations.

Copies of the SEO permits for both wells are provided in Appendix A.

Freedom Hills #1 Well Drilling and Construction Data

Freedom Hills #1 was completed on June 25, 1981 by Ruby Drilling, of Gillette, Wyoming and the well was first put to beneficial use on September 30, 1981. Construction details for Freedom Hills #1 from the Statement of Completion filed with the SEO are summarized in Table 1 and on Figure 2.

The Statement of Completion submitted to the SEO reports that Freedom Hills #1 was drilled to a total depth of 1,560 feet using an 8 3/4-inch drill bit and the well was completed with 6 5/8-inch steel casing with a 0.188-inch wall thickness. The casing was cemented in place from top to bottom before the well was perforated using a gas jet perforator. Perforations were placed from 990 to 1,020 feet; 1,050 to 1,070 feet; 1,156 to 1,176 feet; 1,390 to 1,410 feet; and 1,520 to 1,540 feet in the Fort Union Formation. All of the intervals had 10 3/16th-inch perforations each. There is no record of well development or pump testing on the Statement of Completion.
TABLE 1
FREEDOM HILLS #1 WELL SUMMARY

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Engineer Permit No.</td>
<td>U.W. 85154, fully adjudicated</td>
</tr>
<tr>
<td>Location</td>
<td>NW, SE Section 23, Township 50 North, Range 71 West</td>
</tr>
<tr>
<td>Surface Elevation</td>
<td>4,597 feet, ground level</td>
</tr>
<tr>
<td>Total Depth</td>
<td>1,560 feet</td>
</tr>
<tr>
<td>Hole Diameter</td>
<td>0 – 1,560 feet: 8 ¾ inches</td>
</tr>
<tr>
<td>Casing</td>
<td>0 – 1,560 feet: 6 5/8-inch O.D. steel casing (0.188-inch wall thickness)</td>
</tr>
<tr>
<td>Producing Intervals</td>
<td>990 – 1,020 feet: 10 perforations (3/16” glass jet)</td>
</tr>
<tr>
<td></td>
<td>1,050 – 1,070 feet: 10 perforations (3/16” glass jet)</td>
</tr>
<tr>
<td></td>
<td>1,156 – 1,176 feet: 10 perforations (3/16” glass jet)</td>
</tr>
<tr>
<td></td>
<td>1,390 – 1,410 feet: 10 perforations (3/16” glass jet)</td>
</tr>
<tr>
<td></td>
<td>1,520 – 1,540 feet: 10 perforations (3/16” glass jet)</td>
</tr>
<tr>
<td>Permitted Yield</td>
<td>100 gpm</td>
</tr>
<tr>
<td>Static Water Level</td>
<td>650 feet (6/25/1981)</td>
</tr>
<tr>
<td></td>
<td>620 feet (12/11/2007)</td>
</tr>
<tr>
<td></td>
<td>592 feet (11/30/2010)</td>
</tr>
<tr>
<td></td>
<td>590 feet (12/13/2011)</td>
</tr>
<tr>
<td></td>
<td>630 feet (4/24/2012)</td>
</tr>
<tr>
<td>Pumping Water Level</td>
<td>645 feet (4/12/2013)</td>
</tr>
<tr>
<td>Air Line Setting</td>
<td>920 feet, assumed based on pump setting</td>
</tr>
<tr>
<td>Completion Date</td>
<td>June 25, 1981</td>
</tr>
<tr>
<td>Testing Information</td>
<td>No information</td>
</tr>
<tr>
<td>Pump Information</td>
<td>Berkeley pump, 30 HP motor</td>
</tr>
<tr>
<td></td>
<td>Set at a depth of 920 feet in 1981</td>
</tr>
<tr>
<td>Drilling Contractor</td>
<td>Ruby Drilling (Gillette, WY)</td>
</tr>
</tbody>
</table>

**Freedom Hills #2 Well Drilling and Construction Data**

Freedom Hills #2 was completed on February 10, 1982 by Ruby Drilling of Gillette, Wyoming. The legal location of the well is SE, NW Section 23, Township 50 North, Range 71 West. The well was first put to beneficial use on April 30, 1982. Construction details for Freedom Hills #2 from the Statement of Completion are summarized in Table 2 and on Figure 3.

The Statement of Completion submitted to the SEO reports that Freedom Hills #2 was drilled to a depth of 1,254 feet using an 8 3/4-inch drill bit. The well was completed with 6 5/8-inch steel casing. The well
CONSTRUCTION DETAILS

DEEPNESS

BAKER-MONITOR PITLESS ADAPTOR

+1.5 - 1,550 FEET: 6 5/8-INCH O.D. STEEL CASING

650 FEET (6/25/1981)
620 FEET (12/11/2007)
592 FEET (11/30/2010)
590 FEET (12/13/2011)
630 FEET (4/24/2012)

PUMPING WATER LEVEL:
645 FEET (4/12/2013)

BERKELEY PUMP
30 HP MOTOR
920 FEET BGL (1981)

990 - 1,410 FEET: PERFORATIONS (SEE TABLE)

INTerval FEET  PERforATIONs
990 - 1,020 10 SHOTS (3/16")
1,050 - 1,070 10 SHOTS (3/16")
1,156 - 1,176 10 SHOTS (3/16")
1,390 - 1,410 10 SHOTS (3/16")
1,520 - 1,540 10 SHOTS (3/16")

T.D. = 1,560 FEET
NOT TO SCALE

WESTON
GROUNDWATER • ENGINEERING

FREEDOM HILLS #1
AS-BUILT DIAGRAM
FIGURE 2
was cemented from the surface to the total depth of the well before the well was perforated using a gas jet perforator. Perforations with a diameter of 3/16th of an inch were placed from 810 to 830 feet; 874 to 894 feet; and 1,030 to 1,050 feet in the Fort Union Formation. All of the intervals had 19 perforations each. There is no record of well development or testing on the Statement of Completion.

TABLE 2
FREEDOM HILLS #2 WELL SUMMARY

<table>
<thead>
<tr>
<th>State Engineer Permit No.:</th>
<th>U.W. 85155, fully adjudicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location:</td>
<td>SE, NW Section 23, Township 50 North, Range 71 West</td>
</tr>
<tr>
<td>Surface Elevation:</td>
<td>4,457 feet, ground level</td>
</tr>
<tr>
<td>Total Depth:</td>
<td>1,254 feet</td>
</tr>
<tr>
<td>Hole Diameter:</td>
<td>0 – 1,254 feet: 8 ¾ inches</td>
</tr>
<tr>
<td>Casing:</td>
<td>0 – 1,254 feet: 6 5/8-inch steel casing (0.188-inch wall)</td>
</tr>
<tr>
<td>Producing Intervals:</td>
<td>810 – 830 feet: 19 perforations (3/16” glass jet)</td>
</tr>
<tr>
<td></td>
<td>874 – 894 feet: 19 perforations (3/16” glass jet)</td>
</tr>
<tr>
<td></td>
<td>1,030 – 1,050 feet: 19 perforations (3/16” glass jet)</td>
</tr>
<tr>
<td>Permitted Yield:</td>
<td>100 gpm</td>
</tr>
<tr>
<td>Static Water Level:</td>
<td>600 feet (2/10/1982)</td>
</tr>
<tr>
<td></td>
<td>458 feet (12/11/2007)</td>
</tr>
<tr>
<td></td>
<td>469 feet (11/30/2010)</td>
</tr>
<tr>
<td></td>
<td>587 feet (12/13/2011)</td>
</tr>
<tr>
<td></td>
<td>481 feet (4/24/2012)</td>
</tr>
<tr>
<td>Pumping Water Level:</td>
<td>618 feet (4/12/2013)</td>
</tr>
<tr>
<td>Air Line Setting:</td>
<td>885 feet, assumed from pump setting</td>
</tr>
<tr>
<td>Completion Date:</td>
<td>February 10, 1982</td>
</tr>
<tr>
<td>Testing Information:</td>
<td>No information</td>
</tr>
<tr>
<td>Pump Information:</td>
<td>Berkeley pump, 30 HP motor</td>
</tr>
<tr>
<td></td>
<td>Set at a depth of 885 feet in 1982</td>
</tr>
<tr>
<td>Drilling Contractor:</td>
<td>Ruby Drilling (Gillette, WY)</td>
</tr>
</tbody>
</table>

Water Production

The Water Guy staff conducts routine visits to the Freedom Hills water system to conduct inspections and record system data. Water meter readings collected from the water storage tank inlet line were used to prepare Table 3, which summarizes the water production from the wells. Analysis of the production data reveals that the average annual water production from 2002 to 2011 was 25,675,556 gallons, which
equals an average daily demand of 70,344 gallons (49 gpm). The maximum monthly production occurred in June 2006, when the wells produced 5,246,000 gallons (121 gpm).

When water levels drop five feet below the tank overflow in the Freedom Hills 87,000-gallon water storage tank, the pumps in both of the wells are activated and operate until the tank is filled. During the site visit conducted on April 12, 2013, WESTON staff observed the production rate of the Freedom Hills wells using the flow meter through which water from both wells flows to the tank. The combined pumping rate of the wells was 191 gpm. When Freedom Hills #1 was turned off, it was found that Freedom Hills #2 was pumping 88 gpm. The pumping rate of Freedom Hills #1 is therefore 103 gpm.

**Water Level Trends**

As reported in Table 1, the static water level when Freedom Hills Well #1 was first drilled and perforated was 650 feet, according to the Statement of Completion. The only other known water level measurements from Freedom Hills #1 are from The Water Guy. On December 13, 2011 The Water Guy staff measured an airline reading of 143 psi, which equals 330 feet of water over the end of the airline which is assumed to be the same as the pump setting of 920 feet. The water level measured from the airline reading on December 13, 2011 is therefore 590 feet. WESTON measured the pumping water level of the well on April 12, 2013 after the pump had been on for an unknown amount of time. The airline reading of 119 psi is equivalent to 275 feet and the pumping water is 645 feet.

As reported in Table 2, the static water level when Freedom Hills Well #2 was first drilled and perforated was 600 feet, according to the Statement of Completion. The only other known water level measurements from Freedom Hills #2 are from The Water Guy. On December 13, 2011 The Water Guy staff measured an airline reading of 129 psi, which equals 298 feet of water over the end of the airline which is assumed to be the same as the pump setting of 885 feet. The water level measured from the airline reading on December 13, 2011 is therefore 587 feet. The last available water level measurement was taken on 4/24/12. The airline reading of 175 psi is equivalent to 404 feet. The water level on April 24, 2012 is therefore 481 feet. The water level obtained by WESTON on April 12, 2013 was taken while Freedom Hills #2 was pumping. The airline reading of 115.5 psi is equivalent to 267 feet above the pump. The pumping water level on April 12, 2013 is therefore 633 feet.

The water level data set for the Freedom Hills #1 and #2 wells is limited, which prevents a detailed analysis of long-term water level trends and the potential for future production of the two wells. However, it appears that Freedom Hills is a sufficient distance from the Gillette Fort Union wellfields to prevent a large, sudden drawdown from occurring in the Freedom Hills wells as a result of pumping of the Gillette wells. In fact, the most current water measurements indicate that the water levels in both wells are higher than they were when the wells were drilled in the early 1980's. However, it is recommended that water levels be routinely monitored in Freedom Hills #1 and #2 as required by the SEO permit.

**Water Quality**

WESTON reviewed the available water quality data for Freedom Hills #1 and #2 found in the 2011 annual Consumer Confidence Report provided by the water system operator, The Water Guy. Records of bacteriological sampling found no positive results for bacteria. A fluoride sample collected on May 6, 2008 indicated a result of 2.5 mg/L and a sample from March 21, 2013 indicated a result of 2.8 mg/L. Although that level is below the primary standard of 4.0 mg/L it is above the secondary standard of 2.0 mg/L and could still pose a problem to children because it may cause mottling of teeth or dental fluorosis. A water quality sample was collected by Water Guy staff from the Freedom Hills tank and submitted to Energy Labs for laboratory analysis on June 21, 2013 for major cations, major anions, and for general potability. The results of the water quality analyses are presented in Table 4.
TABLE 3
FREEDOM HILLS
WELL PRODUCTION SUMMARY
2003 - 2011

<table>
<thead>
<tr>
<th>Month</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1,225,000</td>
<td>1,076,000</td>
<td>1,137,000</td>
<td>1,555,000</td>
<td>1,738,000</td>
<td>2,514,000</td>
<td>1,208,000</td>
<td>1,388,000</td>
<td>1,808,000</td>
</tr>
<tr>
<td>February</td>
<td>1,130,000</td>
<td>1,399,000</td>
<td>1,315,000</td>
<td>1,458,000</td>
<td>1,693,000</td>
<td>2,118,000</td>
<td>1,077,000</td>
<td>1,401,000</td>
<td>1,383,000</td>
</tr>
<tr>
<td>March</td>
<td>1,487,000</td>
<td>1,462,000</td>
<td>1,750,000</td>
<td>1,786,000</td>
<td>2,215,000</td>
<td>1,534,000</td>
<td>1,642,000</td>
<td>1,752,000</td>
<td>1,375,000</td>
</tr>
<tr>
<td>April</td>
<td>1,447,000</td>
<td>1,852,000</td>
<td>1,573,000</td>
<td>1,914,000</td>
<td>1,921,000</td>
<td>1,204,000</td>
<td>1,252,000</td>
<td>1,155,000</td>
<td>1,411,000</td>
</tr>
<tr>
<td>May</td>
<td>1,580,000</td>
<td>2,916,000</td>
<td>1,855,000</td>
<td>2,378,000</td>
<td>2,271,000</td>
<td>1,810,000</td>
<td>1,654,000</td>
<td>1,449,000</td>
<td>1,298,000</td>
</tr>
<tr>
<td>June</td>
<td>1,547,000</td>
<td>3,359,000</td>
<td>2,712,000</td>
<td>5,246,000</td>
<td>3,183,000</td>
<td>2,139,000</td>
<td>2,859,000</td>
<td>1,408,000</td>
<td>2,461,000</td>
</tr>
<tr>
<td>July</td>
<td>3,540,000</td>
<td>3,378,000</td>
<td>4,945,000</td>
<td>4,992,000</td>
<td>4,181,000</td>
<td>3,304,000</td>
<td>3,486,000</td>
<td>2,803,000</td>
<td>4,137,000</td>
</tr>
<tr>
<td>August</td>
<td>3,900,000</td>
<td>3,832,000</td>
<td>3,173,000</td>
<td>2,640,000</td>
<td>4,238,000</td>
<td>4,929,000</td>
<td>3,519,000</td>
<td>3,487,000</td>
<td>4,296,000</td>
</tr>
<tr>
<td>September</td>
<td>1,736,000</td>
<td>2,706,000</td>
<td>2,327,000</td>
<td>1,333,000</td>
<td>2,510,000</td>
<td>2,957,000</td>
<td>2,798,000</td>
<td>2,593,000</td>
<td>3,081,000</td>
</tr>
<tr>
<td>October</td>
<td>1,594,000</td>
<td>1,399,000</td>
<td>1,710,000</td>
<td>1,875,000</td>
<td>1,798,000</td>
<td>1,692,000</td>
<td>1,337,000</td>
<td>1,914,000</td>
<td>1,621,000</td>
</tr>
<tr>
<td>November</td>
<td>1,226,000</td>
<td>967,000</td>
<td>1,634,000</td>
<td>1,356,000</td>
<td>1,837,000</td>
<td>1,383,000</td>
<td>1,226,000</td>
<td>1,770,000</td>
<td>1,466,000</td>
</tr>
<tr>
<td>December</td>
<td>1,203,000</td>
<td>1,304,000</td>
<td>1,623,000</td>
<td>1,338,000</td>
<td>2,159,000</td>
<td>1,759,000</td>
<td>1,882,000</td>
<td>1,842,000</td>
<td>1,865,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>21,614,000</td>
<td>25,650,000</td>
<td>25,754,000</td>
<td>27,871,000</td>
<td>29,744,000</td>
<td>27,343,000</td>
<td>23,940,000</td>
<td>22,962,000</td>
<td>26,202,000</td>
</tr>
</tbody>
</table>

Average Annual Demand = 25,675,556 gallons
### TABLE 4
FREEDOM HILLS WELL #1 AND #2 WATER QUALITY SUMMARY

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkalinity</td>
<td>NS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>as CaCO3 (mg/L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barium (mg/L)</td>
<td>2</td>
<td>0.2</td>
<td>0.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicarbonate</td>
<td>NS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>as HCO3 (mg/L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium (mg/L)</td>
<td>NS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbonate</td>
<td>NS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>as HCO3 (mg/L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloride (mg/L)</td>
<td>250</td>
<td>16</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conductivity</td>
<td>NS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(umhos/cm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluoride (mg/L)</td>
<td>4</td>
<td>2.5</td>
<td>2.8</td>
<td>2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardness</td>
<td>NS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>as CaCO3 (mg/L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron (mg/L)</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.04</td>
</tr>
<tr>
<td>Magnesium (mg/L)</td>
<td>0.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrate (mg/L)</td>
<td>10</td>
<td>0.06</td>
<td>0.03</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrate+Nitrite</td>
<td>10 / 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(mg/L)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH (standard units)</td>
<td>6.5 – 8.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.08</td>
</tr>
<tr>
<td>Potassium (mg/L)</td>
<td>NS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAR</td>
<td>NS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium (mg/L)</td>
<td>NS</td>
<td>201</td>
<td>193</td>
<td>196</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfate (mg/L)</td>
<td>250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDS (mg/L)</td>
<td>500 / 1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>466</td>
</tr>
</tbody>
</table>

ND- Not Detected; NS- No Standard; Blank field – Not Analyzed

Recent water quality data obtained from two new Gillette Madison Limestone Test wells were obtained by the WWDC. Select water quality data and the estimated production capacities of the Gillette Madison wells, as provided by Burns & McDonnell, are presented in Table 5. Assuming that the Gillette Madison wells are pumped in proportion to their reported production capacity, the concentrations of fluoride, TDS, sulfate, hardness, and sodium will be similar to the values presented in the bottom row of Table 5. It is understood that actual operations of the Gillette Madison wellfield will vary and may change on a regular basis. The values presented in Table 5 are used in this analysis for planning purposes only.
TABLE 5
GILLETTE MADISON WELLFIELD
PRODUCTION CAPACITY AND WATER QUALITY DATA

<table>
<thead>
<tr>
<th>Well No.</th>
<th>Yield (gpm)</th>
<th>Fluoride (mg/L)</th>
<th>TDS (mg/L)</th>
<th>Sulfate (mg/L)</th>
<th>Hardness (mg/L)</th>
<th>Sodium (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-1</td>
<td>569</td>
<td>1.1</td>
<td>672</td>
<td>314</td>
<td>500</td>
<td>9.8</td>
</tr>
<tr>
<td>M-2</td>
<td>805</td>
<td>0.66</td>
<td>624</td>
<td>260</td>
<td>476</td>
<td>5.4</td>
</tr>
<tr>
<td>M-3</td>
<td>932</td>
<td>0.68</td>
<td>590</td>
<td>257</td>
<td>503</td>
<td>2</td>
</tr>
<tr>
<td>M-4</td>
<td>781</td>
<td>0.64</td>
<td>608</td>
<td>262</td>
<td>478</td>
<td>5</td>
</tr>
<tr>
<td>M-5</td>
<td>622</td>
<td>2.03</td>
<td>678</td>
<td>319</td>
<td>493</td>
<td>8.9</td>
</tr>
<tr>
<td>M-6</td>
<td>616</td>
<td>1.69</td>
<td>714</td>
<td>326</td>
<td>521</td>
<td>7.1</td>
</tr>
<tr>
<td>M-7</td>
<td>542</td>
<td>1.57</td>
<td>654</td>
<td>295</td>
<td>494</td>
<td>5.3</td>
</tr>
<tr>
<td>M-8</td>
<td>539</td>
<td>1.22</td>
<td>724</td>
<td>275</td>
<td>482</td>
<td>6.9</td>
</tr>
<tr>
<td>M-9</td>
<td>1169</td>
<td>0.63</td>
<td>581</td>
<td>262</td>
<td>470</td>
<td>4.7</td>
</tr>
<tr>
<td>M-10</td>
<td>1159</td>
<td>0.63</td>
<td>601</td>
<td>261</td>
<td>470</td>
<td>2</td>
</tr>
<tr>
<td>TW-1</td>
<td>1400</td>
<td>2.2</td>
<td>817</td>
<td>390</td>
<td>600</td>
<td>13</td>
</tr>
<tr>
<td>TW-2</td>
<td>1400</td>
<td>1.9</td>
<td>760</td>
<td>324</td>
<td>690</td>
<td>13</td>
</tr>
<tr>
<td>TOTAL</td>
<td>10,534</td>
<td>1.26</td>
<td>674</td>
<td>299</td>
<td>528</td>
<td>7.25</td>
</tr>
</tbody>
</table>

Freedom Hills could blend water from their own wells with water from the Gillette Regional Madison wellfield to obtain a fluoride concentration that is below the secondary standard of 2.0 mg/L. However, water from the Gillette Madison wellfield has elevated TDS, hardness, and sulfate concentrations. The predicted blended TDS concentration of water from the Gillette Madison wellfield is slightly elevated at 674 mg/L and the water is very hard at 486 mg/L. The predicted blended concentration of water from the Gillette Madison wellfield will exceed the standard for sulfate of 250 mg/L. Hardness concentrations higher than 150 mg/L can lead to deposition of calcium carbonate on plumbing fixtures and encrustation of heating elements in hot water heaters, dishwashers, coffee makers, etc. Many homeowners install water softening systems if the hardness is higher than 200 mg/L. Hard water also tends to increase soap consumption. Sulfate concentrations greater than 250 mg/L tends to have a laxative effect on people not accustomed to the water.

Assuming that the fluoride concentration of the Freedom Hills wells remains at 2.5 mg/L and the concentration from the Gillette Madison wellfield is 1.26 mg/L, then the blending ratio of Freedom Hills water to Gillette Madison water to achieve a concentration of 1.9 mg/L is 51 percent Freedom Hills water to 49 percent Gillette Madison water. The estimated concentrations of TDS, hardness, sulfate, and sodium of the blended water is presented in Table 6.

TABLE 6
PREDICTED WATER QUALITY FROM BLENDING FREEDOM HILLS WATER TO ACHIEVE A FLUORIDE CONCENTRATION OF 1.9 MG/L

<table>
<thead>
<tr>
<th>Dissolved Constituent</th>
<th>Freedom Hills Concentration (mg/L)</th>
<th>Gillette Madison Wellfield Concentration (mg/L)</th>
<th>Blending Ratio (FH : GMW)</th>
<th>Resulting Blended Concentration (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoride</td>
<td>2.5</td>
<td>1.26</td>
<td>51 : 49</td>
<td>1.9</td>
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<tr>
<td>TDS</td>
<td>466</td>
<td>674</td>
<td></td>
<td>568</td>
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<tr>
<td>Sulfate</td>
<td>0</td>
<td>299</td>
<td></td>
<td>147</td>
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<tr>
<td>Hardness</td>
<td>12</td>
<td>528</td>
<td></td>
<td>265</td>
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<tr>
<td>Sodium</td>
<td>196</td>
<td>7.25</td>
<td></td>
<td>104</td>
</tr>
</tbody>
</table>
Alternatively, if the fluoride concentration of the Freedom Hills water is 2.8 mg/L then the blending ratio must be 41 percent water from Freedom Hills and 59 percent from the Gillette Madison wellfield to achieve a fluoride concentration of 1.9 mg/L. The predicted water quality of the blended water at a 41:59 ratio is presented in Table 7. Blending water at a ratio of 41:59 will significantly increase both the TDS and hardness. The sulfate concentration will be higher, but acceptable. One benefit of blending the Freedom Hills water with water from the Gillette Madison wellfield will be a decrease in the sodium concentration, which will also lower the sodium adsorption ratio. Either blending scenario may lead Freedom Hills residents to install water softeners. The blending analysis should be reviewed after the new Gillette Madison wells are constructed and water quality results are known.

**TABLE 7**

**PREDICTED WATER QUALITY FROM BLENDING FREEDOM HILLS WATER TO ACHIEVE A FLUORIDE CONCENTRATION OF 1.9 MG/L**

<table>
<thead>
<tr>
<th>Dissolved Constituent</th>
<th>Freedom Hills Concentration (mg/L)</th>
<th>Gillette Madison Wellfield Concentration (mg/L)</th>
<th>Blending Ratio (FH : GMW)</th>
<th>Resulting Blended Concentration (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoride</td>
<td>2.8</td>
<td>1.26</td>
<td>41 : 59</td>
<td>1.9</td>
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<tr>
<td>TDS</td>
<td>466</td>
<td>674</td>
<td>41 : 59</td>
<td>589</td>
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<tr>
<td>Sulfate</td>
<td>0</td>
<td>299</td>
<td></td>
<td>176</td>
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<tr>
<td>Hardness</td>
<td>12</td>
<td>528</td>
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<td>316</td>
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<tr>
<td>Sodium</td>
<td>196</td>
<td>7.25</td>
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<td>84</td>
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</tbody>
</table>

**Conclusions and Recommendations**

It is anticipated that the Freedom Hills #1 and #2 wells will be able to meet the future demands of the system. Although the Freedom Hills wells do not appear to be influenced from pumping of the Fort Union Aquifer by the City of Gillette wellfield, the District should be vigilant about potential water level declines in the future. Regularly scheduled water level measurements need to be obtained from the Freedom Hills #1 and #2 wells to comply with SEO conditions and limitations on the permit. The data should be reviewed and plotted to observe long-term trends in water levels that may impact well productivity. The District should continue to monitor fluctuations of the fluoride levels in the wells in the future.

**References Cited**

APPENDIX A

FREEDOM HILLS

WELL PERMITS
STATE OF WYOMING
OFFICE OF THE STATE ENGINEER
HERSCHLER BUILDING
CHEYENNE, WYOMING 82002

APPLICATION FOR PERMIT TO APPROPRIATE GROUND WATER

FOR OFFICE USE ONLY

Temporary Filing No. U.W. 21-14-29

PERMIT NO. U.W. 85154

WATER DIVISION NO. 2 DISTRICT 36

U.W. DISTRICT: Campbell

NAME AND NUMBER OF WELL: Freedom Hills #1

1. Name of applicant(s): Freedom Hills Partnership
   Phone: 686-7200

2. Address of applicant(s): 910 E. 3rd. St., Suite G, Gillette, WY
   Zip: 82716

3. Name & address of agent to receive correspondence and notices: Eagle Enterprises, Inc.
   Box 2366, Gillette, WY 82716

4. Use to which the water will be applied: Domestic [ ] Stock Watering [ ] Irrigation [ ] Municipal [ ]
   multi-family water use in a rural subdivision of 2.5 acres per lot [ ]

5. Location of the well: (NOTE: Quarter-quarter (40-acre subdivision) MUST be shown. EXAMPLE: SE\NW\ of Sec. 12, Township 14 North, Range 68 West.)
   Campbell County, NE 1/4 of Sec. 23, 50 N, R., 71 W of the 6th P.M. (or W.R.M.), Wyoming. If located in a planned subdivision, also provide Lot # of the
   Freedom Hills Subdivision (or Add'n) of

6. Mark the well location on the section grid to the right. LOCATION SHOWN IN ITEMS MUST AGREE WITH GRID. If the proposed well is for irrigation use, sketch
   and label all irrigation ditches and canals, streams, reservoirs and other wells. Indicate the point of use or lands to be irrigated from other sources.

7. Estimated depth of the well is ______ feet.

8. MAXIMUM quantity of water to be developed and beneficially used ______ gallons per minute. NOTE: If for domestic or stock use, this application will be processed for a maximum of 25 gallons per minute.
   SPRINGS: Only springs flowing 25 gallons per minute or less, where the proposed use is domestic or stockwatering, will be considered as ground water appropriations.
   After approval of this application, some type of artificial diversion must be constructed to qualify for a water right.

9. If use is not irrigation, mark the point(s) or area(s) of use in the tabulation below.

10. If for irrigation use:
    a. Describe MAXIMUM acreage to be irrigated in each 40 acre subdivision in the tabulation below.
    b. [ ] Land will be irrigated from this well only.
    c. [ ] Land is irrigated from existing water right(s) with water from this well to be additional supply. Describe existing water right(s) under REMARKS.

<table>
<thead>
<tr>
<th>Township</th>
<th>Range</th>
<th>Sec.</th>
<th>NE%</th>
<th>NW%</th>
<th>SW%</th>
<th>SE%</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 71 23</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>50 71 26</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The water from this well will be conveyed by a pipeline to the Freedom Hills #2 wells. This water will be used to water a small family dwelling on each of the
lots 1 through 14.

See plat filed in the subdivision plat file.

11. If for irrigation use, describe method of irrigation, i.e. center pivot sprinkler, flood, etc.
The well is to be constructed on lands owned by ________________________________ the applicant.

(The granting of a permit does not constitute the granting of right of way. If any easement or right of way is necessary in connection with this application, it should be understood that the responsibility is the applicant's. A copy of the agreement should accompany this application, if the land is privately owned and the owner is not a co-applicant.)

The water is to be used on lands owned by ________________________________ the applicant.

(If landowner is not the applicant, a copy of the agreement relating to usage of appropriated water on the land should be submitted to this office. If the landowner is included as a co-applicant on the application, this procedure need not be followed.)

REMARKS: See Freddie Bell Landowner Association agreement filed on the Ross Notices under 185154 (85155).

Under penalties of perjury, I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

[Signature and Date]

THE LEGALLY REQUIRED FILING FEE MUST ACCOMPANY THIS APPLICATION

DOMESTIC AND/OR STOCK WATERING USES

$10.00

(Domestic use is defined as a single-family dwelling and the watering of lawns and gardens not exceeding one (1) acre)

IRRIGATION, MUNICIPAL, INDUSTRIAL, MISCELLANEOUS

$25.00

Monitor (For water level measurements or chemical quality sampling)

NO FEE

IF WELL WILL SERVE MULTIPLE USES, SUBMIT ONLY ONE (THE HIGHER) FILING FEE.

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

THE STATE OF WYOMING)

STATE ENGINEER'S OFFICE

This instrument was received and filed for record on the 12th day of April, 1991, at 9:30 a.m., A.D.

Permit No. U.W. 85154

Date for State Engineer

This is to certify that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This application is approved subject to the condition that the proposed use shall not interfere with any existing rights to ground water from the same source of supply and is subject to regulation and correlation with surface water rights, if the ground and surface waters are interconnected. The use of water hereunder is subject to the further provisions of Chapter 169, Session Laws of Wyoming, 1957, and any subsequent amendments thereto.

Granting of a permit does not guarantee the right to have the water level or artesian pressure in the well maintained at any specific level. The well shall be constructed to a depth adequate to allow for the maximum development and beneficial use of ground water in the source of supply.

If the well is a flowing artesian well, it shall be so constructed and equipped that the flow may be shut off when not in use without loss of water into surface formations or at the surface. This permit and accompanying notices serve to register an existing well and establish a valid water right for the same. Notice of Commencement is waived. Time limit for completion of construction waived.

For additional conditions and limitations see attached status sheet.

A permit of this application may be considered an authorization to proceed with construction of the proposed well.

Construction of said well shall begin within six (6) years from date of approval. A Statement of Completion will be filed within thirty (30) days of completion of construction, including pump installation.

Completion of the beneficial use of water for the purposes specified will be made on or before December 31, 1992.

The amount of appropriation shall be limited to the quantity to which permittee is entitled as determined at time of proof of application of water in beneficial use.

Witness my hand this 24th day of May, 1991, A.D.

[Signature]

STATE ENGINEER

PERMIT NO. U.W. 85154
T.F. No. U.W. 21-11-284

PERMIT STATUS

Priority Date   April 12, 1991  Approval Date  May 24, 1991

ADDITIONAL CONDITIONS AND LIMITATIONS:

1. A meter acceptable to the State Engineer is required to accurately measure the total quantity of water produced from this well.

2. An annual report shall be submitted to the State Engineer no later than February 15 of each year stating the total amount of water produced from this well each month during the previous January 1 to December 31, twelve (12) month period.

3. The report shall identify the well by name, location, permit number and shall identify the type of meter used for the measurement.

4. The report shall contain at least two (2) semi-annual measurements of the pumping water level in the well as measured after a minimum of twenty-four (24) consecutive hours of pumping. The dates the measurements were obtained and period of time the well was pumped prior to obtaining the measurements must be specified.

5. The report shall contain at least two (2) semi-annual measurements of the static water level in the well as measured twenty-four (24) consecutive hours after pumping has ceased. The dates the measurements were obtained and the period of time the well was "shut-in" prior to obtaining the measurements must be specified.

6. The State Engineer may, upon written request, waive all or any portion of these conditions and limitations.

May 24, 1991

DATE OF APPROVAL

Gordon L. Fassett, State Engineer

July 1, 1991 - Proof of Beneficial Use on September 30, 1981 received.
STATE OF WYOMING
OFFICE OF THE STATE ENGINEER

IF WELL IS TO BE ABANDONED, SEE STATEMENT OF COMPLETION AND DESCRIPTION OF WELL
ITEM 15, PAGE 4

NOTE: Do not fold this form. Use typewriter or print neatly with black ink.

---

PERMIT NO. U.W. 85154
NAME OF WELL: Freedom Hills

1. NAME OF OWNER: Freedom Hills Partnership

2. ADDRESS: 910 East 3rd St. Suite G, Gillette, WY Zip Code 82716

3. USE OF WATER: Domestic □ Stock Watering □ Irrigation □ Municipal □ Industrial □ Miscellaneous □ Well to serve all 143 lots

4. LOCATION OF WELL: NE 1/4 SE 1/4 of Section 23, T. 59 N., R. 71 W., of the 6th PM (or W.R.M.), Wyoming, being specifically

<table>
<thead>
<tr>
<th>Bearing and Distance</th>
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<td>____________________</td>
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<td>____________________</td>
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</tbody>
</table>

5. TYPE OF CONSTRUCTION: Drilled [X] Rotary [ ] Dug [ ] Driven [ ] Jetted [ ] Other

6. CONSTRUCTION: Total Depth of Well 1,560 ft. Depth to Static Water Level 650 ft.

   a. Casing Schedule: New [X] Used [ ]

      | Diameter | From | To |
      |----------|------|----|
      | 6 5/8''  | 0    | 1560 |

      Material: Steel
      Gage: 188

   b. Perforations: Type of perforator used: Glass Jets

      Size of perforations: 3/16'' inches by ______ inches.

      Number of perforations and depths where perforated:

      10 shots perforations from 990 ft. to 1020 feet.
      10 shots perforations from 1050 ft. to 1070 feet.
      10 shots perforations from 1156 ft. to 1176 feet.
      10 shots perforations from 1350 ft. to 1410 feet.

   c. Was well screen installed? Yes [X] No [ ]

      Diameter: ______ slot size: _______ set from ______ feet to ______ feet.

      Diameter: ______ slot size: _______ set from ______ feet to ______ feet.

   d. Was well gravel packed? Yes [X] No [ ]

      Size of gravel: ______

   e. Was surface casing used? Yes [X] No [ ]

      Size of surface casing: ______

      Was it cemented in place? Yes [X] No [ ]

7. NAME & ADDRESS OF DRILLER: Ruby Drilling Co., Inc. Box 339 Gillette, WY 82717

8. DATE OF COMPLETION OF WELL (including pump installation): June 25, 1981

9. PUMP INFORMATION: Manufacturer: Berkeley Pump Co.

      Source of power: Tri-County Horsepower: 30 Depth of Pump Setting: 920 ft.

      Amount of Water Being Pumped: 120 Gallons Per Minute. (For springs or flowing wells, see Item 11.)
10. PUMP TEST. Was a pump test made? Yes ☐ No ☒
   If so, by whom ___________________________ Address ___________________________
   Yield: _______ gpm/min. with _______ feet drawdown after _______ hours.
   Yield: _______ gpm/min. with _______ feet drawdown after _______ hours.

11. FLOWING WELL (Owner is responsible for control of flowing well).
   If well yields artesian flow, yield is _______ gpm/min. Surface pressure is _______ lbs. per square inch or _______ feet of water.
   The flow is controlled by valve [ ] cap [ ] plug [ ]
   Does well leak around casing? Yes ☐ No ☒

12. LOG OF WELL: Total depth drilled _______ feet.
   Depth of completed well _______ feet. Diameter of well _______ 3/4" _______ inches.
   Depth to first water bearing formation _______ feet.
   Depth to principal water bearing formation, Top _______ feet to Bottom _______ feet.
   Ground Elevation, if known ___________________________

<table>
<thead>
<tr>
<th>From Feet</th>
<th>To Feet</th>
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<tbody>
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<td>1500</td>
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REMARKS
- Cementing off surface
- Cemented 0 to 1D

INDICATE WATER BEARING FORMATION
- Sand
- Clay
- Coal
- Shale
- Shale and clay
- With clay stringers
- With sand stringers

QUALITY OF WATER INFORMATION:
Was a chemical analysis made? Yes ☐ No ☒
   If so, please include a copy of the analysis with this form.
   If not, do you consider the water as: Good ☐ Acceptable ☐ Poor ☐ Unusable ☒
13. TABULATION

a. If for irrigation, the land proposed to be irrigated should be described in the following tabulation. Describe in the "Remarks" section, under Item 14, the means of conveying the water to the lands and the method of irrigation.

(Give irrigable acreage in each legal subdivision. If proposed use is for additional supply for lands with a right from another source, indicate in the tabulation the priority or permit number, the source of supply and the name of the ditch or other well.)

b. If not used for irrigation, show the area and point(s) of use and location of well in the tabulation below. Also describe the method of conveyance in the "Remarks" section under Item 14.

<table>
<thead>
<tr>
<th>Township</th>
<th>Range</th>
<th>Sec.</th>
<th>NE ¼</th>
<th>NW ¼</th>
<th>SW ¼</th>
<th>SE ¼</th>
<th>TOTALS</th>
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</table>

TOTAL NUMBER OF ACRES TO BE IRRIGATED

Original Supply

Additional Supply

14. PLAT

a. If the well is to be used for irrigation, industrial, miscellaneous or municipal use, show the location of the well on the plat below. For such uses, a plat certified by a licensed engineer or land surveyor is required to be submitted at the time the Proof of Appropriation and Beneficial Use of Ground Water is submitted.

b. For other uses, accurately show the well location, point of use or uses and describe method of conveyance of water to points of use on plat and in "Remarks" section below. Make certain location on plat agrees with written description.

c. A separate map may be submitted if the information required cannot be shown on this plat.

Scale: 2" = 1 Mile

Remarks:

[Plat diagram with scale and location of well and points of use]
15. IF WELL IS TO BE ABANDONED, complete Items 1 through 6, Item 12 (Log of Well) and state reason for abandonment and details of the plugging below.

It is the responsibility of the owner to properly plug or fill in the well in order to prevent contamination of ground water and to cover or cap the well at ground level.

Under penalties of perjury, I declare that I have examined this form and to the best of my knowledge and belief it is true, correct and complete.

[Signature]
Signature of Owner or Authorized Agent

[April 9, 1991]
Date

[April 12, 1991]
Date of Approval

[April 12, 1991]
Date of Priority

[April 12, 1991]
Date of Receipt
STATE OF WYOMING
OFFICE OF THE STATE ENGINEER

PROOF OF APPROPRIATION AND BENEFICIAL USE OF GROUND WATER

The owner is responsible for submitting Parts I and II of this form. Part III will be prepared by a State Engineer Representative at time of inspection.

PART I

WATER DIVISION ________________________  U.W. DISTRICT ________________________
STATEMENT OF CLAIM ________________________  DATE OF PRIORITY ________________________
PERMIT NO. U.W. ________________________  LOCATION NH ________________________ % of Section 23 ________________________
WELL REGISTRATION ________________________  T. 50 _______, N., R. 32 W.
NAME OF WELL ________________________  ________________________

1. Name of Claimant(s) ________________________  Freedom Hills Partnership


3. For What Purpose(s) is Water Used? Use: Miscellaneous ________________________  Date First Used 04/12/91 ________________________

If use is for irrigation, give date irrigation was completed on all lands under this Permit.

PART II

For Irrigation, Industrial, Municipal and Miscellaneous Wells

A plat which has been certified by a licensed professional engineer or land surveyor shall be submitted to accompany this form. The plat shall be in accordance with Sec. 33.29-111, Wyoming Statutes 1977, or any Chapter X and X, Manual of Regulations and Instructions issued by the State Engineer’s Office. (Maximum scale shall be 2” = 1 mile.) The map shall be prepared with waterproof black ink on tracing paper or an acceptable equivalent and shall show on a suitable scale the legal subdivisions, the accurate location of the well or wells, storage facilities, if any, main canals, streams, highways and other important cultural features. Land ownership will be shown, if there is more than one owner under the permit.

IRRIGATION WELLS

Average irrigated water terms of this permit will be clearly shown with a distinctive pattern and a distinction clearly made between lands having an original supply and those provided a supplemental supply. Where use is for supplemental supply for lands with a right from another source, indicate the priority or permit number of the source, the source of supply and the name of the ditch, pipe line or other well. Conveyance system will be shown and described. Indicate method of irrigation being used.

INDUSTRIAL WELLS

In addition to the information outlined above, industrial users will locate and describe conveyance facilities to the point(s) of use, giving as accurately as possible the location of points of use. Permits for other sources of water must be identified.

MUNICIPAL WELLS

The plat will show the area of use and show and describe the means of conveyance of the water from the well to the connection with the distribution system for a municipal water system.

MISCELLANEOUS WELLS

1. The layout and area for wells where the use is described as miscellaneous and where the yield shows of the well exceeds twenty-five (25) gallons per minute must show the area of use and describe and show the means of conveyance from the well to the distribution system and or points of use.

2. The plat for wells where the use is described as miscellaneous and where the yield shown is twenty-five (25) gallons per minute or less may be a 1” minute United States Geological Survey Quadrangle map in lieu of a hand tracing provided the U.S. Geological Survey Quadrangle map is in compliance with the following conditions:

(a) The entire United State Geological Survey quadrangle map must be submitted to the State Engineer’s Office.

(b) The scale on said quadrangle map must be one to twenty-four thousand.

(c) An identified section corner or quarter corner must be shown on said quadrangle map along with Section, Township and Range.

(d) The section in which the well is located and the section(s) where the area(s) or point(s) of use or located must be subdivided into forty (40) acre tracts and the well location and area(s) or point(s) of use clearly labeled and described.

(e) Said quadrangle map showing the well location and area(s) or point(s) of use must be certified by a professional engineer or land surveyor licensed to practice within the State of Wyoming.
A "CERTIFICATE OF OWNERSHIP" FROM THE COUNTY CLERK'S OFFICE SHOWING OWNERSHIP OR CONTROL OF LAND(S) INVOLVED MUST ACCOMPANY THIS FORM.

Under penalties of perjury, I declare that I have examined this form and to the best of my knowledge and belief it is true, correct and complete.

[Signature]
Signature of Owner or Authorized Agent

[Date]
Date

[Date of Receipt] 1951

[19]
STATE OF WYOMING
OFFICE OF THE STATE ENGINEER
HERSCHEL BUILDING
CHEYENNE, WYOMING 82002

APPLICATION FOR PERMIT TO APPROPRIATE GROUND WATER

FOR OFFICE USE ONLY

PERMIT NO. U.W. 85155
TEMPORARY FILING NO. U.W. 21-12-284

WATER DIVISION NO. 2 DISTRICT 10

U.W. DISTRICT ___________ Campell Co.

NOTE: Do not fold this form. Use typewriter or print neatly with black ink.
ALL ITEMS MUST BE COMPLETED BEFORE APPLICATION IS ACCEPTABLE.

NAME AND NUMBER OF WELL. Freedom Hills #2

1. Name of applicant(s) Freedom Hills Partnership __________________________ Phone: 866-7700

2. Address of applicant(s) 910 E. 3rd. St., Suite C, Gillette, WY ____________ Zip 82716

3. Name & address of agent to receive correspondence and notices 
Eagle Enterprises Inc. Box 2366, Gillette, WY 82717

4. Use to which the water will be applied: Domestic [] Stock Watering [] Irrigation [] Municipal []

Industrial [] Miscellaneous [] Multi-family use in a rural subdivision of 2.5 acres per lot

5. Location of the well: (NOTE: Quarter-quarter (40 acre subdivision) MUST be shown. EXAMPLE: Section 36, Township 14 North, Range 6 West, Campbell County, Wyoming) 65.64 acres of Sec. 23, T. 50 N. R. 31 W. of the 6th P.M. (or W.R.M.) Wyoming. If located in a plotted subdivision, also provide Lot __. Block ______ of the Freedom Hills Subdivision (or Addition) of ________

6. Mark the well location on the section grid to the right. LOCATION SHOWN IN ITEM 5 MUST AGREE WITH GRID. If the proposed well is for irrigation use, sketch and label all irrigation ditches and canals, stream, reservoirs and other wells. Indicate the point of use or lands to be irrigated from other sources.

7. Estimated depth of the well is __________ feet.

8. MAXIMUM quantity of water to be developed and beneficially used: 150 gallons per minute. NOTE: If for domestic or stock use, this application will be processed for a maximum of 25 gallons per minute. SPRINGS: Only springs flowing 25 gallons per minute or less, where the proposed use is domestic or stock watering, will be considered as ground water appropriations. After approval of this application, some type of artificial diversion must be constructed to qualify for a water right.

9. If use is not irrigation, mark the point(s) or area(s) of use in the tabulation below.

10. If for irrigation use:

   a. Describe MAXIMUM acreage to be irrigated in each 40 acre subdivision in the tabulation below.

   b. [ ] Land will be irrigated from this well only.

   c. [ ] Land is irrigated from existing water right(s) with water from this well to be additional supply. Describe existing water right(s) under REMARKS.

   d. [ ] Water from this well will be commercial.

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<th>Range</th>
<th>Sec</th>
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<th>NW 1/4</th>
<th>SW 1/4</th>
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<th>TOTALS</th>
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</table>

The water from this well will be commercial with water from the Freemen Hills U.W. 85134. To have one simple frame building on each of lots 9, 10.

See plot filed in subdivision plat file.

11. If for irrigation use, describe method of irrigation, i.e. center pivot sprinkler, flood, etc.

   Permit No. U.W. 85155

SEE REVERSE SIDE

Book No. 632 Page No. 56
12. The well is to be constructed on land owned by _____ The applicant.
   (The granting of a permit does not constitute the granting of right of way. If any easement or right of way is necessary in connection with this application, it should be understood that the responsibility is the applicant's. A copy of the agreement should accompany this application, if the land is privately owned and the owner is not a co-applicant.)

13. The water is to be used on land owned by _____ The applicant.
   (If landowner is not the applicant, a copy of the agreement relating to usage of appropriated water on the land should be submitted to this office. If the landowner is included as a co-applicant on the application, this procedure need not be followed.)

REMARKS: See Freedom Hills Landowners Association agreement, filed in Mayor under U.W. 85154 (85155)

Under penalties of perjury, I declare that I have examined this application and to the best of my knowledge and belief it is true, correct and complete.

[Signature]

Date

THE LEGALLY REQUIRED FILING FEE MUST ACCOMPANY THIS APPLICATION

DOMESTIC AND/OR STOCK WATERING USES $10.00

(Domestic use is defined as a single-family dwelling and the watering of lawns and gardens not exceeding one (1) acre)

IRRIGATION, MUNICIPAL, INDUSTRIAL, MISCELLANEOUS $25.00

MONITOR (For water level measurements or chemical quality sampling) NO FEE

IF WELL WILL SERVE MULTIPLE USES, SUBMIT ONLY ONE (THE HIGHER) FILING FEE.

THIS SECTION IS NOT TO BE FILLED IN BY APPLICANT

THE STATE OF WYOMING

STATE ENGINEER'S OFFICE

This instrument was received and filed for record on the ___ day of ___ , 19___.

[Signature]

Permit No. U.W. 85155

This is to certify that I have examined the foregoing application and do hereby grant the same subject to the following limitations and conditions:

This application is approved subject to the condition that the proposed use shall not interfere with any existing rights to ground water from the same source of supply and is subject to regulation and correlation with surface water rights, if the ground and surface waters are interconnected. The use of water hereunder is subject to the further provisions of Chapter 169, Session Laws of Wyoming, 1957, and any subsequent amendments thereto.

Granting of a permit does not guarantee the right to have the water level or artesian pressure in the well maintained at any specific level. The well should be constructed to a depth adequate to allow for the maximum development and beneficial use of ground water in the source of supply.

If the well is a flowing artesian well, it shall be so constructed and equipped that the flow may be shut off when not in use, without loss of water into surface formations or at the surface.

This permit and accompanying notice serve to register an existing well and establish a valid water right for the same. Notice of Commencement is waived. Time limit for completion of construction waived.

FOR ADDITIONAL CONDITIONS AND LIMITATIONS SEE ATTACHED SHEET

Approval of this application may be considered as authorization to proceed with construction of the proposed well.

Construction of well will begin within one (1) year from date of approval. A Statement of Completion will be filed within thirty (30) days of completion of construction, including pump installation.

Completion of construction and completion of correlation with surface water to the purposes specified in Item 6 of the application will be made by December 31, 19__.

This application will be made by December 31, 19__.

The amount of appropriation shall be limited to the quantity to which the permittee is entitled as determined at time of proof of application of water to beneficial use.

Witness my hand this ___ day of ___ , 19__.

[Signature]

State Engineer

April 8, 1991--Statement of Completion on February 10, 1992 received.
PERMIT NO. U.W. 85155
T.F. No. U.W. 21-12-284

PERMIT STATUS

Priority Date April 12, 1991 Approval Date May 24, 1991

ADDITIONAL CONDITIONS AND LIMITATIONS:

1. A meter acceptable to the State Engineer is required to accurately measure the total quantity of water produced from this well.

2. An annual report shall be submitted to the State Engineer no later than February 15 of each year stating the total amount of water produced from this well each month during the previous January 1 to December 31, twelve (12) month period.

3. The report shall identify the well by name, location, permit number and shall identify the type of meter used for the measurement.

4. The report shall contain at least two (2) semi-annual measurements of the pumping water level in the well as measured after a minimum of twenty-four (24) consecutive hours of pumping. The dates the measurements were obtained and period of time the well was pumped prior to obtaining the measurements must be specified.

5. The report shall contain at least two (2) semi-annual measurements of the static water level in the well as measured twenty-four (24) consecutive hours after pumping has ceased. The dates the measurements were obtained and the period of time the well was "shut-in" prior to obtaining the measurements must be specified.

6. The State Engineer may, upon written request, waive all or any portion of these conditions and limitations.

May 24, 1991

Gordon W. Fessett, State Engineer

July 1, 1991 - Proof of Beneficial Use on April 30, 1982 received.
STATE OF WYOMING
OFFICE OF THE STATE ENGINEER

IF WELL IS TO BE ABANDONED, SEE STATEMENT OF COMPLETION AND DESCRIPTION OF WELL,
ITEM 15, PAGE 4

PERMIT NO. U.W. 85155 NAME OF WELL: Freedom Hills #2

1. NAME OF OWNER: Freedom Hills Partnership.

2. ADDRESS: 910 R., 2nd St., Suite G, Gillette, WY Zip Code: 82716

3. USE OF WATER: Domestic [ ] Stock Watering [ ] Irrigation [ ] Municipal [ ] Industrial [ ] Miscellaneous [ ]

   Well to serve all above.

4. LOCATION OF WELL: SE 1/4 NW 1/4 of Section 23 T 50 N, R 71 W. of the 6th P.M. (or W.R.M.),

   Wyoming, being specifically.

   or ______ ft. North and ______ ft. East from the ____ corner of Section ______ T. ______ N. R. ______ W.

5. TYPE OF CONSTRUCTION: Drilled [ ] Rotary [ ] Dug [ ] Driven [ ] Jotted [ ]

   Other [ ]

6. CONSTRUCTION: Total Depth of Well 1254 ft. Depth to Static Water Level 600 ft.

   a. Casing Schedule New [X] Used [ ]

      __________ diameter from 0 ft. to 1254 ft. ________ Gage ________
      __________ diameter from ________ ft. to ________ ft. ________ Gage ________
      __________ diameter from ________ ft. to ________ ft. ________ Gage ________

   b. Perforations: Type of perforator used ________ Glass Jets ________

      Size of perforations ________ inches by ________ inches.

      Number of perforations and depths where perforated:

      19 shots perforations from 610 ft. to 830 feet.
      19 shots perforations from 874 ft. to 894 feet.

      19 shots perforations from 1030 ft. to 1050 feet.

   c. Was well screen installed? Yes [X] No [ ]

      Diameter: ________ slot size: ________ set from ________ feet to ________ feet.

      Diameter: ________ slot size: ________ set from ________ feet to ________ feet.

   d. Was well gravel packed? Yes [X] No [ ]

      Size of gravel ________ feet to ________ feet.

   e. Was surface casing used? Yes [X] No [ ]

      Diameter: ________ slot size: ________ set from ________ feet to ________ feet.

   f. Was it cemented in place? Yes [X] No [ ]

7. NAME & ADDRESS OF DRILLER: Ruby Drilling Co., Inc. Box 339 Gillette, WY 82717

8. DATE OF COMPLETION OF WELL (including pump installation): February 10, 1982

9. PUMP INFORMATION: Manufacturer: Berkeley ________ Type: Submersible ________

   Source of power: Tri-County ________ Horsepower: 30 ________ Depth of Pump Setting: 885 Feet

   Amount of Water Being Pumped: ________ Gallons Per Minute (For springs or flowing wells, see item 11)
10. PUMP TEST: Was a pump test made? Yes ☐ No ☐
If so, by whom __________________________. Address __________________________.
Yield __________________________ gal/min. with _______ foot drawdown after _______ hours.
Yield __________________________ gal/min. with _______ foot drawdown after _______ hours.

11. FLOWING WELL (Owner is responsible for control of flowing well):
If well yields at given flow, yield is _______ gal/min. Surface pressure is _______ lb/sq. inch, or _______ feet of water.
The flow is controlled by: valve [ ] cap [ ] plug [ ]
Does well leak around casing? Yes ☐ No ☐

12. LOG OF WELL: Total depth drilled _______ feet.
Depth of completed well _______ feet. Diameter of well _______ inches.
Depth to first water bearing formation _______ feet.
Depth to principal water bearing formation Top _______ feet to Bottom _______ feet.

Ground Elevation, If known _____________

<table>
<thead>
<tr>
<th>From Foot</th>
<th>To Foot</th>
<th>Material Type, Texture, Color</th>
<th>Remarks (Cementing, Shutoff, Packing, etc.)</th>
<th>Indicate Water Bearing Formation</th>
<th>Indicate Perforated Casing Location</th>
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<tr>
<td>12</td>
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<td>Red Rock - Slate</td>
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QUALITY OF WATER INFORMATION:
Was a chemical analysis made? Yes ☐ No ☐
If so, please include a copy of the analysis with this form.
If not, do you consider the water as: Good ☐ Acceptable ☐ Poor ☐ Unusable ☐
13. **TABULATION**

a. If for irrigation, the land proposed to be irrigated should be described in the following tabulation. Describe in the “Remarks” section, under Item 14, the means of conveying the water to the lands and the method of irrigation.

(Give irrigable acreage in each legal subdivision. If proposed use is for additional supply for lands with a right from another source, indicate in the tabulation the priority or permit number, the source of supply and the name of the ditch or other well.)

b. If not used for irrigation, show the area and point(s) of use and location of well in the tabulation below. Also describe the method of conveyance in the “Remarks” section under Item 14.

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<tr>
<th>Town</th>
<th>Range</th>
<th>Sec.</th>
<th>NE 1/4</th>
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<th>TOTALS</th>
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**TOTAL NUMBER OF ACRES TO BE IRRIGATED**

Original Supply ____________ acres

Additional Supply ____________ acres

14. **PLAT**

a. If the well is to be used for irrigation, industrial, miscellaneous or municipal use, show the location of the well on the plat below. For such uses, a plat certified by a licensed engineer or land surveyor is required to be submitted at the time the Proof of Appropriation and Beneficial Use of Ground Water is submitted.

b. For other uses, accurately show the well location, point of use or uses and describe method of conveyance of water in points of use on plat and in “Remarks” section below. Make certain location on plat agrees with written description.

c. A separate map may be submitted if the information required cannot be shown on this plat.

Scale: 2" = 1 Mile

REMARDS

______________________________________

______________________________________

______________________________________
15. IF WELL IS TO BE ABANDONED, complete Items 1 through 8, Item 12 (Log of Well) and state reason for abandonment and details of the plugging below.

It is the responsibility of the owner to properly plug or fill in the well in order to prevent contamination of ground water and to cover or cap the well at ground level.

Under penalties of perjury, I declare that I have examined this form and to the best of my knowledge and belief it is true, correct, complete.

[Signature]

Date: [April 1991]

Date of Receipt: [April 1991]

Date of Priority: [April 1991]

Date of Approval: [April 1991]
STATE OF WYOMING
OFFICE OF THE STATE ENGINEER

PROOF OF APPROPRIATION AND BENEFICIAL USE OF GROUND WATER

The owner is responsible for submitting Parts I and II of this form. Part III will be prepared by a State Engineer Representative at time of inspection.

PART I

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<th>WATER DIVISION</th>
<th>2 (10)</th>
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<td>U.W. DISTRICT</td>
<td>Campbell Co.</td>
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<tr>
<td>STATEMENT OF CLAIM</td>
<td>April 12, 1991</td>
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<tr>
<td>PERMIT NO. U.W.</td>
<td>85155</td>
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<td>WELL REGISTRATION</td>
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<tr>
<td>NAME OF WELL</td>
<td>Freedom Hills #2</td>
</tr>
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</table>

1. Name of Claimant(s): Freedom Hills Partnership

2. Address: 910 East 3rd St, Suite C, Gillette, WY. Zip Code: 82716

3. For What Purposes is Water Used?: Land Management Date First Used: April 12, 1991

If use is for irrigation, give date irrigation was completed on all lands under this permit: N/A

PART II

For Irrigation, Industrial, Municipal and Miscellaneous Wells

A plat which has been certified by a licensed professional engineer or land surveyor shall be submitted to accompany this form. The plat shall be in accordance with Sec. 32-09-111 Wyoming Statutes 1977, or see Chapter V and VI. Manual of Regulations and Instructions issued by the State Engineer's Office. (Maximum scale shall be 1" = 1 mile.) The map shall be prepared with waterproof black ink or tracing paper or an acceptable equivalent and shall show on a suitable scale the legal subdivisions, the accurate location of the well or wells, storage facilities, if any, main roads, streams, highways, and other important cultural features. Land ownership will be shown; if there is more than one owner under the permit.

IRRIGATION WELLS

Average irrigated under terms of this permit will be clearly shown with a distinctive pattern and a distinction clearly made between lands having an original supply and those provided a supplemental supply. Where use is for supplemental supply for lands with a right from another source, indicate the priority or permit number of the source, the source of supply and the name of the ditch, pipe line, or other well. Conveyance system will be shown and described. Indicate method of irrigation being used.

INDUSTRIAL WELLS

In addition to the information outlined above, industrial users will locate and describe conveyance facilities to the points of use giving as accurately as possible the location of points of use. Points for other sources of water must be identified.

MUNICIPAL WELLS

The plat will show the area of use and show and describe the means of conveyance of the water from the well to the connection with the distribution system for a municipal water system.

MISCELLANEOUS WELLS

1. The fenicat plat for wells where the use is described as miscellaneous and where the yield of the well exceeds twenty-five (25) gallons per minute must show the area of use and describe and show the means of conveyance from the well to the distribution system and flat points of use.

2. The plat for wells where the use is described as miscellaneous and where the yield or flow is twenty-five (25) gallons per minute or less may be a 7½ minute United States Geological Survey Quadrangle map in lieu of a line tracing provided the U.S. Geological Survey Quadrangle map is in compliance with the following conditions:

(a) The entire United States Geological Survey quadrangle map must be submitted to the State Engineer's Office.

(b) The scale on said quadrangle map must be one to twenty-four thousand.

(c) An identified section corner or quarter corner must be shown on said quadrangle map along with Section, Township and Range.

(d) The section in which the well is located and the quarter(s) where the area(s) or point(s) of use are located must be subdivided into forty (40) acre tracts and the well location and area(s) or point(s) of use clearly labeled and described.

(e) Said quadrangle map showing the well location and area(s) or point(s) of use must be certified by a professional engineer or land surveyor licensed to practice within the State of Wyoming.
A "CERTIFICATE OF OWNERSHIP" FROM THE COUNTY CLERK'S OFFICE SHOWING OWNERSHIP OR CONTROL OF LANDS INVOLVED MUST ACCOMPANY THIS FORM.

Under penalty of perjury, I declare that I have examined this form and to the best of my knowledge and belief it is true, correct and complete.

[Signature]
Signature of Owner or Authorised Agent

Date of Receipt: __________________________ 19_____
Appendix B – Miscellaneous
Background Information on
Freedom Hills ISD
DISTRICT QUESTIONNAIRE

Supplemental Information to Accompany the City of Gillette's WWDC Level III Project Application for Regional Water System Extensions

Gillette Regional Water Supply Project

May 31, 2011

1. INSTRUCTIONS

The City of Gillette Utilities Department, with assistance from the Campbell County Public Works Department, will submit a Level III Project Application to the Wyoming Water Development Commission (WWDC) in August 2011 requesting engineering design, permitting, easement and construction funding for 67% of the costs necessary to extend Regional Water Service from the new Gillette Madison Pipeline to surrounding Improvement and Service Districts and other Water Systems collectively referred to as "Water Districts" located within the Designated Service Area as established by the December 21, 2010 Regional Water Joint Powers Agreement between Campbell County and the City of Gillette. During a May 3, 2011 Special Election, Campbell County Voters approved $20 million from future revenues received through a 1% Specific Purpose Excise Tax (Capital Facilities Tax) to pay for the 33% local match for the regional extension project.

The City of Gillette (City) and Campbell County (County) respectfully request your cooperation as we move forward with the WWDC application to request the 67% State grant funding.

The City, County and the WWDC request the following information be completed and returned to the City by July 15, 2011 within the self-addressed, pre-paid postage envelope.

1. A notarized copy of a resolution supporting the regional extensions project by the board or other governing entity of your respective Water District. An example Resolution is enclosed.
2. Completion and execution (signature) of the following District Questionnaire. The person signing the Questionnaire must have authority to commit the entity to a binding contract.

The City, County and WWDC will use this information to prioritize our Level III funding request for future regional water service extensions. Responsive Water Districts with immediate water quality/quantity deficiencies will be prioritized higher than Water Districts with less water quality/quantity deficiencies. Non-responsive Water Districts will be prioritized last. Based upon availability of WWDC funding, it might take five or more years to receive funding and/or fully benefit from the 67% WWDC grant share for the regional extension project.

2. CONTACT INFORMATION

Type of Entity (please check one):

- Improvement and Service District, recognized per W.S. 18-12-101 thru 18-12-140
- Other Statutorily Recognized Special District (i.e. Water or Irrigation District)
- Home Owner's Association or Subdivision Water Association
- Private Water Provider
- Other. Please explain: ___________________

Freedom Hills Improvement and Service District

P.O. Box 4432

Gillette, Campbell, WY 82717

Eugene E Morgan

Authorized Official - Type or Print Name

Signature of Authorized Official

Date: 7-1-11

5/31/2011 District Questionnaire
3. EXTENSION PRIORITIES (WATER DELIVERY SCHEDULE)

Please check one of the following that best describes your desired timeframe to be connected to the Regional Water System.

- [ ] Immediately (by December 31, 2013)
- [ ] Less Urgent (after December 31, 2013, but before December 31, 2015)
- [x] No Urgency (after January 1, 2016)
- [ ] Never.

Space provided for further explanation, if necessary:

-----------------------------------------

4. INITIAL LEVEL OF SERVICE (LOS)

Please check one of the following that best describes the type of water service you would like to receive upon execution of water service agreement with the City within the first five years after being connected to the Regional Water System.

- [x] LOS A - continuous, year-round wholesale water service from the Regional Water System.
- [ ] LOS B - seasonal service for "peak" or "off-peak" times of the year. (Supplemental water for irrigation demands.)
- [ ] LOS C - short-term emergency service or fire protection stand-by service.
- [ ] LOS D - sell excess water to the Regional Water System, provided District water meets rigid quality requirements.
- [ ] LOS E - no service. We will not enter into a Water Service Agreement with the City within the first five years.

Space provided for further explanation, if necessary: We will use the Madison water to blend with the Ft. union to manage the fluoride levels.

-----------------------------------------

5. LONG-TERM LEVEL OF SERVICE (LOS)

Please check one of the following that best describes the type of water service you would like to receive upon execution of water service agreement with the City, five years after being connected to the Regional Water System, or after December 31, 2021.

- [x] LOS A - continuous, year-round wholesale water service from the Regional Water System.
- [ ] LOS B - seasonal service for "peak" or "off-peak" times of the year. (Supplemental water for irrigation demands.)
- [ ] LOS C - short-term emergency service or fire protection stand-by service.
- [ ] LOS D - sell excess water to the Regional Water System, provided District water meets rigid quality requirements.
- [ ] LOS E - no service. We will not enter into a Water Service Agreement with the City after December 31, 2021.

Space provided for further explanation, if necessary:

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6. **DISTRICT WATER SYSTEM CONDITION – READINESS TO ACCEPT REGIONAL WATER**

(1) Each customer is individually metered.
(2) Each tap is equipped with an operational backflow prevention device, specified to meet the appropriate hazard classification.
(3) Water transmission systems (pipes that transport water from wells to the distribution system) are in good condition.
(4) Water storage facilities are in good condition.
(5) Water pumping systems are in good condition.
(6) Water distribution systems (pipes w/tap connections or hydrant connections) are in good condition.
(7) Valves and fittings in place to connect to the Regional Water System with little disruption to existing operations.
(8) Not aware of any significant water losses within the transmission/distribution system.

Please check one of the following that best describes the known condition of your water system.

- [ ] Ready to receive Regional Water Service. Our system meets ALL of the 8 statements listed above.
- [ ] Some internal improvements are necessary. Our system meets 4 or more of the 8 statements listed above.
- [x] Major internal improvements are needed. Our system meets 3 or less of the 8 statements listed above.

Space provided for further explanation, if necessary: We will be conducting a level two water study on our distribution system.

7. **SCHEDULE OF INTERNAL IMPROVEMENTS**

Please check one of the following that best describes your timeframe to rectify any known internal water system deficiencies prior to receiving Regional Water Service. This assumes a significant level of Federal, State, or Local funding will be available to help out.

- [ ] Known deficiencies will be remedied by December 31, 2013.
- [ ] Known deficiencies will be remedied after December 31, 2013, but before December 31, 2015.
- [x] Known deficiencies will be remedied after January 1, 2016.
- [ ] Unknown. Technical assistance is necessary to help develop a schedule to remedy improvements.

Space provided for further explanation, if necessary:

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* Water Districts are strongly encouraged to apply for a WWDC Level II Study if you have more than one or two known deficiencies and/or possess a funding short-fall that would prevent your District from connecting to the Regional Water System by December 31, 2015. A separate WWDC Application requesting a Level II Study is enclosed for your benefit. Or, Water Districts can download a copy of the WWDC Level II Study Application from the WWDC website:

Applications are to be completed by the District and submitted directly to the Wyoming Water Development Commission by August 15, 2011 to be considered as part of the 2012 Wyoming State Legislature Omnibus Water Planning Bill. If the application is approved, and if State funding is available, the State of Wyoming pays 100% toward the cost of this study. However, a $1,000 application fee is required. $750 of the original $1,000 fee is returned if the study is not completed.

The scope of any proposed Level II Study could involve an evaluation of the District's existing water system condition, development of a schedule for improvements, identification of future funding sources, and/or recommendation of other measures that will improve the operation and efficiency of your District's water system.

City and County Staff are available to help the District(s) prepare this separate Level II application.

Please contact the WWDC at 307.777.7626 for more information.
8. FEDERAL DRINKING WATER COMPLIANCE
   a. Are you under any Federal (EPA) and/or WY DEQ mandate(s) to improve your system?
      (i.e. Significant Deficiencies, Administrative Orders, Notice of Violations, Actions Taken, Compliance Schedules, etc.)
      ☑️ no
      ☐ yes, please explain:

   b. In the last four years has your system been non-compliant with Federal Safe Drinking Water Requirements?
      (i.e. Have you exceeded regulated contaminant MCL's like radio-nuclides, fluoride, nitrates etc.? Have you failed any total coliform samples? Have you received a violation for failing any routine or repeat coliform sampling? Have you exceeded action levels for the Lead/Copper Rule? Have you had any additional sampling due to non-compliance with the Total Coliform Rule, Ground Water Rule or Disinfection By Product Rule?)
      ☑️ yes, please explain: We have had the high fluoride levels.

   c. Does anyone in your District Service Area haul their drinking water?
      ☑️ no
      ☐ yes, please explain:

9. EXISTING WATER SYSTEM INFORMATION
   a. Description of Present Water Supply:
      Number of wells: 2
      Approximate Depth: 1560; 1254 FT. Union
      Primary supply aquifer or formation:
      Approximate Yield in GPM per well: 120; 100
      Total of all wells: 220

   b. Water Storage:
      Treated (volume and description): 75,000 Metal tank
      Raw (volume and description):

   c. Transmission pipeline - Approx. Distance form Source to Distribution System:
      Type of pipe material: Fiberglass, Polly
      Diameter(s):
      Age of pipeline: 30 Years
      Condition of pipeline:

   d. Disinfection - None: Chlorine Gas ☑️ Tablet Feeder ☐ Liquid Hypochlorite ☐

   e. Other Treatment - None: Reverse Osmosis ☐ Membrane ☐ Softening ☐

   f. Are individual water customers metered? ☑️ yes ☐ no
      Do you bill by your meters? ☑️ yes ☐ no
      Identify unmetered usage (irrigation of parks, cemeteries, fire protection, etc.) and amount of unmetered usage:

   g. Do you have an independent raw water irrigation system? ☑️ yes ☐ no
      If yes, what is your raw water system capacity (gallons per day)?
      If yes, what is your average annual raw water usage (gallons)?

5/31/2011 District Questionnaire
h. What is the current population of your District (2010 Census): 640

i. How many active water customers (taps) are located within your District? 161
   How many taps are served by you outside your current District boundary? 0
   How many total water customers (taps) can you serve within your District boundary at full build-out? 0
   What are the name(s) of other water systems served by your District? N/A
   Do you receive water from another District? yes no ✓ If so, what is the name of the purveyor?

j. Total number of gallons produced by all District water sources annually: 29,744,000
   Gallons used per capita per day: ________________________________
   Average Day Demand (total system gallons per day): 12.7
   Historic Peak Day Demand (total system gallons per day): 44.6

k. Maximum capacity of the water supply system (gallons per day): 316,800
   Estimated total future increased capacity needed (gallons per day) ____________________

l. Estimated system water losses (percentage): 25%

m. Identify your current water rights (SEO#, priority date): ____________________
   Describe the status of these water rights (i.e. filings, permits, adjudicated water rights): ____________________

n. What is the single factor (bottleneck) that presently limits your ability to provide water? (i.e. water quality compliance, supply, transmission, treatment, distribution, etc.): ____________________

o. Describe water conservation efforts (i.e. tiered water rates, lawn watering restrictions, etc.): Install water meters.

10. EXISTING FINANCIAL INFORMATION

a. What are your system development charges (i.e. PIF's or tap fees) and other "hook-up" charges like the physical cost of the tap, meter cost, etc. associated with new water connections?

<table>
<thead>
<tr>
<th>Sys. Develop. Fee</th>
<th>Meter Fee</th>
<th>Tap Fee</th>
<th>Other Fees</th>
<th>Total Fees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.00</td>
</tr>
</tbody>
</table>
   Residential:      | $_________| $________| $________ | $________ |
   Commercial:       | $________| $________| $________ | $________ |

b. What are your monthly residential retail water rates?
   Monthly Base Charge: $20.00 Amount of water received from Monthly Base Charge (gallons): Unlimited
   Monthly Use Charge ($ per 1,000 gallons per month above any fixed base charge): _______________
   Maximum amount of water received from the 1st tier Monthly Use Charge (gallons): _______________
   Excess Use Charge ($ per 1,000 gallons per month above the 1st tier use charge): _______________

   c. How much is a monthly residential monthly water bill based on 12,000 gallons per month consumption? $________

   d. Identify any local conditions that affect your rates? (i.e.: flow through for frost prevention, non-water related homeowner assoc. fees, etc.): ____________________
e. Please provide some basic financial information regarding your water system.

**Revenues**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual revenues generated from water sales:</td>
<td>$153,600.00</td>
</tr>
<tr>
<td>Annual revenues from system development charges (i.e. PIF's or tap fees):</td>
<td></td>
</tr>
<tr>
<td>Annual revenues from other sources:</td>
<td>$153,600.00</td>
</tr>
<tr>
<td><strong>Total annual revenues:</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Expenses**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual budget for water supply operation &amp; maintenance expenses:</td>
<td>$21,000.00</td>
</tr>
<tr>
<td>(i.e. O&amp;M costs for equipment, labor and materials for wells, pumps and motors)</td>
<td></td>
</tr>
<tr>
<td>Annual O&amp;M budget for all sampling, lab testing, and compliance reporting:</td>
<td>$1,200.00</td>
</tr>
<tr>
<td>Annual budget for all other operation &amp; maintenance expenses:</td>
<td>$3,840.00</td>
</tr>
<tr>
<td>(i.e. O&amp;M costs for distribution system maintenance, locates, flushing, chemicals, etc.)</td>
<td></td>
</tr>
<tr>
<td>Annual payments for debt retirement (annual loan payments, if any):</td>
<td></td>
</tr>
<tr>
<td>Annual payments made to all capital replacement/repair fund(s):</td>
<td>$12,000.00</td>
</tr>
<tr>
<td>Annual payments to an emergency fund:</td>
<td></td>
</tr>
<tr>
<td>Annual payments for other purposes:</td>
<td>$38,040.00</td>
</tr>
<tr>
<td><strong>Total annual expenses:</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Reserves**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current balance in repair and replacement fund:</td>
<td>$109,000.00</td>
</tr>
<tr>
<td>Current balance in emergency fund:</td>
<td></td>
</tr>
<tr>
<td><strong>Current balance in ALL reserve funds:</strong></td>
<td>$109,000.00</td>
</tr>
</tbody>
</table>

f. Is the operation of your water system self supporting in terms of revenues offsetting costs for operation, maintenance, debt retirement, replacement funds and emergency funds?

- [ ] yes
- [ ] no

If you answered “no” how is the difference subsidized?

(i.e. Federal/State/County Grants, Other Revenue, etc.)

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Space provided for additional comments, if necessary:

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

- END OF DISTRICT QUESTIONNAIRE -

Thank you for your assistance.

*Please return the completed District Questionnaire, Notarized Resolution and most-recent Water Quality Consumer Confidence Report in the self-addressed, pre-paid postage envelope by July 15, 2011.*
RESOLUTION NO.____

A RESOLUTION SUPPORTING A PROJECT TO EXTEND REGIONAL WATER SERVICE TO EXISTING IMPROVEMENT AND SERVICE DISTRICTS AND OTHER WATER SYSTEMS COLLECTIVELY REFERRED TO AS "WATER DISTRICTS" LOCATED WITHIN THE DESIGNATED SERVICE AREA AS ESTABLISHED BY THE DECEMBER 21, 2010 CITY/COUNTY JOINT POWERS AGREEMENT FOR THE GILLETTE REGIONAL WATER SUPPLY PROJECT.

WHEREAS, the City of Gillette conducted a Long Term Water Supply, Level II Study which identified an additional parallel Madison pipeline with an expanded well field, booster stations, treatment facilities and storage reservoirs in order to meet long term water supply needs for the Gillette Area.

WHEREAS, the City of Gillette has applied for and was approved funding commitments from the Wyoming State Legislature for the Design, Permitting, Easements and Construction for the Gillette Madison Pipeline Project.

WHEREAS, the Wyoming Water Development Commission completed an October 2009 Gillette Regional Master Plan Level I Study which identified a Regional Water Service area that will benefit existing Water Districts surrounding Gillette.

WHEREAS, the City of Gillette, with assistance from Campbell County, completed a May 2010 Regional System Potential Participant Connections (Level II) Study which provided detailed construction budget cost estimates to extend regional water service to existing Water Districts surrounding Gillette.

WHEREAS, the City of Gillette and Campbell County, with assistance from the Wyoming Water Development Commission, executed a December 21, 2010 Regional Water Joint Powers Agreement that identifies a Designated Service Area, Organization Structure, Financial Strategies and Governance Methods for future management of the Gillette Regional Water Supply System.

WHEREAS, the Campbell County Voters approved $20 million from future revenues received through a Specific Purpose Excise Tax (Capital Facilities Tax) to pay for the 33% local match to extend Regional Water Service from the new Gillette Madison Pipeline to existing Water Districts located within the Designated Service Area for the Gillette Regional Water Supply Project.

WHEREAS, the City of Gillette will submit a Level III Project Application to the Wyoming Water Development Commission in August 2011 requesting engineering design, permitting, easement and construction funding for 67% of the costs necessary to extend Regional Water Service from the new Gillette Madison Pipeline Project to existing Water Districts located within the Designated Service Area as established by the December 21, 2010 Joint Powers Agreement.
NOW, THEREFORE, BE IT RESOLVED BY THE

(NAME OF ENTITY)

WE SUPPORT A PROJECT TO EXTEND REGIONAL WATER SERVICE TO EXISTING IMPROVEMENT AND SERVICE DISTRICTS AND OTHER WATER SYSTEMS COLLECTIVELY REFERRED TO AS "WATER DISTRICTS" LOCATED WITHIN THE DESIGNATED SERVICE AREA AS ESTABLISHED BY THE DECEMBER 21, 2010 CITY/COUNTY JOINT POWERS AGREEMENT FOR THE GILLETTE REGIONAL WATER SUPPLY PROJECT.

PASSED, APPROVED AND ADOPTED THIS ___ DAY OF ___ 2011.

Signature

(Name (print))
Vice President

STATE OF WYOMING
COUNTY OF CAMPBELL

The forgoing instrument was acknowledged before me this ___ day of ___ 2011, by Eugene Morgan, the Vice-President of the Freedom Hills #161 (water district).

Witness my hand and official seal.

Notary Public

My Commission Expires: 10/9/2013
GILLETTE REGIONAL WATER SUPPLY SYSTEM
JOINT POWERS AGREEMENT

City of Gillette, Wyoming
County of Campbell, Wyoming

THIS JOINT POWERS AGREEMENT is made and entered into by the duly authorized representatives of Campbell County, herein after referred to as the “County”, and the City of Gillette, herein after referred to as the “City”, both of which are located in the State of Wyoming and are both “agencies” as defined by W.S. §16-1-103(a)(i) and for the purposes of this Agreement shall be referred to as “Participating Agencies”.

WHEREAS, the Participating Agencies desire to secure water supply for the region in a manner that meets the long term needs for public health and safety, resource management, sustainability, and economic development; and

WHEREAS, the Participating Agencies believe this regional water supply approach will provide high quality water in a cost effective manner, protect local underground Fort Union aquifer systems, and promote regional cooperation and benefits; and

WHEREAS, the City will confirm an adequate water supply from Madison Aquifer sufficient to meet demands forecasted for regional use by the year 2038; and

WHEREAS, the Participating Agencies agree that a regional supply system will best serve the City, surrounding Improvement and Service Districts (District), and other water systems within the Designated Service Area (DSA), collectively referred to as “Wholesale Customers”; and

WHEREAS, the Participating Agencies desire to promote the equitable distribution of water throughout the region and in doing so develop access to redundant sources of supply for routine, seasonal, and emergency purposes; and

WHEREAS, the Participating Agencies desire to achieve a regional supply system (System) that will be balanced, fair, equitable, and sufficient for their citizens and the region at large; and

WHEREAS, the Participating Agencies desire to establish cooperation and service policies among each other that protect the precious water resources and use them in a sustainable way; and

WHEREAS, the Participating Agencies wish to secure funding from sources, public or private, and to administer those funds in an effective and non-duplicative manner for the needs of the region; and
WHEREAS, the Participating Agencies desire to identify the water supply needs of the region in Campbell County through a continuing and comprehensive process of assessment; and

WHEREAS, the Participating Agencies believe it is desirable to create a forum to facilitate an integrated effort to resolve water supply issues; and

WHEREAS, the Participating Agencies desire, pursuant to the provisions of the Wyoming Joint Powers Act, W.S. Section 16-1-102 through 16-1-109 inclusive (the Act), to execute this Joint Powers Agreement to provide, conduct and perform the planning of, and the funding for, a regional water supply system.

IT IS HEREBY MUTUALLY AGREED AS FOLLOWS:

SECTION I.
Purpose

The Participating Agencies hereby agree that the purpose of this agreement is:

1.1 To execute this Joint Powers Agreement, hereinafter referred to as the “Agreement” or “JPA”, for the sole purpose of providing a joint and cooperative method and vehicle for the planning of, funding for, construction and operation of a regional System for water supply.

SECTION II.
Organization & Responsibilities

2.1 The City and County, as Participating Agencies, have developed this JPA including establishing a Regional Water Panel (Panel) to execute certain specified provisions within this JPA. The Panel created by this Agreement shall not constitute a separate body corporate and politic or legal entity separate and distinct from the Participating Agencies but rather as an administrative board to aid and assist the Participating Agencies in the administration of this Agreement and the requirements of W.S. 16-1-102, et. seq. The method for appointment, terms, and vacation of panel positions is set forth in Section V.

2.2 The operation of the regional System including all Project facilities, infrastructure, and components along with existing City non-Project facilities shall be the responsibility of the City.

SECTION III.
Duration

3.1 This Agreement is effective on the date of the signature last affixed to the signature page and shall be of unlimited duration unless duly dissolved, amended, expanded or otherwise changed by appropriate action of the Participating Agencies. Dissolution can only
occur with a unanimous vote of the Participating Agencies. Sufficient prior notice is defined as
no less than 180 days prior to the intended date of dissolution. Any dissolution must allow for
sufficient prior notice and must provide for the continuation of the regional System and the
continuance of service to contracted Wholesale Customers receiving water from the Project.
Upon dissolution, rate making principles set forth herein shall be preserved through water service
agreements or other comparable arrangements.

3.2 In the event of dissolution or termination of this Agreement, the distribution of
any assets, facilities, improvements or other property shall be to each Participating Agency
which shall be determined to have an ownership interest and/or right to share in the distribution
equivalent to the ratio of value of funds or assets contributed or paid by that Participating
Agency to the value of funds and assets contributed by all Participating Agencies.

SECTION IV.
Project Components

4.1 The regional System, hereinafter referred to as the “Project”, including all new
water supply project facilities, infrastructure, and components along with existing City supply
facilities shall be under the ownership of the City.

4.2 The Project will include all new and existing water supply facilities, infrastructure
and components necessary to provide wholesale water supply to the City and other Wholesale
Customers. The procedures, responsibilities, administration, funding, rates, charges, and service
policies related to the Project are subject to this Agreement regardless of ownership of said
facilities, infrastructure and components.

4.3 The Project components shall be as described below and as graphically
represented on the Project map, attached as Exhibit A to this Agreement. A database of assets is
attached as Exhibit B to this Agreement. Exhibit A and B will be updated when new Project
supply components are added.

4.4 All Project components will be designed and constructed to adhere to City
standards unless the City authorizes an exception. By definition, all other facilities not identified
as outlined above will be deemed non-Project components. In general, supply facilities located
on the delivery side (upstream) of and including master meters will be considered Project
components and supply facilities and distribution systems located beyond (downstream of) the
master meters will be considered non-Project components unless they benefit the regional
system.

SECTION V.
Governance

5.1 Responsibilities of the City - As owner of the Project, the City will be responsible
for making daily and strategic decisions considered in the best interest of Wholesale Customers
as a whole and, in the course of doing so, will receive input from the County, representatives of
the Wholesale Customers, and the Regional Water Panel. The City is committed to manage,
administer, finance, and operate the Project in a business-like manner making decisions that are equitable and representative of all customers.

5.2 Regional Water Panel Creation and Composition - A new group with limited authority will be formed under the JPA. The group shall be named the “Regional Water Panel” (Panel).

5.3 Composition of Panel - The Panel shall be comprised of seven (7) persons, none of whom shall be serving on the governing bodies of the Participating Agencies at the time of appointment and appointed as follows:

a) Three (3) representatives appointed by Campbell County, Three (3) representatives appointed by the City of Gillette and One (1) representative from the Wyoming Water Development Commission (WWDC) or their appointee.

b) Upon appointment of the initial Panel, the terms of the Panel members shall be staggered as follows:

- Each Participating Agency shall appoint one member for five (5) years.
- Each Participating Agency shall appoint one member for four (4) years.
- Each Participating Agency shall appoint one member for three (3) years.
- The WWDC shall appoint one member for four (4) years

c) All appointments made thereafter shall be for a full term of five (5) years.

d) Vacancies for unexpired terms shall be filled by appointment of the governing body of the Participating Agency who appointed the person whose seat is vacated. If after four years from complete Project construction, the Participating Agencies and WWDC deem that the participation of WWDC is no longer necessary, the remaining members will select the replacement for the WWDC member.

e) An appointed panel member may be removed by a Participating Agency who made their appointment for the following reasons:

- Failure to attend three (3) consecutive regularly scheduled meetings without reasonable justification.
- Failure or refusal to perform official duties.
- With or without cause.

5.4 Powers of Panel - The Panel shall have the power to make decisions, as specified in this Agreement. In exercising, performing or carrying out any power, privilege, authority, duty or function under this Agreement, the Panel, within the limits of the authorities set out in this Agreement, shall exercise and enjoy the following powers, privileges and authority:

a) The establishment of a Panel meeting schedule wherein the business of the Panel will be conducted, and meetings shall be no less frequent than semi-annually.
b) The ability to call special meetings in addition to any regularly scheduled meetings provided such meetings are held in accordance with Wyoming State Law and are duly noticed to the Public.

c) Review supply system financing strategies, annual operations & maintenance budgets, and annual capital budgets.

d) Accept or reject rates and charges as proposed by the City for regional supply costs prior to adoption by the City.

e) Provide recommendations to the Participating Agencies regarding requests for water from potential Wholesale Customers outside the DSA and the corresponding expansion of the DSA.

f) Voting – Each Panel member represents one equal vote. Voting requirements shall be as follows:

- For the Panel to take action, a quorum of four members must be present.
- A Panel member must be present at the meeting in order to vote on Panel decisions.
- All matters decided by the Panel shall be by a simple majority vote.

g) The execution of a dispute resolution process. It is agreed that disputes between the Participating Agencies and/or Wholesale Customers over matters related to implementation of this Agreement, Water Service Agreements, or regional supply rates and charges will be handled through the dispute resolution process described below.

   g.1) General Disputes. The dispute resolution process for general disputes shall follow a three-step process.

   Step 1: The first step in any dispute involves a good faith effort on the part of the disputing parties to resolve any disagreement by informal discussions among each participant.

   Step 2: If at any time a party to a dispute determines that such informal discussions in Step 1 will not result in a resolution, that party may request a review be initiated by the Regional Water Panel. The Regional Water Panel’s decision will be made in writing to the Parties within 45 days.

   Step 3: Either Party may appeal the decision of the Panel within 30 days from the date of the Panel’s written decision through the Wyoming legal system in a forum using a judge without a jury.

   Each party will bear their own costs of the dispute resolution process.
g.2) Rate-related Disputes.

The dispute resolution process for disputes related to wholesale supply rates and System Development Charges shall follow the three-step process as set forth below.

Step 1: Same as g.1)

Step 2: Same as g.1)

Step 3: The decision of the Panel may be appealed within 30 days to a Rate Technical Panel. The Rate Technical Panel shall be comprised of one rate expert selected by the City, one rate expert selected by the County, and one rate expert jointly selected. In Step 3, the Rate Technical Panel’s decision shall be binding.

The cost of the Rate Technical Panel shall be borne as follows:

- The City shall pay for their selected expert.
- The County shall pay for their selected expert.
- The City and the County shall share equally in the cost of the jointly selected expert.

h) To adopt such rules as it determines to be convenient and appropriate for the conduct of its business, including without limitation rules and procedures for meetings.

i) Costs and expenses of the Panel will be included in the Project’s operating budget which shall be approved by the Participating Agencies.

SECTION VI.
Amendments

6.1 This Agreement may be amended but only through the adoption of an amendment petition by both of the governing bodies of the participating agencies.

SECTION VII.
Service Requirements

7.1 The Project shall serve a Designated Service Area (DSA) as identified in Exhibit C, which by this reference is incorporated herein, and which encompasses areas within Campbell County. The DSA will be established, maintained, and updated by the Participating Agencies and the DSA will be consistent with Campbell County Regional Planning Policies. In addition, the Project will continue to fulfill agreements and service obligations of the City to existing wholesale customers in Crook County.
7.2 Eligibility for connection to the regional water system:

a) Any existing system as of December 21, 2010 within the DSA may request connection to the Project on a voluntary basis and will be served upon execution of a Water Service Agreement which specifies the duties and responsibilities of the Wholesale Customer and the City.

b) Subject to local ordinances, regulations, and exemptions, new subdivisions or Districts located within the DSA which are approved after December 21, 2010 and after Project start-up, will be required by the City or County, depending on their respective jurisdictions, to connect and be served by the Project upon review by the Panel and upon execution of a Water Service Agreement.

c) Potential wholesale customers outside of the DSA may request connections to the regional water supply system through petitions to the Panel. The Panel shall review the petitions and provide recommendations to the City and County for approval relating to the disposition of the requests and any corresponding changes to the DSA. Considerations in the review and approval process will include, but not necessarily limited to, Project water availability, county planning considerations, economic feasibility for the Project and the customer, and the viability of other potential water supplies for the potential customer. Approval of such connections will result in amendments to the DSA and execution of Water Service Agreements.

7.3 Types of Service - Two types of service are available for the Project:

a) Type 1 – Service connections to the Madison pipelines, receiving only Madison well field water and limited to those systems served through an extension from either the existing or new Madison wellfield transmission pipelines.

b) Type 2 – Service connections to the Gillette water distribution system, receiving only blended Madison and in-City source water. Type 2 service connections will require extensions from the existing City water distribution grid.

7.4 Levels of Service (LOS) - For those potential Wholesale Customers within the Designated Service Area (DSA) of the Project and interested in being serviced by the Project, there are five (5) options for LOS. The available LOS are as follows:

a) Level of Service A - Level of Service A is for continuous, year round wholesale water service.

b) Level of Service B - Level of Service B is for seasonal service for peak or off-peak seasons of the year.

c) Level of Service C - Level of Service C is for emergency and/or fire flow service only.
d) Level of Service D - Level of Service D is for potential buy/sell back service for water.

e) Level of Service E - Special or additional services not listed above.

Changes to LOS for existing Wholesale Customers shall be negotiated between the City and the Wholesale Customer requesting a change in their LOS.

7.5 Water Service Agreements - Each Wholesale Customer shall enter into a Water Service Agreement (WSA) with the City prior to receiving supply from the Project. The WSA shall specify the terms and conditions of service. Any disputes relating to the WSA shall follow the dispute resolution process identified in Section V. The City shall not require any Wholesale Customer to enter into a pre-annexation agreement or require annexation as a condition of entering into a Water Service Agreement or obtaining water from the regional supply system. Water Service Agreements will include, as a minimum:

a) Issues relating to water rates and system development charges.

b) Requirements that the funding, design, permitting, land acquisition, construction engineering, and construction of any extensions will be the responsibility of the Wholesale Customer.

c) The extensions will be constructed in accordance with city standards and will include a master meter and backflow prevention.

d) Upon completion of the construction by the Wholesale Customer and acceptance by the City, the extension will be turned over to the City for operation and maintenance. Upon retirement of any debt associated with the construction by the Wholesale Customer, the extension will be sold to the City for one dollar.

e) Unless otherwise requested by the Wholesale Customer and approved by the City, the Wholesale Customer will retain operational responsibility of its own non-Project facilities.

f) Special provision as related to Type and Level of Service.

g) Other provisions, as necessary.

SECTION VIII.

Financing, Budgeting, Rates and Charges

8.1 Initial Project Capitalization - Initial capitalization of the Project shall be funded through a Joint (City/County) Financing Plan to be developed and based on monies from the State of Wyoming, Capital Facility Tax Funds, monthly rates, system development fees (SDCs), or other funds.
8.2 Project Extension to Wholesale Customers - Project extensions to Wholesale Customers shall comply with procedures established in Water Services Agreements and funding for the extension shall be the ultimate responsibility of the Wholesale Customer unless other funding mechanisms are available.

8.3 Non-Project Distribution Systems - Funding responsibilities for internal distribution system improvements (non-Project components) are the responsibility of the Wholesale Customers. Unless otherwise requested by a Wholesale Customer seeking service from the City related to non-Project components, and agreed to by action of the Gillette City Council, that Wholesale Customer will retain operational responsibility of its own existing non-project facilities by using its own staff or contracting for services from independent contractors having staff with appropriate certification, qualifications, and equipment.

8.4 Financial Policies - The City and County commit to implement the Project financial policies as presented in Exhibit D to this Agreement.

8.5 Budget - The City shall, no less frequently than once each calendar year, prepare a proposed budget setting forth the anticipated capital and operating costs for the Project for the next twelve (12) months. The budget shall include the anticipated costs of such activities, a brief explanation of the need for such activities and a schedule for the payment of the proposed budget.

8.6 Monthly Rates - Monthly rates calculated for the Project’s wholesale supply shall be developed by the City in accordance with generally accepted rate setting methodologies as described in the AWWA M-1 Manual Principals of Water Rates, Fees, and Charges, latest edition. The Participating Agencies agree that this methodology, attached as Exhibit E, will be applied to the calculation of wholesale supply rates.

Annually, the City shall present to the Panel the monthly rates and SDCs recommended for the following year. The Panel shall either accept or reject the City’s recommendations. If the Panel accepts the proposal, the City shall adopt and enact the rates according to its appropriate legislative action. In the event the Panel rejects the City’s recommendations, the Panel shall clearly state the reason(s) for rejection and the City shall recalculate rates and present a revised proposal to the Panel for acceptance. In the event the City does not agree with the reasons for rejection by the Panel, the Dispute Resolution Process outlined in Section V shall govern the decision.

The Participating Agencies agree that the regional wholesale supply rate will be calculated based on the Project budget and will be uniformly charged to all Wholesale Customers at the same LOS. Further, the Participating Agencies acknowledge that in addition to the regional supply related costs of the Project, each system is responsible for development and application of its own local distribution related costs. Further, it is agreed that at no time shall a local retail rate, which includes both supply and distribution related costs, be set at an amount that is less than the wholesale supply rate calculated for the Project (i.e. local funding credits shall not exceed local distribution costs).
8.7 Cost of Service and Rate Design Studies - The Participating Agencies agree that a comprehensive cost of service and rate design study shall be performed at periodic intervals, not to exceed every five (5) years, with annual reviews and revisions made as needed. The cost of said studies shall be borne by the City and appropriately become part of the cost of the regional water supply rate calculation.

8.8 System Development Charges - Charges for connection shall be on a quantified equivalent residential unit (ERU) basis through establishment of a supply System Development Charge (SDC). Such SDC shall be calculated in accordance with generally accepted rate setting methodologies as described in the AWWA M-1 Manual Principals of Water Rates, Fees, and Charges, latest edition. The Participating Agencies have agreed to a generally accepted methodology for calculating SDCs which is attached as Exhibit F to this agreement.

SECTION IX. 
System Infrastructure and Regulatory Compliance Standards

9.1 The City will have responsibility for compliance with all federal and state regulations pertaining to the USEPA Safe Drinking Water Act (SDWA) and other qualitative or quantitative rules, the costs of which will be included in the Project. In general, the City will take prompt and appropriate actions mandated by regulation, but may seek customer or committee input on aesthetic or other non-regulatory matters before taking action considered to be in the best interests of regional customers as a whole.

9.2 Water provided by the Project must be SDWA compliant at the wholesale metering point. Wholesale Customers retaining ownership and operational obligations will be responsible for SDWA compliance throughout their own source, storage, and distribution facilities. If Wholesale Customers opt to sell water back to the Project, they must ensure it is SDWA compliant before supplying Project facilities and, if not compliant, may be disconnected from the Project. All Wholesale Customers will be required to install, monitor, and maintain appropriate levels of cross-connection control devices at their expense.

SECTION X. 
Indemnity of Members and Officers and Limits of Liability

10.1 Each Participating Agency shall indemnify its own members according to their own indemnity and limitation of liability capacities.

10.2 IN WITNESS WHEREOF, the Participating Agencies have caused this Agreement to be made and executed on the respective undersigned date, in accordance with the authorizations contained and Resolutions duly adopted by the Board of County Commissioners of the County of Campbell, Wyoming, and the City Council of the City of Gillette, Wyoming.
CITY OF GILLETTE, WYOMING

(SEAL)
ATTEST:

[Signature]
City Clerk

CAMPBELL COUNTY, WYOMING, acting by and through the Campbell County Board of Commissioners

(SEAL)
ATTEST:

[Signature]
Campbell County Clerk

Duane Evenson, Mayor

Roy Edwards, Chair
APPROVAL BY ATTORNEY GENERAL

In accordance with Wyo. Stat. §16-1-105(a)(ii), the Wyoming Attorney General has reviewed this Gillette Regional Water Supply System Joint Powers Agreement and determined that the Agreement is compatible with the laws and constitution of the State of Wyoming. The approval of this Agreement by the Attorney General is limited to the terms and conditions of the Agreement itself, and the approval does not extend to any individual project nor the financing of any individual project contemplated under the Agreement itself.

Approved this 4th day of January, 2011.

[Signature]
Attorney General, State of Wyoming
RESOLUTION NO. 2327

A RESOLUTION CONCERNING RURAL WATER SYSTEM EXTENSIONS

WHEREAS, Gillette operates a municipal water system which serves City residents and residents of Campbell County who reside outside the city limits; and,

WHEREAS, On June 29, 2005 Gillette experienced the highest daily demand on the water system (the Peak Day) at 15.825 Million Gallons (MG). The Maximum daily production on the Peak Day was only 14.688 MG.

WHEREAS, Since the Peak Day, the population of Gillette has grown by over 3000 people, from 25,829 to 29,087 according to the 2010 census, and from 7,500 customers to 9,492 customers who receive water from the City municipal water system; and,

WHEREAS, Since the Peak Day, the maximum production of the water system has increased to 15.84MG; and

WHEREAS, Gillette will not have any further significant increase in water production delivered into its system until the Gillette Regional Water Supply System is completed, which is estimated to be in 2016; and,

IT IS RESOLVED BY THE GOVERNING BODY OF THE CITY OF GILLETTE, WYOMING:

Until the Gillette Regional Water Supply System is completed and production increases significantly, Gillette will;

1. continue its current conservation efforts to limit and reduce consumption of water supplied by its system; and,

2. continue to work with County Water Districts identified as future customers of the Gillette Regional Water System, so they can be served with water when it is available; and,

3. consider previous water service commitments to extend the City water system to serve areas outside the city limits; and,

4. consider exceptional emergency situations; and,

5. consider requests to extend the City water system to serve areas outside the city limits for non-consumptive uses such as to provide fire flows; and,

6. postpone approval of other requests to extend the City water system to serve areas outside the city limits.

PASSED, APPROVED AND ADOPTED July 5, 2011.

( SEAL )

ATTEST:

Tom Murphy, Mayor

Cindy Staskiewicz, Deputy City Clerk

Karlene Abelseth, City Clerk
Appendix C – Madison Transmission Main 90% Plans
Appendix D – Correspondence Related to the Possible Regional Connections
Hi Shane.

Attached is a copy of our proposed pipeline hydraulic grade line from the Pine Ridge Tanks to the City's Southern Drive Tank. (HY-2 and HY-3)

Our proposed regional connection to Freedom Hills will be located between Rozet and Wyodak, downstream of the proposed Donkey Creek Pump Station, near the proposed 42-inch diameter Madison pipeline at Sta. 706+30.

Attached is an excerpt from our 90% pipeline plan & profile drawings in this area. Sheet WA-11 shows the location of the proposed stub-out connection (interconnect) for the Meadow Springs Line 1 and Line 2 Extensions.

I've also enclosed a separate excerpt that shows the 90% connection details and proposed interconnect details from the new 42-inch line to the old 30-inch line. Sheet ED-2 shows the proposed plan for this area. When preparing your cost estimates, please include the bore, casing, 12-inch pipeline, 30-inch live tap, valves and related appurtenances to connect the 30-inch and 42-inch pipelines together as part of this particular district extension project. Feel free to modify this detail, as appropriate. We will only be providing the 12-inch tap and valve as part of the 42-inch pipeline project.

From the proposed Hydraulic Grade Line, at Sta. 706+30, the pressures will range from 165 psi (static, Donkey Creek PS not running) to 200 psi @ max day. I'm having to scale these of the Hydraulic Grade Line, so consider 165 psi to 200 psi as an "approximate" range for this area at the 42-inch pipeline connection. (Please check my work, here.) Freedom Hills is quite a bit higher in elevation when compared to the Madison Pipeline connection. Not sure if HDR considered stepping-down pressure at the 42-inch pipeline connection, or if they intended to use the higher pipeline pressure in the smaller extension line and then step down at the service connection to Freedom Hills. Regardless, I think it would be prudent to assume we will have some type of control valve that will reduce pressure between the Madison Pipeline and Freedom Hills.

Attached is a link to access Tech Memo #5 from the B&McD Pre-Design Report. This tech memo summarizes existing Madison Water Quality when compared to some of our other water sources. Hardness is the big issue. Water quality in the new wells will be similar to the existing wells. http://www.gillettewy.gov/Modules/ShowDocument.aspx?documentid=5344


Finally, attached is a link to download our 2012 Consumer Confidence Report. This report summarizes water quality for the "blended" water supply which will not be the case for Freedom Hills - since 99% of the time they will be receiving non-blended Madison water. http://www.gillettewy.gov/Modules/ShowDocument.aspx?documentid=5753
I'll forward the full water quality test suite from Energy Labs for the new Madison Wells separately - in a couple of weeks - once I receive the final report.

There is a lot of info here. Let me know if you have any questions.

Hope this helps.
Mike

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On Mon, Jun 10, 2013 at 10:53 AM, Shane Porter <shanep@wlcwy.com> wrote:

Hi Mike:

I wanted to thank-you for your time and input at the meeting last week. Your input is extremely helpful. Not sure if there is anyone that knows the history and status of the Regional Project as well as you do, and it helps tremendously to have you at these meetings to convey information to the Districts.

I am now plugging away on Freedom Hills and have a couple items I need your help with:

1.) Do you have an estimate or a place I could look for the delivery pressure for the Existing Madison Line and the new proposed parallel Madison line along I-90 in the vicinity of the Freedom Hills Connection. The proposes Meadow Springs Line would tap both the existing and proposed lines based on the HDR Report. The HDR Report indicates a estimated delivery point pressure of 100 psi. Not sure if this pressure is for the existing line or proposed line.

2.) Do you have existing water quality information in the Madison Line. Is there any water quality information for the new well field?

Thanks

Shane
Shane M. Porter, P.E.

Project Manager

WLC Engineering, Surveying, & Planning

200 Pronghorn St., Casper, WY 82601

307-266-2524

Emails and attachments may be public records under the Wyoming Public Records Act, W.S. § 16-4-201 et seq., and may be subject to public disclosure pursuant to this Act, unless a specific exception applies which limits or prohibits disclosure.
Hi Shane.

I left you a crazy long voice message.

Attached is a table that has water quality info for all of our existing City wells. The water quality data is 10 yrs old for the City's original wells. I've been told the fluoride concentration(s) from the Madison formation have not changed much over the past 10 years for the original 10 Madison wells. The wells labelled with a "M" pre-fix are our Madison formation wells in Crook County. "S" pre-fix = "soft" Fort Union Wells in Gillette. "FH" pre-fix = Fox Hills formation wells, also in Gillette. The two new Madison test wells are hand entered in the columns in the far right.

Wells M-1 thru M-10 yield 8,000 gpm nominal capacity. (We can probably "yield" 8,500 gpm (+/-) from the existing 10 Madison wells, but our pipeline capacity between Crook County and Gillette limits our capacity down to 8,000 gpm, nominal.)

The two new Madison wells will yield 1,400 gpm each, 2,800 gpm combined.

I suggest we perform a "weighted average" exercise to anticipate fluoride concentration with all 12 wells running at 8,000 gpm + 2,800 gpm = 10,800 gpm.

Example Equation:
{[(Avg fluoride concentration 10 original wells) x (8,000 gpm)] + [(Avg fluoride concentration 2 new wells) x (2,800 gpm)]} / {10,200 gpm} = Anticipated Avg Fluoride Concentration from all Madison Formation wells.

We can use this "weighted average" approach to also predict future fluoride concentrations . . . in the next 5 years, we will have the existing 10 wells + 5 new wells @1,400 gpm each = 8,000 gpm + 7,000 gpm = 15,000 gpm Madison supply. In the next 30 years, at full build-out capacity, we will have the existing 10 wells + 12 new wells @ 1,400 gpm each = 8,000 gpm + 16,000 gpm = 24,000 gpm Madison supply.

Remember, we only need to worry about the Madison wells for water quality purposes for the Freedom Hills area.

Hope this makes sense.

Please give me a call tomorrow or early next week after you've had a chance to think about it.

Mike
On Thu, Jul 18, 2013 at 2:29 PM, Shane Porter <shanep@wlcwyo.com> wrote:

Mike:

I am sending you the WWDO's review comments for Freedom Hills. The main item of consequence is water quality from the new Madison Well Field. We used the existing water quality in our analysis and it appears the new well field is showing different results. I will be looking into options for Freedom Hills, but it appears blending to reduce Freedom Hills fluoride issues is not going to be a viable option due to similar levels in the new Madison Wells as compared to the Freedom Hills wells.

Jodie has asked me to take this new water quality into account in my Southfork Estates Final Report. I'm not sure how to handle this. The water for Southfork estates would be blended with your Fort Union Wells. I'm struggling with how to estimate that blending ratio to predict regional water quality at the Southfork Estates location. My understanding is that this blending ratio varies and is not a constant. Do you have any suggestions on typical ratios to use or is this even realistic to predict. Has anyone else looked at possible blending ratios for the regional water using only water from the new Well Field?

Thanks,

Shane

**Shane M. Porter, P.E.**

Project Manager

WLC Engineering, Surveying, & Planning

200 Pronghorn St., Casper, WY 82601

307-266-2524
Good Morning,

I don't think it was too bad. The comments are attached, with the exception of one that will require the directors guidance tomorrow. Pay special attention to the fluoride level comments as these have the potential to ripple through the analysis. Let me know if you have any questions.

Jodie Pavlica, PE
Project Manager
Wyoming Water Development Office

On Mon, Jul 15, 2013 at 4:12 PM, Shane Porter <shanep@wlcwyo.com> wrote:

Sounds good. Hope I didn't get beat up too bad!

Thanks,

Shane

Shane M. Porter, P.E.
Project Manager
WLC Engineering, Surveying, & Planning
200 Pronghorn St., Casper, WY 82601
307-266-2524
Shane,

We should have most of our draft report comments to you tomorrow. There is one question that we need to ask the director and he will be out until Wednesday.

Jodie Pavlica, PE
Project Manager
Wyoming Water Development Office
Jodie.Pavlica@wyo.gov

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