This is a digital document from the collections of the Wyoming Water Resources Data System (WRDS) Library.

For additional information about this document and the document conversion process, please contact WRDS at wrds@uwyo.edu and include the phrase “Digital Documents” in your subject heading.

To view other documents please visit the WRDS Library online at: http://library.wrds.uwyo.edu

Mailing Address:
Water Resources Data System
University of Wyoming, Dept 3943
1000 E University Avenue
Laramie, WY 82071

Physical Address:
Wyoming Hall, Room 249
University of Wyoming
Laramie, WY 82071

Phone: (307) 766-6651
Fax: (307) 766-3785

Funding for WRDS and the creation of this electronic document was provided by the Wyoming Water Development Commission (http://wwdc.state.wy.us)
EXECUTIVE SUMMARY
Peoples Improvement & Service District
Gillette Regional Connections 2, Level II Study

October 1, 2012

Submitted To: Wyoming Water Development Commission
6920 Yellowtail Road
Cheyenne, WY 82002

Prepared By: WLC Engineering, Surveying & Planning
200 Pronghorn Street
Casper, WY 82601

Weston Engineering, Inc.
1401 Highway 16 E
Upton, WY 82730
EXECUTIVE SUMMARY
Peoples Improvement & Service District
Gillette Regional Connections 2, Level II Study

October, 2012

Submitted To: Wyoming Water Development Commission
6920 Yellowtail Road
Cheyenne, WY 82002

Prepared By: WLC Engineering, Surveying & Planning
200 Pronghorn Street
Casper, WY 82601

Weston Engineering, Inc.
1401 Highway 16 E
Upton, WY 82730

Principal Authors: Shane Porter, P.E.
GILLETTE REGIONAL CONNECTIONS 2
LEVEL II STUDY

EXECUTIVE SUMMARY

October, 2012

PEOPLES IMPROVEMENT AND
SERVICE DISTRICT

PREPARED FOR:
WYOMING WATER DEVELOPMENT
COMMISSION

PREPARED BY:
WLC ENGINEERING, SURVEYING AND
PLANNING

IN CONJUNCTION WITH

WESTON
GROUNDWATER ENGINEERING
1. Introduction and Project Description

The Peoples Improvement and Service District owns and operates a rural water system located just outside the corporate limits of Gillette, Wyoming extending east from the intersection of Highway 50 and Southern Drive.

In August, 2011 The City of Gillette applied to the WWDC for $60,000,000 to assist with funding for the District Extensions to the ongoing Regional Water System Project. The funding consists of a 67% ($40,000,000) grant from the WWDC with a 33% ($20,000,000) local match. The local match is planned to be provided from revenues received though a $20,000,000 Specific Purpose Excise Tax (Capital Facilities Tax) which was approved by the Campbell County Voters on May 3, 2011.

In order to help determine District Connection priorities and further determine estimated costs for the District Extensions, Districts were encouraged to apply for a fully funded WWDC Level II study to perform a more detailed evaluation of a possible regional connection as well as to help identify other possible deficiencies within their water systems.

The Peoples ISD applied to the WWDC for funding to complete a Level II study. In June of 2012, WLC Engineering, Surveying and Planning (WLC) was hired by the WWDC to complete this Level II study. The Peoples ISD is primarily interested in a back-up water source in the event that something happens with their current water supply well, Lucky Harry #1.

The primary focus of this study is to evaluate options for a regional connection as a back-up water supply and provide recommendations and costs for connecting to the regional line. In addition, WLC will evaluate options to recompletion Peoples Well No. 1 well for use as a back-up or supplemental supply and evaluate the functionality of the Peoples water system as a whole.

2. Water Usage

To determine current water use, billing records were obtained from the Peoples ISD over a period from June 2011 to June 2012. The records contained the monthly consumption figures for each water meter in the Peoples distribution system. The records were entered into a database in order to allow for demand calculations for the model.

The Peoples Water System consists of two separate water distribution systems. One system is gravity fed by the main storage tank and the other is fed by a hydro-pneumatic tank which is pressurized by a small booster station. Using GIS mapping of the district with the property owners and lot numbers shown, the users who were fed off the pressure tank system were identified and their usages were separated from the gravity supplied properties. Figure 1 presents the overall water system identifying the areas served by the gravity system (Area A) and the properties served by the pressurized system (Area B). Table 1 lists the lots that are fed by each system.

From the monthly billed water usage reports provided by the Peoples ISD, a ‘minimum’, ‘average’, and ‘peak’ monthly water use was determined. Based on the current ADD of 30,348 gpd and a population of 275 (from District records), this creates a per capita average water use of 110 gallons per person. However, as indicated by the district, there are 13 lots that are not currently connected to the system. Using an average of 4 persons per lot creates 52 less people that are not actually using the water system. The per capita water use is therefore 136 gallons per person, for the people currently served by the system.
Table 1: Water Usage Areas

<table>
<thead>
<tr>
<th>Map Area</th>
<th>Included Lots</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Concho Valley Estates Subdivision excluding lots 29B, 36, 35, 34, 32, 26, 25B, 40, 7, 21C; Wind Dancer II lots 5D, 5H, 6D - Total # of lots = 50</td>
<td>Tank System</td>
</tr>
<tr>
<td>B</td>
<td>Southern Drive Subdivision, Monsoor Subdivision, Wind Dancer II lots 14 and 15, CVE lot 29B, 6170 and 6140 Antelope Valley St. - Total # of lots = 12</td>
<td>Booster Pump System</td>
</tr>
</tbody>
</table>

The per capita water use is 136 gallons per person with an average of 4 persons per lot. Assuming all 13 lots connect some time in the future this comes out to an additional 7,072 gallons per day for the ‘average’ day demand. The predicted future ADD is therefore 37,420 gpd. The future PDD can be projected by applying the PDD to ADD ratio of 2.50 to the future ADD of 37,420 gpd. This creates a future PDD of 93,550 gpd. The ratio of future ADD to current ADD is 1.23, meaning there will be a 23% increase in water demand from adding the additional 13 lots to the system.

3. Hydraulic Analysis
The layout for the current water system was determined using a combination of existing plans from the original installation, collected field survey data, and information from the system operator. This information was compiled and a layout was developed within the modeling software.

The storage tank size and operating levels were determined from information provided by the system operator. The tank diameter is 21’ with a standard maximum operating level of 24’. The well pump is set to turn on when the water level in the tank drops to 19’. This operational data was entered into the model to provide for pressures in the system.

The analysis of the Peoples water distribution system shows that the system is, currently, adequately sized to provide necessary flows and pressures for the current demands required. It also has the capacity to serve the additional lots that could potentially be connected to the system in the future. As the system is comprised mostly of glued joint PVC installed in the early 1980’s, it may experience water main leaking and breaks in the near future. It would be recommended to continue to replace the existing 4” with new C900 PVC as these leaks and breaks occur.

4. Geographic Information System (GIS) Development
The following components are included in the GIS database to provide the Peoples ISD with a solid base of geospatial data for their water system and to provide a platform to further develop the GIS database in other areas of critical infrastructure management. The components included in the GIS database include:

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

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

5. Water System Operations

The Peoples Improvement District currently gets its raw water from a groundwater well, Lucky Harry #1 which is located near the storage tank. As there is currently no back-up water supply to the tank, well or well pump failure would be detrimental to the systems ability to provide water until it could be repaired or replaced.

A chlorine gas disinfecting system is used to treat the raw water prior to entering the storage tank. The chlorination system is controlled by the well pump turning on and off. When it turns on, a solenoid valve is energized allowing chlorine gas to be injected in the water supply. The chlorine gas is located in a separate cabinet within in the pump house.

Treated water is pumped 40’ through 4” PVC pipe into the storage tank by the 30 hp well pump. The tank provides a total capacity of 95,300 gallons. The tank is reportedly in good condition with minimal leaks or deterioration. The storage tank is able to provide adequate storage to meet the ADD of 30,348 gallons. The tank has the capacity to provide water for approximately three days at the average day demand should the water supply be disconnected.

Water from the tank is divided into two pressure zones within the Peoples ISD; a gravity fed zone and a booster pump station pressure zone. The booster pump zone consists of a 2 hp Monarch lead pump, a 2 hp Goulds lag pump and a 50 gallon hydro-pneumatic tank. The booster pumps are fed from the gravity fed distribution line from the storage tank. No back-up power supply is in place for this system. When the power goes out, this booster pump system and the properties it services are out of service.

This booster pump system serves the users to the south of the tank and Lot 29B of Concho Valley Estates, where the elevations are too high to utilize the gravity tank zone. From the hydro-pneumatic tank, water is fed to the users through a 4” PVC distribution system comprised of approximately 5,050 feet of water line, with the furthest user being approximately 3,600 feet away. There is a single 2” flushing hydrant located near the end of the line.

The gravity zone is fed from the tank by approximately 1,300 feet of 6” PVC line which runs from the tank to the north across Southern Drive where it tee’s off with 4” PVC to the west and east. The majority of the remaining system is comprised of approximately 12,600 feet of 4” glued PVC installed in the early 1980’s, with the exception of a new 790 foot segment of 6” PVC installed on Bunny Lane from Grand View south to Southern Dr. There are eight 2” flushing hydrants located throughout the system. The system is reportedly in good condition with a few leaks developing due to the age of the pipe.

6. Water Supply Analysis

The Peoples ISD is currently supplied by the Lucky Harry #1 well which was completed in 1976 and produces water from the upper Fort Union Formation. Peoples Well No. 1, which was completed in 2007, was originally intended to serve as a redundant supply for the Lucky Harry #1 well. However, due to elevated levels of fluoride and poor production from the lower Fort Union
Executive Summary

Formation, the Wyoming Department of Environmental Quality – Water Quality Division (WDEQ) has never issued a permit to allow the well to be used as a public water supply well.

Lucky Harry #1
Lucky Harry #1 is currently equipped to produce approximately 62 gpm and serves as the sole source of water supply for the Peoples ISD. The water level in the well has dropped by approximately 475 feet since the well was completed in late 1976. The rate of water level drop since 1976 is approximately 13 feet per year. If the historical rate of water level decline continues, then the Lucky Harry #1 well may not sustain the current yield for more than eight additional years even if the pump intake is set just above the uppermost perforations.

Peoples Well No. 1
Peoples Well No. 1 was designed to be a redundant supply to augment and possibly to ultimately replace the Lucky Harry #1 well which currently supplies the Peoples ISD. Peoples Well No. 1 is currently completed in the lower portion of the Fort Union Formation in accordance with the SEO condition placed on the permit. The WDEQ would not issue a permit for use of the well as a public water supply as a result of poor water quality. As part of this study, a plan has been developed for recompletion of Peoples Well No. 1 in the upper Fort Union.

Because there are so many factors that may have an influence on the water level trends in the Fort Union Aquifer in the Gillette area, it is not possible to predict whether groundwater production from Lucky Harry #1 or a recompleted Peoples Well No. 1 will be sustainable for more than 20 years.

7. Proposed System Improvements
Based on our evaluation, the Peoples water system is in good condition and provides a consistent source of good quality water. The system, however, does lack redundant supply. As discussed, the Fort Union water levels continue to decline and it is difficult to determine how long the supply will last. In addition, Lucky Harry #1 is aging and it’s difficult to determine its long term reliability. A redundant supply for Peoples is a necessity.

7.1 Connection to Regional Main
At this time, Peoples ISD has indicated they do not wish to become a full time regional customer. Their current supply well is sufficient and producing good quality water. The Peoples ISD has however, expressed interest in connecting to the regional system to provide redundancy in their water supply.

Regional Connection Option 1
Option 1 consists of installing a package booster pump at the location of this 12” Tee to provide Regional water to the Peoples ISD. WLC recommends an enclosed package booster pump station capable of delivering 75 gpm at 185 feet of head. Electrical and control modifications will be required to connect the pump station to the tank to ensure the pumps will start and stop at the correct tank levels. A PLC with remote terminal units (RTU) should be installed with the pump station to automate the system. In lieu of a back-up generator, the City of Gillette recommends power service be brought in from two different electrical suppliers (one being the City of Gillette) and a transfer switch be installed to automatically switch to the other power source if one of the providers is down. This will eliminate the additional cost of back-up generator. The proposed booster station for Option 1 would be sized adequately to accommodate larger pumps and pumping rates to allow for upgrades to the station when desired by Regional.
Executive Summary

Approximately 1,300 feet of 6” C900 DR-18 PVC pipe would be required to be installed from the new booster station to a location near the People’s tank. The 6” line would terminate near the existing pump house and a 6”x4” tee would be installed. 4” PVC would be installed from this Tee to a master meter building. A flushing hydrant would be installed on the other leg of the 6” tee. WLC recommends a 4” master mag meter and 4” reduced pressure backflow device be installed in the proposed meter building. A control valve will need to be installed directly after the meter to control delivery pressures into the pump house. These improvements would all be owned and operated by the Regional System.

Approximately 16 feet of 4” DR-25 PVC will be installed from the meter building to make the connection to the pump house. In addition, the chlorinator should be upgraded for the system. This option can be utilized as either a back-up emergency supply for as a full-time connection. Figure 2 presents the layout of the recommended improvements for Regional Connection Option 1.

Regional Connection Option 2
The Regional Water System’s long-term plan is to install a booster station at the planned 12” tee that is being installed on the 36” Madison Pipeline and pump water to a new tank at or near the location of the existing People’s Tank. A gravity line would then be installed from this tank to the existing 12” main along the north side of Southern Drive. The elevation of this tank would provide higher pressures in this 12” main converting it to a higher pressure zone.

With this long term goal in mind, WLC has developed Regional Connection Option 2. For Regional Connection Option 2, WLC recommends an enclosed package booster pump station be installed at this 12” Tee capable of delivering 200 gpm at 250 feet of head. Electrical and control modifications will be required to connect the pump station to the tank to ensure the pumps will start and stop at the correct tank levels. A PLC with remote terminal units (RTU) should be installed with the pump station to automate the system. In lieu of a back-up generator, service could be brought in from two different electrical suppliers and a transfer switch installed to switch power if one of the providers is down.

Based on an estimated supply rate of 200 gpm, Option 2 will require the installation of approximately 1,300 feet of 8” C900 DR-18 PVC pipe from the new booster station to a location near the People’s tank. The 8” line would terminate near the existing pump house and an 8”x4” tee installed. 4” PVC would be installed from this Tee to a master meter building. A flushing hydrant would be installed on the other 8” leg of the tee. This leg would be utilized for future use by Regional. WLC recommends a 4” master mag meter and 4” reduced pressure backflow device be installed in the proposed meter building. A control valve will need to be installed directly after the meter to control delivery pressures into the pump house. These improvements would all be owned and operated by the Regional System. The increased booster station capacity and increased water main size from 6” to 8” would not be eligible for WWDC funding.

Approximately 16 feet of 4” DR-25 PVC will be installed from the meter building to make the connection to the pump house. In addition, the chlorinator should be upgraded for the system. This option can be utilized as either a back-up emergency supply for as a full-time connection.
7.2 Peoples Well No. 1

In 2007 the Peoples ISD drilled a new well, Peoples Well No. 1, to serve as a back-up or supplemental water supply to Lucky Harry #1. The construction of Peoples Well No. 1 was funded through a State Revolving Fund loan at a cost of approximately $318,000. With the District currently funding the debt retirement on this loan, it would be beneficial if this well could be put into production. In order to utilize Peoples Well No. 1 as a water supply well, the well would have to be recompleted in the Upper Fort Union and a new transmission main would have to be installed.

From the well approximately 4,350 feet of 6” C900 DR-25 PVC pipe would need to be installed connecting the well to the treatment building. Electrical and control modifications will be required to connect the pump station to the tank to ensure the pumps will start and stop at the correct tank levels. A PLC with remote terminal units (RTU) should be installed with the well pump to automate the system. In addition, the chlorinator should be upgraded for the system.

Cost estimates for the Regional Connection Options and the recompletion of Peoples Well No. 1 are presented in Table 2 below.

<table>
<thead>
<tr>
<th>IMPROVEMENT</th>
<th>TOTAL COST</th>
<th>REGIONAL SYSTEM PORTION TOTAL COST</th>
<th>PEOPLES ISD PORTION TOTAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>REGIONAL CONNECTION OPTION 1</td>
<td>$457,921</td>
<td>$430,514</td>
<td>$27,407</td>
</tr>
<tr>
<td>REGIONAL CONNECTION OPTION 2</td>
<td>$544,492</td>
<td>$517,085</td>
<td>$27,407</td>
</tr>
<tr>
<td>PEOPLES WELL RECOMPLETION AND TRANSMISSION MAIN IMPROVEMENTS</td>
<td>$419,989</td>
<td>0</td>
<td>$419,989</td>
</tr>
</tbody>
</table>

8. Financial Evaluation and Funding Recommendations

In 2012, the Peoples ISD budget indicates income is generated by an assessment income consisting of $529/year for property that currently has a water tap (64 total); water sales based on a monthly base fee of $25/customer for the first 10,000 gallons plus a tiered rate of $1.30 per additional 1,000 gallons; water tap fees (assumes one per year); and a small amount of interest income. Operating Expenses consist of materials, legal fees, utilities, water quality tests, administration, insurance, repairs and maintenance, and the SRF Debt Service for Peoples Well No. 1 which is amortized to continue through year 2030.

It has already been established that regional connections would likely be funded by WWDC funding. The portion of the improvements from the regional main to the District’s master meter would be funded at 67% grant and 33% local match funded by the revenues of the Specific Purpose Excise Tax. The portion of the improvements from the master meter downstream to the connection to the District’s system would be funded at 67% grant and 33% local match. The following Table 3 presents a possible funding scenario for Regional Connection Option 1. WLC has assumed that the 33% match portion for the District’s Improvements would be funded out of People’s reserves. Since the costs to increase pumping and supply capacity for Regional Connection Option 2 (difference in Regional System Portion Total Cost for Option 1 and Option 2, approximately $87,000) are not expected to be eligible for WWDC funding and will be borne by the Regional Water System, no funding scenarios are provided in this report. The costs for Peoples ISD are the same for each option.
Executive Summary

Regional Portion of Connection $287,009 $0 $143,505 $0 $430,514
District Portion of Connection $18,271 $0 $0 $9,136 $27,407
TOTALS $305,280 $0 $143,505 $9,136 $457,920

Note: 2012 Estimated Construction Costs are Escalated by 3% Per Year to Estimate 2014 Values.

The wholesale water rate for the purchase of regional water has not been established at this time. The City of Gillette estimates the eventual wholesale rate to range from $4 to $16/thousand gallons. The following table summarizes the current average water rate for Peoples ISD customers and the projected water rates for various Regional Purchase Scenarios.

<table>
<thead>
<tr>
<th>Current Average Water Rates</th>
<th>$2.76</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projected Water Rates for Regional Connection Scenario 1 (Use 1/3 Regional Water at $5/Thousand Gallons)</td>
<td>$4.69</td>
</tr>
<tr>
<td>Projected Water Rates for Regional Connection Scenario 2 (Use 1/3 Regional Water at $10/Thousand Gallons)</td>
<td>$6.35</td>
</tr>
<tr>
<td>Projected Water Rates for Regional Connection Scenario 3 (Use 1/3 Regional Water at $15/Thousand Gallons)</td>
<td>$8.00</td>
</tr>
<tr>
<td>Projected Water Rates for Regional Connection Scenario 4 (Use All Regional Water at $5/Thousand Gallons)</td>
<td>$8.00</td>
</tr>
<tr>
<td>Projected Water Rates for Regional Connection Scenario 5 (Use All Regional Water at $15/Thousand Gallons)</td>
<td>$17.94</td>
</tr>
</tbody>
</table>

WLC believes that if the Peoples Well No. 1 Well Redevelopment and Transmission Main Improvements are pursued the funding would be from another SRF Loan. It is possible that up to 25% principal forgiveness on this loan could occur; however, to be conservative, we are assuming 100% of the loan will be required to be repaid. The following Table 5 presents the recommended funding for these improvements.

<table>
<thead>
<tr>
<th>Item</th>
<th>Grant</th>
<th>SRF Loan</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peoples #1 Redevelopment and Transmission Main Improvements</td>
<td>$0</td>
<td>$419,989</td>
<td>$419,989</td>
</tr>
<tr>
<td>TOTALS</td>
<td>$0</td>
<td>$419,989</td>
<td>$419,989</td>
</tr>
</tbody>
</table>

Note: 2012 Estimated Construction Costs are Escalated by 3% per Year to Estimate 2014 Costs.

The Peoples Well No. 1 improvements would require an additional assessment of $411 per property per year for a total of $940/year to generate the necessary funds to service the new debt.
9. Conclusions and Recommendations

The Peoples water system is in good condition and provides good quality water. The system’s only real deficiency at this time is that there is no back-up or redundant water source to ensure a stable water supply to the Peoples ISD customers.

Based on our detailed analysis of the current water supply source and the regional water source, WLC recommends that the District pursue a Regional Connection Option 1 as a back-up water supply. If water is only purchased for a minimal time frame during an emergency situation, it is likely that the Peoples reserve accounts could cover the wholesale costs without raising customer rates. This scenario is the most likely scenario in the short term. However, if Lucky Harry #1 suddenly exhibits poor quantity or quality due to the strain on the Fort Union aquifer, then a wholesale purchase of some or all of the water supply though the emergency/back-up connection may become necessary. Regional Connection Option 2 could be pursued if the Regional Water System desires to provide the long term upgrades at this time. The costs to the Peoples ISD are the same for Option 1 and Option 2.

WLC presented several budget scenarios related to the purchase of wholesale water from the Regional System. Scenarios ranged from purchasing a third of the Peoples ISD annual water supply from the Regional System at a rate of $5/thousand gallons to purchasing all of the Peoples ISD annual water supply from the Regional System at a rate of $15/thousand gallons. For all scenarios, the Peoples ISD will have to raise their customers’ water rates in order to generate funds to purchase the wholesale water if needed.

Long term, the Peoples ISD will need to continue to evaluate Lucky Harry #1 to gauge its adequacy for supply. As long as Lucky Harry #1 continues to produce good water quality and quantity it should continue to be the primary source of water for Peoples ISD. We recommend that Peoples ISD monitor the water levels and water quality in Lucky Harry #1 as presented in the main body of this report and detailed in Appendix A, so that future planning and budgeting for purchase of water from the Gillette Regional water system can occur. Routine monitoring will provide trends and indicators if the condition of Lucky Harry #1 is declining.

Although we have provided information regarding the recompletion of Peoples Well No. 1 as an alternative supply, we do not recommend pursuing this option at this time. It is possible that completion of the Gillette Regional water project will decrease the demand on the upper Fort Union Aquifer as more water is produced from Gillette’s Madison well field. However, based on correspondence with the City of Gillette, they intend to continue to utilize their Fort Union wells to the maximum extent possible. Any reduction in demand on the Fort Union would be from abandonment of wells as various Districts connect to the Regional System, so any reduction in demand on the Fort Union aquifer is expected to be minimal.

Until additional water level data are collected and the cost for water from the Gillette Regional water system and quantity of water the Gillette Regional water system will pump from the Fort Union Aquifer are known, we recommend that the Peoples ISD not perform further work on the Peoples Well No. 1.

WWDC funding for Regional Connection Option 1 should be applied for by both the Regional Water System and the Peoples ISD for their respective portions by October 1, 2013.