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FINAL REPORT
for:

HIDDEN HILLS WATER SYSTEM
LEVEL I STUDY

Prepared for:

Wyoming Water Development Commission

Submitted by:

EnTech, Inc.
Consulting Engineers
Sheridan, Wyoming

December, 2001
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APPENDICIES

APPENDIX 1: QUESTIONNAIRE SENT TO POTENTIAL SERVICE AREA CUSTOMERS
APPENDIX 2: GROUNDWATER REVIEW FOR THE HIDDEN HILLS SERVICE AREA, PILCH ENGINEERING, AUGUST 2001
EXECUTIVE SUMMARY

In 2000, residents of the Hidden Hills area submitted an application for funding in the amount of $35,000 to the Wyoming Water Development Commission (WWDC) to study the feasibility of implementing a public water system to serve property owners in the Hidden Hills area and certain areas within the Prairie Dog Creek valley. This application was ultimately approved by the 2001 Wyoming State Legislature.

The Hidden Hills area is located predominantly within the Prairie Dog Creek valley, approximately four miles southeast of the Sheridan city limits as measured up the Prairie Dog Creek valley. A questionnaire was sent out to property owners within a likely service area within the Prairie Dog Creek valley in July 2001 which included the Hidden Hills area. Based upon the results from the questionnaire, a proposed service area was developed for a possible public water system in the area. The proposed service area is recommended to be as follows:

- the area along U.S. Highway 14 north of the highway’s intersection with Hidden Hills Road, and
- the Hidden Hills area.

There are 17 existing parcels of land along U.S. Highway 14 and 35 parcels within the Hidden Hills area, or a total of 52 existing parcels, that could conceivably receive water service from a public water system within this proposed service area.

The potential water demands of the 52 parcels are estimated to be as follows:

<table>
<thead>
<tr>
<th>DEMAND TYPE</th>
<th>DEMAND PER ACCOUNT</th>
<th>NUMBER OF ACCOUNTS</th>
<th>TOTAL PROJECTED DEMAND</th>
</tr>
</thead>
<tbody>
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<td>Avg. Annual</td>
<td>14,400 gal/month</td>
<td>52</td>
<td>748,800 gal/month (25 A-F/yr) (2)</td>
</tr>
<tr>
<td>Peak Day</td>
<td>0.91 gpm (1)</td>
<td>52</td>
<td>47 gpm</td>
</tr>
<tr>
<td>Peak Hour</td>
<td>1.52 gpm</td>
<td>52</td>
<td>79 gpm</td>
</tr>
<tr>
<td>Peak Momentary</td>
<td>1.67 gpm</td>
<td>52</td>
<td>87 gpm</td>
</tr>
</tbody>
</table>

(1) gpm = gallons per minute
(2) A-F = acre-feet

There is currently no public water system within the entire Prairie Dog Creek valley, except for an area served by the Sheridan Area Water Supply Joint Powers Board (SAWSJPB) immediately east of the City of Sheridan. Domestic water service in the area is provided via individual private water wells or, if wells are inadequate, hauling water from Sheridan. Results from the July 2001 questionnaire concluded that existing individual wells within the proposed service area do not generally provide water of both suitable quality and quantity.

Groundwater was considered as an alternative for a water supply to serve the proposed service area. However, study results concluded that it was not likely that a sufficient quantity of water could be obtained of a suitable quality to provide a source of supply for a public water system.

The most feasible alternative to serve the proposed service areas is determined to be a connection to the SAWSJPB public water system. This alternative would involve a connection to the SAWSJPB system at a location immediately south and east of the City of Sheridan adjacent to U.S. Highway 14, just east of the existing Rocky Hills Subdivision at approximately the Prairie Dog Creek watershed boundary along U.S. Highway 14. A 10-inch pipeline and 8-inch pipeline provide transmission capability in this area from the SAWSJPB’s South East Pump Station.
A review of the SAWSJPB system revealed that there is adequate capacity within the South East Pump Station to serve an additional 26 new customers, after discounting for the number of connections currently in use, the number of allocated connections not in use, and the number of undeveloped lots within existing adjacent subdivisions now being served. This review assumed that water service would be provided to both existing and new connections in the current manner with which service is provided; i.e., the pump station matches all demands without storage for peak periods. If a storage tank can be constructed to offset peak hour and peak momentary flows, there is adequate capacity within the pump station to serve the possible 53 parcels within the proposed service area in addition to existing customers. Such a storage tank would logically be constructed to an overflow elevation of 4156 feet to match the hydraulic grade line of the pump station.

The recommended alternative to provide for a public water system within the Prairie Dog Creek valley, to include service to the Hidden Hills area, would utilize the SAWSJPB as a source of supply and would consist of the following components:

1. A connection to the existing 8-inch transmission main of the SAWSJPB system at approximately the intersection of U.S. Highway 14 and Peno Road (at the Rocky Hills Subdivision).
2. An 8-inch transmission main extending along the easterly side of U.S. Highway 14 right-of-way to the intersection of this highway with Hidden Hills Road.
3. An 8-inch transmission main extending beneath U.S. Highway 14 along Hidden Hills Road and terminating at a 50,000 gallon storage tank.
4. A pump station along Hidden Hills Road that would utilize the 8-inch transmission main and storage tank as a source of water. The pump station would be sized to meet domestic needs; however, it would not be of sufficient capacity to provide fire protection at a level that would be required within a municipality. It would require a discharge pressure of approximately 165 psi in order to provide sufficient pressure to the highest home to be served, which is at approximately elevation 4340 feet.
5. A 6-inch transmission main connecting the storage tank to the pump station.
6. A 6-inch transmission main extending from the pump station along Hidden Hills Road to the intersection with Jewel Road.
7. A 4-inch transmission main extending further along Hidden Hills Road to the southerly end of the road, said southerly end being in the NE¼ of Section 30, T55N, R83W.
8. A 2-inch transmission main extending along Jewel Road to the Ruby Subdivision.
9. Various appurtenances to make the components described above functional.

In addition to this proposed system, modifications to the SAWSJPB’s telemetry system would be performed which would allow for the pumps within the South East Pump Station to be controlled by the water level within the new 50,000 gallon storage tank. A small chlorinator is also proposed, to be located at the South East Pump Station, in order to assure maintenance of a chlorine residual in this long length of main that is likely to have minimal usage.

This recommended alternative has an estimated capital cost of $1,374,745. There are four additional up-front costs over and above this capital cost that need to be considered as well. These up-front capital costs include:

1. The cost to establish a district.
2. The cost for the issuance of bonds.
3. The system investment fee charged by SAWSJPB to allow connection to its system.
4. The cost to extend property owners’ service line from the meter pit to their proposed point of use.

Of the various funding sources considered for this proposed alternative, the two most logical non-local sources are the WWDC and the Rural Utilities Service (RUS). In order to be considered for funding from either of these agencies, it will be necessary to establish a public district. The most logical type of district recommended to be formed is a water district.

The most likely financial scenario for funding of the proposed alternative assumes:
- a 50% WWDC grant (for WWDC-eligible components);
- a 50% RUS grant; and
- a 50% RUS loan (@ 4 7/8% for a 30-year term).

A summary of the capital and up-front capital costs (less the property owners’ service line costs), as well as the prospective manner in which these costs would be funded, is shown below.

<table>
<thead>
<tr>
<th>Item</th>
<th>WWDC Grant</th>
<th>RUS Grant</th>
<th>RUS Loan</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Construction</td>
<td>$647,642</td>
<td>$363,551</td>
<td>$363,552</td>
<td>$1,374,745</td>
</tr>
<tr>
<td>District Formation</td>
<td>$0</td>
<td>$7,500</td>
<td>$7,500</td>
<td>$15,000</td>
</tr>
<tr>
<td>Bond Issuance</td>
<td>$0</td>
<td>$2,500</td>
<td>$2,500</td>
<td>$5,000</td>
</tr>
<tr>
<td>SAWSJPB System Inv. Fees</td>
<td>$46,025</td>
<td>$23,013</td>
<td>$23,012</td>
<td>$92,050</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>$693,667</strong></td>
<td><strong>$396,564</strong></td>
<td><strong>$396,564</strong></td>
<td><strong>$1,486,795</strong></td>
</tr>
</tbody>
</table>

Assuming that 35 of the possible 52 parcels will commit to being customers of a proposed public water system within the Prairie Dog Creek area, and that the funding summarized above could be procured, the annual debt service payment for the recommended alternative is estimated to be $25,154, or $59.89 per month per residence.

Other anticipated costs for water service include:
- funding an estimated reserve account (10% of the annual debt payment),
- estimated operation and maintenance expenses (assumes that the SAWSJPB provides retail water service, but that the users of the PDPWS would have to pay additional expenses such as district administration and pump station O & M expenses), and
- SAWSJPB user fees.

Taking the debt service and these other anticipated costs for water service into account, the monthly cost per residence for water service (14,000 gallons per month) is estimated to be as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Monthly Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt Service</td>
<td>$59.89</td>
</tr>
<tr>
<td>Reserve Account</td>
<td>$5.99</td>
</tr>
<tr>
<td>O&amp;M Expenses</td>
<td>$28.57</td>
</tr>
<tr>
<td>SAWSJPB User Fees</td>
<td>$38.25</td>
</tr>
<tr>
<td><strong>Total Monthly Cost</strong></td>
<td><strong>$132.70</strong></td>
</tr>
</tbody>
</table>

The following items provide for a recommended path forward for those interested in receiving water service within the proposed service area.
1. Obtain commitments from at least 35 interested parties in the proposed service area to participate in the proposed project at the user rates discussed above. These connections must be in the proposed service area; otherwise, additional system extension costs will likely be incurred.

2. Once property owner commitments are obtained, establish a water district with which the WWDC, RUS and SAWSJPB could contract for funding and water service.

3. Discuss with RUS the feasibility of obtaining a higher grant/loan percentage in order to lower projected monthly assessments.

4. Enter into a water service agreement with SAWSJPB for service to the area.

5. Obtain an Environmental Report for the proposed project through the Midwest Assistance Program.

6. Submit applications to the WWDC and RUS in 2002 for funding of design and construction. For the WWDC, this means that Level 3 funding would be requested, bypassing the Level 2 step.

7. Commence with design of the water system in the summer of 2003.

1. INTRODUCTION AND PROJECT DESCRIPTION

In 2000, residents of the Hidden Hills area submitted an application to the Wyoming Water Development Commission (WWDC) to study the feasibility of implementing a public water system to serve property owners in the area. The WWDC approved the application and recommended funding of a Level I study to the 2001 Wyoming State Legislature. The 2001 Legislature eventually funded the study in an amount of $35,000.

The Hidden Hills area is located predominantly within the Prairie Dog Creek valley, approximately four miles southeast of the Sheridan city limits as measured up the Prairie Dog Creek valley (See Figure 1-1). Although the Hidden Hills Homeowners Association submitted the Level I study application for funding, the WWDC has nonetheless made it clear that the feasibility study should not be limited to exclusively the Hidden Hills area. As a result, this study will investigate providing a public water system to not only the Hidden Hills area, but also to adjacent and nearby properties within the Prairie Dog Creek valley. This Prairie Dog Public Water System is henceforth referred to as the PDPWS.

The scope of this supplemental study includes the following:

- an evaluation of the present and future water needs within a proposed service area within the Prairie Dog Creek valley;
- an inventory of existing sources of water to serve domestic needs in the area;
- a listing of potential water supply alternatives and cost estimates to implement these possible alternatives;
- a determination of any permits that might be required;
- an economic analysis of the ability of potential users to pay, including a possible financing plan to keep the local share of any improvements to a minimum; and
- a recommended path forward.
2. PRESENT AND FUTURE WATER NEEDS

2.1 Identification of Service Area

In order to determine the water needs of both the present and future for the proposed PDPWS, it is necessary to determine the potential areas of service. Factors dictating the boundaries of a possible service area for this project include the following.

Topography
Water delivery systems are designed based upon topography and related elevations. As a general rule of thumb, there are approximately 0.43 pounds per square inch (psi) of pressure for every one foot of elevation. Wyoming Department of Environmental Quality (WDEQ) requirements call for a minimum design pressure of 35 psi in the distribution system, whereas excessively high distribution system pressures create both additional operating expense and wear-and-tear upon the system. The Uniform Plumbing Code requires the installation of pressure-regulating valves for individual services in which distribution system pressures exceed 80 psi.

Population Density
Generally speaking, the more connections that a water system has, the less the system costs on a per user basis. Thus water systems should logically be constructed in areas where population density is the greatest, or where it is determined that there is a significant likelihood for land development with resulting population growth.

Level of Interest
It is important to determine the level of interest in a possible public water system prior to determining the possible service area. Homeowners in the Hidden Hills area, although not topographically in a desirable location regarding water service, have nonetheless displayed a great deal of interest in receiving water service, as they submitted the original application to the WWDC which led to this study. Several of the properties have such deficient water wells that they haul water from the City of Sheridan’s bulk water station.

Based upon the three factors cited above, in July 2001 questionnaires were mailed out to property owners within a likely service area within the Prairie Dog Creek valley. The likely service area in which questionnaires were sent included:

- the properties along U.S. Highway 14 from its intersection with Peno Road south to the confluence of Meade Creek and Prairie Dog Creek (this southerly boundary was selected in part due to the southerly limit of service from the SAWSJPB system without requiring additional pumping – see Section 3.2); and
- the Hidden Hills area. (The Hidden Hills area is defined by the unplatted properties served by Hidden Hills Road and Jewel Road, as well as the Ruby, Bertalan and Los Cerros Subdivisions of Sheridan County - see Figure 2-1.)

The July 2001 questionnaire requested information on existing private water systems and the level of interest in receiving water service from a possible public water system. (See Appendix 1 for copy of questionnaire). In the matter of level of interest, the questionnaire asked the following question of property owners:
Without in any way committing yourself, do you have an interest in receiving water from a public water system, if the cost for water does not exceed (check all that apply):

- $25/month? □ Yes □ No
- $50/month? □ Yes □ No
- $75/month? □ Yes □ No
- $100/month? □ Yes □ No
- greater than $100/month? □ Yes □ No

The following responses were received to this specific question of the questionnaire:

- For the Peno Road area, there were no responses in which there was at least a moderate level of interest (i.e., willing to pay at least $50 per month).
- For the area along U.S. Highway 14 north of the highway’s intersection with Hidden Hills Road, there were five responses indicating at least a moderate level of interest.
- For the area along U.S. Highway 14 south of the highway’s intersection with Hidden Hills Road, there were two responses indicating at least a moderate level of interest.
- For the Hidden Hills area, there were 16 responses indicating at least a moderate level of interest.

As a result of the outcome of these responses received, the proposed service area for a proposed public water system is recommended to be as follows:

- the area along U.S. Highway 14 north of the highway’s intersection with Hidden Hills Road, and
- the Hidden Hills area.

This proposed service area is depicted in Figure 2-1.

2.2 Needs of Service Area

The lands within the proposed service area are comprised of agricultural lands (along U.S. Highway 14) and rural residential (the Hidden Hills area). There are 17 existing parcels of land along U.S. Highway 14 and 35 parcels within the Hidden Hills area, or a total of 52 existing parcels that could conceivably receive water service from a PDPWS. Of the parcels within the Hidden Hills area, 10 of them lie within the three platted subdivisions: Los Cerros (4), Bertalan (3) and Ruby (3).

The potential water demands of the 52 parcels can be assumed to be similar to the rural residential users of the SAWSJBP that do not rely upon alternative forms of irrigation. The rural residential users of the Southeast Water & Sewer District within the SAWSJBP’s system would be an example of such users, and data on these users is readily attainable (see Section 3.2.1.1). As such, metered records of usage by customers in this area were used to determine the average annual usage.

In addition to the determination of average annual usage, it is important to forecast peak demands by prospective users of a public water system. A peak demand estimation methodology is described in subsequent Section 3.2.1.1, which provided estimates of the peak demands in the Southeast area, which can be used to estimate demands in the PDPWS.
Based upon the analysis of area metered records and a peak demand analysis, which is discussed in Section 3.2.1.1, the following table projects the potential demands of the 52 parcels discussed above.

Table 2.1
Demands of Proposed Service Area

<table>
<thead>
<tr>
<th>DEMAND TYPE</th>
<th>DEMAND PER ACCOUNT</th>
<th>NUMBER OF ACCOUNTS</th>
<th>TOTAL PROJECTED DEMAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Annual</td>
<td>14,400 gal/month</td>
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<td>Peak Momentary</td>
<td>1.67 gpm</td>
<td>52</td>
<td>87 gpm</td>
</tr>
</tbody>
</table>

(1) gpm = gallons per minute
(2) A-F = acre-feet

2.3 Existing Sources of Water

The questionnaire discussed in Section 2.1 also requested information on existing sources of water within the Prairie Dog Creek valley. There is currently no public water system within the entire valley, except for an area served by the SAWSJPB in the Rocky Hills Subdivision immediately east of the City of Sheridan. Results of the questionnaire and a review of records from the Wyoming State Engineer’s Office (WSEO) reveal that domestic water service within the valley is provided via individual private water wells or, if wells are inadequate, hauling water from Sheridan. Some use of surface water impoundments or water from Prairie Dog Creek or its ephemeral tributaries also occurs for outside irrigation of landscaping and gardens within the area.

The questionnaire polled residents on both the current water quality and water quantity of their domestic systems. Based upon this polling, it can be concluded that existing individual wells within the proposed service area do not provide water of both suitable quality and quantity.
3. WATER SUPPLY ALTERNATIVES AND COST ESTIMATES

3.1 Groundwater

The scope as identified by the WWDC stated that groundwater was to be considered as an alternative for a water supply to serve the proposed service area. Mr. Tom Pilch, PE, PG, of Pilch Engineering was retained by EnTech to evaluate the potential for such a groundwater supply. As part of Pilch’s work, a review was performed of existing water well information in the Hidden Hills area using the WSEO registered well database dated July 2001. Additionally, well log and water quality information was obtained from some of the property owners who submitted this information along with their questionnaires.

In a report entitled *Groundwater Review for the Hidden Hills Service Area* prepared by Pilch Engineering and dated August 2001 (see Appendix 2), the following important points were brought forth.

- The two water-bearing formations in the area that could potentially supply water at “reasonable” depths were the Wasatch and Fort Union formations. These two formations are the current targets of coal bed methane (CBM) operators working in the area.
- The potential water-bearing formation beneath the Fort Union Formation is the Lance Formation. The depth to this formation in the potential service area is estimated to be over 5,000 feet. Little is known of the water quality or quantity of this formation in this area. Drilling a well to the Lance Formation could possibly increase the potential for additional water quantity, but the water would likely decrease in quality due to the additional depth.
- Most of the wells in the WSEO database are reported to yield between 2-20 gpm, with the majority of wells having yields of less than 10 gpm.
- Those wells with yields more conducive to the amount required for a public water system (i.e., > 50 gpm) exist in the alluvium adjacent to a stream such as Prairie Dog Creek. However, because of the direct influence that the stream would have on such wells, and the potential impact upon the stream if water would be pumped from them, it would not be prudent to attempt to develop such wells.
- “Based on the information reviewed and general knowledge of the geological formations in this area, drilling a well in this area that would produce over 15-25 gpm would be unlikely.”
- “Water quality [of existing wells] within the study ranges from fair to poor.”

Per Pilch, drilling a well to the Lance Formation is estimated to cost approximately $500,000, based upon an estimated depth of 5,000 feet and cost per drilling of $100 per foot. Due to the lack of any substantive information on the quality or quantity of water within the Lance Formation in this area, it is believed that drilling a well to this formation would be expensive and extremely risky, and is therefore not recommended.

Based upon the information provided in the Pilch report, one can assume that the maximum sustained yield of a water well drilled to either the Wasatch or Fort Union formations would be approximately 15 gpm. This would mean that three wells of this capacity would be necessary to approach the estimated peak-day demand of 47 gpm as stipulated in Table 2.1. However, based upon this small yield per well, it makes little sense to even have a public water system. In lieu of
constructing a system to distribute and pump water, monies would be much better spent drilling individual wells and serving each property owner with those wells.

According to representatives of the WWDC, it makes little sense to consider a public groundwater supply unless the sustained yield is at least 50 gpm. Therefore, due to the information provided by the geologist regarding the remote likelihood of completing a well with such yield, and the rationale discussed above regarding the need for a water distribution system for wells of such low quantity, a groundwater alternative will not be evaluated further.

3.2 Connection to SAWSJPB Public Water System

3.2.1 Existing SAWSJPB System

In 1993, the SAWSJPB constructed a public water system to serve the Southeast Water and Sewer District area, located immediately south and east of the City of Sheridan adjacent to U.S. Highway 14. Distribution and transmission pipelines were constructed to serve the residences in this area, with the furthest east pipeline located on the easterly side of the Rocky Hills Subdivision at approximately the boundary for the Prairie Dog Creek watershed along U.S. Highway 14. A 10-inch pipeline and 8-inch pipeline provide transmission capability in this area from the South East Pump Station (SEPS) discussed below. (See Figure 3-1 for SAWSJPB system components.)

The SAWSJPB system also serves certain areas of the Little Goose Creek valley at a location that is actually closer to the Hidden Hills area than the end of the SAWSJPB system discussed above (i.e., on the easterly side of the Rocky Hills Subdivision). However, in considering this SAWSJPB connection alternative, the possibility of extending a pipeline from this Little Goose Creek valley system to serve the Prairie Dog Creek valley, and Hidden Hills area in particular, was excluded from further consideration due to the following reasons.

- The steep, difficult terrain between the Little Goose Creek valley and the Prairie Dog Creek valley in this area would make both construction and operation of the pipeline very difficult.
- There would be little likelihood of future connections on such a pipeline, as would be the case if a pipeline were extended from the Rocky Hills area up the Prairie Dog Creek valley.
- In order for service to be delivered from the Little Goose Creek valley system, it would be necessary to install facilities that would pump water (and thus increase pressures) for all potential customers in the Prairie Dog Creek valley, and then correspondingly reduce pressures for some of the customers at lower elevations in the Prairie Dog Creek valley. Thus, this would be a very inefficient method of providing service from an energy standpoint.

3.2.1.1 South East Pump Station (SEPS)

An important component of the public water system serving the Southeast area, and also potentially the Prairie Dog Creek valley, is the SEPS. The SEPS is located at 1851 Brundage Lane (U.S. Highway 14), directly adjacent to the Skyline Drive-In Theater. The SEPS houses five pumps which, because they pump to a closed system (i.e., they do not pump to a tank or reservoir), are designed to function together to meet a full range of flows. Three of the pumps
have variable speed drives, which allow a range of flow deliveries from minimum flow up to a peak momentary demand of 230 gpm. Above that flow rate, either of the two large constant speed pumps (designed for fire flow events) is energized.

The SEPS reportedly has been designed to meet the following parameters (Design Report for Little Goose Water Distribution System Booster Pumping Stations, HKM Associates, April 1993):

Design No. of Taps to be Served – 107

Design Flows:
- Peak Day – 114 gpm
- Peak Hour – 182 gpm
- Peak Momentary – 230 gpm
- Fire Flow – 1000 gpm

Discharge Hydraulic Grade Line (HGL) to be maintained – 4156 feet.

The SEPS has also been constructed to accommodate two additional pumps as the area of service expands.

City of Sheridan Utilities Maintenance Department – operator of the SAWSJPB system, including the SEPS – has indicated no major problems with the operation of this station.

A review of SAWSJPB billing records indicates that approximately 73 connections are currently served by the SEPS, with an additional four connections signed up for but not currently using water. All 73 connections are rural residential users; i.e., there are no commercial accounts within the area. In addition, there are four platted lots within the Eastern Hills Subdivision that are vacant and not signed up for water service. It is anticipated, however, that these lots, once constructed upon, would become customers of the SAWSJPB. In the year 2000, the existing customers used an average of 14,000 gallons per month, based upon individual metered records. This average agrees quite closely with the metered flow through the SEPS, which averaged 14,400 gallons per month per account for this same period.

On July 12 and 13, 2001, a compilation of various flow parameters for the SEPS was performed by EnTech personnel by recording metered flow information over a 24-hour period within the SEPS. This compilation was performed for the purposes of verifying historical metered flow records, as well as to determine both peak hour and peak momentary flow information. Such data is important in determining the capability of the SEPS as it currently exists to provide for additional customers.

The 24-hour period during July 12th and 13th was used due to historical peak-day flows typically occurring during the second week of July. In discussions with Sheridan water treatment plant personnel, actual plant effluent flows for these two days were as follows:
- July 12, 2001 – 9.1 Million Gallons Per Day (MGD)
- July 13, 2001 – 9.3 MGD.

The water treatment plant personnel also reported that July 10th had been the peak day recorded thus far for the year 2001, which was reported to be 9.8 MGD. Thus the July 12th – 13th time period can be reasonably used to determine an approximate peak-time period for the year 2001 by multiplying the data compiled by 9.8/(0.5)(9.1 + 9.3), or 1.07.

Results of the compilation on July 12th and 13th revealed the following usage for the 73 accounts:
Daily Flow – 62 gpm, or 0.85 gpm per account
Peak Hour Flow – 104 gpm, or 1.42 gpm per account
Peak Momentary Flow – 115 gpm, or 1.57 gpm per account.

Multiplying these data values times 1.07 to compute theoretical values gives the following:
Peak Daily Flow – 66 gpm, or 0.91 gpm per account (assumed to be the peak daily flow)
Peak Hour Flow – 111 gpm, or 1.52 gpm per account
Peak Momentary Flow – 123 gpm, or 1.67 gpm per account.

This information was utilized in the development of the demands of the proposed service area (Table 2.1).

Using this information, one can logically and conservatively conclude that there is sufficient capacity within the SEPS. Using the design flow information, an additional 26 typical residential connections can be provided service without implementing further improvements at the SEPS. This conclusion has been determined as follows:

- Design Number of Connections: 107
- Less Number of Connections Currently in Use: 73
- Less Number of Allocated Connections Not in Use: 4
- Less Number of Undeveloped Eastern Hills Lots: 4

- Additional Connections to Potentially be Provided Service: 26

The conclusion is felt to be conservative because the July 12th-13th actual flow data suggests that the SEPS can comfortably meet such additional demands based upon the peak day, peak hour and peak momentary demands it is currently experiencing. However, there are currently undeveloped lands immediately east of the Eastern Hills area that loom as potential development areas within the current area of service of the SAWSJPB. The SAWSJPB may prefer to reserve the additional capacity of the SEPS determined to currently be available for future use within these undeveloped areas, rather than address the needs of those areas not within the current service area.

The determination made above assumes a continuance of the existing mode of operation of the SEPS as a closed system. Should a storage tank be installed at the appropriate elevation to which the SEPS could pump, the existing system could more ably provide for additional connections, as the storage tank would serve to offset both peak hour and peak momentary demands. The advantages would apply to both a proposed PDPWS as well as existing customers served by the SEPS.

Based upon the existing discharge HGL to be maintained by the SEPS of 4156 feet, water service could be provided within the Prairie Dog Creek valley at a minimum pressure of 40 psi without the need for additional pumping to an elevation of 4060 feet. Prairie Dog Creek is at elevation 4060 feet at approximately its confluence with Meade Creek. As such, the Prairie Dog Creek - Meade Creek confluence was selected as the southerly boundary for a proposed service area (as discussed in Section 2.1) in part because of this important hydraulic and topographic elevation. A storage tank would logically be constructed to an overflow elevation of 4156 feet to match the SEPS’ HGL.

The 4060-foot maximum elevation within the Prairie Dog Creek valley is depicted in Figure 3-1.
3.2.2 Proposed SAWSJPB Water System Connection

A proposed PDPWS that would utilize the SAWSJPB as a source of supply would consist of the following components:

10. A connection to the existing 8-inch transmission main of the SAWSJPB system at approximately the intersection of U.S. Highway 14 and Peno Road (at the Rocky Hills Subdivision).

11. An 8-inch transmission main extending along the easterly side of U.S. Highway 14 right-of-way to the intersection of this highway with Hidden Hills Road.

12. An 8-inch transmission main extending beneath U.S. Highway 14 along Hidden Hills Road and terminating at a 50,000 gallon storage tank. The storage tank would be constructed to have an overflow elevation of 4156 feet. Based upon existing topographic relief in the area, this tank could be constructed beneath the ground.

13. A pump station along Hidden Hills Road that would utilize the 8-inch transmission main and storage tank as a source of water. The pump station would be sized to meet domestic needs; however, it would not be of sufficient capacity to provide fire protection at a level that would be required within a municipality. It would require a discharge pressure of approximately 165 psi in order to provide sufficient pressure to the highest home to be served, which is at approximately elevation 4340 feet.

14. A 6-inch transmission main connecting the storage tank to the pump station.

15. A 6-inch transmission main extending from the pump station along Hidden Hills Road to the intersection with Jewel Road.

16. A 4-inch transmission main extending further along Hidden Hills Road to the southerly end of the road, said southerly end being in the NE¼ of Section 30, T55N, R83W.

17. A 2-inch transmission main extending along Jewel Road to the Ruby Subdivision.

18. Various appurtenances to make the components described above functional.

This proposed water system is depicted in Figure 3-2. In addition to this proposed system, modifications to the SAWSJPB’s telemetry system would be performed which would allow for the pumps within the SEPS to be controlled by the water level within the new 50,000 gallon storage tank. A small chlorinator is also proposed, to be located at the SEPS, in order to assure maintenance of a chlorine residual in this long length of main that is likely to have minimal usage.

Estimated costs for this alternative are shown in Table 3.1.
### Table 3.1
SAWSJPB Connection Alternative Cost Estimate

<table>
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<tr>
<th>ITEM</th>
<th>UNIT</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>ESTIMATED COST</th>
<th>ESTIMATED COST</th>
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<tr>
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<td><strong>$1,374,745</strong></td>
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</table>
3.2.3 **Basis for Cost Estimates**

Cost estimates were derived by reviewing bid tabulations of recent construction projects in Wyoming. Estimated pipe costs are installed costs and include all trenching, backfilling, bedding placement, minor bends, and other minor project costs.

Preparation of final designs and specifications was assumed at ten percent (10%) of the total construction cost and did not include permitting, legal fees and right-of-way acquisition.
4. RECOMMENDED ALTERNATIVE

The recommended alternative for the PDPWS is the SAWSJPB connection. This recommendation is based upon the premise that a connection to the SAWSJPB system represents the only realistic alternative when compared to a groundwater supply alternative, which has been stated to be very unlikely to be procured in amounts and of a quality needed for a public water supply. Discussions with potential customers indicate a strong preference for SAWSJPB water over that from a groundwater source.

The recommended alternative includes the installation of a 50,000 gallon storage tank. A smaller tank is proposed than what may be required for ultimate demands in the Prairie Dog Creek valley; however, additional tanks can be added in the future at the proposed site as the system expands.

As opposed to installation of a tank, pumps within the SEPS could be increased in capacity to meet the additional demands placed upon the system by the users within the Prairie Dog Creek valley. Additionally, and as mentioned previously, the SEPS has been designed to accommodate two additional pumps. However, installation of a storage tank vs. enlargement of the existing SEPS system will provide for the following benefits not offered by merely expanding the pump station capacity.

- The SEPS will no longer have to meet instantaneous demands. Instead, the pumps within the SEPS will be able to pump on a more uniform basis, and will be able to be shut off occasionally as the system is served by the tank during slack times. The tank can also provide additional fire flow capacity over and above the existing fire pumps located in the SEPS.
- The proposed pump station in the Hidden Hills area can operate more reliably with the suction source being a storage tank than merely the 8-inch transmission main, particularly due to the fact that the 8-inch transmission main is served by the variable flows discharging from the SEPS.
- In the event of a temporary shutdown of the SEPS, temporary service to customers in both the Prairie Dog Creek valley and those currently served by the SEPS within the SAWSJPB system can be maintained.

These benefits are afforded to the SAWSJPB as well as the Prairie Dog Creek valley customers, thus this tank installation can be an attraction for the SAWSJPB to provide service in this area.

The SAWSJPB connection alternative as depicted in Table 3.1 has an estimated capital cost of $1,374,745. There are four additional up-front costs over and above this capital cost that need to be considered as well. These capital costs are listed below:

5. **The cost to establish a district.** In order to have an entity with which the WWDC can contract for design and construction of the proposed alternative, a district must be established. Such establishment entails certain costs.

6. **The cost for the issuance of bonds.** If it is necessary to incur debt financing for any proposed project, it will be necessary to obtain a loan or issue bonds. The cost to issue these bonds should be considered.

7. **The system investment fee charged by SAWSJPB to allow connection to the SAWSJPB system.** The SAWSJPB requires payment of a system investment fee for all new connections to its system. This fee is assessed to pay a portion of the costs necessary to provide capital infrastructure such as water supply, treatment and transmission facilities,
including the SEPS. The current system investment fee of the SAWSJPB is $2,630 for a typical residential connection.

8. The cost to extend property owners’ service line from the meter pit to their proposed point of use. This cost varies with each property, and is based upon length of service line required, type of service line material used, soil conditions, and surface obstacles (e.g., landscaping, fencing, driveways, etc.).

These four additional costs are discussed in more detail in Section 6.4.

Besides capital and necessary up-front costs, both operational and replacement costs need to be considered. In discussions with the SAWSJPB, for purposes of this report it can be assumed that the SAWSJPB would serve customers on a retail vs. wholesale basis, under certain terms and conditions. If that is in fact the case, residents receiving water service could expect to have the transmission and distribution systems that are constructed in this project to be operated and maintained by the SAWSJPB, as part of the costs to receive water. (SAWSJPB actually has a contract with the City of Sheridan to operate and maintain its system, thus this would mean that City personnel would operate and maintain the system.) This would include the reading of meters and transmittal of bills. Included within the SAWSJPB rate is a percentage to apply towards a “sinking fund” for future replacement of system components.

SAWSJPB may also desire to have the proposed water system dedicated to it, much as is done when a new subdivision receives service from SAWSJPB. The SAWSJPB typically requires construction in accordance with its standards, and is then deeded the system to assume ultimate ownership. The fact that the recommended alternative will likely require the accumulation of debt may preclude initial ownership by SAWSJPB. However, the water service agreement could be written so that SAWSJPB will become the ultimate owner of the system once the debt is fully retired. Until that time, SAWSJPB could nonetheless operate and maintain the system through its contract with the City.

Regarding the “certain terms and conditions” discussed above, the SAWSJPB has established a precedence in a recently served area that the cost to operate and maintain a pump station serving a particular area such as the proposed Hidden Hills area would be excessive to normal operations. As a result, it is assumed for purposes of this report that the SAWSJPB will place a surcharge should be placed upon the user charges of those receiving water service via the pump station, to include the cost for operation, maintenance and replacement of the pump station.

Estimated costs for the surcharge are included within the economic analysis and financial plan of Section 6.4.
5. **REQUIRED PERMITS**

The following permits and approvals will be required in order to proceed with implementation of the recommended alternative for the proposed PDPWS. This listing does not include any approvals required as a result of formation of a district, which is discussed in Section 6.2. It also does not include any funding agreements between a proposed district and the appropriate funding agency, including the WWDC, nor with any engineering firms or construction contractors that will be required to design and construct the recommended alternative.

1. **Water Service Agreement with SAWSJPB.** An agreement must be reached with the SAWSJPB dealing with water service to the area. It should spell out the terms and conditions for water service, the design and construction standards that will have to be met, the fees and charges that will be assessed, who will own, operate and maintain the system, and any additional surcharge that might be assessed due to the need for a pump station.

   If the SAWSJPB agrees to provide service, it will likely be necessary to expand its service area boundary, as the Prairie Dog Creek valley is not currently within its defined boundary.

2. **WDEQ Permit to Construct.** Once plans and specifications are developed for construction of the recommended alternative, the WDEQ must approve of those plans.

3. **WDEQ Stormwater Pollution Prevention Plan.** WDEQ requires development of a pollution prevention plan for any construction activities that result in clearing, grading or otherwise disturbing five or more acres. Depending upon the actual width of disturbance, it is possible that the five-acre maximum area will be exceeded on this project.

   As WDEQ has already established a general permit for this purpose, an individual permit is not required. Instead, a notice of intent should be filed with WDEQ within 30 days of construction commencement, stating in part that a pollution prevention plan is on file and available for review by WDEQ if necessary.

   The pollution prevention plan is routinely delegated to the construction contractor and included in the construction contract.

4. **License Agreements with Sheridan County.** Depending upon the exact location of the existing SAWSJPB system, it may be necessary to secure a license agreement from Sheridan County to permit the installation of the 8-inch transmission main across county roads, including Peno Road. This license agreement may be written in the name of SAWSJPB as the permittee, depending upon who will ultimately own the water system.

5. **License Agreements with Wyoming Department of Transportation.** It will be necessary to cross U.S. Highway 14 with the proposed transmission main at least once within the Prairie Dog Creek valley. It may also be necessary to extend service lines from one side of the highway to the other, depending upon the customers ultimately served. Any such crossings will require receipt of an approved license agreement with the Wyoming Department of Transportation.
6. **Protective Covenants of Hidden Hills Landowners Association.** A declaration of protective covenants for the Hidden Hills Landowners’ Association was recorded on June 20, 1984. Within that declaration, it is stated as follows:

   “Tract owners shall provide their own water supplies, which shall comply with the laws of the State of Wyoming, and regulations of the State Board of Control.”

Based upon this language, it would appear that these protective covenants should be amended to have a public water system provide the water supplies necessary for the area, in lieu of individual systems. Such an amendment is possible “upon approval of the owner or owners of 75% of the land within the boundaries” of the plat prepared in April 1984 and on file in the Sheridan County Clerk’s Office. This plat specifically excludes the Ruby Subdivision.

7. **U.S. Army Corps of Engineers 404 Permit.** As an exact alignment for the proposed water system has not yet been decided upon, no delineation of wetlands has yet been made. Depending upon the ultimate alignment of any proposed pipelines, it may be necessary to obtain the approval of the U.S. Army Corps of Engineers for any stream crossings or other areas where waters of the United States exist, along with their associated wetlands.

   The need for this permit will become known once final design is completed.

8. **Environmental Report.** If funding is to be provided by the U.S. Department of Agriculture’s Rural Utilities Service, it will be necessary to procure an Environmental Report of the affected area. Any environmental impacts associated with the project must be mitigated.

9. **Land and Right-of-Way.** Although not actually required permits, it will be necessary to secure fee simple title for the proposed storage tank, and also possibly for the proposed booster station. (If the booster station is located underground, an easement may suffice.) Easements will be necessary for the water mains, service lines, and related appurtenances.

As the Hidden Hills area is not a platted subdivision, there were some initial concerns about securing right-of-way for the water mains, service lines and appurtenances within the Hidden Hills area. However, a review of the Sheridan County Courthouse records revealed that the roads within the Hidden Hills area were dedicated to the public in late 1979, and with such dedication, public access for utilities such as water systems.
6. **ECONOMIC ANALYSIS AND FINANCING PLAN**

In order to assist any and all prospective funding agency in determining a fair and equitable financing plan for the recommended alternative identified in Section 4, it is necessary to conduct an economic analysis associated with a proposed financing plan in order to determine the ability of property owners to potentially fund the proposed PDPWS. This analysis and plan must be adequate to address the needs of all prospective funding agencies.

6.1 **Potential Funding Sources**

There are many state and federal agencies that administer programs that fund water system improvements. The agencies from which grants and loans are typically requested for funding public water systems such as the PDPWS are described below.

6.1.1 **WWDC**

This state agency provides grants and loans to be utilized for the development of water within the State of Wyoming. Funding for the WWDC originates from a tax placed upon extracted minerals, including principally coal. Eligible projects include those associated with the development and transmission of water, but not the treatment or distribution of water.

Grants are usually available for 50% of the cost for project development, although sometimes – in cases of demonstrated hardship – higher percentages can be obtained. Loans for the non-grant share of project-eligible costs are available at a current rate of 7¼% and term of up to 30 years, although longer terms may also be considered.

The WWDC is recommended to be a major contributor of funding for the transmission aspects of this project.

6.1.2 **Rural Utilities Service**

The Department of Agriculture’s Rural Utilities Service (RUS) provides grants and loans to be utilized for the development of water within rural communities and areas around the United States. As opposed to the WWDC, eligible projects can include those associated with the treatment and distribution of water, as well as transmission.

Grants can be available for up to 50% of the cost for project development, although sometimes – in cases of demonstrated hardship – higher percentages can be obtained. Loans for the non-grant share of project-eligible costs are available at a current rate of 4 7/8% and term of 25-30 years, depending upon the type of district formed. Tap fees for the initial users of the project are often deemed to be project-eligible. Service line costs from the property line to the home are not usually eligible under RUS’s program, but are eligible under the Department of Agriculture’s Rural Housing Service (RHS). Interest rates and terms for RHS loans are a function of household income.

As mentioned previously, in order to receive RUS funding, an Environmental Report must be prepared for the lands being affected by the proposed project. An Environmental Report can be prepared by the Midwest Assistance Program for the RUS at no cost to the applicant, although
any mitigation required as determined in the Environmental Report is the applicant’s responsibility.

The RUS could potentially be a major contributor of funding for this project.

6.1.3 State of Wyoming Land and Investment Board (SLIB)

This state agency provides grants and loans to be utilized for the development of infrastructure within communities and special districts around the State of Wyoming. The board of directors for the SLIB is comprised of the five state elected officials. Funding for SLIB-supplied grants and loans originates from federal mineral royalties that obtained from minerals extracted from within the State, of which a portion is returned to Wyoming. Eligible projects are not limited to, although of course can be, those associated with all aspects of the delivery of water, including treatment, transmission and distribution of water. Water and sewer projects, in fact, receive a higher priority for SLIB funding due to their importance to the health and safety of Wyoming citizenry.

Grants are usually available for up to 50% of the cost for project development, although sometimes – in very rare cases of demonstrated hardship – higher percentages can be obtained. Loans for the non-grant share of project-eligible costs are available at 7¼%. The rate is based upon the prime rate and thus fluctuates. An SLIB loan has a term of 30 years.

6.1.4 WDEQ State Revolving Loan Fund

The WDEQ administers the State Revolving Loan Fund (SRF) for both water and sewer projects throughout Wyoming. Funding for the SRF originates from Congress-supplied monies to the U.S. Environmental Protection Agency, which in turn allocates a portion of these funds to each state.

WDEQ continually updates a ranking of projects eligible for the SRF. At this time, a public water system to serve residences within the Prairie Dog Creek valley is not on the priority list for SRF funds. However, in discussions with Brian Mark, SRF program coordinator for the WDEQ, it is likely that this project could quickly become eligible).

Loans for the non-grant share of project-eligible costs are available at a current rate of 4% and term of 20 years. No grant monies are available from this funding source.

6.2 District Formation

In order for any prospective agency to have an entity with whom it may contract, it is necessary to establish an organization for such contracting purposes. Typically, this involves establishment of a district. Water districts, water & sewer districts and improvement & service districts are the usual types of districts utilized in Wyoming for these purposes.

As the likelihood of providing sewer is very remote in this area, establishment of a water & sewer district makes little sense. Because improvement & service districts do not have the power of condemnation, and there may be a need for such condemnation authority, this type of district should not be created. Such condemnation must be available in order to construct the proposed project, as a considerable number of easements are likely to be necessary along U.S. Highway
14. Therefore, the most logical type of district recommended to be formed is a water district.

Water district law is discussed in the Wyoming state statutes at §41-10-1011, et seq. Some important topics that must be followed to be in compliance with these statutes are the following.

- A petition for district formation shall be signed by at least 25% of the landowners owning at least 25% of the assessed valuation of property within the proposed district. No tract of land 20 acres or more shall be included in the district without the written consent of each person having legal title to the tract.
- The board of county commissioners has the authority to approve the petition for formation, and may enter an order directing the formation of the district and the district’s initial directors to a vote of the affected landowners. If a majority of the voters cast votes in favor of formation, the district is formed.
- If any portion of the proposed district is within two miles of any city or town, standards used for construction of the water system must be at least as stringent as those of that city or town.
- Once formed, the district has the power to levy up to eight mils of ad valorem taxes without a vote of the district electors.
- Any indebtedness incurred requires a majority vote of the district electors.
- The maximum term for any debt incurred is 30 years.
- The cost for district formation includes attorney fees, publication costs, election costs for officer selection, and boundary surveys.

6.3 Determination of Equivalent Dwelling Units

Equivalent Dwelling Units (EDU’s) are defined by RUS as “the level of service provided to a typical residential dwelling. One EDU is equivalent to a ¾-inch or 5/8-inch service line tap”. Within the proposed PDPWS area to be served, only rural residences and domestic connections to ranches would be installed. They will be ¾-inch or 5/8-inch service line taps. As such, it is assumed that that the number of EDU’s to be served is the same as the number of services.

6.4 Projected Costs

6.4.1 Capital Costs and Related Debt Service

Table 3.1 identified the recommended alternative to provide water service in the subject area. The capital cost to implement this alternative was shown to be an estimated amount of $1,374,745.

Section 4 also stated that there are additional up-front costs that must be considered and accounted for when evaluating the overall cost to the ultimate customer. These additional costs are listed below.

- District Establishment Costs. In order to have an entity with which the WWDC can contract for design and construction of the proposed alternative, a district must be established. Such establishment entails certain costs identified in Section 6.2, including attorney’s fees, publication costs, election costs for officer selection, and boundary surveys. These costs are estimated to be:
Attorney fees $7,000
Election and Publication costs $3,000
Boundary surveys $5,000

$15,000

- **Bond Issuance Costs.** Assuming that it is necessary to incur debt for the project, and bonds would be the chosen method of debt service (as would be required if RUS funding is obtained), there will be the cost to issue these bonds. Per discussions with RUS personnel, the cost for bond issuance would be approximately $5,000 if the amount of debt to be incurred is less than $500,000, or approximately $6,000 if the amount of debt to be incurred is greater than $500,000.

- **SAWSJPB System Investment Fees.** In order to receive water service from the SAWSJPB, it is necessary to pay its system investment fee. The current connection fee of SAWSJPB is $2,630 for a typical residential connection.

- **Individual Service Lines on Private Property.** Service line costs from the meter pit at the property line to the actual point of use are the responsibility of the property owner. Discussions with local plumbers have provided an estimated cost of $13/lineal foot for this service line, to include all connections necessary and an internal expansion tank for the plumbing system. Assuming a distance of 300 feet from the property line to the residence, the average cost for this installation is $3,900.

As mentioned previously, and depending upon household income, it may be possible to finance these costs via the Department of Agriculture’s RHS program.

Most, but not all, of the costs described are eligible for grants and loans from the various funding sources identified in Section 6.1.

After discussions with representatives of all of these agencies regarding the manner with which they might be able to provide funding, the following two financial scenarios are analyzed for consideration of service to the PDPWS:

### 6.4.1.1 Scenario 1

Scenario 1 assumes the following:

- WWDC grant (@ 50% for grant-eligible items); and
- RUS loan (@ 100% of non-WWDC eligible items).

Table 6.1 lists the various components of Scenario 1. It includes both the capital and up-front costs discussed previously, except for the individual service lines on private property. It is assumed that all system components will be WWDC grant-eligible except for service line costs from the main to the property line, and that all components will be RUS eligible. It is also assumed that 35 of the possible 52 parcels will commit to being customers of the proposed PDPWS. To obtain a perspective on this number of possible customers, there are presently approximately 36 existing properties within the proposed service area that have addresses and thus have residences upon them.
Based upon the above assumptions, the amount of the proposed RUS loan would be $794,128. Using figures for an RUS loan of 4 7/8% interest at a term of 30 years, the annualized payment for the loan is $50,370, or, based upon 35 EDU’s, $119.93 per month per EDU.

Table 6.1
Capital and Up-Front Costs
Scenario 1 – RUS Loan

<table>
<thead>
<tr>
<th></th>
<th>WWDC Grant (1)</th>
<th>RUS Loan</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Construction</td>
<td>$647,642</td>
<td>$727,103</td>
<td>$1,374,745</td>
</tr>
<tr>
<td>District Formation</td>
<td>$0</td>
<td>$15,000</td>
<td>$15,000</td>
</tr>
<tr>
<td>Bond Issuance</td>
<td>$0</td>
<td>$6,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>SAWSJPB System Inv. Fees</td>
<td>$46,025</td>
<td>$46,025</td>
<td>$92,050(2)</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>$693,667</td>
<td>$794,128</td>
<td>$1,487,795</td>
</tr>
</tbody>
</table>

(1) assumes all components except for service lines from main to property line are grant-eligible

(2)$2630/connection x 35 EDU’s

6.4.1.2 Scenario 2

As opposed to Scenario 1 (in which a loan is obtained from RUS for all of the non-WWDC eligible costs), Scenario 2 assumes that the non-WWDC eligible costs will be funded with a 50% grant and 50% loan from the RUS. All other cost allocations remain the same. This scenario also again assumes that 35 individual customers will be part of the PDPWS.

Table 6.2 lists the various components of Scenario 2, which are the same as Scenario 1 but with different funding allocations. It shows the amount of the proposed RUS loan to be $396,564. Based upon an RUS loan of 4 7/8% interest at a term of 30 years, the annualized payment for the loan would be $25,153, or, based upon 35 EDU’s, $59.89 per month per EDU.

Table 6.2
Capital and Up-Front Costs
Scenario 2 – RUS Grant and Loan

<table>
<thead>
<tr>
<th></th>
<th>WWDC Grant (1)</th>
<th>RUS Grant</th>
<th>RUS Loan</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Construction</td>
<td>$647,642</td>
<td>$363,551</td>
<td>$363,552</td>
<td>$1,374,745</td>
</tr>
<tr>
<td>District Formation</td>
<td>$0</td>
<td>$7,500</td>
<td>$7,500</td>
<td>$15,000</td>
</tr>
<tr>
<td>Bond Issuance</td>
<td>$0</td>
<td>$2,500</td>
<td>$2,500</td>
<td>$5,000</td>
</tr>
<tr>
<td>SAWSJPB System Inv. Fees</td>
<td>$46,025</td>
<td>$23,013</td>
<td>$23,012</td>
<td>$92,050(2)</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>$693,667</td>
<td>$396,564</td>
<td>$396,564</td>
<td>$1,486,795</td>
</tr>
</tbody>
</table>

(1) assumes all components except for service lines from main to property line are grant-eligible

(2)$2630/connection x 35 EDU’s

6.4.2 Reserve Account

RUS requires the establishment and maintenance of a reserve account for debt repayment. This reserve account is to be 10% of the annual debt payment.
The reserve account for Scenario 1 is calculated to be $5,037, or based upon 35 EDU’s, $11.99 per EDU per month.

The reserve account for Scenario 2 is calculated to be $2,515, or based upon 35 EDU’s, $5.99 per EDU per month.

### 6.4.3 Operation and Maintenance Expenses

Listed in Table 6.3 are the projected annual operations and maintenance (O&M) expenses for the proposed PDPWS. As SAWSJPB is proposed to provide retail service and operate and maintain the PDPWS system, the below costs are not extensive. The SAWSJPB will bill the PDPWS customers the standard retail rate for providing O&M services for all components of the transmission and distribution systems, except for the Hidden Hills pump station. For this pump station, estimated annual O&M costs are depicted below, which includes an amount to be set aside for eventual replacement of the components of the pump station.

**Table 6.3**  
Projected Annual O & M Expenses- Year 2003

<table>
<thead>
<tr>
<th>Expense Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Administration</td>
<td>$ 5,000</td>
</tr>
<tr>
<td>Pump Station Operation, Maintenance and Replacement</td>
<td>$ 7,000</td>
</tr>
<tr>
<td><strong>Total Estimated Annual O&amp;M Expenses</strong></td>
<td><strong>$ 12,000</strong></td>
</tr>
</tbody>
</table>

Based upon the above table and 35 EDU’s, the estimated monthly O&M expenses per EDU is $28.57 per month per EDU. This amount would apply to both Scenarios 1 and 2.

### 6.4.4 SAWSJPB User Fees

SAWSJPB’s current rates for water service are shown in Table 6.4, and are shown as follows.

**Table 6.4**  
SAWSJPB User Fee Schedule

<table>
<thead>
<tr>
<th>Bi-monthly Minimum Charge</th>
<th>Usage per Two Months</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>$51.30</td>
<td>0-31,500 gal.</td>
<td>$0.90/1000 gal</td>
</tr>
<tr>
<td></td>
<td>&gt; 31,500 gal.</td>
<td>$1.10/1,000 gal</td>
</tr>
</tbody>
</table>

Assuming that SAWSJPB does in fact agree to provide retail water service to customers in the proposed service area, this will be the amount that customers will pay the SAWSJPB for water service. Based upon the projected average monthly usage of 14,000 gallons per month, a typical customer (i.e., 1 EDU) would pay SAWSJPB an amount of $38.25 per month. If alternative irrigation sources are available for the customer, usage for a typical resident would be less.

This SAWSJPB user fee would apply to both Scenarios 1 and 2.
6.4.5 **Cost Summary**

Table 6.5 depicts a summary of the monthly costs per EDU discussed above, showing both Scenarios 1 and 2.

<table>
<thead>
<tr>
<th>Item</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt Service</td>
<td>$119.93</td>
<td>$59.89</td>
</tr>
<tr>
<td>Reserve Account</td>
<td>$11.99</td>
<td>$5.99</td>
</tr>
<tr>
<td>O&amp;M Expenses</td>
<td>$28.57</td>
<td>$28.57</td>
</tr>
<tr>
<td>SAWSJPB User Fees</td>
<td>$38.25</td>
<td>$38.25</td>
</tr>
<tr>
<td><strong>Total Monthly Cost</strong></td>
<td>$198.74</td>
<td>$132.70</td>
</tr>
</tbody>
</table>

6.4.6 **Comparison with Similar Communities**

User fees for nearby communities and rural water systems have been listed in Table 6.6 to provide for a comparison with user fees that would be assessed in the PDPWS. All fees are based upon a usage of 14,000 gallons month per EDU. The PDPWS monthly amount assumes receipt of 50% RUS loan.

<table>
<thead>
<tr>
<th>Community/System</th>
<th>Total Bill</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Sheridan</td>
<td>$18.71</td>
</tr>
<tr>
<td>SAWSJPB</td>
<td>$38.25</td>
</tr>
<tr>
<td>Dayton</td>
<td>$23.60</td>
</tr>
<tr>
<td>Buffalo</td>
<td>$17.80</td>
</tr>
<tr>
<td>NW Rural Dist. - Cody</td>
<td>$58.48</td>
</tr>
<tr>
<td><strong>PDPWS (Scenario 2)</strong></td>
<td><strong>$132.70</strong></td>
</tr>
</tbody>
</table>
7. SUMMARY AND PATH FORWARD

7.1 Summary

Listed below is a summary of the key points that have been determined in this study.

1. Based upon a questionnaire distributed to property owners in portions of the Prairie Dog Creek valley sent out in July, 2001, there is:
   - no interest in a PDPWS in the Peno Road area;
   - some interest in a PDPWS in the area along U.S. Highway 14 from the Rocky Hills Subdivision to Hidden Hills Road;
   - considerable interest in a PDPWS in the Hidden Hills area; and
   - little interest in a PDPWS along U.S. Highway 14 south of Hidden Hills Road.
   As such, the areas along U.S. Highway 14 to Hidden Hills Road and the Hidden Hills area were established as a proposed service area for the PDPWS.

2. There are approximately 52 parcels of land within the proposed PDPWS service area, which are rural residential or ranch properties. Ten of these parcels are within platted subdivisions. Some of the parcels are owned by the same property owner.

3. There is a lack of acceptable quality and quantity of water for residences and ranches in the area proposed for service by the PDPWS. Several residents in the Hidden Hills area haul their water from the City of Sheridan’s bulk water station.

4. There is little likelihood of finding acceptable groundwater supplies in the Prairie Dog Creek valley that would serve as a suitable supply for a public water supply.

5. The most feasible method of providing water to the PDPWS would be via a connection to the SAWSJPB system in the area of Rocky Hills Subdivision. This alternative would involve construction of transmission mains, a pump station, storage tank, service lines and related appurtenances to provide for the service area. The total capital and up-front cost for this system is estimated to be $1,486,795.

6. There is currently no public entity in the service area that could contract with various agencies to receive funding for a public water system.

7. The public entity that could be established that could best serve the needs for a public water system is a water district.

8. Based upon receipt of funding as depicted in Section 6.4.1.2, (Scenario 2), that being:
   - a grant from the WWDC in the amount of $693,667,
   - a grant from the RUS in the amount of $396,564,
   - a loan from the RUS in the amount of $396,564 at 4 7/8% for a term of 30 years,
   it is estimated that the average monthly cost to receive water service if these funds are obtained would be $132.70/month. This average monthly cost assumes usage at 14,000 gallons per month, and that there would be 35 connections to the PDPWS. If more than 35 connections can be made, the average cost can be correspondingly reduced. However, such
connections should not increase the size of the proposed new system (such as by extending
the distribution system), or any savings will be offset by new system extension costs.

The cost to install and connect the property owner’s private service line and extend it to his
or her point of use is not included in this cost. It is estimated that the cost for this service line
connection and extension would be $3,900 per residence, assuming a 300-foot long service
line.

7.2  **The Path Forward**

Based upon the above summary, the following items provide for a path forward.

9. Obtain commitments from at least 35 interested parties in the proposed service area to
participate in the proposed project at the use rates discussed above. These connections
must be in the proposed service area, or additional system extension costs will likely be
incurred.

10. Once property owner commitments are obtained, establish a water district with which the
WWDC, RUS and SAWSJPB could contract for funding and water service.

11. Discuss with RUS the feasibility of obtaining a higher grant/loan percentage in order to
lower projected monthly assessments.

12. Enter into a water service agreement with the SAWSJPB for service to the area.

13. Obtain an Environmental Report for the proposed project through the Midwest
Assistance Program.

14. Submit applications to the WWDC and RUS in 2002 for funding of design and
construction. For the WWDC, this means that Level 3 funding would be requested,
bypassing the Level 2 step.

15. Commence with design of the water system in the summer of 2003.

APPENDIX 1

QUESTIONNAIRE SENT TO POTENTIAL SERVICE AREA CUSTOMERS
QUESTIONNAIRE ON EXISTING WATER WELLS
July, 2001

(Note: Extra copies of this questionnaire are being provided to you in case you have more than one water well. Please fill out a questionnaire for each water well that you own.)

1. Name: ________________________________________________________________

2. Street Address: _______________________________________________________

3. Mailing Address (if different than street address):
   ________________________________________________________________

4. Phone Number:  (home)__________________________
   (work) __________________________

5. E-mail address: _______________________________________________________

6. Legal Description of Property: _________________________________________
   ________________________________________________________________
   ________________________________________________________________

7. Is there an existing water well currently in use that serves your property?  ☐ Yes   ☐ No

8. What purposes does this water well serve?
   ☐ Inside domestic use
   ☐ Lawn & garden irrigation
   ☐ Stockwater
   ☐ Commercial Irrigation
   ☐ Other _______________________

9. If you don't use your water well for inside domestic use or lawn and garden irrigation, how do you supply water for these two purposes?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
10. If you do **not** have an existing water well, have you or anyone else ever attempted to drill a water well? □ Yes □ No □ N/A □ Don't know

If the answer is yes, please describe why the property does not now have a water well that serves it.

__________________________________________________________________________

__________________________________________________________________________

11. How many total water wells serve your property? ____________________________

12. What was the approximate date of this water well's installation? ________________

13. Does the water well have a permit obtained from the Wyoming State Engineer? □ Yes □ No
   If so, please provide a copy of the permit along with this returned questionnaire.

14. Do you have a copy of the driller's report for your water well? □ Yes □ No
   If so, please provide a copy of the report along with this returned questionnaire.

15. Do you have a copy of a recent water quality analysis of the water from within your well? □ Yes □ No
   If so, please provide a copy of the report along with this returned questionnaire.

16. What is the approximate depth of your water well casing (in feet) from the ground surface? ________________________________________________

17. What is the approximate depth that the intake for your pump is set from the ground surface? (in feet) ____________________________________________

18. What is the approximate depth that the slotted casing for your water well pump is set from the ground surface? (in feet) _____________________________________________

19. If the water well that is used for indoor use is **not also** used for outside irrigation, why not?
   _______________________________________________________________________
   _______________________________________________________________________
   _______________________________________________________________________

20. What do you use instead for outside irrigation? ________________________________
   _______________________________________________________________________
   _______________________________________________________________________
   _______________________________________________________________________
21. Have at any time you or the previous owner been forced to drill a new water well because of inadequacy of a previous water well?  □ Yes  □ No

If the answer is yes, please describe the circumstances that required a new water well.

________________________________________________________________________

________________________________________________________________________

22. Do you know what geological formation is the source of your water?  □ Yes  □ No

If so, what is that geological formation?

________________________________________________________________________

23. How would you describe the quality and quantity of the water from your well?

Quality:

________________________________________________________________________

Quantity (include any flow rate information you currently have):

________________________________________________________________________

24. Do you provide any treatment to your well water (such as reverse osmosis, filtration, etc.)? If so, what is that treatment?

________________________________________________________________________

25. Is there any additional information that you think we should know pertaining to your water well or individual water system?

________________________________________________________________________

________________________________________________________________________

26. Without in any way committing yourself, do you have an interest in receiving water from a public water system, if the cost for water does not exceed (check all that apply):

   $25/month?  □ Yes  □ No
   $50/month?  □ Yes  □ No
   $75/month?  □ Yes  □ No
   $100/month? □ Yes  □ No
   greater than $100/month? □ Yes  □ No
Thank you very much for completing this questionnaire! Please return to:
EnTech, Inc. Consulting Engineers
1949 Sugarland Drive, #205
Sheridan, WY 82801
307-673-1542
FAX (307-673-1547)
Email: entech@fiberpipe.net
in the stamped return envelope at your earliest convenience.
APPENDIX 2

GROUNDWATER REVIEW FOR THE HIDDEN HILLS SERVICE AREA, PILCH ENGINEERING, AUGUST 2001
August 27, 2001

Entech, Inc.
Attn Dave Engles, P.E.
1949 Sugarland Drive, Suite 205
Sheridan, Wyoming 82801

Subject: Hidden Hills Groundwater Review.

Dear Dave:

Enclosed is a copy of the above subject report. Due to the time line of September 1, 2001, additional information from the State Engineer's Office was not retrieved, and the report was written based on the existing information.

Additional information may have been helpful, but don't believe the general summary of findings would have changed. In general, it is my opinion that constructing a well with greater capacity than 15-25 gpm in this area would be very difficult. Based on the geologic formations and existing well data, the majority of the wells in this area realistically produce less than 10 gpm. Doubling this capacity seems difficult.

Three water quality analysis on wells are contained in Appendix C. Water quality ranges greatly throughout this area, but believe that these results would be applicable to the water bearing formations that would be targeted for a municipal well.

Lastly, this report is based on existing published data in this area, and is what I am typically aware of. However, if this appears feasible at all, some field testing or pilot test should be run. The data must be verified.

If you have any questions, please call.

Sincerely,

Thomas J. Pilch, P.E., P.G.
GROUNDWATER REVIEW
FOR THE
HIDDEN HILLS SUBDIVISION AREA

PREPARED FOR
ENTECH, INC.
SHERIDAN, WYOMING

PREPARED BY
PILCH ENGINEERING
SHERIDAN, WYOMING

AUGUST 2001
PURPOSE AND SCOPE

This report presents the results of a groundwater review for the Hidden Hills Subdivision area located south-southeast of Sheridan, Wyoming. This study was conducted for the purpose of identifying the potential for drilling a public water supply well to service approximately 55 residential dwellings.

The study consisted of reviewing a detailed questionnaire completed by residents within the Hidden Hills area, reviewing existing groundwater usage in the area and reviewing the geological conditions within the area. This information is summarized in the following sections.

RESIDENTIAL QUESTIONNAIRE

Entech, Inc., the project engineer for evaluating this overall project, conducted a public meeting and sent out a questionnaire. This questionnaire generally asked residents about their well construction, usage, and quality and quantity of well water. Approximately 30 responses were received.

Only 2 of the responses indicated that they had a well that was sufficient quality and quantity. The remaining responses indicated that the well quality and/or quantity were not sufficient for their household needs. Approximately 7 responses indicated they do not have a well and haul water to their residents. There were also others that indicated they hauled water to supplement their well.

Several of the respondents submitted well logs of their on-site wells. Three of the respondents submitted water quality analysis.

Based on these responses, it is obvious that the existing groundwater usage in this area does not supply an adequate quantity and quality of water to the residents.
GROUNDWATER WELL INFORMATION

In order to evaluate if a public water well could be produced in this area a review of the existing well information was performed. This review was performed by using the Wyoming State Engineers (WSE) registered well database, and the well information submitted by the respondents.

A review of the WSE registered well database was performed in the area approximately presented on the appended USGS Site Map, Appendix A. This data base gives the well location, permit number, status, use, applicant name, date drilled, yield, static water level, well depth, producing zone, and whether a well log and chemical analysis is on file. Copies of the database for this general area are contained in Appendix B.

The location of the wells and depth they were producing was plotted on the USGS Site Map. The depth of production and well log information were also placed on this map. This information indicated where most wells were drilled and to what depth they were producing. This information was used in conjunction with the area geology to determine if there is some specific depth or geologic formation that contains better quantity and quality groundwater. This evaluation is explained in the next section.

GEOLOGIC REVIEW – GROUNDWATER USAGE

The geology in this area generally consists of two formations. These formations are estimated to extend to at least 2,000 feet below the study area. These formations are the Wasatch and Fort Union Formations. The Wasatch lies on top of the Fort Union. The contact between these formations, for discussion purposes, is near Interstate 90 and generally parallels the interstate in this area. These formation generally dip to the east at approximately 3-5 degrees.
The Wasatch Formation consists of inter-bedded clays and sands. The Fort Union Formation consists of inter-bedded claystones, sandstones and lignite (coal). Because the Wasatch lies on top of the Fort Union its beds outcrop at the contact and east. The Fort Union beds outcrop at the contact and west. The Fort Union extends westerly to near the base of the Big Horn Mountains.

Because the Wasatch Formation outcrops near the Hidden hills area, the amount of recharge water for this formation is minimized. However, the Fort Union Formation encompasses a large area and has a lot of potential for recharge sources.

With the known geological conditions and existing well information plotted in this area, an evaluation of the water bearing zone(s) was reviewed. To show this evaluation, a cross section was constructed. A copy of this cross section is presented in Appendix A. The approximate location of the cross section is presented on the USGS Site Map.

The cross section shows the surface topography across this area and the approximate geologic formation dip. Also presented is an area that shows the Area/Depth of Well Usage. This area/depth is based on the WSE database. The wells along the western side of the study area are typically 100-200 feet in depth. The wells in and near the Little Goose Drainage are generally 100-400 feet in depth. The wells in the Hidden Hills area range depending on the surface elevation, but are generally completed in the 200-400 foot depth range. There is one well, as presented, in the Hidden Hills area that is approximately 1,000 feet deep.

When comparing the area/depth of well usage across the site with the dip in the geologic beds, the wells in the Hidden Hills area are producing from the Wasatch or upper portion of the Fort Union. The only real exception is the one well located in Hidden Hills that is drilled to 1,000 feet.
WATER QUALITY AND QUANTITY

Water quality is based on the three analysis that the respondents submitted, respondent’s comments relating to quality and knowledge of the groundwater within this area. Copies of the laboratory tests submitted by the respondents are contained in Appendix C. Two parameters of interest are TDS and sulfates. As shown, the TDS ranges from 557 ppm to 990 ppm, and the sulfates range from less than 10 ppm to 393 ppm. Both of these parameters exceed public drinking water standards.

The majority of the respondents to the questionnaire indicated that the water quality was poor. Groundwater in this area can have a wide range of quality; depending on if the well is completed in sands or clays, and even lignite. However, it is believed that the three copies of the analysis appended are typical of the better quality groundwater.

Water quantity was evaluated based on the WSE database, respondent’s information and general knowledge of this area. In the WSE database most of the wells are reported to yield between 2 - 20 gpm, with the majority of the wells with yields less than 10 gpm. There are a few shallow wells that are reported to be over 50 gpm. However, these wells are located in an alluvial aquifer (next to a Creek/River). Information from the Hidden Hills respondents all generally indicated that yields were less than 5 gpm. The 1,000-foot well in Hidden hills has a reported yield of 15 gpm.

Based on the information reviewed and general knowledge of the geological formations in this area, drilling a well in this area that would produce over 15-25 gpm would be unlikely. A 1,500-foot well producing from more than one water-bearing zone would probably be required to reach the 25 gpm rate. Drilling deeper than 1,500 feet attempting to find better production zones is a possibility. However, attempting to drill deep enough to encounter the next Formation, Lance, is probably out of the question due to the depth. The Fort Union and Lance Formation contact is near the face of the Big Horn Mountains,
approximately 16 miles due west of the project site. Assuming the average easterly dip is 5 degrees, the Lance would be estimated to be over 5,000 feet beneath the surface at the project site.

Another factor that must be taken into account when drilling deeper is the quality of the water. In general, the deeper the formation the further the recharge area is from the project site. As groundwater moves through the formation, the quality will get worse. Therefore, a deeper well may increase the quantity of groundwater, but the quality of the groundwater will likely be worse.

**SUMMARY**

- Majority of the Respondents within the Hidden Hills Subdivision don’t have an adequate well that produces the quality and quantity for a typical residential dwelling.
- Most of the well usage is 200 to 600 feet within the study area. West of Little Goose Creek the wells are producing from the Fort Union Formation and east of Little Goose Creek the wells are producing from the Wasatch or upper portion of the Fort Union.
- Water quality within the study ranges from fair to poor. It is highly unlikely that groundwater will meet public water supply standards. Therefore, some type of treatment will be necessary.
- Quantities of wells contained on the WSE data base range from less than 5gpm to generally up to 20 gpm. Most of these quantities are estimates, not pump tested. Based on the geological formations, it is unlikely that a single well could be constructed to produce more than 15-25 gpm. This well is estimated to have to be drilled to a depth of 1,500 feet, or elevation 2,800 to 3,200 msl.
- Drilling deeper into the Fort Union or even to the Lance Formation could increase the quantity of a production well. However, the quality of groundwater may get worse with depth due to the distance of the recharge area away from the project site.
- For a public water supply, it would be recommended that two wells be drilled. Continuous operation of one well near full capacity may limit the life of a well. Also, with only one well the entire system is shut down if there is a problem with the well.
- The majority of the data evaluated for this study is from WSE published well records. This data is typically estimated or approximated. Therefore, actual field tests should be run or even a pilot test well completed prior to designing any system. A pilot test well could be used to blend groundwater with treated SAWS water, or even used for irrigation purposes. The money spent on a test well may not be wasted.