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Funding for WRDS and the creation of this electronic document was provided by the Wyoming Water Development Commission (http://wwdc.state.wy.us)
Poison Spider Pipelines
Level II Study
FINAL REPORT

Prepared For:
Wyoming Water Development Commission

NOVEMBER 2010

Prepared by:

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Poison Spider Pipelines

Level II Study

FINAL REPORT

NOVEMBER 2010

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SECTION 1 - INTRODUCTION

This section of the Study provides introductory and background information about the Poison Spider Pipelines Level II Feasibility Study and acknowledges some of the people who were influential in the successful completion of this Study.

BACKGROUND

The Poison Spider Improvement and Service District, hereinafter referred to as “District,” is located approximately 13 miles southwest of Casper, Wyoming in Natrona County, as shown in Figure 1-1. The District is responsible for providing domestic water service to many of the residents in this rural area. The water system is classified as a public water supply by the U.S. Environmental Protection Agency (EPA). The District's service area boundary is extensive, encompassing approximately 27 square miles. The area is zoned primarily for agriculture and used predominantly for ranching and farming.

The water system which serves the District was originally constructed and owned by the Poison Spider Water Company. The Company primarily consisted of the ranchers and landowners whose water wells were of poor quality and who wanted a more reliable water system. The original water system was constructed in the late 1960’s through a contract with the U.S. Soil Conservation Service, and initially served about 25 customers. The original source of supply was a shallow alluvial well located on the east side of the North Platte River just downstream of the Bessemer Bend Bridge. Because of the long distances and variable topography, the system was divided into two pressure zones. Water from the well was pumped westward across the river and along Bessemer Bend Road to a buried steel water storage tank. Everything between the well and the booster station were in the lower pressure zone of the water system. The water from the water storage tank was then pumped northward by an inline booster pumping station to provide water service to the upper pressure zone. The upper zone system served properties as far north as Poison Spider Road, including the Poison Spider School and properties north and west of the school.
FIGURE 1-1
POISON SPIDER IMPROVEMENT AND SERVICE DISTRICT LOCATION MAP
The original water delivery piping system consisted of approximately twelve miles of buried pipelines. Due to the vast size and topographic diversity of the District’s service area, and in an effort to reduce costs, the delivery system was constructed of small diameter, (four-inch diameter and smaller) plastic piping. In order to ensure a reliable supply to all customers, each user was provided with a “dole valve” which regulated the flow to about one half gallon per minute to each customer. Because of the low flow capability of the delivery system, it was necessary for each user to construct a buried cistern to store water on the homeowner’s property. A homeowner pumping system consisting of a pump and pressure tank, was used to convey the water from the cistern to the house plumbing in the quantity and pressure required by the homeowner.

In the late 1970s, the alluvial well “silted up” and quit producing. An infiltration gallery was constructed under the river to replace the well in 1979. The infiltration gallery did not always produce high quality water, and the water system limped along for about ten years often producing murky and turbid drinking water. In the late 1980s, the system came under the scrutiny of the EPA and the District was required to upgrade the water supply system to meet EPA Drinking Water Standards. In 1992, the District applied to the Wyoming Water Development Commission to perform a Level II Feasibility Study to determine the most feasible method of providing a long term reliable water supply. Three water supply alternatives were evaluated in the study: 1) a supply from adjacent Pioneer Water and Sewer District (Pioneer); 2) a deep groundwater well and, 3) an alluvial well. The study determined that the most feasible water supply was a connection to the Pioneer water system. In 1996, the District constructed a transmission pipeline from the Pioneer pipeline that serves the Poison Spider School, and extended it southward to connect into the District’s own water system. As part of the same project, a metering house with a chlorination system was constructed near the connection to the Pioneer transmission pipeline. The District also installed modern automatic touch read water meters in meter pits for all the customers in the system.
In the mid-1990s, the Central Wyoming Regional Water System (CWRWS) was formed. The regional concept was that one regional water treatment facility would serve all the surrounding communities and districts, and would sell water to all the members at a wholesale rate. The transmission and storage systems that delivered water to the members would be taken over, and owned and operated by the CWRWS. Soon thereafter, both Pioneer and the District chose to become Regional members, and the water transmission pipeline, meter house, and chlorination facility connecting the District to the Pioneer system were taken over by the CWRWS. In addition, the construction debts for the connection facilities were also taken over by the CWRWS.

The current water delivery system was mapped as part of the study, and is shown in Figure 1-2. The water delivery system is over 40 years old, and now serves 45 customers. It is believed to have been constructed of thin-walled, small diameter piping that was relatively new to the industry at that time. The water system was originally designed to provide service from the well situated in the south end of the District. The pipeline sizes in the southern portion of the District are larger, being closer to the original source of supply. However, once the District became a regional water customer, the source of supply shifted, and is now on the north end of the District where the delivery system is smaller. Because of the northern supply point, the pressures in the delivery system have increased, and can range from 60 to 150 pounds per square inch (psi). As a result, the system has been experiencing an increased number of leaks and failures, which have resulted in increased maintenance costs. In addition, many of the buried cisterns are not well maintained, and are believed to be a source of contamination from insects, rodents and other undesirable elements. The EPA has expressed concerns for many years that the cisterns are potential contamination sources and should be eliminated. However, because of the limited capacity of the old delivery system, the cisterns are necessary to provide flow equalization throughout the system.
Figure 1-2
Water System Feature Location Map

Legend

- Poison Spider District Boundary (Appx.)
- Road
- 2" Or Smaller Waterline
- 2.5" To 3" Waterline
- 4" To 6" Waterline
- 8" Or Larger Waterline
- CWRWS
- Valve
- Gate Valve
- Curb Stop
- PRV Valve
- CWRWS Storage Tank
- Hydrant
- Water Test Station
- Agricultural
- Commercial
- Residential
- Res Vacant Land
- Exempt
- Other

1" = 1mi

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POISON SPIDER PIPELINES, LEVEL II STUDY, FINAL REPORT

609 Consulting, LLC

Drawn by: JEL
Date: 12 Nov 2010
Scale: 1" = 1mi
Over the past 15 years, many new residences have been established within the District boundary, many of which do not have access to the existing water system. Most of the new homes are located in the 12 Mile Road area, and some along new roadways known as Tuffy Road and Dusty Lane. Each of the residences has an individual well many of which are generally of poor quality and variable quantity. As part of this Level II Study, the District would like to evaluate the possibility of extending the existing water system to serve the new residents.

**STUDY PURPOSE**

The purpose of this Study is to evaluate the feasibility of replacing troublesome, inadequate and undersized portions of the District’s water delivery system with a modern piping system. The new piping system would be sized to meet the current and projected flow demands of the District, and allow for the elimination of the troublesome cisterns. In addition, the District's ability to provide water service to the new homes and other potential water customers in the District will also be evaluated.

This Study is divided into five sections, and is intended to follow the usual WWDC study format, and address the subjects normally required by the state funding agencies. The five sections of the Study are highlighted as follows:

- Section 1 - Introduction
- Section 2 - Service Area and Water Demand Projections
- Section 3 - Evaluation of the Existing System
- Section 4 - Conceptual Design and Cost Estimates
- Section 5 - Economic Analysis, Project Financing and Implementation

**ACKNOWLEDGEMENTS**

Many people assisted in the preparation and completion of this Study. Listed below, are a few of the people whose assistance and input were valuable and greatly appreciated.

- Wyoming Water Development Commission staff for their assistance, administration of the contract, attendance at progress meetings, cooperation and direction.
Poison Spider Improvement and Service District Board of Directors: Dave Creager, Bill Kossert, Patrick Munsell, Clay McCardell, and Ty Schroeder, for their assistance, guidance and support.

Central Wyoming Regional Water System: David Hill, Director for his support, assistance and guidance.

David Drell, attorney for the District.

Natrona County Board of Commissioners for their assistance and support.
SECTION 2 - SERVICE AREA AND DEMAND PROJECTIONS

This section of the Study identifies the District’s water service area, and presents population growth and corresponding water demand projections for current and future populations.

WATER SERVICE AREA

The Poison Spider Improvement and Service District (District) boundary encompasses nearly 27 sections of land, as shown in Figure 1-1 previously. Because most of the area is used for ranching and farming, and some parcels are very large, only a small portion of the entire area is currently served by the District’s water system. For the purpose of this Study, the service area is considered to be the lands within the District boundary.

POPULATION AND GROWTH

Typically, water supply systems are expected to have a useful life of 50 years. And, typically, population projections are made for a 50-year planning period to determine the system’s water demand, and to size the piping system for the 50-year population. Because of the cyclical economy and the reliance on the energy industry, it is very difficult to accurately predict population growth over such a lengthy period. The District currently has about 45 customers, which equates to a population of approximately 144, based on 3.2 persons per household in Natrona County. There are approximately 30 additional homes in the 12 Mile Road area that could potentially be served by the District’s water system, which equates to a population of 96. The total current serviceable population is estimated to be 240.

Historically, the population in Natrona County has grown at an annual rate of 1 to 1.5%. Over a 50-year period, the 1% annual growth equates to a multiple of 1.65 which if applied to the current population would result in a year 2060 population of 396. An annual growth rate of 1.5% equates to a multiple of 2.10, which if applied to the current population would equate to a 2060 population of 504.
Because there are so many large land parcels in the District, there will be many opportunities in the future for development and subdivisions of the land. Conversations with the District board indicate knowledge of areas which could be sold and developed in the near future, particularly if domestic water is available. There are prime development lands in the Shinn Road area, the areas along the southern portions of Bessemer Bend Road, and areas west of Poison Spider School. For the purpose of this study, and at the Board’s urging, the study used a growth rate that would equate to a tripling of the District population by 2060, or a projected population of 730. The equivalent growth rate for a tripling of the population is approximately 2.25%.

**WATER USAGE**

As discussed previously in this section, the District purchases water at a wholesale rate from the CWRWS. A recent Casper Master Plan and hydraulic water model prepared for the WWDC indicates that the average daily water usage in the District is 144 gallons per person per day. For the purpose of this Study and in an effort to be consistent with the recent Casper Master Planning study, the average daily water usage for the Poison Spider system was assumed to be 150 gallons per capita per day.

**WATER DEMANDS**

There are three water usage figures that are used in evaluating water demands. The first is the “average day demand”, or ADD. The ADD is calculated by dividing the total water use in the system throughout the year by the service area population, and then dividing again by 365 days. Several studies performed over the past 10 years have identified the ADD for residential use in the rural areas around the CWRWS area to be about 150 gallons per capita per day (gpcpd). For the purpose of this Study, the ADD for the District area is assumed to be 150 gpcpd.

The second water usage figure is “peak day demand” or PDD. PDD is defined as the highest water usage experienced during a 24-hour period. The PDD usually occurs in the summer when irrigation watering is at its peak. PDD is used to size the pumping facilities in the water system. The previously referenced studies have identified the PDD for residential use as being 3 times the ADD, or in the District’s case, 450 gpcpd.
The third water usage figure is the “peak hour demand”, or PHD. PHD is the peak water usage observed at a point in time due to daily cyclical water demands. The PHD is used to size the water transmission and distribution system piping. The previously referenced studies have identified the PHD in the service area to be 5 times the ADD, or 750 gpcpd in the District.

WATER DEMAND PROJECTIONS

The water demand projections for the District’s water service area are presented in Table 2-1, and are based on an annual growth rate of 2.25%. The current peak hour demand for the District is projected to be 180,000 gallons per day, or 125 gallons per minute (gpm). The expected peak hour demand for year 2060 is projected to be 547,500 gallons per day, or 380 gpm.

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>ADD (Gallons/Day)</th>
<th>PDD (Gallons/Day)</th>
<th>PHD Gallons/Day- (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>240</td>
<td>36,000</td>
<td>108,000</td>
<td>180,000-125</td>
</tr>
<tr>
<td>2020</td>
<td>300</td>
<td>45,000</td>
<td>135,000</td>
<td>225,000-156</td>
</tr>
<tr>
<td>2030</td>
<td>375</td>
<td>56,250</td>
<td>168,750</td>
<td>281,250-195</td>
</tr>
<tr>
<td>2040</td>
<td>469</td>
<td>70,350</td>
<td>211,050</td>
<td>351,750-244</td>
</tr>
<tr>
<td>2050</td>
<td>587</td>
<td>88,050</td>
<td>264,150</td>
<td>440,250-306</td>
</tr>
<tr>
<td>2060</td>
<td>730</td>
<td>109,500</td>
<td>328,500</td>
<td>547,500-380</td>
</tr>
</tbody>
</table>
SECTION 3 – EVALUATION OF EXISTING SYSTEM

This section of the Study provides the results of the evaluation of the existing water system, addresses the GIS mapping, presents the results of the hydraulic modeling, and provides a brief analysis of the District boundary.

BOUNDARY

The Poison Spider Water Company became the Poison Spider Improvement and Service District in November, 1992. The Resolution of Formation signed by the Natrona County Commissioners is attached in Appendix A. The District’s boundary as described in the Resolution is shown in Figure 1-2 previously. The boundary was determined primarily based on the landowners who were being served by the private water system, although there are several properties within the District boundary that are not served by the water system. Of particular interest is the area just east of 12 Mile Road that was originally excluded from the District (south half of the northwest quarter of SEC 27 T33N R81W) which has since been subdivided into eight properties. The area will need to be annexed into the District in order for the properties to be served by the water system. The District’s attorney is currently working with the landowners and Natrona County Commissioners to change the boundary to include these properties.

Also of interest is the northern area of the District boundary north of Poison Spider Road. The Pioneer Water and Sewer District boundary overlaps the Poison Spider I&S District boundary, and there are actually several Pioneer water customers and the Poison Spider School who receive Pioneer water and reside within both the Pioneer and Poison Spider District boundaries. See Figure 3-1 for the boundary conflict information. The District should refer this issue on to the attorney to determine if there are adverse consequences or if the boundary overlap should be remedied.
WATER SYSTEM OPERATION

A map of the existing water system was provided in Figure 1-2 previously, and should be referred to in conjunction with the description of the existing water system operation. The existing water system is supplied water through a connection to the regional water system located along Poison Spider Road. The regional pipeline is an 8-inch diameter PVC pipeline that was constructed in 1995, and is located along 12 Mile Road for a portion of its length. The regional pipeline is aligned to the west in a 20-foot wide easement where it connects to the existing 3-inch pipeline located in the Right-of-Way of Bessemer Bend Road.

As indicated in Section 1, the Poison Spider water system was constructed of small diameter pipelines, dole valves and private cisterns in the late 1960s. The system was originally designed to be supplied from the well located in the southern end of the District along the North Platte River. With the regional water system connection in 1995, the system is now supplied from the north end of the District, and the supply component is the Pioneer Water Storage Tank.

The 1995 regional pipeline connection was constructed with a chlorination house located approximately 3,800 feet south of the connection point. The chlorination house was constructed with a gas chlorination system that was intended to boost the chlorine residual in the water going to the District system. The gas chlorination system is no longer in use because the regional water system uses a chloramine disinfection system which is intended to increase the life of the chlorine. The previous gas chlorine system is not compatible with the new chloramination system utilized by the regional system.

The chlorine house also houses the master water meter which is used to measure the water supplied to the District, and is the meter which is used for regional billing purposes. The existing meter is a 4-inch magnetic flow meter. The chlorine house also houses a 4-inch pressure reducing valve (PRV) which is set to reduce the pressure in the regional pipeline from 95 psi to 50 psi. A pressure sustaining valve is installed in a manhole at the point of connection to the District’s water system and is intended to maintain a constant downstream pressure in the District’s system, see Photo 3-1.
The District’s water system operation is very simple, it is a gravity fed system. The Pioneer Water Storage Tank provides all the pressure and volume for the Districts system. The overflow elevation of the tank is 5667, which results in a static pressure of 110 pounds per square inch (psi) at the regional water connection point. Because of the differences in elevation from the Pioneer Tank to the south end of the District, the pressure in the system is again reduced at a PRV located along Bessemer Bend Road to control the pressure below 100 psi to the Riverfield Subdivision residents located along Speas Road, see Photo 3-2.
The water system has a few isolation valves which are used to isolate portions of the system when needed for pipeline repairs and maintenance. It is reported by the system operator that the isolation valves in the system are not very functional and often times don’t work. There are a few hydrants in the system although the system is not designed to supply fire flow protection. The hydrants in the system are used for line flushing and are located at strategic points in the system. Flushing hydrants are also located at the ends of dead-end pipelines. Some of these flushing hydrants are typical fire hydrants; see Photo 3-3, and some are yard hydrants; see Photo 3-4. While yard hydrants allow for water flushing to keep the water fresh, they are not large enough to provide the volumes of flow needed to flush sediment from the lines.

Each water customer in the system receives water through a metered connection to a main pipeline. The meters are installed in a buried “meter pit” which is generally located at the property line of the customer. A typical meter pit drawing is shown in Figure 3-2.
PHOTO 3-3
Flushing Hydrant

PHOTO 3-4
Yard Hydrant
**FIGURE 3-2**

**TYPICAL WATER METER PIT**

- **Frost Proof Meter Pit Cover**
- **Insulating, Minicel L200 - 2" Min**
- **Sensus Meter**
- **Ford 80 Series Coppersetter with Dual Check Valve**
- **5M3 Z3 HPG Watts Water Pressure Regulator**
- **PVC Pipe Brace - Tie Copper Setter with Nylon Ties**
- **18" x 48" Ford Plastic Meter Box with Insulating Pak**
- **Curb Stop W/Box**
- **Polyethylene Pipe**
- **Precast Non-Reinforced Concrete Block (2" Thick)**
- **4 x 4 Wood Post (Locate Near Fence)**
- **Electronic Meter Readout**
- **6" Gravel**
- **Polyethylene Pipe**
- **Polyethylene Pipe**

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**POISON SPIDER PIPELINES, LEVEL II STUDY, FINAL REPORT**
The meter readout is attached on a post adjacent to the meter can, and is read monthly by the operator for individual billing purposes. In a few areas of the District, the meters are grouped together to simplify meter reading, see Photo 3-5.

![Photo 3-5: Meter Reading Stations at Charlotte Lane](image)

**FIELD EVALUATIONS**

Field evaluations were conducted to determine the condition of the existing water system components. Concerns have been expressed by the system operators that the piping system was constructed of thin-walled (low pressure) PVC pipe. In order to evaluate the type and condition of the piping system, a local utility contractor was hired to excavate and expose the pipeline in selected locations. The excavation locations were selected where the location of the pipeline was known and the condition was of concern. The excavations were performed at two locations on the 3-inch pipeline located along the road right-of-way on Bessemer Bend Road. The results of the field excavations indicated that the 3-inch pipeline is constructed of class 160 PVC and the pipe is in very good condition; see Photos 3-6 and 3-7.
The pipe is not thin-walled and should provide good service for many years. Concerns were also voiced by the system operators that the pipe was wearing out on the bottom half due to the system carrying abrasive rocks and sediment for many years. The pipeline interior was not examined because of the problems in trying to shut down the system for cutting into the pipe. However, conversations were held with the contractor used to repair the system, and he did not indicate any knowledge of worn out piping.
GIS
The information gathered during the inventory of existing facilities was recorded in ArcGIS (GIS) shapefiles and compiled into a geodatabase. The tasks performed for the GIS are summarized below:

**DATA COLLECTION**
609 personnel met with representatives from the District and mapped existing features using Trimble GeoXH mapping-grade GPS surveying equipment. Selected locations were then excavated and their locations, physical features and conditions logged into the field data collection equipment. Estimated/approximate locations for features not exposed at the surface were also collected based on the recollections of the District representative and were included in the data set. The data collection process was completed over the course of several field campaigns.

**DATA PROCESSING**
The results of each field data collection campaign were returned to the office and post-processed using ArcGIS and Trimble’s Pathfinder Office products to improve the accuracy of all of the collected locations. The accuracy of the post-processed data is sub-meter, and in most cases, sub-foot. Additional fields in the data set were populated with the appropriate attributes. Once field data collection was completed, a comprehensive data set was assembled.

**GEODATABASE COMPLETION**
The field collected data was then compared with the engineering plan sets; adjusted, updated, and completed where necessary. Additional attribute data from the engineering plan set was incorporated into the data set where appropriate.

**FINALIZATION**
609 personnel corresponded with Liz Hepp of the City Of Casper’s GIS Department and obtained a copy of their Infrastructure Geodatabase. We also discussed details necessary for compatibility with their data set, standardized feature symbolization and other related issues. The field collected data was then reformatted and imported into an unpopulated ‘skeleton’ of the City Of Casper’s Infrastructure Geodatabase. Feature attributes were then added or adjusted where appropriate.
The compiled geodatabase data set was quality controlled for accuracy and consistency, compacted and prepared for shared use by the City of Casper and the Natrona County GIS department.

**HYDRAULIC MODELING**

In order to analyze the District’s water system, a hydraulic model was developed. The hydraulic model utilized the Bentley WaterCAD V8i hydraulic modeling software as developed by Haestad Methods, Inc. The WaterCAD model employs the Hazen and Williams equations for analyzing and solving the pipe network system. The WaterCAD model uses a “link-node” description to develop a skeletal layout of the proposed water system.

The primary goal of the modeling effort was to ascertain whether the system can meet DEQ requirements (Chapter 12, Section 14). The DEQ requirements are: “All water mains, including those not designed to provide fire protection, shall be sized after hydraulic analysis based on flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all flow conditions. The normal working pressure in the distribution system shall not be less than 35 psi.” The current system was analyzed to determine whether it can meet these requirements, and it was determined that the system is adequate. The model was then used to evaluate the water systems ability to meet future projected water demands that will occur as the number of customers increase as discussed in Section 2. The model was used to recommend water system improvements needed to meet the future water demands as the customer base increases.

The modeling effort is fully described in a Hydraulic Analysis Report, and is included as Appendix B.
SECTION 4 - CONCEPTUAL DESIGN AND COST ESTIMATES

This section of the Study presents the conceptual design for the proposed water supply system for the District and corresponding cost estimates.

ENGINEERING CONSIDERATIONS

There are several engineering considerations that must be taken into account when developing a conceptual design for the District’s water system. One consideration is providing the ability to meet the future demands of the system as growth occurs. The existing system was designed and constructed to serve 25 to 30 customers and to deliver a regulated flow from the southern end of the District. The design and sizing relied on the use of cisterns at each residence to store water to meet the demands of the household. There is not much additional capacity in the existing system to serve more than the current 45 customers, or provide additional service as the District population grows.

Another engineering consideration is the replacement of undersized and aging water piping with new and more adequately sized piping. The piping in the system is 40 years old, and even though it appears to be in good condition, many of the lines are undersized and not capable of providing adequate flows and pressures. There are still many residents who rely on storage in their private cisterns and a booster pumping system to provide the needed flows. The need for cisterns can be eliminated by providing adequately sized water system piping.

A third engineering consideration is providing the ability to serve the new residents in the District in the 12 Mile Road area who need a reliable water supply. There are approximately 30 potential new customers in the 12 Mile Road area that could be served by the District, and it appears through meetings and questionnaires that approximately half (15) of them may be interested in having a domestic water system.
CONCEPTUAL DESIGN
The conceptual design for the water system improvements is based primarily on the three engineering considerations described above. Several design considerations need to be taken into account in the development of the conceptual design, including DEQ Rules and Regulations, hydraulic modeling, surface features, subsurface conditions, existing utilities, and right-of-way constraints. Each of these engineering design considerations and corresponding impact on the water system design are discussed below.

DEQ RULES AND REGULATIONS
One of the most important considerations are the requirements of the Wyoming Department of Environmental Quality (DEQ) for a rural water supply system. These requirements are summarized as follows:

- The system must be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow. The normal working pressure in the distribution system must not be less than 35 psi.
- Where dead-end water mains occur, they are to be provided with a flushing hydrant or blow-off for flushing purposes.
- Isolation valves must be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs.
- All water lines and service lines shall be constructed below frost line. Locally the depth of soil cover to protect against freezing is 5-1/2 feet of soil cover.

HYDRAULIC MODELING
Current practice in the area requires that the water system sizing be based on a hydraulic model. A hydraulic model was developed for the proposed water system alignment to determine the pipeline sizing needed to adequately serve the current and future demands of the water system. The water modeling was discussed previously in Section 3. The demands were distributed throughout the water system to correspond to existing homes and potential future development areas. The goal of the hydraulic modeling was to size the water system to provide for the projected water demands at a
minimum working pressure of 50 psi. The hydraulic modeling methods and results are presented as Appendix B, and one of the primary recommendations is to extend an 8-inch pipeline westward along Poison Spider Road from the school area to the west end of the District. However, based on District Board discussions, it was preferred for budget purposes that the existing 2 ½ -inch pipeline in the area be replaced instead. Therefore, this report recommends the water line replacement option as the preferred alternative in the northwest District area.

**Surface Features**
There are several surface features that were considered in developing the conceptual design of the water system, including flowing creeks and irrigation ditches, paved and graveled roadways, ditches, pastures, and wetland-type areas. Each feature is discussed below:

- There are several flowing creeks (Poison Spider Creek, Iron Creek) and their tributaries which course through the District. These creeks are under the jurisdiction of the State Engineer’s Office and the US Army Corps of Engineers (ACOE). Any pipeline construction that interferes with the surface water must be permitted through the ACOE. The conceptual design must take into consideration the method of pipeline/creek crossings. The conceptual design presented in this section proposes that the creek crossings be performed by directional boring under the creeks to avoid any disturbances to the creek.

- The area is irrigated with surface water through a series of ditches from the Casper Alcova Irrigation District (CAID). The ditches carry water during the irrigation season which runs from May 1 to September 1. The irrigation system ditches typically have 100-foot rights-of-way, and the water pipelines cannot be aligned in the CAID rights-of-ways. In addition, if the pipelines must cross under the ditches, the ditches cannot be disturbed by excavation, and must be bored similar to the creek crossings.

- All of the major roadways in the District are County roadways, operated and maintained by the County Road and Bridge Department. All the County roadways are graveled public roadways. In general, the water line alignments will be planned to follow the roadways in order to make the pipelines available for
maintenance and to limit the number of easements needed if the lines were to be located on private property. The design of the water delivery system will need to be planned to minimize disturbance of the roadways and private properties (if necessary). In addition, any disturbance to the roadways and private properties will need to be restored to pre-existing conditions or better.

- There are several large drainages in the District area that present challenges for pipeline construction. Many of the drainages are located in difficult terrain and are steep and difficult to access. Pipeline crossings in these areas will need to be well planned to avoid excessive costs for difficult construction techniques.
- Pipeline alignments in the 12 Mile Road area will need to cross private lands in order to serve all properties. The roadways across these lands are privately owned and any disturbances from excavation must be restored to satisfy the property owner.
- There are areas in the District that may be considered as wetland-type areas. These areas have formed from irrigation seepage and poor drainage. These areas must be avoided for pipeline alignments, because of the potential for wetlands disturbance, and because of the higher costs associated with construction in wet and unstable conditions.

**Subsurface Considerations**
Planning for the water system will need to take into account the subsurface soil conditions and the groundwater table. In September, test pit excavations were made along the proposed pipeline alignments to evaluate soil conditions and groundwater depths. These test pit excavations indicated that the soils are generally silty/sand and no shallow bedrock was discovered. Groundwater levels range from 3 to 5 feet below the surface and are assumed to be higher during the irrigation season than non-irrigation times.

**Existing Utilities**
Existing utilities, particularly underground utilities, will need to be avoided when planning alignments for the water system. During the course of arranging for the test pit excavations, utility companies were notified and located their utilities in the areas of the
excavations. Existing utilities are generally located along the roadway borrow ditches, and include electrical power (Rocky Mountain Power), cable TV (Cablevision / Bresnan Communications), telephone (Qwest Communications), and natural gas (SourceGas). Power, cable TV and phone are generally located above ground on wooden poles. Natural gas lines are buried at depths ranging from 18 to 36 inches and need to be accurately located during the design phase of the project.

**Right-of-Way Constraints**
Existing rights-of-way will present constraints to the design of and alignments for the water supply pipelines. As indicated previously, the planned alignments for the water system are proposed to follow existing county roadways wherever possible. The right-of-way widths are generally 66 feet, and it appears that there is adequate space to construct a water line along the side of the roadway. Further evaluation of the roadway ownership in the 12 Mile Road area needs to be made during the design of the system to clarify that the proposed water system can be constructed within the existing roadways. As for the pipeline alignments which need to cross private property, easement agreements will need to be obtained for constructing the water lines on these properties.

**Directional Drilling Opportunities**
Opportunities for directional drilling techniques were investigated during the course of the Study. Discussions with local directional drilling contractors indicate that pipelines could easily be installed under creeks, irrigation ditches and even paved roadways to avoid disturbance. In terms of cost, directional drilling may be a more cost effective solution than trenching and dewatering operations. Directional drilling may be performed through wet and unstable soils areas for distances up to 300 feet. Typically, directional drilling is performed using HDPE piping. If directional drilling is performed for portions of the project, PVC to HDPE transitions will be required.

**Design Features of Conceptual Plan**
The conceptual design of the proposed water system improvements for the Poison Spider system is presented in Figure 4-1. Plan and profile drawings of the major pipelines are provided as Appendix C. The conceptual design has been developed in
accordance with the design considerations previously presented. The goal of the conceptual design is to locate and align the new water mains so that every property that so desires, has access to a water main. Some of the significant design elements and features of the conceptual design are hereby highlighted:

- A new 8-inch pipeline will be constructed in the northwest portion of the District to replace the existing 2½-inch pipeline. The pipeline will be aligned to follow existing roadways, even though the roadways are privately owned. The existing water meters will need to be relocated to the new pipeline, and the services extended to the old meter pit location. The new pipeline will be extended northward under Poison Spider Road by directional drilling to connect to the water system on the north side of the road. A flushing hydrant will be located at the end of the 8-inch pipeline to allow for routine flushing and maintenance. Easements will be needed for the portions of the new pipeline that is not located in the existing water line easements.

- A new 8-inch transmission pipeline will be constructed along 12 Mile Road to serve the 12 Mile Road area residents. The line will be extended from the existing CWRWS pipeline southward to Bessemer Bend Road and then eastward to connect to the existing 8-inch pipeline located in Rasmus Lee Road. A new PRV vault will need to be installed on the 8-inch pipeline along Bessemer Bend Road to reduce the pressure in the new pipeline downstream in the Riverfield subdivision.

- A new 6-inch pipeline is planned to be constructed through the existing Riverfield subdivision to replace the existing 1-1/4 inch pipelines which currently serve the homes in the area. A flushing hydrant will be placed on the end of the pipeline to allow for occasional flushing and maintenance. The existing water meter pits will need to be relocated on to the new pipeline. The pipeline will be located in the existing pipeline easements.

- A new 6-inch pipeline is planned to be constructed eastward from the 12 Mile Road pipeline along Dusty Lane to serve an estimated eight properties in the Dusty Lane area. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Up to eight new meter pits will be
constructed at the property lines to serve the residents. Easements will be needed for all portions of the proposed pipeline.

- A new 3-inch water line would be constructed eastward from the pipeline in 12 Mile Road at about the mid-section line of Section 34 to serve an estimated three properties. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Up to three water meter pits would be installed to serve the properties. Easements will be needed for all portions of the pipeline.

- A new 2-inch water main would be constructed westward along County Road 313, from the pipeline in 12 Mile Road to serve two properties. A flushing hydrant would be installed at the end of the water line. Two new water meter pits would be installed to serve the residents. No easements would be required for this pipeline because it will be located within the county road right-of-way.

- The existing pressure sustaining valve located at the connection of the 8-inch CWRWS pipeline and the existing 3-inch pipeline will be left in service. The PSV valve will be needed until the future 8-inch pipeline is extended from the Poison Spider School area westward to the west end of the District. The existing air-vacuum release valves in the vault will also need to be kept in service.

- Several new gate valves will be installed in existing pipelines to replace old valves that are no longer operable.

- New air-vacuum release valves will be installed at the tops of hills to relieve the air that can build up in the pipeline and reduce capacity.

- Flushing hydrants will also be installed at locations along the 12 Mile Road pipeline that are favorable for flushing the water lines for maintenance.

- Isolation valves are located to minimize service disruptions during maintenance.

- All areas along the graveled roadways that are disturbed by construction will be re-graveled and restored to pre-existing condition.

- All areas within the easements for water lines across private property will be seeded and returned to pre-existing condition to satisfy the property owner.

- New water meters will be located in buried “meter pits” that will be located in public rights-of-way or easements dedicated to the District, and as close to the
property lines as possible. A radio read meter system will be provided to allow efficient meter reading for the District operator.

- Existing water meter pits will be converted to a radio read system. The old meters will be replaced with new meters and the meter pit lid replaced with a lid and transmitter as required for the radio read system.

**LAND AND RIGHT-OF-WAY ACQUISITION NEEDS**

Nearly all of the proposed water lines are planned to be located in established public road rights-of-way. Where the proposed water line alignment crosses private property, a right-of-way must be obtained from the property owner in the form of an easement agreement. The easement agreement contains a legal description of the property to be granted to the District for the right-of-way. Once the parties have executed the easement agreement, it is filed with the County Clerks office, and the right-of-way becomes recorded as an integral part of the property.

The following are the portions of the water system which have been identified as requiring rights-of-way to construct the proposed water system (see Figure 4-1 also):

- For portions of the 8-inch pipeline in the northwestern portion of the District.
- For the 6-inch pipeline along Dusty Lane.
- For the 3-inch pipeline located mid-section of Section 34.

**PERMITTING AND LICENSING NEEDS**

In order to design and construct the water system, several permits will need to be acquired. The primary permitting needs for the project are highlighted below:

- All water mains and meter pits aligned within the County road rights-of-way require a permit from the Natrona County Road and Bridge Department. The permit will define how the roadways and borrow ditches will be restored.
- A DEQ Permit to Construct will be required prior to construction of the water system.
- A permit or license will be required from the Casper Alcova Irrigation District for crossing under the supply or waste ditches.
The US Army Corps of Engineers (ACOE) usually requires a permit for a water main to cross under a surface water or drainage ditch. Conversations with ACOE representatives indicate the ditch crossings are covered under the “nationwide” permit, and a project specific permit is not required. However, ACOE notification, and coordination are required under the existing nationwide permit.

ENVIRONMENTAL MITIGATION

As a part of this Study, an Environmental Assessment (EA) was performed. The EA is required when federal funding agencies such as the State Revolving Loan Fund (SRF) are involved. Results of the EA are highlighted below. The Environmental Assessment Report is included in its entirety as Appendix D.

- A cultural resource survey must be conducted prior to the ground disturbance activities, primarily in those areas not previously disturbed by development, road construction, etc.
- A wetland delineation must be conducted to determine the acreage and boundaries of wetlands, if any, impacted by construction of the project, and appropriate US Army Corps of Engineers permits obtained prior to commencing construction.
- A survey for threatened, endangered, and candidate species, as well as for raptor nests will need to be conducted prior to any construction activities. If any listed species or raptor nests are found that might be impacted by the project, a mitigation plan coordinated through the US Fish and Wildlife Service will need to be developed to mitigate any impacts.
- Depletions, if any, from the North Platte River will need to be evaluated and a cost calculated for payment to the US Fish and Wildlife Service.
- Mitigation efforts will need to be planned for and executed during construction to limit runoff and erosion, control dust, and re-vegetate disturbed lands.
COST ESTIMATES
Cost estimates for the proposed water system are shown in Table 4-1. The total project cost is estimated to be $1,410,070 and is based on year 2012 construction costs. The estimate was prepared using costs from recent similar work in the greater Casper area. Right-of-way costs where needed for the pipelines were estimated at $4.00 per linear foot. The engineering and contingency cost formulas shown are as required by the WWDC. Project component eligibility and financing plans are discussed in the next section.
## TABLE 4-1 - Preliminary Construction Cost Estimate

### WWDC ELIGIBLE ITEMS

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### Construction Costs

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### TOTAL ESTIMATED PROJECT COST (WWDC Eligible 2012) | **$1,035,835**

### Non-WWDC Eligible Items (SLIB Eligible)

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**TOTAL COMBINED PROJECT COST** | **$1,410,070**
SECTION 5 - ECONOMIC ANALYSIS, PROJECT FINANCING AND IMPLEMENTATION

This section presents an economic analysis for the proposed water supply project. The intent of this section is to provide the financial information necessary to determine the end cost to users under the funding scenarios involving Wyoming Water Development Commission (WWDC) assistance and other state and federal funding.

DEBT FINANCING PLAN

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 summarized as follows:

- Wyoming Water Development Commission (WWDC) – Recently, the WWDC has been providing grant and loan funding in a 67:33 grant-loan ratio. Loans are typically available at an interest rate of 4% for a term of up to 30 years, although some terms may be longer. Eligible water system components usually include water transmission pipelines, booster stations, water storage tanks and flushing hydrants for transmission pipelines.

- State Revolving Loan Fund (SRF) – The 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 Lands and Investments Board (SLIB), and is only a loan fund. This loan fund can be used for all components of a water system. Currently, loans are available at an interest rate of 2½% for a term of up to 20 years.

- State Lands and Investments Board (SLIB) – The SLIB is composed of five elected state officials. The SLIB currently provides grant and loan funding in a 50:50 loan-grant ratio. Loans are currently available at an interest rate of 5.31%, for a term of up to 30 years. Eligible water system components typically include all portions of the water system including fire hydrants, water services and meter pits.
Rural Utilities Service (RUS) – 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. Conversations with RUS representatives indicate the Poison Spider area will not qualify for RUS grant funds because the income of the area is above the median state income level. The area will qualify for loan funding from RUS, and interest rates depend on the prevailing federal bank rates. For the purpose of this study, it is assumed that RUS funding will not be as attractive as the other funding programs.

The total project is estimated to cost $1,410,070 as shown in Table 4-1 previously. The WWDC eligible project cost is estimated to be $1,035,835, and the WWDC Non-eligible portion of the project cost is estimated to be $374,235. The District still has remaining debt of $146,000 from the 1995 water project, and the associated assessment costs are currently $8,971 per year for the existing customers. The approach to funding the project assumes that all the proposed improvements will benefit the residents equally. The new 8-inch pipeline along 12 Mile Road provides for a major loop in the southern portion of the system that will improve flows and reliability of the system. The new 8-inch pipeline in the northwestern portion of the District will improve pressures and flows, and reduce maintenance costs for the District. The new water mains coming off the system along 12 Mile Road provides a reliable water supply to the residents and increases the customer base for the District. The financing plans assume that 15 new customers will be added to the system for a total customer base of 60. The financing plans also assume that the new customers will share in the existing debt reduction equally.

There are two feasible scenarios for funding construction of the project. Scenario No. 1 is the traditional funding scenario, and is summarized in Table 5-1. The traditional funding scenario includes funding the WWDC eligible components with a grant for 67% of the cost, or $694,009. The remaining 33%, or $341,826 not funded by the grant
would be funded through a WWDC loan for 30 years. The SLIB eligible portions of the project would be funded through a 50% grant and 50% loan, or $187,118 each from SLIB for 30 years. The resulting assessment annual cost would be $689 per tap.

Table 5-1 – Preliminary Funding Scenario No. 1 Traditional

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<td>TOTAL ESTIMATED PROJECT COST - CCT (2012)</td>
<td>$1,035,835</td>
</tr>
<tr>
<td>WWDC Grant (67% of CCT)</td>
<td>$694,009</td>
</tr>
<tr>
<td>WWDC Loan (33% of CCT)</td>
<td>$341,826</td>
</tr>
<tr>
<td>WWDC Loan Conditions</td>
<td>4%, 30 Years</td>
</tr>
<tr>
<td>Total Cost Per Tap (CCT/60 Taps)</td>
<td>$5,697</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Tap</td>
<td>$329</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WWDC Non-Eligible Components - SLIB Grant and Loan</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT (2012)</td>
<td>$374,235</td>
</tr>
<tr>
<td>SLIB Grant (50% of CCT)</td>
<td>$187,118</td>
</tr>
<tr>
<td>SLIB Loan (50% of CCT)</td>
<td>$187,118</td>
</tr>
<tr>
<td>SLIB Loan Conditions</td>
<td>5.17%, 30 Years</td>
</tr>
<tr>
<td>Total Cost Per Tap (CCT/60 Taps)</td>
<td>$3,119</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Tap</td>
<td>$210</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Combined Assessment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Debt Cost per Tap</td>
<td>$8,816</td>
</tr>
<tr>
<td>Total Combined Assessment</td>
<td>$539</td>
</tr>
<tr>
<td>Current Assessment Cost of $8,971 Shared by 60 Taps</td>
<td>$150</td>
</tr>
<tr>
<td>Total Combined Assessment</td>
<td>$689</td>
</tr>
</tbody>
</table>

Funding Scenario No. 2 is a more conservative scenario, and has been required to ensure that the residents are committed to the project even if other traditional grants are not available. Scenario No. 2 includes funding the WWDC eligible components ($1,035,835) with a 67% grant for $694,009, and a 30-year loan of $341,826 for 33% of the WWDC eligible cost. The WWDC non-eligible portions of the project would be funded with a loan from SLIB for the total non-eligible costs of the project. The non-eligible portion of the project would be funded with a loan of $374,235. The resulting assessment cost for this scenario would be $899 per tap per year. Funding Scenario No. 2 is presented in Table 5-2.
For the purpose of this Study, and in an effort to be conservative, the SRF and RUS funding agencies have not been included in the funding mix. However, both the RUS and the SRF funding programs are certainly alternatives to the WWDC and SLIB loan portions of the project.

### TABLE 5-2 – PRELIMINARY FUNDING SCENARIO NO. 2 CONSERVATIVE

<table>
<thead>
<tr>
<th>WWDC ELIGIBLE COMPONENTS - WWDC Grant and Loan</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT (2011)</td>
<td>$1,035,835</td>
</tr>
<tr>
<td>WWDC Grant (67% of CCT)</td>
<td>$694,009</td>
</tr>
<tr>
<td>WWDC Loan (33% of CCT)</td>
<td>$341,826</td>
</tr>
<tr>
<td>WWDC Loan Conditions</td>
<td>4%, 30 Years</td>
</tr>
<tr>
<td>Total Cost Per Tap (CCT/60 Taps)</td>
<td>$5,697</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Tap</td>
<td>$329</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WWDC NON-ELIGIBLE COMPONENTS - SLIB Loan Only</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL ESTIMATED PROJECT COST - CCT (2011)</td>
<td>$374,235</td>
</tr>
<tr>
<td>SLIB Grant (0% of CCT)</td>
<td>$0</td>
</tr>
<tr>
<td>SLIB Loan (100% of CCT)</td>
<td>$374,235</td>
</tr>
<tr>
<td>SLIB Loan Conditions</td>
<td>5.17%, 30 Years</td>
</tr>
<tr>
<td>Total Cost Per Tap (CCT/60 Taps)</td>
<td>$6,237</td>
</tr>
<tr>
<td>Assessment Cost Per Year per Tap</td>
<td>$420</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Combined Assessment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Debt Cost per Tap</td>
<td>$11,934</td>
</tr>
<tr>
<td>Total Combined Assessment</td>
<td>$749</td>
</tr>
<tr>
<td>Current Annual Assessment of $8,971 Shared by 60 Taps</td>
<td>$150</td>
</tr>
<tr>
<td><strong>Total Combined Assessment</strong></td>
<td><strong>$899</strong></td>
</tr>
</tbody>
</table>
The two funding scenarios presented above are both feasible, but the resulting construction debt is more for Scenario No. 2 than for Scenario No. 1. In order to be conservative, this study assumes that Funding Scenario No. 2 will be the most likely funding scenario to be achieved. For the purpose of this study it is assumed that Funding Scenario No. 2 will be achieved, although the grant funds identified under Funding Scenario No. 1 should be pursued.

The financing plan for Scenario No. 2 proposes that a large portion of the project cost will be paid by State grants, totaling $694,009. The remaining portion of the project cost not funded through grants totals $716,061. If the total non-grant portion of the project cost is divided equally among the 60 properties in the District, the cost per property would be $11,934. There are several methods for each property to pay its $11,934 share of the project cost. One common method is for the property owner to pay it off either with cash, or by obtaining a personal loan.

Another method for obtaining the non-grant portion of the project cost is for the District to borrow the funds on behalf of the property owners. In order to borrow the funding, by State Statute, the Improvement and Service District must hold a public hearing to consider adoption of a resolution authorizing an assessment on each property in the District that benefit from the water project. If no more than 30% of the property owners to be assessed object to the assessment, the District can adopt a resolution which authorizes the assessment to repay the debt. If more than 30% of the property owners to be assessed object to the assessment, the District cannot adopt the resolution, and another resolution cannot be considered for a year.

In addition to the resolution hearing, the WWDC requires that the District hold a District-wide election to ensure the residents are committed to the project. The election must pass by a majority of the residents who vote in order for the project to be considered for funding by the WWDC.
Once the District authorizes the assessment, and the loans are obtained, the District will need to work with the County Assessor to develop an assessment roll of properties to be assessed for repayment of the water system debt. The County will then issue the water system debt assessment and include it with the annual property tax assessment. The County will reimburse the collected assessments to the District on a quarterly basis. The District will make its annual loan payment from the collected assessments.

The debt assessment for the project will be based upon the two loans that the District will need to acquire from the WWDC and SLIB. The number of taps actually benefiting, and therefore subject to the assessment, is assumed to be 60 taps. The estimated debt assessment cost under the proposed financing plan for Funding Scenario No. 2 is shown in Table 5-2 previously, and is estimated to be $899 per year for each tap. The funding plan also includes the existing annual debt payment of $8,971 being spread among 60 taps.

**WATER USER RATES**

The current water user rate for the District is a flat monthly fee of $39 per tap plus $2.50 per each one thousand gallons used. The water user rate set by the District must be adequate to account for all the operating expenses of the District’s water system. Table 5-3 presents the estimated operation and maintenance (O&M) costs for the proposed system with 60 taps. The annual operating budget is estimated to be $42,000, which equates to a monthly user fee of $58.33 per month. These costs are based on the current District operating budget, and budgets from other similar districts in the area. It appears that the current usage fee of $2.50 per 1000 gallons used is adequate and will not need to be increased to support the operation of the system. The current CWRWS wholesale rate for water is $1.37 per 1,000 gallons purchased.
Table 5-3 – Operation and Maintenance Costs and Proposed User Rate

<table>
<thead>
<tr>
<th>Description</th>
<th>Monthly Unit</th>
<th>Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator Wages</td>
<td>$500</td>
<td>$6,000</td>
</tr>
<tr>
<td>Materials and Supplies</td>
<td>$25</td>
<td>$300</td>
</tr>
<tr>
<td>Regional Water Cost (8,000 gal/mo/home)</td>
<td>$750</td>
<td>$9,000</td>
</tr>
<tr>
<td>Water Sampling</td>
<td>N/A</td>
<td>$5,000</td>
</tr>
<tr>
<td>Bookeeping</td>
<td>$300</td>
<td>$3,600</td>
</tr>
<tr>
<td>Repairs</td>
<td>N/A</td>
<td>$5,000</td>
</tr>
<tr>
<td>Emergency Fund</td>
<td>N/A</td>
<td>$1,500</td>
</tr>
<tr>
<td>Sinking Fund ($300K@4%/30yr.)</td>
<td>$400</td>
<td>$4,800</td>
</tr>
<tr>
<td>Bonding</td>
<td>N/A</td>
<td>$500</td>
</tr>
<tr>
<td>Liability Insurance</td>
<td>N/A</td>
<td>$1,500</td>
</tr>
<tr>
<td>Legal</td>
<td>N/A</td>
<td>$1,000</td>
</tr>
<tr>
<td>Advertising</td>
<td>N/A</td>
<td>$500</td>
</tr>
<tr>
<td>Engineering</td>
<td>N/A</td>
<td>$1,000</td>
</tr>
<tr>
<td>Stamps/Mailings</td>
<td>$25</td>
<td>$300</td>
</tr>
<tr>
<td>Audit</td>
<td>N/A</td>
<td>$2,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$42,000</strong></td>
<td></td>
</tr>
</tbody>
</table>

Avg. cost per user/month (60 initial users) **$58.33**

Proposed Use Rate:
- Maintenance Fee $39/mo/tap = $39.00
- Usage Rate $2.50/1000 gal. = $20.00
- Total Monthly Cost $59.00

One Time Connection Costs to New Customers

In addition to the ongoing water system debt assessment costs and water use fees, there will be several “one-time” costs associated with new customers connecting to the water system. The one-time costs to each property will vary considerably depending on the requested service tap size and the distance from the home to the meter pit at the water main. These connection costs are the responsibility of the property owner and are not eligible to be paid with either state or federal grants or loans. It is estimated for new customers that these costs could range from $2,000 to $5,000. A summary of the primary one-time connection costs is given below.

- Regional Water System Investment Charge – Typically, water districts charge a “tap” fee for installing a water service line and meter pit from the water main to the customer’s property line. The tap fee typically consists of two components: 1)
the District’s installation fee, plus 2) a CWRWS system investment charge (SIC). Typical tap fees in local water districts currently range from $2,500 to $4,000 for a ¾-inch tap. For those new Poison Spider customers wanting taps prior to the water system construction, a customer will only be required to pay the system investment charge; no installation charge will be required since the District’s installation costs will be included in the total project construction cost. The current CWRWS SIC charges for a ¾-inch and a 1-inch tap are currently $600, and $1,002 respectively. Any District property owner wanting to delay receiving a tap past the time of construction will be required to pay the District’s installation tap fee plus the CWRWS SIC. The total tap fee for a customer receiving a tap after construction of the water system is expected to be approximately $4,000.

- **Service Line Installation** – The property owner will need to install the water service line from the meter pit to the house. The size of the service line will depend on the pressure and volume of flow needed at the house. Estimated construction costs for service line installation range from $6 to $10 per lineal foot of line. For a home located within 100 feet of the meter pit, the service line installation cost is estimated to be between $600 and $1,000. This cost will also depend on the disturbance to the property, and the type of rehabilitation (ie. sod, concrete replacement etc.) needed to restore the property after construction.

- **House Plumbing Conversion** – The existing house plumbing system will need to be connected to the new water service, and the well piping disconnected. The well may be used for yard and livestock watering etc., but cannot be connected to the water system piping. Plumbing costs will vary depending upon each individual building and specific plumbing system, and are estimated to be around $500. The District and CWRWS will inspect the plumbing conversion to ensure a complete separation of the systems, and a nominal fee may be charged.

**IMPLEMENTATION**

The WWDC program consists of three levels: Level I is Reconnaissance; Level II is Feasibility; and, Level III is Design and Construction. This Level II Feasibility Study provides the preliminary design and cost estimates needed for the District to determine
whether the project is feasible and affordable. In order for the proposed project to move to Level III, several steps will need to be successfully completed.

The first step is the successful adoption of a resolution authorizing the debt assessment to repay the construction loans. The District Board must notify the property owners in the District of its intent to adopt a resolution giving the District authority to incur debt to construct the water system improvements, and to repay the debt through assessments on those properties which receive a benefit from the project. The County Clerk must give notice (by advertisement in a local newspaper) to the owners of property to be assessed of the District’s intent to adopt the resolution, the nature of the project, the amount of the assessment, and the date of the meeting at which the proposed resolution will be adopted. If no more than 30% of the property owners who are subject to the assessment object to the project, the Board may adopt the resolution. If more than 30% of the property owners to be assessed object to the assessment, the resolution may not be adopted, and the resolution cannot be considered again for at least one year.

The resolution must be successfully adopted by the District Board, and the District-wide election must pass before the District can expect to be seriously considered for state or federal funding assistance. WWDC funding applications for ongoing projects are accepted once a year, on or before October 1 for continuing projects advancing to Level III status, and are reviewed through December. If funding is approved, it is done so by the Wyoming State Legislature in the upcoming legislative session. Applications for the SLIB loan funds are considered once per year by the Natrona County Commissioners. The SLIB application should be submitted at the same time as the WWDC application to be considered by spring.

The second step is for the District to pass the District-wide election required by the WWDC as collateral for the WWDC loan. The election must pass by a majority of the residents who vote.
Assuming the debt assessment resolution is successfully adopted, the District-wide election passes, and the District’s funding applications are accepted and approved, the Level III process can be initiated in the summer of 2011. The District can then begin the process of hiring a consultant to design the water project, provide easement and land acquisition services, and prepare bidding and construction documents. The design phase is expected to require 5 to 7 months. Once the bidding and construction documents are approved by the funding and regulatory agencies, the project can be advertised for bids. The bidding process normally requires 45 to 60 days before a construction contract is executed. Once a Contractor is hired, the construction process can begin, and should be completed within 4 to 6 months. A tentative implementation schedule based on the above discussion is presented in Table 5-4 below.

<table>
<thead>
<tr>
<th>Date</th>
<th>Deadline to Apply for Level III WWDC Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 1, 2010</td>
<td>WWDC Funding</td>
</tr>
<tr>
<td>March 2011</td>
<td>WWDC Funding Approval</td>
</tr>
<tr>
<td>June 2011 - October 2011</td>
<td>Design and Easement Acquisition</td>
</tr>
<tr>
<td>November 15, 2011</td>
<td>Obtain DEQ and Other Permits</td>
</tr>
<tr>
<td>December 2011</td>
<td>Bidding Process</td>
</tr>
<tr>
<td>February 2012 - October 2012</td>
<td>Construction</td>
</tr>
</tbody>
</table>
RESOLUTION NO. 83-92

RESOLUTION FOLLOWING HEARING OF PETITION FOR FORMATION OF POISON SPIDER IMPROVEMENT AND SERVICE DISTRICT

WHEREAS, the Board of County Commissioners, Natrona County, Wyoming, has received a petition of landowners requesting the formation of an Improvement and Service District; and

WHEREAS, a public hearing was held in Room 115, Natrona County Courthouse, 200 North Center Street, Casper, Wyoming, on the 3rd day of November, 1992, wherein no objections were made regarding the formation of said District; and

WHEREAS, the Board of County Commissioners, Natrona County, Wyoming, has found that the establishment of the proposed District would serve the public convenience and necessity in that area and that the Petition to form such District has been properly presented;

NOW, THEREFORE, BE IT HEREBY resolved that the formation of the Poison Spider Improvement and Service District is hereby established with the boundaries of said District described as follows:

**Township 32 North, Range 81 West, 6th P.M.**
- Section 3: All
- Section 4: All
- Section 5: All
- Section 6: All
- Section 7: All
- Section 8: All, except SW\_\_SW\_\_\_
- Section 9: All, except SW\_\_
- Section 10: That part of the NW\_\_NW\_\_ west of the center of the North Platte River
- Section 17: NE\_\_NE\_\_
- Section 18: NW\_\_NW\_\_

**Township 32 North, Range 82 West, 6th P.M.**
- Section 1: E\_\_E\_\_
- Section 12: E\_\_E\_\_
- Section 13: NE\_\_NE\_\_

**Township 33 North, Range 81 West, 6th P.M.**
- Section 8: All
- Section 9: All
- Section 15: All
- Section 16: All
- Section 17: All
- Section 18: All
- Section 19: All
- Section 20: All
- Section 21: All
- Section 22: All
- Section 23: All
- Section 26: All
- Section 27: All, except the S\_\_NW\_\_
- Section 28: All
- Section 29: All
- Section 32: All
- Section 33: All
- Section 34: All
- Section 35: All
FURTHERMORE, IT IS HEREBY RESOLVED that an election for organization of the Poison Spider Improvement and Service District be held on the 7th day of December, 1992. The following electors are hereby appointed as judges of said election:

1. Dixie McLemore
2. Jane Yeamans
3. Tracy Millett

APPROVED AND ADOPTED this 3rd day of Nov., 1992.

BOARD OF COUNTY COMMISSIONERS OF NATRONA COUNTY, WYOMING

By Chairman

ATTEST:

By County Clerk
NOTICE OF HEARING
PROPOSED
POISON SPIDER IMPROVEMENT AND SERVICE DISTRICT

NOTICE IS HEREBY given that the Board of County Commissioners, Natrona County, Wyoming, will conduct a hearing to consider a Petition for the Formation of the Poison Spider Improvement and Service District. The boundaries of the proposed District are described as follows:

Township 32 North, Range 81 West, 6th P.M.: All, Sections 3 through 7, inclusive; N\%NE\% Section 18;

Township 32 North, Range 82 West, 6th P.M.: E\%NE\% Section 1; E\%NE\% Section 12; NE\%NE\% Section 13;

Township 33 North, Range 81 West, 6th P.M.: All, Sections 8 and 9, inclusive; all, Sections 15 through 23, inclusive; all, Section 26; all Section 27, except the S\%NW\%; all, Sections 28, 29; all, Sections 32 through 35, inclusive.

The Petition for formation of the District is filed so that improvements of local necessity and public convenience can be acquired, constructed, operated and maintained as provided in §18-12-101 through 18-12-140, W.S. (1977). The proposed financing of the improvements of said District may be accomplished by taxation, assessment, borrowing, and bonds.

The names of the people nominated for the initial Board of Directors of said District are: Dave Creager, Dick Wheeler, and Darrell Aanestad.

The hearing will be held in Room 115, Natrona County Courthouse, 200 North Center Street, Casper, Wyoming, at 5:30 p.m. on the 3 day of November, 1992. All interested persons will be heard at the hearing, and written requests for exclusion or inclusion of land in the proposed District shall be heard and considered. The above Petition for the formation of the Poison Spider Improvement and Service District may be inspected at the office of the County Commissioners, Natrona County Courthouse, 200 North Center, Casper, Wyoming, during regular business hours.

BOARD OF COUNTY COMMISSIONERS
OF NATRONA COUNTY

By
James K. Sandison, Chairman

ATTEST:

Mary Ann Collins, County Clerk

PUBLISH:
RESOLUTION 83-92

DECLARING THE FORMATION
OF
AN IMPROVEMENT AND SERVICE DISTRICT
AFTER ELECTION
BY RESIDENTS
OF THE DISTRICT

WHEREAS, the Board of County Commissioners of Natrona County, Wyoming has been petitioned by landowners Poison Spider, a subdivision of Natrona County, Wyoming, for the establishment of an improvement and service district; and

WHEREAS, the Board of County Commissioners of Natrona County, Wyoming held a public hearing on November 3, 1992, and no objection to such improvement and service district being received and finding that the petition had been properly presented and that the proposed district would serve the public convenience and necessity in that area, they did thereby adopt a Resolution establishing the formation of the Poison Spider Improvement and Service District, and calling for an election to be held on December 7, 1992; and

WHEREAS, said election was held and a majority of the votes were cast in favor of the organization of the Poison Spider Improvement and Service District;

NOW, THEREFORE, BE IT HEREBY RESOLVED that the Poison Spider Improvement and Service District is declared organized and is granted the taxing authority, bonding authority and rule making authority and such other powers as provided in §§ 18-12-101 through 18-12-140, W.S. Annot. (1977, Repub. Ed.). The boundaries are described as follows:

**Township 32 North, Range 81 West, 6th P.M.**:
Section 3: All
Section 4: All
Section 5: All
Section 6: All
Section 7: All
Section 8: All, except SW\(_4\)SW\(_4\)
Section 9: All, except SW\(_4\)
Section 10: That part of the NW\(_4\)NW\(_4\) west of the center of the North Platte River
Section 17: NE\(_4\)NE\(_4\)
Section 18: NE\(_4\)N\(_4\)

**Township 32 North, Range 82 West, 6th P.M.**:
Section 1: E\(_8\)E\(_8\)
Section 12: E\(_8\)E\(_8\)
Section 13: NE\(_8\)NE\(_8\)

**Township 33 North, Range 81 West, 6th P.M.**:
Section 8: All
Section 9: All
Section 15: All
Section 16: All
Section 17: All
Section 18: All
Section 19: All
Section 20: All
Section 21: All
Section 22: All
Section 23: All
Section 26: All
Section 27: All, except the S\textsuperscript{1/4} NW\textsuperscript{4}
Section 28: All
Section 29: All
Section 32: All
Section 33: All
Section 34: All
Section 35: All

APPROVED AND ADOPTED this \_\_\_ day of November, 1992.

BOARD OF COUNTY COMMISSIONERS OF
NATRONA COUNTY, WYOMING

By Bill B Brown
Chairman

ATTEST:

By Mary Ann Coon
County Clerk
WHEREAS, the Board of County Commissioners, Natrona County, Wyoming, has received a petition of landowners requesting the formation of an Improvement and Service District; and

WHEREAS, a public hearing was held in Room 115, Natrona County Courthouse, 200 North Center Street, Casper, Wyoming, on the 3rd day of November, 1992, wherein no objections were made regarding the formation of said District; and

WHEREAS, the Board of County Commissioners, Natrona County, Wyoming, has found that the establishment of the proposed District would serve the public convenience and necessity in that area and that the Petition to form such District has been properly presented; and

NOW, THEREFORE, BE IT HEREBY resolved that the formation of the Poison Spider Improvement and Service District is hereby established with the boundaries of said District described as follows:

<table>
<thead>
<tr>
<th>Township 32 North, Range 81 West, 6th P.M.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 3: All</td>
</tr>
<tr>
<td>Section 4: All</td>
</tr>
<tr>
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</tr>
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</tr>
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</tr>
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<td>Section 9: All, except SW$</td>
</tr>
<tr>
<td>Section 10: That part of the NW$NW$/ west of the center of the North Platte River</td>
</tr>
<tr>
<td>Section 17: NW$NE$</td>
</tr>
<tr>
<td>Section 18: NW$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Township 32 North, Range 82 West, 6th P.M.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 1: E$E$</td>
</tr>
<tr>
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</tr>
<tr>
<td>Section 13: NE$NE$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Township 33 North, Range 81 West, 6th P.M.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 8: All</td>
</tr>
<tr>
<td>Section 9: All</td>
</tr>
<tr>
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<td>Section 18: All</td>
</tr>
<tr>
<td>Section 19: All</td>
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<tr>
<td>Section 20: All</td>
</tr>
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</tr>
<tr>
<td>Section 23: All</td>
</tr>
<tr>
<td>Section 26: All</td>
</tr>
<tr>
<td>Section 27: All, except the S$NW$</td>
</tr>
<tr>
<td>Section 28: All</td>
</tr>
<tr>
<td>Section 29: All</td>
</tr>
<tr>
<td>Section 32: All</td>
</tr>
<tr>
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<td>Section 35: All</td>
</tr>
</tbody>
</table>
FURTHERMORE, IT IS HEREBY RESOLVED that an election for
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are hereby appointed as judges of said election:

1. Dixie McLemore
2. Jane Yeamans
3. Tracy Millett

APPROVED AND ADOPTED this 3 day of NOV., 1992.

BOARD OF COUNTY COMMISSIONERS OF
NATRONA COUNTY, WYOMING

By
Chairman

ATTEST:

By
County Clerk
NOTICE OF HEARING
PROPOSED
POISON SPIDER IMPROVEMENT AND SERVICE DISTRICT

NOTICE IS HEREBY given that the Board of County Commissioners, Natrona County, Wyoming, will conduct a hearing to consider a Petition for the Formation of the Poison Spider Improvement and Service District. The boundaries of the proposed District are described as follows:

Township 32 North, Range 81 West, 6th P.M.: All, Sections 3 through 7, inclusive; N\(\frac{1}{4}\)W\(\frac{1}{4}\) Section 18;

Township 32 North, Range 82 West, 6th P.M.: E\(\frac{1}{4}\)W\(\frac{1}{4}\) Section 1; E\(\frac{1}{4}\)W\(\frac{1}{4}\) Section 12; N\(\frac{1}{4}\)N\(\frac{1}{4}\) Section 13;

Township 33 North, Range 81 West, 6th P.M.: All, Sections 8 and 9, inclusive; all, Sections 15 through 23, inclusive; all, Section 26; all, Sections 28, 29; all, Sections 32 through 35, inclusive.

The Petition for formation of the District is filed so that improvements of local necessity and public convenience can be acquired, constructed, operated and maintained as provided in §18-12-101 through 18-12-140, W.S. (1977). The proposed financing of the improvements of said District may be accomplished by taxation, assessment, borrowing, and bonds.

The names of the people nominated for the initial Board of Directors of said District are: Dave Creager, Dick Wheeler, and Darrell Annestad.

The hearing will be held in Room 115, Natrona County Courthouse, 200 North Center Street, Casper, Wyoming, at 5:30 p.m. on the 3 day of November, 1992. All interested persons will be heard at the hearing, and written requests for exclusion or inclusion of land in the proposed District shall be heard and considered. The above Petition for the formation of the Poison Spider Improvement and Service District may be inspected at the office of the County Commissioners, Natrona County Courthouse, 200 North Center, Casper, Wyoming, during regular business hours.

BOARD OF COUNTY COMMISSIONERS
OF NATRONA COUNTY

By
James K. Sandison, Chairman

ATTEST:

Mary Ann Collins, County Clerk

PUBLISH:
RESOLUTION 63-92
DECLARING THE FORMATION
OF
AN IMPROVEMENT AND SERVICE DISTRICT
AFTER ELECTION
BY RESIDENTS
OF THE DISTRICT

WHEREAS, the Board of County Commissioners of Natrona County, Wyoming has been petitioned by landowners Poison Spider, a subdivision of Natrona County, Wyoming, for the establishment of an improvement and service district; and

WHEREAS, the Board of County Commissioners of Natrona County, Wyoming held a public hearing on November 3, 1992, and no objection to such improvement and service district being received and finding that the petition had been properly presented and that the proposed district would serve the public convenience and necessity in that area, they did thereby adopt a Resolution establishing the formation of the Poison Spider Improvement and Service District, and calling for an election to be held on December 7, 1992; and

WHEREAS, said election was held and a majority of the votes were cast in favor of the organization of the Poison Spider Improvement and Service District;

NOW, THEREFORE, BE IT HEREBY RESOLVED that the Poison Spider Improvement and Service District is declared organized and is granted the taxing authority, bonding authority and rule making authority and such other powers as provided in §§ 18-12-101 through 18-12-140, W.S. Annot. (1977, Repub. Ed.). The boundaries are described as follows:

<table>
<thead>
<tr>
<th>Township 32 North, Range 81 West, 6th P.M.:</th>
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<tbody>
<tr>
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<td>Section 8: All, except S\w NW4</td>
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<td>Section 9: All, except SW1</td>
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<tr>
<td>Section 10: That part of the NW1 NW1 west of the center of the North Platte River</td>
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<td>Section 17: NW1 NW1</td>
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<td>Section 18: NW1</td>
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Section 27: All, except the 8¼NW¼
Section 28: All
Section 29: All
Section 30: All
Section 31: All
Section 32: All
Section 33: All
Section 34: All
Section 35: All

APPROVED AND ADOPTED this 3 day of December, 1993.

BOARD OF COUNTY COMMISSIONERS OF
NATRONA COUNTY, WYOMING

By: Rufe B. Brown
Chairman

ATTEST:

By: Mary Ann Cole
County Clerk
APPENDIX B – HYDRAULIC ANALYSIS REPORT
Poison Spider Pipelines

Level II Study

Hydraulic Analysis Report

November 2010

Prepared For:

Wyoming Water Development Commission

Prepared by:

C. H. Guernsey & Company
5555 North Grand Boulevard
Oklahoma City, OK 73112-5507

Phone: (405) 416-8100
Fax: (405) 416-8114
www.chguernsey.com
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1.0 SUMMARY

The Poison Spider Improvement and Service District (‘Poison Spider’) water supply system obtains potable water from the Central Wyoming Regional Water System. Poison Spider is fed from the Pioneer Water and Sewer District booster station, located on Poison Spider Road between 7-Mile Road and 8-Mile Road. The booster station pumps water through a 10-inch diameter main located on Poison Spider Road to the 0.5 MG Pioneer elevated water storage tank. This tank serves the Poison Spider water supply system.

Modeling was undertaken using both current and future Maximum Day demands. Future demands were based upon a population growth rate of 2%, which would double the existing population served by the water supply system in 35 years; therefore future Maximum Day demands were obtained by doubling the current Maximum Day demands. Future demands also included extending the current water supply system to supply water to properties on Dusty Lane.

Modeling indicates that the current water supply system is satisfactory to meet current demands but not future demands. Due to changes in elevation, there is a requirement for the pressure reducing valve currently installed at the metering station. However the presence of this valve means that there is insufficient system pressures in the future at the west end of Poison Spider Road, along Shinn Road, and along Bessemer Bend Road heading east towards the river.

Future low pressure problems at the west end of Poison Spider Road can be solved by extending the existing 8-inch diameter main on Poison Spider Road west from the Poison Spider School to tie into the existing 2-inch diameter main. Installation of this main would require the removal of the existing pressure sustaining valve on the existing 8-inch diameter main east of Bessemer Bend Road, and the installation of a pressure reducing valve upstream of Poison Spider School to reduce slightly excessive pressures.

Future low pressure problems along Bessemer Bend Road heading east towards the river can be solved by extending the existing 8-inch diameter main on 12-Mile Road south to Bessemer Bend Road. This main also provides an opportunity to provide water to properties located on Dusty Lane. The 8-inch diameter main could be extended east along Bessemer Bend Road to connect into an existing 8-inch diameter main on High Lane to remove the current restriction in capacity of being fed by a 3-inch diameter main.

Future low pressure problems along Shinn Road can only be solved by replacing the existing 1.5-inch diameter east of 12-Mile Road. The size of the main is dependent on future demands, but modeling indicates that a 2-inch diameter main would be sufficient if demands doubled on this road.

In terms of robustness, extending the 8-inch diameter main on 12-Mile Road south to Bessemer Bend Road would provide an alternative supply route to the southern half of the system in the event of a pipe burst. Extending the 8-inch diameter main on Poison Spider Road west would also provide an alternative supply route into the whole system and to the northern half in particular. However the new main would be connecting into small diameter pipework, which would restrict flows into the system should the main on 12-Mile Road burst. To provide a supply route equal in size to the existing supply main on 12-Mile Road, an 8-inch diameter
main would be required to connect the new 8-inch diameter main on Poison Spider Road to the existing 8-inch diameter main that currently terminates at Bessemer Bend Road.

Poison Spider has decided that the extension of the 8-inch diameter main on Poison Spider Road west from the Poison Spider School shall be a future improvement project and shall not be implemented at this stage. Until such time that this main is installed, the existing pressure sustaining valve on the existing 8-inch diameter main east of Bessemer Bend Road needs to remain active.
2.0 WATER SUPPLY SYSTEM OVERVIEW

The Poison Spider Improvement and Service District (‘Poison Spider’) water supply system obtains potable water from the Central Wyoming Regional Water System (‘CWRWS’). Poison Spider is supplied from the Pioneer Water and Sewer District (‘Pioneer’) booster station, located on Poison Spider Road between 7-Mile Road and 8-Mile Road. The booster station pumps water through a 10-inch diameter main located along Poison Spider Road to the 0.5 MG Pioneer elevated water storage tank. This tank is located on Emigrant Gap Ridge, and has an overflow elevation of 5,667 ft.

Details of the Poison Spider water supply system downstream of the Pioneer tank are given in Figure 2-1. From the tank, an 8-inch diameter main heads south-west and terminates at the Poison Spider School, located on Poison Spider Road. At the intersection of Poison Spider Road and 12-Mile Road (located approximately ½ mile north-east of the school), an 8-inch diameter main branches off and heads south along 12-Mile Road. Downstream of the branch, the 12-Mile Road main passes through a meter vault. The vault marks the start of the Poison Spider water supply system, and it consists of a reduced pressure backflow preventer, a pressure reducing valve (‘PRV’), a chlorine injection system and a magnetic flow meter. Since the CWRWS switched from chlorine to chloramine as a means of providing a disinfectant residual in the system, chlorine is no longer injected at the vault. The PRV is set to reduce the upstream pressure of approximately 110 psi to a downstream pressure at its outlet of 60 psi; the elevation of the PRV is approximately 5,405 ft, and so the hydraulic gradient is set to approximately 5,545 ft.

The 8-inch diameter main continues south for approximately 2 miles to Shinn Road before turning west for approximately 1 mile to Bessemer Bend Road. At this road the main ties into an existing main that heads both north and south. The 3-inch diameter southern leg runs south for approximately 2 miles before turning east. From here it runs approximately 2 miles before turning south-east for a short distance to terminate on the north bank of the North Platte River. Due to the change in elevation (the land falls south towards the river), a PRV is installed in the main at a point east of the intersection of 12-Mile Road and Bessemer Bend Road to prevent excess pressures at the river, which is approximately 100 ft lower.

The 2.5-inch diameter northern leg runs north for approximately 1.5 miles before heading north-west to Phillips Lane. At this point the main reduces in size to 2-inch diameter, and it turns west and then north-west to reach Poison Spider Road. The main further reduces in size to 1.5-inch diameter and heads north-east along the road for a short distance before heading north for approximately 1.5 miles to the northern boundary of the district. This northern leg is at the highest elevations in the system; the 2-inch diameter main on Poison Spider Road is approximately 180 ft higher than the 8-inch diameter main at the intersection of 12-Mile Road and Shinn Road. In order to maintain pressure in this part of the system, a pressure sustaining valve (PSV) is located in the 8-inch diameter just before it reaches Bessemer Bend Road.

From Bessemer Bend Road, a 1.5-inch diameter main runs east parallel to the 8-inch diameter main back to 12-Mile Road, and then east and then south along Shinn Road for approximately 1.25 miles.
There are 26 customer meters within the district. Some customers are fed indirectly from the water supply system via cisterns. The cisterns are fed off the mains using float valves and the customer pumps water out of the cistern. There are no fire hydrants within the district, although there are some flushing hydrants, and yard hydrants used for flushing.
Figure 2-1
Water System Feature Location Map

Legend
- Poison Spider District Boundary (Appx.)
- Road
- 2" Or Smaller Waterline
- 2.5" To 3" Waterline
- 4" To 6" Waterline
- 8" Or Larger Waterline
- CWRWS
- Valve
- Gate Valve
- Curb Stop
- PRV Valve
- CWRWS Storage Tank
- Hydrant
- Water Test Station
- Agricultural
- Commercial
- Residential
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- Other

Water Supply System Overview

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Water Supply System Overview
3.0 WATER DEMANDS

Hydraulic analysis of the Poison Spider water supply system was undertaken using an existing Bentley WaterCAD V8i model of the entire CWRWS dated 04/23/2009 and developed by Civil Engineering Professionals, Inc. of Casper, WY and as supplied to 609 Consulting, LLC, of Casper, WY.

3.1 Current Average Day Demands

The provided WaterCAD model already had current Average Day and Maximum Day demands populating the model. The Average Day Demands for the Poison Spider water supply system are given in Table 3-1. This table provides the demand assigned to each node in the model. For reference, Figure 3-1 is a plot of the system taken from WaterCAD that shows the node reference numbers.

<table>
<thead>
<tr>
<th>Node Reference</th>
<th>Node Location</th>
<th>Average Day Demand (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-12609</td>
<td>Bessemer Bend Road @ 8-inch diameter main</td>
<td>1.9</td>
</tr>
<tr>
<td>J-12610</td>
<td>Bessemer Bend Road @ 1.5-inch diameter main</td>
<td>1.9</td>
</tr>
<tr>
<td>J-13024</td>
<td>Bessemer Bend Road @ High Lane</td>
<td>1.9</td>
</tr>
<tr>
<td>J-13025</td>
<td>S end of 8-inch diameter main, High Lane</td>
<td>1.9</td>
</tr>
<tr>
<td>J-13044</td>
<td>SW corner of Bessemer Bend Road</td>
<td>1.9</td>
</tr>
<tr>
<td>J-13045</td>
<td>N end of Rasmus Lee Road</td>
<td>1.9</td>
</tr>
<tr>
<td>J-13054</td>
<td>Poison Spider School</td>
<td>1.2</td>
</tr>
<tr>
<td>J-13083</td>
<td>Poison Spider Road @ 1.5-inch diameter main</td>
<td>1.9</td>
</tr>
<tr>
<td>J-13084</td>
<td>N of Poison Spider Road</td>
<td>1.9</td>
</tr>
<tr>
<td>J-13097</td>
<td>North Platte River</td>
<td>1.9</td>
</tr>
<tr>
<td>J-13106</td>
<td>S end of Shinn Road</td>
<td>1.9</td>
</tr>
</tbody>
</table>

The Average Day Demand of the water supply system downstream of the intersection of Poison Spider Road and 12-Mile Road is 20.2 gpm. Of this demand, 1.2 gpm is attributed to the Poison Spider School, so the demand of the Poison Spider system (i.e. downstream of the PRV on 12-Mile Road) is 19 gpm. This demand has been split evenly between 10 nodes located throughout the system.

3.2 Current Maximum Day Demands

The current Maximum Day Demands in the provided model were derived by multiplying the Average Day Demands by a factor of 2.75. This factor was derived as part of the Casper Master Plan Level I Study dated 10/15/2006 and prepared by Civil Engineering Professionals, Inc.

The Maximum Day Demands for the Poison Spider water supply system are given in Table 3-2. The Maximum Day Demand of the water supply system downstream of the intersection of Poison Spider Road and 12-Mile Road is 55.55 gpm.
Table 3-2: Poison Spider, Maximum Day Demands

<table>
<thead>
<tr>
<th>Node Reference</th>
<th>Node Location</th>
<th>Maximum Day Demand (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-12609</td>
<td>Bessemer Bend Road @ 8-inch diameter main</td>
<td>5.225</td>
</tr>
<tr>
<td>J-12610</td>
<td>Bessemer Bend Road @ 1.5-inch diameter main</td>
<td>5.225</td>
</tr>
<tr>
<td>J-13024</td>
<td>Bessemer Bend Road @ High Lane</td>
<td>5.225</td>
</tr>
<tr>
<td>J-13025</td>
<td>S end of 8-inch diameter main, High Lane</td>
<td>5.225</td>
</tr>
<tr>
<td>J-13044</td>
<td>SW corner of Bessemer Bend Road</td>
<td>5.225</td>
</tr>
<tr>
<td>J-13045</td>
<td>N end of Rasmus Lee Road</td>
<td>5.225</td>
</tr>
<tr>
<td>J-13054</td>
<td>Poison Spider School</td>
<td>3.3</td>
</tr>
<tr>
<td>J-13083</td>
<td>Poison Spider Road @ 1.5-inch diameter main</td>
<td>5.225</td>
</tr>
<tr>
<td>J-13084</td>
<td>N of Poison Spider Road</td>
<td>5.225</td>
</tr>
<tr>
<td>J-13097</td>
<td>North Platte River</td>
<td>5.225</td>
</tr>
<tr>
<td>J-13106</td>
<td>S end of Shinn Road</td>
<td>5.225</td>
</tr>
</tbody>
</table>

Of this demand, 3.3 gpm is attributed to the Poison Spider School, so the demand of the Poison Spider system (i.e. downstream of the PRV on 12-Mile Road) is 52.25 gpm.

3.3 Future System Demands

No information has been provided on the current population served by Poison Spider water supply system, or on the projected population growth within the district in terms of overall figures and locations where growth is likely to occur.

In light of this lack of data, it was decided to use the growth rate selected for the Evansville Water Master Plan Level 1 Study dated September 2009 and prepared by C. H. Guernsey & Company. In this study, a growth rate of 2.0% was selected by the Town as a reasonable rate of growth. Evansville, like Poison Spider, located on the outskirts of Casper and so it is assumed for modeling purposes that the growth rate would be similar. Based on a 2% growth rate, an existing population would double over a 35-year period; therefore the existing Average Day and Maximum Day Demands were doubled, which would represent a 2% growth rate to the year 2045.

The future demands used in modeling are given in Table 3-3 and Table 3-4. These tables show that the future demands of the Poison Spider system (i.e. downstream of the PRV on 12-Mile Road) as 38 gpm for the Average Day and 104.5 gpm for the Maximum Day.

Areas already exist into which the current water supply system can be expanded. Approximately 20 properties exist on Dusty Lane (which is located off 12-Mile Road south of Shinn Road) that currently obtain their water from ground wells. These have the potential to be connected to the system if the 8-inch diameter main was extended further south on 12-Mile Road. Therefore a further future demand was calculated for these properties. Based upon a water consumption of 125 gallons per capita per day and 3 persons per household, the current Average Day Demand of 20 properties would be 7500 gpd, or 5.208 gpm, with a current Maximum Day Demand of 14.323 gpm. Doubling this discussed above leads to a future Average Day Demand of 10.42 gpm and a future Maximum Day Demand of 28.65 gpm.
### Table 3-3: Poison Spider, Future Average Day Demands, Current System

<table>
<thead>
<tr>
<th>Node Reference</th>
<th>Node Location</th>
<th>Average Day Demand (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-12609</td>
<td>Bessemer Bend Road @ 8-inch diameter main</td>
<td>3.8</td>
</tr>
<tr>
<td>J-12610</td>
<td>Bessemer Bend Road @ 1.5-inch diameter main</td>
<td>3.8</td>
</tr>
<tr>
<td>J-13024</td>
<td>Bessemer Bend Road @ High Lane</td>
<td>3.8</td>
</tr>
<tr>
<td>J-13025</td>
<td>S end of 8-inch diameter main, High Lane</td>
<td>3.8</td>
</tr>
<tr>
<td>J-13044</td>
<td>SW corner of Bessemer Bend Road</td>
<td>3.8</td>
</tr>
<tr>
<td>J-13045</td>
<td>N end of Rasmus Lee Road</td>
<td>3.8</td>
</tr>
<tr>
<td>J-13054</td>
<td>Poison Spider School</td>
<td>2.4</td>
</tr>
<tr>
<td>J-13083</td>
<td>Poison Spider Road @ 1.5-inch diameter main</td>
<td>3.8</td>
</tr>
<tr>
<td>J-13084</td>
<td>N of Poison Spider Road</td>
<td>3.8</td>
</tr>
<tr>
<td>J-13097</td>
<td>North Platte River</td>
<td>3.8</td>
</tr>
<tr>
<td>J-13106</td>
<td>S end of Shinn Road</td>
<td>3.8</td>
</tr>
</tbody>
</table>

### Table 3-4: Poison Spider, Future Maximum Day Demands, Current System

<table>
<thead>
<tr>
<th>Node Reference</th>
<th>Node Location</th>
<th>Maximum Day Demand (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-12609</td>
<td>Bessemer Bend Road @ 8-inch diameter main</td>
<td>10.45</td>
</tr>
<tr>
<td>J-12610</td>
<td>Bessemer Bend Road @ 1.5-inch diameter main</td>
<td>10.45</td>
</tr>
<tr>
<td>J-13024</td>
<td>Bessemer Bend Road @ High Lane</td>
<td>10.45</td>
</tr>
<tr>
<td>J-13025</td>
<td>S end of 8-inch diameter main, High Lane</td>
<td>10.45</td>
</tr>
<tr>
<td>J-13044</td>
<td>SW corner of Bessemer Bend Road</td>
<td>10.45</td>
</tr>
<tr>
<td>J-13045</td>
<td>N end of Rasmus Lee Road</td>
<td>10.45</td>
</tr>
<tr>
<td>J-13054</td>
<td>Poison Spider School</td>
<td>10.45</td>
</tr>
<tr>
<td>J-13083</td>
<td>Poison Spider Road @ 1.5-inch diameter main</td>
<td>6.6</td>
</tr>
<tr>
<td>J-13084</td>
<td>N of Poison Spider Road</td>
<td>10.45</td>
</tr>
<tr>
<td>J-13097</td>
<td>North Platte River</td>
<td>10.45</td>
</tr>
<tr>
<td>J-13106</td>
<td>S end of Shinn Road</td>
<td>10.45</td>
</tr>
</tbody>
</table>

#### 3.4 Daily Demand Pattern

The provided WaterCAD model contained a demand pattern that had been applied to every node in model to account for the diurnal variation in water usage. In a demand pattern, the daily demand is spread equally over 24 hours, and then an hourly multiplier is applied to each hour’s demand. The sum of the hourly multipliers is 24 to give an average hourly multiplier of one.

As the pattern was applied to every node in the model, it represents the average diurnal water usage in the CWRWS and covers residential, commercial and industrial water usage patterns. The demand pattern is given in Figure 3-2. This shows a peak hourly demand at 9.30 p.m. (hourly multiplier of 1.43) and a secondary peak demand at 6.30 a.m. (hourly multiplier of 1.29).
The pattern also shows a minimum hourly demand at 2.30 p.m. (hourly multiplier of 0.62) and a secondary minimum demand at 1 a.m. (hourly multiplier of 0.69).

**Figure 3-2: Daily Demand Pattern**
4.0 HYDRAULIC ANALYSIS OF CURRENT SYSTEM

Hydraulic analysis of the current system was carried out using the provided WaterCAD model, except that two changes were made to enable the analysis to proceed:

1. The Maximum Day scenario would not run in model due to error messages. To overcome this, the Maximum Day was represented by copying the Average Day scenario and applying a daily factor of 2.75 to the demand pattern.

2. On running an extended period simulation (EPS) with the Maximum Day scenario, the water supplied by the CWRWS water treatment plant could not keep up with demand and all of the elevated storage tanks within the system would empty. It was noticed that the water treatment plant was modeled as a node with a fixed demand that was limiting flow out of the plant. To overcome this, the plant was modeled as a reservoir with a hydraulic grade that matched that of the replaced node. In doing this, the flow of the plant was similar to the Maximum Day Demand stated in the Casper Master Plan Level I Study.

No calibration of the provided model was undertaken on the assumption that it had already been calibrated. The purpose of calibration is to check that the model is a good reflection of how the existing water system operates. It involves comparing a known set of conditions in the water system against the same set of conditions in the model to see if they match. If there is a significant difference between the system and the model, the model is not a good representation of reality. A known set of conditions in the water system suitable for modeling can be produced by undertaking a fire flow test, which is undertaken at fire hydrants. The Poison Spider water supply system does not have fire hydrants, but it does have flushing hydrants. Model calibration specific to the Poison Spider part of the CWRWS model could be carried out by undertaking fire flow tests at flushing hydrants.

Since the Poison Spider water supply system does not have fire hydrants, a fire flow analysis was not undertaken. For water supply systems, the worst-case scenario in terms of demands and pressures is usually represented by a demand for fire flow occurring during the peak hour of the peak day. Since fire flows cannot occur in this system, the worst-case scenario is represented by the demands occurring during the peak hour of the peak day.

The system was therefore modeled using the Current Maximum Day scenario with an EPS. The EPS calculates the system pressures and demands for each hour in the run period based upon the demand and demand pattern allocated to each node. The EPS therefore provides a representation of how pressures would vary throughout the peak day.

The setting for the PRV at the meter vault on 12-Mile Road is known, but the setting for the PRV on Bessemer Bend Road east of 12-Mile Road is not known. For modeling purposes, the PRV was set such the pressure at the North Platte River would not exceed 100 psi. In order to achieve this, modeling indicated that the PRV should be set with a hydraulic gradient of 5,430 ft; since the PRV is located at an elevation of approximately 5,280 ft, this represents a PRV setting of approximately 65 psi. The setting of the PSV at Bessemer Bend Road on the 8-inch diameter main is not known. For modeling purposes, a PSV was not modeled in order to see what effect it would have on the system.
A graph of how the pressure varies throughout the current Maximum Day for various points throughout the Poison Spider water supply system are given in Figure 4-1 to Figure 4-6. The locations can be correlated with reference to Figure 3-1.

The current Maximum Day highest pressures in the system are at Poison Spider School, which are in the range 113-118 psi. The pressures change in direct response to the change in water elevation in the Pioneer tank. The effects of the PRV’s in the system can be seen by the pressures noted at the intersection of 12-Mile Road and Shinn Road and at the North Platte River, where pressures are near constant and just below 100 psi. The effect of head loss in the small diameter main feeding Shinn Road can be seen that there is a wide variation in pressures, between 45 psi at periods of low demand to 75 psi at periods of high demand.

Both the south end of Bessemer Bend Road and the west end of Poison Spider Road are downstream of the PSV. Due to the slope of the land, the pressures at the south end of Bessemer Bend Road are very good (in the range 70-84 psi), but at the system high point (west end of Poison Spider Road), the pressures are low, between 28-40 psi. It is likely therefore that the PSV has been set such that the downstream pressure does not fall below 35 psi to maintain acceptable pressures in the north-west section of the system.

Analysis of the results from this modeling indicates that current water supply system appears to be satisfactory to meet current peak day demands, and that no improvements are necessary to improve pressures.
Figure 4-3: Current Maximum Day Pressures - End of Shinn Road

Pressure (psi)

75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0

Time (hours)

0.000
7.000
14.000
21.000
28.000
35.000
42.000
49.000
56.000
63.000
70.000
Figure 4-4: Current Maximum Day Pressures - Bessemer Bend Rd (South End)

Pressure (psi)

Time (hours)

J-13044 - Current Max Day - Pressure
Figure 4-5: Current Maximum Day Pressures - At River

Pressure (psi)

<table>
<thead>
<tr>
<th>Time (hours)</th>
<th>Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>70.000</td>
<td>99.2</td>
</tr>
<tr>
<td>63.000</td>
<td>99.0</td>
</tr>
<tr>
<td>56.000</td>
<td>98.9</td>
</tr>
<tr>
<td>49.000</td>
<td>98.7</td>
</tr>
<tr>
<td>42.000</td>
<td>98.6</td>
</tr>
<tr>
<td>35.000</td>
<td>98.4</td>
</tr>
<tr>
<td>28.000</td>
<td>98.3</td>
</tr>
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<td>21.000</td>
<td>98.1</td>
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<tr>
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<td>97.9</td>
</tr>
<tr>
<td>7.000</td>
<td>98.1</td>
</tr>
<tr>
<td>0.000</td>
<td>99.2</td>
</tr>
</tbody>
</table>
Figure 4-6: Current Maximum Day Pressures - Poison Spider Road (West End)

Pressure (psi):

- 40.5
- 39.0
- 37.5
- 36.0
- 34.5
- 33.0
- 31.5
- 30.0
- 28.5

Time (hours):

- 70.00
- 63.00
- 56.00
- 49.00
- 42.00
- 35.00
- 28.00
- 21.00
- 14.00
- 7.00
- 0.00
5.0 HYDRAULIC ANALYSIS OF CURRENT SYSTEM WITH FUTURE FLOWS

To determine how the current water supply system would handle future growth, the system was modeled using a Future Maximum Day scenario with an ESP. This scenario had model demands that were double those used in the Current Maximum Day scenario to represent future demands (see Section 3.3). The system was modeled with the existing pipework to determine if improvements are required to handle future growth.

A graph of how the pressure varies throughout the future Maximum Day, along with the graph of the current Maximum Day pressures for comparison, for various points throughout the Poison Spider water supply system are given in Figure 5-1 to Figure 5-6. The locations can be correlated with reference to Figure 3-1.

At Poison Spider School, there is very little change in pressure. The highest pressures seen are still 118 psi, but there is a slight drop off in the low pressures from 113 psi to 112 psi. At the intersection of 12-Mile Road and Shinn Road, the pressures are still constant but slightly down by approximately 1 psi. However, downstream of this point there are major changes in pressures. At the North Platte River, downstream of the second PRV, the high pressures are still just below 100 psi, but the low pressures are down around 68 psi, which indicates that the pressures at the PRV are below 65 psi at certain times of the peak day; in fact, if the pressure at the river is at 68 psi, due to elevation changes the pressure at the PRV would be approximately 30 psi, which is on the low end of acceptability. This is also indicated by the pressures at the south end of Bessemer Bend Road, which vary from 23 psi to 70 psi.

Two locations indicate that no pressure would exist at certain times of the day; at the end of Shinn Road and at the high elevations in the system (west end of Poison Spider Road). At the end of Shinn Road, the maximum pressures predicted are approximately 40 psi, and at the west end of Poison Spider Road, the maximum predicted pressures are approximately 30 psi. This indicates that the existing PSV would be unable to maintain adequate pressure in the northwest section of the system since the pressure upstream of the PSV is inadequate.

The pressures in the system do not directly affect all customers since some pump from a cistern. However the reduced pressures may mean periods of reduced or no flows to the cisterns, which may not re-fill in time before water is demanded again; therefore customers are likely to suffer periods where demands cannot be met.
Figure 5-1: Future Maximum Day Pressures without Improvements - Poison Spider School

<table>
<thead>
<tr>
<th>Pressure (psi)</th>
<th>Time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>118.8</td>
<td>0.000</td>
</tr>
<tr>
<td>118.1</td>
<td>6.000</td>
</tr>
<tr>
<td>117.5</td>
<td>12.000</td>
</tr>
<tr>
<td>116.9</td>
<td>18.000</td>
</tr>
<tr>
<td>116.3</td>
<td>24.000</td>
</tr>
<tr>
<td>115.6</td>
<td>30.000</td>
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<td>115.0</td>
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<td>114.4</td>
<td>42.000</td>
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<td>60.000</td>
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<tr>
<td>111.9</td>
<td>66.000</td>
</tr>
<tr>
<td>111.3</td>
<td>72.000</td>
</tr>
</tbody>
</table>
Figure 5-2: Future Maximum Day Pressures without Improvements - 12-Mile Road & Shinn Road

Pressure (psi)

98.8
98.5
98.3
98.0
97.8
97.5
97.3
97.0
96.8

Time (hours)

0.000
7.000
14.000
21.000
28.000
35.000
42.000
49.000
56.000
63.000
70.000
Figure 5-3: Future Maximum Day Pressures without Improvements - End of Shinn Road

Pressure (psi)

75.0
62.5
50.0
37.5
25.0
12.5
0.0
-12.5
-25.0
-37.5
-50.0
-62.5
-75.0

Time (hours)

70.000
63.000
56.000
49.000
42.000
35.000
28.000
21.000
14.000
7.000
0.000
Figure 5-4: Future Maximum Day Pressures without Improvements - Bessemer Bend Road (South End)

Pressure (psi)

Time (hours)

J-13044 - Current Max Day - Pressure
J-13044 - Future Max Day (No Improvements) - Pressure
Figure 5-5: Future Maximum Day Pressures without Improvements - At River J-13097

Current Max Day Pressure
Future Max Day (No Improvements) Pressure

Pressure (psi)

Time (hours)

0.000 7.000 14.000 21.000 28.000 35.000 42.000 49.000 56.000 63.000 70.000

0.000 65.0 70.0 75.0 80.0 85.0 90.0 95.0 100.0

- J-13097 - Current Max Day - Pressure
- J-13097 - Future Max Day (No Improvements) - Pressure
Figure 5-6: Future Maximum Day Pressures without Improvements - Poison Spider Road (West End)

Current Max Day Pressure

Future Max Day (No Improvements) Pressure

Pressure (psi)

0.0
-10.0
-20.0
20.0
30.0
40.0
50.0

Time (hours)

0.000
7.000
14.000
21.000
28.000
35.000
42.000
49.000
56.000
63.000
70.000
6.0 HYDRAULIC ANALYSIS OF SYSTEM IMPROVEMENTS

From the hydraulic analysis undertaken in Section 5.0, improvements to the Poison Spider water supply system are required in the future to maintain adequate system pressures during period of peak demand.

The hydraulic analysis of the future flows illustrates one drawback of the current system. The north-west section of the system (the west end of Poison Spider Road) is at roughly the same elevation as where the water enters the system, in the vicinity of Poison Spider School. However the water must travel down 12-Mile Road and then west and then north on Bessemer Bend Road to get there, therefore the main descends to a lower elevation before rising back up again. To ensure that pressures on 12-Mile Road are not excessive, the pressure is reduced at the PRV in the meter vault by approximately 45 psi; therefore pressures in the north-west section of the system are lower than the pressures at Poison Spider School by at least 45 psi plus the frictional losses in the mains. The mains in the north-west section are 3-inch, 2-inch and 1.5-inch diameters, and so frictional losses are proportionally higher than if the mains were 8-inch diameter.

Two potential solutions to improving pressures in the north-west section of the system are:

A) Remove the PRV from the meter vault on 12-Mile Road. This would provide an additional 45 psi of pressure to the system. The Maximum Day pressures at the west end of Poison Spider Road would then be in the region of 33-75 psi; and the low pressures could be increased by raising the set point of the PSV. One potential disadvantage would be that the pressures on 12-Mile Road at Shinn Road would peak at 145 psi. This could cause leaks or bursts in existing mains if they are old or have been weakened.

B) Extend the 8-inch diameter main on Poison Spider Road south-west along the road from Poison Spider School to tie into the existing pipework at the west end of Poison Spider Road. This would provide the north-west section with pressures similar to those experienced by the school, and the PSV would be removed from service.

Another potential drawback of the current system is that it is entirely fed by the one 8-inch diameter main on 12-Mile Road. Should a break occur in this line, then the entire system will be without water except for that stored in the cisterns. Equally, a break in the 3-inch diameter main on Bessemer Bend Road could deprive either the north-west section or the entire southern section of the system of water due to their dependence upon one feed main. By extending the 8-inch diameter main along Poison Spider Road, a second point of entry is introduced into the system, such that there is an alternative feed should one of the mains break. In a similar manner, extending the 8-inch main diameter down 12-Mile Road from Shinn Road to Bessemer Bend Road provides and alternative feed to the southern section should one of the mains break.

A second advantage of extending the 8-inch main south on 12-Mile Road is that it provides an opportunity to connect the properties on Dusty Lane to the system. The Maximum Day Demand calculated for these properties (see Section 3.3) was added into the model on a node on the new main to represent this demand.
A hydraulic analysis was therefore undertaken using the Future Maximum Day scenario, but with the two 8-inch diameter extensions mentioned above in place and with other system improvements in place:

A) There is an 8-inch diameter main on High Lane (located close to the river) that is fed by the 3-inch diameter main on Bessemer Bend Road. Having a 3-inch diameter main feeding into an 8-inch diameter main restricts the capacity of the larger main; therefore the 8-inch diameter main was extended from 12-Mile Road to High Lane as a replacement to the 3-inch diameter main. A PRV was inserted in the 8-inch diameter main east of 12-Mile Road with the same settings as the existing PRV.

B) An 8-inch diameter main on Bessemer Bend Road was installed in the model from the western end of the existing 8-inch diameter main to the proposed 8-inch diameter extension on Poison Spider Road. This provides an alternate supply route of similar diameter to the existing supply route on 12-Mile Road; otherwise the new main on Poison Spider Road would be feeding the system via small diameter pipework. A PRV was inserted in the main south of Poison Spider Road with the same settings as the existing PRV on 12-Mile Road.

A new PRV was installed in the model just upstream of Poison Spider School to reduce the pressure at the school to a maximum of 100 psi. This was done to maintain the philosophy of limiting the maximum pressures in the system to this value. The hydraulic gradient of the PRV was set at 5,600 ft, which represents a PRV setting of approximately 100 psi. Although not modeled, a meter would be required downstream of the school to measure system water consumption as provided by this new feed main.

Modifications were also made to the Shinn Road main. Instead of being fed off the 3-inch diameter main on Bessemer Bend Road, the main was tied into the new 8-inch diameter main on 12-Mile Road, so reducing its length by 1 mile. In addition the diameter of the main was upsized to 2-inch diameter. A map of the network after the improvements listed above is given in Figure 6-1, which is a plot of the WaterCAD model.

A graph of how the pressure varies throughout the Future Maximum Day for both the existing system and the system with improvements for various points throughout the Poison Spider water supply system is given in Figure 6-2 to Figure 6-7. The locations can be correlated with reference to Figure 6-1.

At Poison Spider School, the PRV provided a constant pressure fractionally below 100 psi as opposed to it varying slightly between 112-118 psi in the original model. The benefit of extending the 8-inch diameter main along Poison Spider Road is reflected in the pressure results for the west end of Poison Spider Road. Here the pressure remained at a constant 75 psi (due to the new PRV at the school) as opposed to being below 30 psi and zero at certain times of the day. The pressures at the intersection of 12-Mile Road and Shinn Road remain unchanged, while the pressures at the south end of Bessemer Bend Road increase from the range 23-70 psi to a more constant range of 84-87 psi. At the North Platte River, the pressures are very similar to the current Maximum Day scenario (constant and just below 100 psi), as opposed to dropping to 68 psi at certain times of the day. From this, it can be deduced that the pressures at the upstream PRV do not fall below 65 psi on the Maximum Day. With a 2-inch diameter main on
Shinn Road, the pressures fluctuate over the range 63-77 psi, as opposed to being below 40 psi and zero at certain times of the days with the 1.5-inch diameter main.
Figure 6-2: Future Maximum Day Pressures with Improvements - Poison Spider School
Figure 6-4: Future Maximum Day Pressures with Improvements - End of Shinn Road

J-13106 - Future Max Day (No Improvements) - Pressure
J-13106 - Poison Spider Future Max Day - Pressure
Figure 6-5: Future Maximum Day Pressures with Improvements - Bessemer Bend Road (South End)

Pressure (psi)

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<th>90.0</th>
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<th>80.0</th>
<th>75.0</th>
<th>70.0</th>
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Figure 6-6: Future Maximum Day Pressures with Improvements - At River

- J-13097 - Future Max Day (No Improvements) - Pressure
- J-13097 - Poison Spider Future Max Day - Pressure

Pressure (psi)

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<th>63.000</th>
<th>56.000</th>
<th>49.000</th>
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7.0 HYDRAULIC ANALYSIS OF WATER AGE

Another factor to take into consideration in the hydraulic analysis of a water supply system is the water age i.e. how long does the water remain in the system before it is consumed. Water age impacts on water quality, since the longer it remains in the system, the greater chance that water quality can degrade. This degradation could be due to such factors as the loss of disinfectant residual. The CWRWS uses chloramines to provide a disinfection residual as opposed to chlorine, since chloramines provide a longer lasting disinfection residual than chlorine.

The purpose of water age modeling for the Poison Spider water supply system is to see what the water age is and to determine if any of the proposed improvements have an impact on water age. Since water moves more slowly through a system at lower demands, a hydraulic analysis of water age was carried out by using Average Day Demands. This was achieved by taking the Future Maximum Day scenario without and with improvements and changing the daily factor in the demand pattern from 2.75 to 1.

In water age analysis, the analysis commences with a water age equal to zero; therefore it must go through several iterations to calculate the water age. In order to achieve this, the run time for the analysis was set to 360 hours.

The water to the Poison Spider water supply system is supplied by the Pioneer booster pumps or by the Pioneer tank when the pumps are not in operation. Therefore the minimum water age will occur as the water enters the water system. A graph of the Average Day water age in the Pioneer tank for both scenarios is given in Figure 7-1. This shows that there is little change in water age with the improvements in place. In both scenarios, the water age on average varies between 175 hours and 190 hours.

At the west end of Poison Spider Road (Figure 7-2), the water age without improvements varies between 210 and 225 hours when supplied by the Pioneer tank, but drops to between 150 and 170 hours when supplied by the Pioneer booster pumps. With the improvements in place, the water age when supplied by the Pioneer tank is between 185 to 210 hours, dropping to between 125 to 140 hours when supplied by the pioneer booster pumps. The improvements therefore lead to an improvement of between 15 to 30 hours in water age.

In comparison, at Poison Spider School (Figure 7-3), the water age without improvements varies between 220 and 230 hours when supplied by the Pioneer tank, but drops to between 150 and 175 hours when supplied by the Pioneer booster pumps. With the improvements in place, the water age when supplied by the Pioneer tank is between 180 to 200 hours, dropping to between 120 to 135 hours when supplied by the pioneer booster pumps. The improvements therefore lead to an improvement of between 30 to 40 hours in water age. The overall water age is slightly less (and the reduction in water age slightly greater) for Poison Spider School than the west end of Poison Spider School, which is due to its closer proximity to the source of water.

The highest water ages in the system are at the North Platte River (Figure 7-4). Without improvements, the water age varies between 260 and 270 hours when supplied from the Pioneer tank and around 210 hours when supplied by the Pioneer booster station. With improvements, the water age varies between 220 and 230 hours when supplied by the Pioneer tank and around 170 hours when supplied by the Pioneer booster pumps.
Figure 7-1: Water Age - Pioneer Tank

- Future Max Day (No Improvements) Water Age - Age (Calculated)
- Future Max Day (With Improvements) Water Age - Age (Calculated)
Figure 7-2: Water Age - Poison Spider Road (West End)

J-13882 - Future Max Day (No Improvements) Water Age - Age (Calculated)

J-13882 - Future Max Day (With Improvements) Water Age - Age (Calculated)
8.0 CONCLUSIONS/RECOMMENDATIONS

From the hydraulic analyses of the Poison Spider water supply system, it can be concluded that the current system is adequate to supply the anticipated current demands without pressure problems occurring. However, the current system does not have redundancy, in that if there is a break in the existing 8-inch diameter line on 12-Mile Road, the entire system will be deprived of water. Additionally, a break in the existing 3-inch line on Bessemer Bend Road will either deprive either the north-west section or the southern section of the system of water.

Analysis indicates that the current system could not cope with potential future demands. Low pressure problems would occur in the north-west section of the system, along Shinn Road and along the southern section of Bessemer Bend Road. However, reinforcing the system to provide redundant lines will solve most of the low pressure problems that will occur should the current water demands double. Reinforcement would consist of extending the existing 8-inch diameter main on Poison Spider Road from Poison Spider School to the west, installing an 8-inch diameter main from the above mentioned extension south to the existing 8-inch diameter main, and extending the existing 8-inch diameter main on 12-Mile Road to Bessemer Bend Road and High Lane.

Analysis indicates that future low pressures on Shinn Road can be solved by replacing the existing 1.5-inch diameter main with a 2-inch diameter main. However, the distribution of demands in the model may not accurately reflect the reality of the system. The model was set up with a current Average Day demand at the end of Shinn Road of 1.9 gpm. There is only one property located on Shinn Road and the demand is too high for one property, unless water is drawn for cattle watering. Therefore, the demand in the model may be overstated, which is further exaggerated by doubling the flows to represent future conditions. In summary, the replacement of the existing main with a larger diameter main may not be required.

Regarding water age in the water supply system, this is heavily influenced by the water age of the source water. The system is fed either directly or indirectly (via the Pioneer tank) from the Pioneer booster station, which is ultimately fed from the CWRWS water treatment plant; therefore, the biggest factor on water age is the time taken for water to reach the booster station from the plant. Within the Poison Spider system, water age will be affected by where water is used and the presence of dead ends. A small demand at the end of a dead end usually leads to an increase in water age. By extending the existing 8-inch diameter along Poison Spider Road, a dead end at Poison Spider School is eliminated, so slightly reducing water age at this point. The water age in general will decrease as demands increase in the future.

To primarily provide robustness to the water supply system and to secondarily eliminate future pressure problems, it is recommended that following improvements are made to the water supply system as a minimum:

- Install an 8-inch diameter main on Poison Spider Road, from the existing 8-inch diameter main at Poison Spider School to the westernmost point of the existing 2-inch diameter main on Poison Spider Road (approximately 1.25 miles, or 6,600 ft). If required, install a new meter downstream of Poison Spider School on the new main for billing purposes.
• Install an 8-inch diameter main on 12-Mile Road, from the existing 8-inch diameter main at Shinn Road to the existing 3-inch diameter main on Bessemer Bend Road (approximately 2 miles, or 10,560 ft). Tie the 1.5-inch diameter in Shinn Road into the new main and abandon the 1.5-inch diameter main from Bessemer Bend to 12-Mile Road.

• With installation of the new main on Poison Spider Road, removed the existing PSV located on the existing 8-inch diameter main east of Bessemer Bend Road.

The following improvements are recommended as additional to the above improvements if certain goals are adopted by Poison Spider:

• Install an 8-inch diameter main on Bessemer Bend Road, from the proposed 8-inch diameter main on 12-Mile Road to the existing 8-inch diameter main on High Lane (approximately 2,500 ft). This would ensure that the capacity of the main on High Lane is not restricted by being supplied by a smaller diameter main. Install a new PRV on the new main, setting to be approximately 65 psi.

• Install an 8-inch diameter main on Bessemer Bend Road, from the existing 8-inch diameter main north, turning west onto Phillips Lane and then turning north to connect into the new 8-inch diameter main on Poison Spider Road (approximately 8,500 ft). This would ensure that the alternate supply route into the system will be the same size as the current supply route on 12-Mile Road over its entire length. Install a new PRV downstream of its connection to the Poison Spider Road main, setting to be the same as the existing PRV located on 12-Mile Road.

• Install a new PRV immediately upstream of Poison Spider School, setting to be approximately 100 psi. This would ensure that the maximum pressure in the system does not exceed approximately 100 psi when the existing main on Poison Spider Road is extended west and connected into the system.

• Install a new main on Shinn Road. The size is to be determined by the amount of growth expected to occur along the road.
NOTE:
THE PLAN & PROFILES ARE SHOWN FOR GENERAL PURPOSES ONLY.
THESE DRAWINGS ARE FOR ESTIMATING PURPOSES ONLY AND DO
NOT REFLECT THE ACTUAL LOCATION OF THE PROPOSED WATER MAIN.

NOTE:
RELOCATE EXISTING WATER METER
TO NEW WATER MAIN (TYPICAL).
NOTE: RELOCATE EXISTING WATER METER TO NEW WATER MAIN (TYPICAL).

NOTE: THE PLAN & PROFILES ARE SHOWN FOR GENERAL PURPOSES ONLY. THESE DRAWINGS ARE FOR ESTIMATING PURPOSES ONLY AND DO NOT REFLECT THE ACTUAL LOCATION OF THE PROPOSED WATER MAIN.

NEW 8" WATER MAIN

INSTALL AIR VAC VALVE

EXIST 1" WATER MAIN

NOTE: RELOCATE EXISTING WATER METER TO NEW WATER MAIN (TYPICAL).

INSTALL 2,500 L.F. 8" PVC WATER MAIN

PROPOSED 8" WATER MAIN

NOTE: RELOCATE EXISTING WATER METER TO NEW WATER MAIN (TYPICAL).
NOTE:
The plan & profiles are shown for general purposes only. These drawings are for estimating purposes only and do not reflect the actual location of the proposed water main.

NOTE:
Relocate existing water meter to new water main (typical).

Install 2,500 L.F. 8" PVC water main.
NOTE: THE PLAN & PROFILES ARE SHOWN FOR GENERAL PURPOSES ONLY. THESE DRAWINGS ARE FOR ESTIMATING PURPOSES ONLY AND DO NOT REFLECT THE ACTUAL LOCATION OF THE PROPOSED WATER MAIN.

NOTE: RELOCATE EXISTING WATER METER TO NEW WATER MAIN (TYPICAL).
NOTE: THE PLAN & PROFILES ARE SHOWN FOR GENERAL PURPOSES ONLY.
THESE DRAWINGS ARE FOR ESTIMATING PURPOSES ONLY AND DO NOT REFLECT THE ACTUAL LOCATION OF THE PROPOSED WATER MAIN.

NOTE: RELOCATE EXISTING WATER METER TO NEW WATER MAIN (TYPICAL).
PROPOSED 8" WATER MAIN

INSTALL 8" GATE VALVE

INSTALL 3" GATE VALVE

POISON SPIDER CREEK

INSTALL 2,500 L.F. - 8" PVC WATER MAIN

NOTE:
THE PLAN & PROFILES ARE SHOWN FOR GENERAL PURPOSES ONLY.
THESE DRAWINGS ARE FOR ESTIMATING PURPOSES ONLY AND DO NOT REFLECT THE ACTUAL LOCATION OF THE PROPOSED WATER MAIN.

NOTE:
RELOCATE EXISTING WATER METER TO NEW WATER MAIN (TYPICAL).

INSTALL 3" WATER MAIN

INSTALL 8" GATE VALVE

POISON SPIDER CREEK CROSSING

INSTALL 8" GATE VALVE

INSTALL 8" GATE VALVE

PROVIDE DIRECTIONAL BORE AT CREEK CROSSING
NOTE: THE PLAN & PROFILES ARE SHOWN FOR GENERAL PURPOSES ONLY. THESE DRAWINGS ARE FOR ESTIMATING PURPOSES ONLY AND DO NOT REFLECT THE ACTUAL LOCATION OF THE PROPOSED WATER MAIN.

NOTE: RELOCATE EXISTING WATER METER TO NEW WATER MAIN (TYPICAL).
NOTE:
The plan & profiles are shown for general purposes only. These drawings are for estimating purposes only and do not reflect the actual location of the proposed water main.

NOTE:
Relocate existing water meter to new water main (typical).

Install 3" gate valve
Install 8" gate valve
Install 3' proposed connection
Install air vac valve
Install 8" water main

12 MILE ROAD
PROPOSED 8" WATER MAIN

NOTE:
The plan & profiles are shown for general purposes only. These drawings are for estimating purposes only and do not reflect the actual location of the proposed water main.

NOTE:
Relocate existing water meter to new water main (typical).

Install 3,500 L.F. 8" PVC water main

Install air vac valve
NOTE:
The plan & profiles are shown for general purposes only. These drawings are for estimating purposes only and do not reflect the actual location of the proposed water main.

NOTE:
Relocate existing water meter to new water main (typical).

INSTALL 2,500 L.F. - 8" PVC WATER MAIN

MATCH LINE STATION - 100+00

DIRECTIONAL BORE UNDER CREEK

EMIGRANT TRAIL

IRON CREEK

BESSEMER BEND ROAD

INSTALL AIR VAC VALVE

PROPOSED 8" WATER MAIN

PROPOSED 8" WATER MAIN
NOTE: THE PLAN & PROFILES ARE SHOWN FOR GENERAL PURPOSES ONLY. THESE DRAWINGS ARE FOR ESTIMATING PURPOSES ONLY AND DO NOT REFLECT THE ACTUAL LOCATION OF THE PROPOSED WATER MAIN.

NOTE: RELOCATE EXISTING WATER METER TO NEW WATER MAIN (TYPICAL).

INSTALL 1,816.5 L.F. - 8" PVC WATER MAIN

INSTALL AIR VAC VALVE

EXISTING 3" WATER MAIN

EXISTING 4" WATER MAIN

PROPOSED 8" WATER MAIN

INSTALL 8" GATE VALVE

CONNECT TO EXISTING 8" WATER MAIN

INSTALL 4" GATE VALVE ON EXISTING LINE

EXISTING 3" WATER MAIN

EXISTING 4" WATER MAIN

PROPOSED 8" WATER MAIN

INSTALL AIR VAC VALVE
NOTE: THE PLAN & PROFILES ARE SHOWN FOR GENERAL PURPOSES ONLY. THESE DRAWINGS ARE FOR ESTIMATING PURPOSES ONLY AND DO NOT REFLECT THE ACTUAL LOCATION OF THE PROPOSED WATER MAIN.

NOTE: RELOCATE EXISTING WATER METER TO NEW WATER MAIN (TYPICAL).
NOTE: THE PLAN & PROFILES ARE SHOWN FOR GENERAL PURPOSES ONLY. THESE DRAWINGS ARE FOR ESTIMATING PURPOSES ONLY AND DO NOT REFLECT THE ACTUAL LOCATION OF THE PROPOSED WATER MAIN.

NOTE: RELOCATE EXISTING WATER METER TO NEW WATER MAIN (TYPICAL).
APPENDIX D – ENVIRONMENTAL ASSESSMENT REPORT
ENVIRONMENTAL ASSESSMENT

FOR

POISON SPIDER PIPELINES LEVEL II
FEASIBILITY STUDY

NATRONA COUNTY
WYOMING
ENVIRONMENTAL ASSESSMENT

SUMMARY

PROJECT IDENTIFICATION

Applicant: Poison Spider Improvement and Service District
Address: 4420 South 12 Mile Road, Casper, WY 82604
Project: Poison Spider Pipelines Water Project

CONTACT PERSON

Bill Kossert
4420 South 12 Mile Road, Casper, WY 82604
Ph: 307-234-4003

ABSTRACT

The Poison Spider Improvement and Service District is located approximately 8 miles west of the Town of Mills, Wyoming, and 10 miles west of the City of Casper. The District’s water system currently provides water to 45 customers. The current water supply for the District residents is provided through a wholesale agreement with the Central Wyoming Regional Water System (CWRWS). The District’s existing water system was constructed in the late 1960s and is 40 years old. The system is undersized in some areas and needs to be upgraded. In addition, there are approximately 25 properties in the 12 Mile Road area of the District that are not served by the water system. These properties are served by private wells that in many cases are poor in quality and capacity. The District would like to replace some of the old pipelines in the District, and to construct a new water system to serve the residents in the 12 Mile road area. All of the new water lines would be constructed within existing county road rights-of-ways to the extent possible.

The proposed water supply project should not have any adverse impacts on the planning area with proposed mitigation measures. Several issues were raised during the planning stages, including: (1) erosion control and re-vegetation of areas disturbed during construction; (2) impacts on wildlife; (3) impacts on wetlands; (4) impacts on archeological or historic sites; and (5) impacts on threatened or endangered species.

COMMENT PERIOD

In conformance with the requirements of the National Environmental Policy Act and Wyoming Environmental Review Process, this Finding of No Significant Impact (FONSI) will be subject to
a 30-day public review period. The FONSI will be distributed to interested persons and agencies for their review. The FONSI will be available for public review at the Wyoming Department of Environmental Quality/Water Quality Division, 122 West 25th Street, Herschler Building, Cheyenne, Wyoming. All comments received will be given due consideration. Comments should be directed to:

Brian Mark, SRF Program Principal
Water Quality Division
122 West 25th Street
Herschler Building, 4W
Cheyenne, WY 82002
Tel: 307-777-5973; Fax: 307-777-5973
E-mail: bmark@wyo.gov

SECTION 1 – PURPOSE AND NEED FOR ACTION

This section of the Environmental Assessment Report (Report) identifies the purpose and the need for the water supply project.

PROJECT PURPOSE AND NEED

The Poison Spider Improvement and Service District (District) is located west of Casper, Wyoming, in Natrona County, see Figure 1. The District constructed a rural water supply system in the late 1960s. The water system was originally supplied by a shallow alluvial well, however the well silted up and was abandoned. The District now receives its water supply from the Central Wyoming Regional Water System (CWRWS). The water delivery system is 40 years old and has not been improved. Portions of the system are undersized and need to be upgraded. In addition, many new homes have been constructed in the District in the 12 Mile Road area. The new homes are not served by the District’s water system, but have private wells. Many of the wells are poor in quality and capacity. The purpose of the project is to replace some of the troublesome older and undersized water lines and to extend the existing system to serve the new residents in the 12 Mile Road area. A map of the planned improvements is provided in
Figure 4-1. The proposed water system improvements will provide a more reliable and functional water system for all the District customers.

DECISIONS TO BE MADE/SPECIAL APPROPRIATION GRANT

The decision to be made is to select an alternative in this document for improving the Districts water supply system and to serve approximately 23 new properties, including the “No Action” alternative, where no improvements would be provided. The decision will take into consideration the analysis of environmental effects. The decision will also take into consideration comments, suggestions, and recommendations brought forward during the public and agency scoping process, as well as any requirements by other federal agencies that have jurisdiction over the project. The project will require a NPDES permit for ground disturbance activities and a Section 404 permit for wetland/waters of the U.S.

SECTION 2 – ALTERNATIVES

This section of the Report defines the alternatives and further describes the preferred alternative.

ALTERNATIVE 1 – NO ACTION ALTERNATIVE

The “No Alternative” is not acceptable because the residents of the Poison Spider Improvement and Service District will experience ever increasing maintenance costs for the existing system, and residents on poor quality wells will be faced with a poor quality and inadequate groundwater supply that could jeopardize their health and safety.

ALTERNATIVE 2 – UPGRADE EXISTING WATER SYSTEM

The preferred alternative for the District is to make improvements to the aging water system and to extend the system to serve the residents in the 12 Mile Road area.

DETAILED DESCRIPTION OF PREFERRED ALTERNATIVE

The conceptual design of the proposed water system improvements for Poison Spider Improvement and Service District is given in Figure 4-1 of the Level II Report, and attached to this Report. The goal of the conceptual design is to replace troublesome undersized water mains and extend the water system to the 12 Mile Road area. The new water lines would be located and
aligned such that every property in the area has access to a water main. Some of the significant design elements and features of the conceptual design are highlighted below:

- A new 8-inch pipeline will be constructed in the northwestern portion of the District to replace the existing 2-1/2 inch pipeline. The pipeline will be aligned to follow existing roadways, even though the roadways are privately owned. The existing water meters will need to be relocated to the new pipeline and the services extended to the old meter pit location. A flushing hydrant will be located at the end of the 8-inch pipeline to allow for routine flushing and maintenance. Easements will be needed for the portions of the new pipeline that is not located in the existing water line easements.
- A new 8-inch transmission pipeline will be constructed along 12 Mile Road to serve the 12 Mile Road area residents. The line will be extended from the existing CWRWS pipeline southward to Bessemer Bend Road and then eastward to connect to the existing 8-inch pipeline located in Rasmus Lee Road.
- A new 6-inch pipeline is planned to be constructed through the existing subdivision to replace the existing 1-1/4 inch pipelines which currently serve the homes in the area. A flushing hydrant will be placed on the end of the pipeline to allow for occasional flushing and maintenance. The existing water meter pits will need to be relocated on to the new pipeline. The pipeline will be located in the existing pipeline easements.
- A new 6-inch pipeline is planned to be constructed eastward from the 12 Mile Road pipeline along Dusty Lane to serve an estimated 8 properties in the Dusty Lane area. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Up to 8 new meter pits will be constructed at the property lines to serve the residents. Easements will be needed for all portions of the proposed pipeline.
- A new 6-inch pipeline is planned to be constructed eastward from the 12 Mile Road pipeline along Tuffy Road and then southward to serve an estimated 11 properties in the Dusty Road area. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Up to 11 new meters would be installed at the property line to serve the properties. Easements will be needed for all portions of the pipeline.
• A new 3-inch water line would be constructed eastward from the pipeline in 12 Mile Road at about the mid section line of section 34 to serve an estimated 3 properties. A flushing hydrant will be installed at the end of the pipeline to allow for occasional flushing and maintenance. Up to 3 water meter pits would be installed to serve the properties. Easements will be needed for all portions of the pipeline.

• A new 2-inch water main would be constructed westward along County Road 313, from the pipeline in 12 Mile Road to serve 2 properties. A flushing hydrant would be installed at the end of the water line. Two new water meter pits would be installed to serve the residents. No easements would be required for this pipeline because it will be located within the county road right-of-way.

• Two new pressure reducing valve vaults will be installed to regulate the pressures in the southern portions of the District. One PRV vault would be located on the southern end of the new pipeline in 12 Mile Road. The other PRV vault would be located on the 3-inch existing pipeline near the southern end of the pipeline.

• The existing pressure sustaining valve located at the connection of the 8-inch CWRWS pipeline and the existing 3-inch pipeline will be deactivated and taken out of service. The existing air-vacuum release valves will be kept in service.

• A few new gate valves will be installed in existing pipelines to replace old valves that are no longer operable.

• Air-vacuum release valves will be installed at the tops of hills to relieve the air that can build up in the pipeline and reduce capacity.

• Flushing hydrants will also be installed at locations along the 12 Mile Road pipeline that are favorable for flushing the water lines for maintenance.

• Isolation valves are located to minimize service disruptions during maintenance.

• All areas along the graveled roadways that are disturbed by construction will be re-graveled and restored to pre-existing condition.

• All areas within the easements for water lines across private property will be seeded and returned to pre-existing condition to satisfy the property owner.

• New water meters will be located in buried “meter pits” that will be located in public rights-of-way or easements dedicated to the District, and as close to the property lines as
possible. A radio read meter system will be provided to allow efficient meter reading for the District operator.

- Existing water meter pits will be converted to a radio read system. The old meters will be replaced with new meters and the meter pit lid replaced with a lid and transmitter as required for the radio read system.
- The water line alignments should avoid the need for any disturbance of wetlands.

SECTION 3 - IMPACTS AND MITIGATION

This section of the Report identifies the impacts, the environmental issues, and permits associated with construction of the water supply system for the District.

ISSUE SUMMARY

The proposed water supply project should not have any significant adverse impacts on the planning area with proposed mitigation measures. Several issues were raised during the planning stages. These issues included: (1) erosion control and re-vegetation of areas disturbed during construction; (2) impacts on wildlife; (3) impacts on wetlands; (4) impacts on archeological or historic sites; and (5) impacts on threatened or endangered species.

POPULATION, LAND USE AND GROWTH

The current population estimate for the District area was made using house counts. Recent Natrona County census data indicate the average household in the county has 3.2 people. The District currently has about 75 property owners, which equates to a population of approximately 240. The District has thousands of acres of ranch and farm lands which could some day be developed into smaller parcels.

Historically, the population in Natrona County has grown at an annual rate of 1 to 1.5%. Over a 50-year period, the 1% annual growth equates to a multiple of 1.65 which if applied to the current population would result in a year 2060 population of 396. An annual growth rate of 1.5% equates to a multiple of 2.1, which if applied to the current population would equate to a 2060 population of 504.
Because there are so many large parcels in the District, there will be many opportunities in the future for development and subdivisions of the land. Conversations with the District board indicate knowledge of areas which could be sold and developed in the near future, particularly if domestic water is available. There are prime development lands in the Shinn Road area, and the areas along the southern portions of Bessemer Bend Road. For the purpose of this study, and at the Boards urging, the study used a growth rate that would equate to a tripling of the District population by 2060, or a projected population of 730. The growth rate for a tripling of the population is about 2.25%.

ENVIRONMENTAL ISSUES

The following section summarizes the responses received from the state and federal agencies regarding the proposed project.

The U.S. Department of Agriculture, Natural Resources Conservation Service, responded that “Based on the information provided, we believe your project will not adversely impact important agricultural lands, since there will be no apparent conversion of lands from agricultural use to non-agricultural use. However, we would recommend prompt re-vegetation of the disturbed areas to minimize soil erosion and weed control”, (see response at end of this report).

The U.S. Army Corps of Engineers determined that some water lines may cross wetlands created by the seasonal irrigation practices. They requested that an on-site wetland delineation be conducted to determine if there are wetlands in the project area subject to regulation and to establish exact locations and boundaries of wetlands and other waters of the U.S. The Corps stated that if the impacts created by the planned activities do not exceed the criteria listed under the nationwide permit, the project would qualify for authorization under the Nationwide Permit 12, which authorizes “Utility Line Activities”.

The Wyoming State Historic and Preservation Office (SHPO) stated that “A search of our records shows that a cultural resource survey has not been conducted for the area of potential effect (APE). Additionally, cultural resources are known to exist in the APE”. They recommend that the EPA carry out appropriate efforts necessary for identification of historic properties,
which may include a file search, background research, consultation, consideration of visual effects, sample field investigations or field survey. A report will need to be submitted to SHPO for review and comment (see response at the end of the report).

The U.S. Fish and Wildlife Service (FWS) stated that “Based on the information provided in your letter, it is unlikely that the proposed work will adversely affect any threatened or endangered species or migratory birds. You may consider this project as proposed, to be in compliance with the Endangered Species Act of 1973, as amended (Act), 16 U.S.C. 1531 et seq. and the Migratory Bird Treaty Act, 16 U.S.C. 703” (see response at the end of the report).

The Office of Homeland Security states that if any portions of the proposed project be located within designated Special Flood Hazard Areas (SFHAs) for the county, the project will need to conform to the Flood Damage Prevention Regulations adopted by the county.

The Wyoming Department of Environmental Quality, Air Quality Division states that they do not anticipate adverse air quality impacts with the possible exception of dust problems during site preparation. Environmental planning for the construction phase should include effective dust control procedures that will ensure compliance with the Wyoming Air Quality Standards and Regulations. Dust control measures may include frequent watering and/or chemical stabilization, (see response at the end of the report).

The Wyoming State Engineers Office reported that the new area to be served in the 12 Mile Road area will need to be added to the recognized CWRWS service area. (see response at the end of the report).

**PERMITS**

The project will require a National Pollution Discharge Elimination System (NPDES) permit prior to any ground disturbance activities and a Section 404 permit from the Army Corps of Engineers prior to any impacts to wetlands or other waters of the U.S.
UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts will include minor, short term increases in noise and ambient air particulate levels and increased traffic in the immediate vicinity of the construction activities. These impacts will be minor and short term in nature, and mitigated to the extent possible by including proper construction practices in the project specifications.

Construction of the project will result in the commitment of resources including capital, manpower and materials.

SECTION 4 – MITIGATION SUMMARY

After an evaluation of anticipated impacts of construction and operation of the proposed facilities, the following mitigation alternatives and recommendations were selected to minimize or eliminate these impacts.

(1) The applicant agrees to perform: a) routine mitigation techniques for limiting direct runoff from disturbed areas and dewatering devices, including berms, sediment traps, silt fences, water checks, etc. which will be effective in limiting possible erosion and sediment discharge; b) implement dust control measures at the access roads and construction sites; c) re-establish vegetation which was disturbed in accordance with local land use type.

(2) The applicant will demonstrate to the satisfaction of the Administrator that it has, or will have a fee simple or such other estate or interest in the site of the project, including necessary easements and rights-of-way, as the Administrator finds sufficient to assure undisturbed use and possession for the purpose of construction and operation for the estimated life of the project. This demonstration must be completed satisfactorily prior to start of any construction.

SECTION 5 – COMMENTS AND COORDINATION

This section of the Report addresses final comments and coordination efforts.
PREPARERS OF THE ENVIRONMENTAL ASSESSMENT
This Environmental Assessment was prepared by Barry Venn, PE, 609 Consulting, LLC. 5830 E. 2nd Street, Casper, WY 82609.

PUBLIC PARTICIPATION
Public participation activities included newsletters and public meetings. The primary function of the newsletters were to notify the property owners of the status of the study, present important issues facing property owners and provide scheduling of public meetings.

Two public meetings were held during the course of the study. The meetings were well attended with an average attendance of over 50 percent of the residents at each meeting. At each meeting, representatives of the WWDC and the consultant made presentations and answered questions. The purpose of the meetings was to allow the public the opportunity to hear about the study, and to provide input about issues, interests, and the direction the study should take.

AGENCY COORDINATION AND CONSULTATION
The following agencies were contacted/consulted in the development of the Environmental Assessment:

- U.S. Army Corps of Engineers
- U.S. Department of Agriculture, NRCS
- U.S. Department of the Interior, Fish and Wildlife Service
- Wyoming Department of Environmental Quality, Air Quality Division
- Wyoming Game and Fish Department
- Wyoming Office of Homeland Security
- Wyoming State Historic Preservation Office

Responses from each of the agencies are included at the end of this report.
May 11, 2010

Mr. Barry Venn, PE
609 Consulting, LLC
5830 East 2nd Street
Casper, WY 82609

Re: Environmental Review Request for Poison Spider Pipelines Improvement Project
Natrona County

Dear Mr. Venn:

In an April 21, 2010 letter, 609 Consulting, LLC requested an environmental review for the above referenced project as it relates to Wyoming Air Quality Standards and Regulations (WAQSR.) As presented in the letter, the Wyoming Water Development Commission is funding a feasibility study for proposed improvements and expansion to the existing Poison Spider Improvement and Service District rural water distribution system west of Casper in Natrona County, Wyoming.

For pipeline construction activities, the Air Quality Division (Division) does not anticipate any adverse air quality impacts with the possible exception of dust problems during site preparation and construction. Fugitive emissions requirements can be found in WAQSR Chapter 3 § 2 (f). Environmental planning should include effective dust control procedures that will ensure compliance with WAQSR. Dust control measures may include frequent watering and/or chemical stabilization.

For questions regarding the contents of this correspondence, please contact the Division's Casper Field Office at (307)473-3470 or 3455.

Sincerely,

Chris Hanify
Air Quality District Engineer

cc: file
Bob Gill, Acting Air Quality Administrator, Cheyenne
Linda Dewitt, Asbestos Program Coordinator
Air Quality - Cheyenne
May 11, 2010

Wyoming Regulatory Office

Barry Venn
609 Consulting
5830 East Second Street
Casper, Wyoming 82609

Dear Mr. Venn:

This letter is in response to your request dated April 21, 2010, for Department of the Army review of the Poison Spider Pipelines Improvement Project. The proposed work will be located in various sections of Townships 32 and 33 North, Range 81 West, Natrona County, Wyoming.


The proposed work includes the replacement of some existing water delivery lines and the installation of new lines to extend the water district's service area. We have reviewed the information submitted with your request and determined that the newly installed lines will cross several waters of the United States. Therefore, any discharge of dredged or fill material to these streams associated with water line installation will require a Department of the Army permit.

We have also identified several possible cultural resource issues associated with the project. From the information provided, it appears that the new lines will cross two historic routes of the Emigrant Trail. We have also determined that the Bessemer Bend Bridge, a structure listed on the National Register of Historic Places, is in the general project area. It is probable that the lead federal agency on this project will need to consult with the State Historic Preservation Office, under Section 106 of the National Historic Preservation Act, on potential project impacts to these resources prior to the initiation of construction.
The Mormon-Pioneer National Historic Trail passes through or near the project area. We suggest you consider contacting the appropriate office of the National Park Service, the managing agency, to assess possible project impacts to the trail.

If you have any questions, please contact Dennis Blinkhorn at (307)772-2300 and reference file number NWO-2010-00983.

Sincerely,

Matthew A. Bilodeau
Program Manager
Wyoming Regulatory Office
May 11, 2010

Barry Venn, P.E.
609 Consulting, LLC
5830 East 2nd St.
Casper, WY 82609

RE: Compliance with Federal Authorities – Poison Spider Pipelines Improvement Project

Dear Mr. Venn:

Thank you for the opportunity to provide comment relative to the proposed project. The Wyoming State Engineer’s Office provides the following comments relative to the water rights which authorize water to be supplied to the Poison Spider Improvement and Service District, (District).

The District is supplied water from the Central Wyoming Regional Water System under various water rights using numerous surface and ground water sources, and the District is located within the recognized Service Area of the Regional Water System. According to the map provided, it appears that a small portion of the project, particularly those areas in which new service connections would ultimately be created in Sections 27, 28, 33, and 34, are not currently authorized to receive water from the Regional Water System.

While this agency has allowed municipalities and service and improvement districts to modify or expand their Service Areas at their discretion, if new service connections are created within the Sections described above, a new Service Area map will ultimately need to be submitted to the State Engineer’s Office by the Regional Water System to recognize their ability to deliver water to the Sections described above under their existing water rights.

This constitutes the body of comment of the State Engineer’s Office relative to the proposed project at this time.

Should you have additional questions regarding this matter, feel free to contact me at 307-777-5063.

Sincerely,

Lisa Lindemann, Administrator
Ground Water Division

Cc: Matt Hoobler, North Platte Coordinator
May 7, 2010

Mr. Barry Venn, PE
609 Consulting LLC
5830 East 2nd Street
Casper, WY 82609

RE: Your Letter dated April 21, 2010, Poison Spider Pipelines Improvement Project

Dear Mr. Venn,

Thank you for your letter requesting comment on the above listed project. With regards to the flood plain management, Natrona County participates in the National Flood Insurance Program (NFIP) and the Federal Emergency Management Agency has published Flood Insurance Rate Maps, which delineate the Special Flood Hazard Areas (SFHAs) for the county. Should the proposed project be located in a SFHA, then the project will need to conform to the Flood Damage Prevention Regulations adopted by the county. Please be advised that implementation of the NFIP construction requirements resides at the local governmental level through enforcement of the local Flood Damage Prevention Regulations. The proposed project will need to be coordinated and permitted with the county and not by our office. Your point of contact is:

Ms. Trish Chavez
Natrona County Planning Office
120 West 1st Street, Suite 200
Casper, WY 82601

Sincerely,

Kim Johnson
Wyoming State Coordinator
National Flood Insurance Program

Larry Majerus
Deputy Director

Angela VanHouten
Bioterrorism Program Manager
(307) 777-5778

Kelly Ruiz
Public Information Officer
(307) 777-4909
609 Consulting, LLC  
Attn: Barry Venn, PE  
5830 East 2nd Street  
Casper, WY 82609

Dear Mr. Venn:

The Natural Resources Conservation Service (NRCS) has reviewed the proposal for the Poison Spider Pipelines Improvement Project dated April 21, 2010.

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

It does not appear there will be any permanent conversion of irrigated agricultural land to non-agricultural use based on the information you provided. As such, we do not believe the work will adversely impact prime farmland. However, if you feel your project will, in fact, convert farmland to non-agricultural use, further review may be necessary. We do recommend prompt re-vegetation of the disturbed areas to minimize soil erosion and weed encroachment. If you need assistance developing a seeding plan or would like a review of an existing seeding plan to ensure suitability for the soil types impacted, feel free to contact the local NRCS office in Casper. A good point of contact would be Mary Schrader, the District Conservationist, at (307) 261-5436 extension 113.

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

Sincerely,

J. XAVIER MONTOYA  
State Conservationist

Cc: Mary Schrader, District Conservationist, Casper Field Office  
    Tom Watson, Area Conservationist, Douglas Area Office
May 3, 2010

Barry Venn, PE
609 Consulting, LLC
5830 East 2nd Street
Casper, WY 82609

re: Wyoming State Revolving Fund, Poison Spider Pipelines Improvement Project (SHPO File # 0510RLC001)

Dear Mr. Venn:

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

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

We have enclosed a copy of a cultural resource consultants list for your use. Please refer to SHPO project control number #0510RLC001 on any future correspondence dealing with this project. If you have any questions, please contact me at 307-777-5497.

Sincerely,

Richard L. Currit
Senior Archaeologist
The Wyoming State Historic Preservation Office (SHPO) does not permit or license consultants and makes no endorsement of any particular consultant.

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Dear Mr. Venn:

Thank you for your letter of April 21, 2010, received in our office on April 23, regarding the Level II Feasibility Study for the Poison Spider Pipelines Improvements Project (Project). This Project will upgrade old and undersized water pipelines in the existing water system that is located in Natrona County.

You have requested information regarding species listed under the Endangered Species Act of 1973, as amended (Act), 16 U.S.C. 1531 et seq. In response to your request, the U.S. Fish and Wildlife Service (Service) is providing you with recommendations for protective measures for threatened and endangered species in accordance with the Act. We are also providing recommendations concerning migratory birds in accordance with the Migratory Bird Treaty Act (MBTA), 16 U.S.C. 703, and the Bald and Golden Eagle Protection Act (BGEPA), 16 U.S.C. 668. Wetlands are afforded protection under Executive Orders 11990 (wetland protection) and 11988 (floodplain management), as well as section 404 of the Clean Water Act. Other fish and wildlife resources are considered under the Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq., and the Fish and Wildlife Act of 1956, as amended, 16 U.S.C. 742a-742j.

In accordance with Section 7(c) of the Act, we have determined that the following species or their designated habitat may be present in the proposed project area. We would appreciate receiving information as to the current status of each of these species within the proposed project area.
### Listed, Proposed, Candidate Species and their Designated and Proposed Critical Habitat that may be in the proposed Project Area

<table>
<thead>
<tr>
<th>Species/Critical Habitat</th>
<th>Scientific Name</th>
<th>Status</th>
<th>Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black-footed Ferret</td>
<td><em>Mustela nigripes</em></td>
<td>Endangered</td>
<td>Prairie dog towns</td>
</tr>
<tr>
<td>Greater Sage-Grouse</td>
<td><em>Centrocercus urophasianus</em></td>
<td>Candidate</td>
<td>Sagebrush habitats</td>
</tr>
<tr>
<td>Platte River Species</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Interior Least Tern,</td>
<td><em>Sternula antillarum</em></td>
<td>Endangered</td>
<td>Downstream riverine habitat of the Platte River system*</td>
</tr>
<tr>
<td>Pallid Sturgeon,</td>
<td><em>Scaphirhynchus albus</em></td>
<td>Endangered</td>
<td></td>
</tr>
<tr>
<td>Piping Plover,</td>
<td><em>Charadrius melodus</em></td>
<td>Threatened</td>
<td></td>
</tr>
<tr>
<td>Western Prairie Fringed Orchid,</td>
<td><em>Platanthera praecilae</em></td>
<td>Threatened</td>
<td></td>
</tr>
<tr>
<td>Whooping Crane)</td>
<td><em>Grus americana</em></td>
<td>Endangered</td>
<td></td>
</tr>
<tr>
<td>Platte River Species</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Critical Habitat</td>
<td>Designated for whooping crane in Nebraska in riverine habitat of the Platte River system (see 50 CFR 17.95(b))*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ute Ladies’-tresses</td>
<td><em>Spiranthes diluvialis</em></td>
<td>Threatened</td>
<td>Seasonally moist soils and wet meadows of drainages below 7,000 ft. elevation</td>
</tr>
</tbody>
</table>

**Black-footed ferret:** Black-footed ferrets (*Mustela nigripes*) may be affected if prairie dog towns are impacted. Please be aware that black-footed ferret surveys are no longer recommended in black-tailed prairie dog towns statewide. If white-tailed prairie dog towns or complexes greater than 200 acres will be disturbed, please contact our office to determine if surveys for ferrets are recommended. Surveys may be recommended even if only a portion of the white-tailed prairie dog town or complex will be impacted. According to the Black-Footed Ferret Survey Guidelines, a prairie dog complex consists of two or more neighboring prairie dog towns less than 7 km (4.3 miles) from each other. We encourage project proponents to protect all prairie dog towns or complexes for their value to the prairie ecosystem and the many species that rely on them. We further encourage you to analyze potentially disturbed prairie dog towns for their value to future black-footed ferret reintroduction.

**Greater sage-grouse:** The greater sage (*Centrocercus urophasianus*) is a candidate for listing under the Endangered Species Act (75 FR 13910). Greater sage-grouse are dependent on sagebrush habitats year-round. Habitat loss and degradation, as well as loss of population connectivity have been identified as important factors contributing to the decline of greater sage-grouse populations rangewide (Braun 1998, Wisdom et al. 2002). Therefore, any activities that result in loss or degradation of sagebrush habitats that are important to this species should be closely evaluated for their impacts to sage-grouse. If important breeding habitat (leks, nesting or
brood rearing habitat) is present in the project area, the Service recommends no project-related disturbance March 15 through June 30, annually. Minimization of disturbance during lek activity, nesting, and brood rearing is critical to sage-grouse persistence within these areas. Likewise, if important winter habitats are present, we recommend no project-related disturbance November 15 through March 14.

We recommend you contact the Wyoming Game and Fish Department to identify important greater sage-grouse habitats within the project area, and appropriate mitigative measures to minimize potential impacts from the proposed project. The State of Wyoming has adopted a “Core Population Area Strategy” to ensure greater sage-grouse conservation. We encourage planners to fully implement the State of Wyoming’s protective measures for the Core Sage-Grouse Population Areas.

The Service recommends surveys and mapping of important greater sage-grouse habitats where local information is not available. The results of these surveys should be used in project planning, to minimize potential impacts to this species. No project activities that may exacerbate habitat loss or degradation should be permitted in important habitats.

**Platte River Species:** If the proposed action may lead to consumptive use of water or have the potential to affect water quality in the Platte River System, there may be impacts to threatened and endangered species inhabiting the downstream reaches of this river system. For more information on how to seek ESA coverage for water-related activities through the Platte River Recovery Implementation Program, please visit our web site at: [http://www.fws.gov/platteriver](http://www.fws.gov/platteriver).

**Ute ladies'-tresses:** Ute ladies'-tresses (*Spiranthes diluvialis*) is a perennial, terrestrial orchid, 8 to 20 inches tall, with white or ivory flowers clustered into a spike arrangement at the top of the stem. *S. diluvialis* typically blooms from late July through August; however, depending on location and climatic conditions, it may bloom in early July or still be in flower as late as early October. *S. diluvialis* is endemic to moist soils near wetland meadows, springs, lakes, and perennial streams where it colonizes early successional point bars or sandy edges. The elevation range of known occurrences is 4,200 to 7,000 feet (although no known populations in Wyoming occur above 5,500 feet) in alluvial substrates along riparian edges, gravel bars, old oxbows, and moist to wet meadows. Soils where *S. diluvialis* have been found typically range from fine silt/sand, to gravels and cobbles, as well as to highly organic and peaty soil types. *S. diluvialis* is not found in heavy or tight clay soils or in extremely saline or alkaline soils. *S. diluvialis* seems intolerant of shade and small scattered groups are found primarily in areas where vegetation is relatively open. Surveys should be conducted by knowledgeable botanists trained in conducting rare plant surveys. *S. diluvialis* is difficult to survey for primarily due to its unpredictability of emergence of flowering parts and subsequent rapid desiccation of specimens. The Service does not maintain a list of "qualified" surveyors but can refer those wishing to become familiar with the orchid to experts who can provide training or services.
Species of Concern

**Black-tailed prairie dog:** The range of the black-tailed prairie dog (*Cynomys ludovicianus*) once spanned the short and mixed grass prairies of North America east of the Rockies from southern Canada to northern Mexico. This species still occurs over much of its historic range, although in more widely scattered large colonies. Black-tailed prairie dogs occur within the eastern third of Wyoming. A population thought to have been intentionally introduced outside of this range also occurs in the Bighorn Basin. We encourage the conservation of prairie dog colonies for their value to the prairie ecosystem and the many species that rely on them. Threats that may be significant to conserving black-tailed prairie dog populations include disease (sylvatic plague) and some control programs (poisoning). Prairie dogs serve as the primary prey species for the black-footed ferret and several raptors, including the golden eagle and ferruginous hawk. Prairie dog colonies and burrows also provide shelter or nest sites for species like the mountain plover and burrowing owl. Because black-tailed prairie dog colonies in Wyoming do not currently support any ferret populations, black-footed ferret surveys are not necessary in their colonies found within Wyoming. However, we do encourage evaluating black-tailed prairie dog colonies for the potential reintroduction of black-footed ferrets.

**Mountain Plover:** The Service has agreed to reopen the comment period in 2010 on the proposed rule to list the mountain plover as a threatened species (67 FR 72396, December 5, 2002) and to complete a new final determination on the proposal by May 1, 2011. Once the comment period is reopened and pending the completion of the new final determination, the mountain plover will be proposed for listing. Section 7(a)(4) of the Act, requires Federal agencies to confer with us on any action that is likely to jeopardize the continued existence of any species proposed for listing. Federal action agencies may also request a conference on any proposed action that may affect a species proposed for listing.

We encourage project planners to develop and implement protective measures should mountain plovers occur within project areas. Measures to protect the mountain plover from further decline may include: (1) avoidance of suitable habitat during the plover nesting season (April 10 through July 10), (2) prohibition of ground disturbing activities in prairie dog towns, and (3) prohibition of any permanent above ground structures that may provide perches for avian predators or deter plovers from using preferred habitat. Suitable habitat for nesting mountain plovers includes grasslands, mixed grassland areas and short-grass prairie, shrub-steppe, plains, alkali flats, agricultural lands, cultivated lands, sod farms, and prairie dog towns. We encourage you to develop protective measures with an assurance of implementation should mountain plovers be found within the project areas.

**White-tailed Prairie Dog:** In May of 2008, the U.S. Fish and Wildlife Service initiated a status review for the white-tailed prairie dog (73 FR 24910). The purpose of the status review is to determine whether the species warrants listing as threatened or endangered under the Endangered Species Act (16 U.S.C. 1531 et seq.). Threats that may be significant to conserving white-tailed prairie dog populations include disease (sylvatic plague) and some control programs (poisoning).
While the white-tailed prairie dog occurs over much of its historic range, colonies are more widely dispersed and population sizes have declined (Keinath 2004, Pauli et al. 2006).

The white-tailed prairie dog inhabits areas across western and central Wyoming, northwest Colorado, northeastern Utah, and a small area in south-central Montana. Wyoming encompasses the majority of the range of the species (Keinath 2004). White-tailed prairie dogs typically inhabit moderately sloped grassland, desert grassland, and shrublands at altitudes between 5,500 to 9,800 feet. We encourage the conservation of prairie dog colonies for their value to the many species that rely on them. Prairie dogs serve as the primary prey species for the black-footed ferret and several raptors, including the golden eagle and ferruginous hawk. Prairie dog colonies and burrows also provide shelter or nest sites for species like the mountain plover and the burrowing owl. Please note we are currently updating our list of black-footed ferret ‘block-cleared areas’—areas of prairie dog colonies for which black-footed ferret surveys are no longer required. For projects affecting white-tailed prairie dog towns, please contact our office for site-specific guidance on the need for ferret surveys.

**Migratory Birds**: The MBTA, enacted in 1918, prohibits the taking of any migratory birds, their parts, nests, or eggs except as permitted by regulations, and does not require intent to be proven. Section 703 of the MBTA states, “Unless and except as permitted by regulations ... it shall be unlawful at any time, by any means or in any manner, to ... take, capture, kill, attempt to take, capture, or kill, or possess ... any migratory bird, any part, nest, or eggs of any such bird...” The BGEPA prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagles or their body parts, nests, or eggs, which includes collection, molestation, disturbance, or killing.

Work that could lead to the take of a migratory bird or eagle, their young, eggs, or nests (for example, if you are going to erect new roads, or power lines in the vicinity of a nest), should be coordinated with our office before any actions are taken.

Removal or destruction of such nests, or causing abandonment of a nest could constitute violation of one or both of the above statutes. Removal of any active migratory bird nest or nest tree is prohibited. For golden eagles, inactive nest permits are limited to activities involving resource extraction or human health and safety. Mitigation, as determined by the local Service field office, may be required for loss of these nests. No permits will be issued for an active nest of any migratory bird species, unless removal of an active nest is necessary for reasons of human health and safety. Therefore, if nesting migratory birds are present on, or near the project area, timing is a significant consideration and needs to be addressed in project planning.

If nest manipulation is proposed for this project, the project proponent should contact the Service’s Migratory Bird Office in Denver at 303-236-8171 to see if a permit can be issued for this project. No nest manipulation is allowed without a permit. If a permit cannot be issued, the project may need to be modified to ensure take of a migratory bird or eagle, their young, eggs or nest will not occur.
Wetlands/Riparian Areas: Wetlands may be impacted by the proposed project. Wetlands perform significant ecological functions which include: (1) providing habitat for numerous aquatic and terrestrial wildlife species, (2) aiding in the dispersal of floods, (3) improving water quality through retention and assimilation of pollutants from storm water runoff, and (4) recharging the aquifer. Wetlands also possess aesthetic and recreational values. If wetlands may be destroyed or degraded by the proposed action, those wetlands in the project area should be inventoried and fully described in terms of their functions and values. Acreage of wetlands, by type, should be disclosed and specific actions should be outlined to avoid, minimize, and compensate for all unavoidable wetland impacts.

Riparian or streamside areas are a valuable natural resource and impacts to these areas should be avoided whenever possible. Riparian areas are the single most productive wildlife habitat type in North America. They support a greater variety of wildlife than any other habitat. Riparian vegetation plays an important role in protecting streams, reducing erosion and sedimentation as well as improving water quality, maintaining the water table, controlling flooding, and providing shade and cover. In view of their importance and relative scarcity, impacts to riparian areas should be avoided. Any potential, unavoidable encroachment into these areas should be further avoided and minimized. Unavoidable impacts to streams should be assessed in terms of their functions and values, linear feet and vegetation type lost, potential effects on wildlife, and potential effects on bank stability and water quality. Measures to compensate for unavoidable losses of riparian areas should be developed and implemented as part of the project.

Plans for mitigating unavoidable impacts to wetland and riparian areas should include mitigation goals and objectives, methodologies, time frames for implementation, success criteria, and monitoring to determine if the mitigation is successful. The mitigation plan should also include a contingency plan to be implemented should the mitigation not be successful. In addition, wetland restoration, creation, enhancement, and/or preservation does not compensate for loss of stream habitat; streams and wetlands have different functions and provide different habitat values for fish and wildlife resources.

Best Management Practices (BMPs) should be implemented within the project area wherever possible. BMPs include, but are not limited to, the following: installation of sediment and erosion control devices (e.g., silt fences, hay bales, temporary sediment control basins, erosion control matting); adequate and continued maintenance of sediment and erosion control devices to insure their effectiveness; minimization of the construction disturbance area to further avoid streams, wetlands, and riparian areas; location of equipment staging, fueling, and maintenance areas outside of wetlands, streams, riparian areas, and floodplains; and re-seeding and re-planting of riparian vegetation native to Wyoming in order to stabilize shorelines and streambanks.

For our internal tracking purposes, the Service would appreciate notification of any decision made on this project (such as issuance of a permit or signing of a Record of Decision or Decision Memo). Notification can be sent in writing to the letterhead address or by electronic mail to FW6_Federal_Activities_Cheyenne@fws.gov.
We appreciate your efforts to ensure the conservation of Wyoming's fish and wildlife resources. If you have questions regarding this letter or your responsibilities under the Act and/or authorities or resources described above, please contact Genevieve Skora of my office at the letterhead address or phone (307) 772-2374, extension 225.

Sincerely,

[Signature]

Brian T. Kelly
Field Supervisor
Wyoming Field Office

cc:
WGFD, Non-game Coordinator, Lander, WY (B. Oakleaf)
WGFD, Non-game Coordinator, Cheyenne, WY (M. Phinney)

Literature Cited


