WHEATLAND MASTER PLAN
LEVEL I STUDY
- Executive Summary -

Submitted To:
STATE OF WYOMING
WATER DEVELOPMENT COMMISSION
6920 YELLOWTAIL ROAD
CHEYENNE, WYOMING 82002

THE TOWN OF WHEATLAND
600 9TH ST.
WHEATLAND, WY 82201

Prepared By:

Wester Wetstein & Associates
Consultants in Engineering and Hydrogeology
605 Plaza Court
P.O. Box 2202
Laramie, WY 82073
(307) 742-9220

201 W. Lakeway
Suite 1000
Gillette, WY 82718
(307) 686-1125

In conjunction with:

NOVEMBER 2010
Executive Summary

1 GENERAL
This document briefly summarizes information and recommendations presented in subsequent chapters of the Wheatland Master Plan – Level I Study. The purpose of the study is to provide a complete overview of the Town’s water system and advise about any infrastructure, fiscal, or operational improvements necessary to sustain the system into the future. The planning horizon offered in this report is for the next 30 years and considers long term financing of required improvements and expected future demand. Additional goals of this study include the creation of a working hydraulic model, billing rate structure review, creation of a GIS data set, and investigate the higher than usual water usage in the system.

2 EXISTING SYSTEM
The Town of Wheatland obtains water for municipal use from eight wells all located within town limits. These are the Black Mountain Well Nos. 1, 2, and 3 and Wheatland Well Nos. 1, 2, 3, 5, and 6. Water is disinfected at three locations before entering the system. The Town utilizes three 1-MG storage tanks. The distribution system is broken up into three different pressure zones.

The Town of Wheatland’s wells are located in or near the distribution system. The wells are permitted for 3,000-GPM collectively. The Main Pressure Zone is located primarily on the east side of Interstate-80 and is supported by Wheatland Well Nos. 1, 2, 3, 5, and 6 through the use of the North and South Settling Basin Booster Stations and twin 1.0-MG standpipe storage tanks. Located near the twin storage tanks is the Tower House Booster Station that boosts water from the Main Pressure Zone to the Country Club Pressure Zone which serves the southwest portion of Town. The Black Mountain Pressure Zone is located west of Interstate-80 is supported by the Black Mountain Well Nos. 1, 2, and 3 and a single 1.0-MG standpipe storage tank. The zones can be cross-fed through the use of existing pressure reducing valves and the Black Mountain Booster Station No. 1 located adjacent to the Black Mountain Well No. 1. Figure 1-1 shows the location of existing facilities as well as the primary transmission/distribution mains in the system.

3 SERVICE AREA, POPULATION PROJECTIONS, AND DEMAND
As part of this study the City of Wheatland service area was identified, population projections were developed, and current and future demand for the Town of Wheatland were identified and/or calculated. The service area for this study includes the incorporated and unincorporated areas of Wheatland currently served by the water supply and distribution system. Data from the Economic Analysis Division of the Wyoming Department of Administration and Information (WDAI) and the U.S. Census were used to develop population growth rates which were then used to estimate the future water demands for the service area. Considerations were also made for up and coming projects in the area which included the expansion at Camp Guernsey, a large scale wind farm, and the oil and gas development of the Niobrara Shale in southeast Wyoming.

There are essentially two trends that may be used to forecast the population for the Town of Wheatland. The first comes from the historical trend from the years 1910 through 2000 and the second stems from predictions made by the WDAI. Both trends utilize U.S. Census data. The WDAI uses additional factors, but are generalized across the region and are not necessarily
specific to the area. With the exception of the 1980s and 1990s, the population has increased steadily at a rate of about 27 people per year. The construction of the Laramie River Station in the 1970s brought a major influx of laborers who left after the construction was complete. This trend is illustrated as the “Nominal Growth Rate” shown in Figure 3-2. The shown trend line ignored the effects of the 1980s and 1990s. By extrapolating this trend out to the year 2040, the population is projected to be 4,624.

The WDAI has forecasted a decline in the population. The WDAI has shifted toward a state-wide decline due to the recent reduction in energy production in Wyoming. This trend seems to be applied statewide, although not all regions in the state show a downward trend. Projections are not as optimistic as they once were. The Platte County region is affected by this less than other regions of the state because oil and gas exploration is not as predominant in this area. The WDAI’s forecasted population is also shown in Figure 3-2.

Raw water production records provided by the Town were used in conjunction with population estimates to determine the average daily water usage per person. Between 2006 and 2009, usage has averaged 323.5 gallons per capita per day (GPCD). Water usage for the Town of Wheatland typically peaks in July due to increased residential and municipal irrigation. The average peak usage is 702-GPCD and occurs in the month of July. The peak monthly usage to average monthly usage ratio is 2.17 between the years of 2006 and 2009. The Town of Wheatland does not directly monitor flow into the system as each pressure zone utilizes stand pipe tank(s) and allows the tanks to float on the system. Therefore, it is impossible to determine how much water is being consumed by end users and how much water is being used to replenish the tanks. Therefore, it is not possible to calculate a useable peak day ratio.

Future demands for the Town of Wheatland can be estimated using the future population projections and average usage figures. Average daily demand on the water system is projected to increase from 1.2 million gallons per day (MGD) to 1.5 MGD. Peak month usage is expected to increase from 2.7 MGD to 3.2 MGD. The estimates are summarized in Table 3-6.

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
<th>Average Day Demand (MGD) @ 323.5 GPCD</th>
<th>Peak Month Usage (MGD) @ 2.17 Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>3,817</td>
<td>1.2</td>
<td>2.7</td>
</tr>
<tr>
<td>2015</td>
<td>3,952</td>
<td>1.3</td>
<td>2.8</td>
</tr>
<tr>
<td>2020</td>
<td>4,086</td>
<td>1.3</td>
<td>2.9</td>
</tr>
<tr>
<td>2025</td>
<td>4,221</td>
<td>1.4</td>
<td>3.0</td>
</tr>
<tr>
<td>2030</td>
<td>4,355</td>
<td>1.4</td>
<td>3.1</td>
</tr>
<tr>
<td>2035</td>
<td>4,490</td>
<td>1.5</td>
<td>3.2</td>
</tr>
<tr>
<td>2040</td>
<td>4,624</td>
<td>1.5</td>
<td>3.2</td>
</tr>
</tbody>
</table>
4 WATER SUPPLY
This study reviewed the use, availability, reliability, and operations of the water sources currently in use by the Town of Wheatland. Water Quality of the wells, which are all completed in the Arikaree Formation, is slightly hard with total dissolved solids of about 400 which is quite good.

Many of the components in the system are quite old. Wire to water efficiency testing was attempted at most of the facilities. These tests are a way to determine if the amount of water being produced or pumped justifies the amount of power the equipment is using. These tests can identify facilities that aren’t performing properly. Facilities with questionable performance were identified and are identified as described below along with other deficiencies found in the system. The following deficiencies and remedial actions are summarized below:

1) Unbalanced Pumps at North Settling Basin Booster Station – Testing of the North Settling Basin Booster Station revealed that the pumps are not performing equally. All of the pumps use a 75-HP motor, but current draw from each of these motors indicates that they are each operating under very dissimilar conditions. For instance, the western pump is drawing nearly 102-HP worth of power (outputting about 76-HP at the shaft) while the middle pump is drawing only about 52-HP worth of power (outputting about 39-HP at the shaft). There are two potential reasons for the varying pumping conditions. The most likely reason is that dissimilar pumps are installed on each of the motors. The other possibility is that this is demonstrating different levels of wear on the pumps; however, given the large performance difference between the pumps, this case is unlikely. There is no apparent reason for these pumps to be operating so differently nor is there adequate reasoning for why different size pumps would be installed in this facility. Installation and service records for the facility were unavailable and therefore there is no easy way to determine whether excessive pump wear or dissimilar pumps are the reason for the discrepancy. It is recommended that the Town acquire recent service records to determine the last condition of the pumps and also find the make and model of each of the pumps installed. If the records show no apparent reason for the discrepancy, or are ultimately unavailable, it is recommended that the Town perform a pump service on all of the pumps at the North Settling Basin Booster Station to identify the reason for the uneven operating conditions. A meter should also be installed outside of the booster station to measure the flow rate being pumped by the booster station and these data should be recorded in a SCADA system. The installation of a flow meter would require a small vault be installed adjacent to the booster station that would straddle the existing transmission line. An inline flow meter would be installed in the vault and the necessary power supply and SCADA connections would be made. The installation cost is estimated at $12,500. The flow meter would be a versatile tool that could be used for assessing pump performance and water accounting.

2) High Draw Down in Wheatland Well Nos. 5 and 6 - Wheatland Well Nos. 5 and 6 exhibit an unusually high rate of drawdown. Based on the results from the short-term pump tests performed on these two wells, it appears that the currently installed pumps are oversized. The near-well transmissivity of the aquifer in the vicinity of these two wells does not allow the large volume of water to move through the aquifer without a significant amount of headloss, resulting in the pumping level being drawn down to very near or at the pump intake level. Using the calculated transmissivity from the short-term tests, a Theis analysis was performed and it was determined that the production should be limited to between 400 GPM and 460 GPM for Well No. 5 and between 440 GPM and 505 GPM for Well No. 6. At these lower discharge rates, the pumping level should remain above the pump intake which would minimize the potential for the pump to cavitate. Costs were not developed for this
recommended improvement because the Town is in the process of installing down-hole transducers that monitors the pumping level and shuts the pumps down in the event of excess draw-down. This is considered a temporary fix that is good for the life of the existing pumps. When the pump is replaced, consideration should be made for a smaller pump that is better suited to the well’s characteristics. Note also that this fix does come with slightly higher pumping costs as the pump is required to pump at higher total dynamic head.

3) High Power Input Into Wheatland Well No. 5 - Testing of the Wheatland Well No. 5 showed an unusually high power draw into the motor. The well uses a 50-HP motor. The motor draws 75.7 HP worth of power which translates to approximately 58 HP of output power at the shaft (as calculated from the efficiency and power factor of the motor). It is recommended that a smaller pump be installed in the well as stated previously in the second deficiency. The installation of a smaller pump would bring the motor into a proper load range. It is recommended that the Town consider the replacement of the motor. The motor has proven stable in its current arrangement, albeit will likely fail prematurely. Town personnel should monitor the motor, temperatures, and loading regularly.

4) High Power Input Into Black Mountain Well No. 1 - Testing of the Black Mountain Well No. 1 showed a high power draw into the motor. The well uses a 60-HP motor coupled to a line-shaft turbine pump. The motor draws nearly 87-HP worth of power (equates to almost 67-HP of power output to the shaft). Installation and service records for the facility were unavailable and therefore it is difficult to speculate on the cause of the excessive power draw. One possibility could be that the pump was improperly specified similar to Wheatland Well No. 5 where it is likely that the motor was selected without properly considering other power loss factors. The other possibility is that one of the components in the pump system (motor, column, line-shaft, pump, etc.) have worn or failed. It is recommended that the Town acquire recent service records to determine the last condition of the pump and also find the make and model of the pump installed. If the records show no apparent reason for the discrepancy or are ultimately unavailable, it is recommended that the Town perform a pump service to identify the reason for the high power draw. Similar to Wheatland Well No. 5, the motor has proven stable in its current arrangement, albeit will likely fail prematurely. Town personnel should keep a very close eye on the motor and monitor temperatures and loading regularly.

5) Low Operating Efficiency in Wheatland Well No. 1 - Testing of the Wheatland Well No. 1 showed a slightly low wire to water efficiency of 42%. This is an overall operating efficiency of the entire pump system which includes motor, pump, mechanical linkage, and electrical interconnects. An efficiency of 45% to 55% is considered typical. The low efficiency in this well most likely indicates excessive wear and it is likely time to perform a service on the pump to determine its current condition and replace if necessary.

6) Lack of Lead/Lag Sequencing of Wheatland Wells - The current control scheme of the Wheatland Wells is not optimal. The current system initiates Well Nos. 1, 2, and 3 simultaneously if water is needed in the North Settling Basin. Similarly Well Nos. 5 and 6 are initiated simultaneously if water is needed in the South Settling Basin. Running all of the wells together has some disadvantages. The first disadvantage is that with all of the wells running, flow rate is maximized in the connecting pipeline which imposes additional backpressure on each of the wells leading to higher pumping costs. Another disadvantage is the increased drawdown on the aquifer. This essentially results in a deeper pumping level which also increases pumping costs. It is recommended to install a supervisory control and data acquisition (SCADA) system capable of initiating well pumps individually as required and also rotates the lead and lag sequence of the pumps so as to operate the pumps at
even intervals. The SCADA system would offer several benefits including single point control and monitoring, system-wide lead/lag sequencing, historical operating records, and would optionally offer remote control of the system for personnel in the field or on-call. Timber Line Electric and Control Corporation (TLECC) offered their assistance to prepare a cost estimate to integrate all existing controls into a complete SCADA package. TLECC completed a system walkthrough with Town personnel on May 25, 2010 to review existing equipment. Nearly all of the existing telemetry equipment can be retained. Costs for upgrading the telemetry system are estimated at $74,392.

7) Exceeding Adjudicated Pumping Rate (Well Nos. 2, 5, and 6) - The current pumping equipment in Wheatland Well No. 2, Well No. 5 and Well No. 6 allow a production from these wells that exceeds the Wyoming State Engineer's Office's adjudicated rates. Because of the short duration of the pumping tests conducted as part of this study, the average discharge from these wells may actually be closer to the adjudicated rate than that which was measured during this study’s pump tests. However, if this is not the case, it is recommended that when the pumping equipment in these wells need to be replaced, that they are replaced with equipment that will discharge at the adjudicated rate.

5 WATER RIGHTS
The Town of Wheatland has numerous groundwater rights supporting their water system. These rights are comprised of 9 wells permitted between 1933 and 2000 and are summarized in Table 5-1. There is a difference between the permitted names and what the well is currently called and are as shown in the Table below.

<table>
<thead>
<tr>
<th>Permit No.</th>
<th>Permitted Name</th>
<th>Current Name</th>
<th>Priority</th>
<th>Appropriation (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UW 36</td>
<td>Wheatland Well No. 7</td>
<td>Well No. 1</td>
<td>7/10/1958</td>
<td>425</td>
</tr>
<tr>
<td>UW 109</td>
<td>Wheatland Well No. 3</td>
<td>Collapsed</td>
<td>7/31/1934</td>
<td>600</td>
</tr>
<tr>
<td>UW 490</td>
<td>Wheatland Well No. 5</td>
<td>Well No. 3</td>
<td>9/8/1936</td>
<td>550</td>
</tr>
<tr>
<td>UW 491</td>
<td>Wheatland Well No. 6</td>
<td>Well No. 2</td>
<td>9/24/1933</td>
<td>475</td>
</tr>
<tr>
<td>UW 2187</td>
<td>Wheatland Well No. 8</td>
<td>Well No. 6</td>
<td>2/7/1968</td>
<td>450</td>
</tr>
<tr>
<td>UW 2188</td>
<td>Wheatland Well No. 9</td>
<td>Well No. 5</td>
<td>2/7/1968</td>
<td>450</td>
</tr>
<tr>
<td>UW 48832</td>
<td>Black Mountain Village No. 1</td>
<td>Same</td>
<td>3/20/1979</td>
<td>475</td>
</tr>
<tr>
<td>UW 55321</td>
<td>Black Mountain Village No. 2</td>
<td>Same</td>
<td>1/10/1980</td>
<td>300</td>
</tr>
<tr>
<td>UW 132328</td>
<td>Black Mountain Village No. 3</td>
<td>Same</td>
<td>5/19/2000</td>
<td>600</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,325 GPM</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The States of Wyoming, Colorado, and Nebraska contributes funding and water to the Platte River Recovery Implementation Program (PRRIP). These contributions are being made on behalf of water users as the PRRIP serves as the reasonable and prudent alternative under the Endangered Species Act (ESA) for the depletions occurring in Wyoming on or before July 1, 1997. As it does not make sense to contribute water to the PRRIP on one hand and continue to use more water on the other, the three states agreed to mitigate new depletions in excess of those that were occurring before July 1, 1997. All three states developed a depletions plan. Wyoming’s version is entitled “Depletions Plan, Platte River Basin, Wyoming” or simply Wyoming’s Depletions Plan.

Wyoming’s Depletions Plan is based on “baselines” and “benchmarks” defining the maximum annual depletions that occurred between 1992 and 1996. These baselines and benchmarks serve to define the water use that has ESA coverage under the PRRIP. There are three baselines. The baseline that addresses the town’s water use also includes water use of all of the other municipalities in the North Platte basin, the industries in the North Platte basin, and
irrigation in the Laramie River basin and North Platte basin below Guernsey Dam. Each of these uses has a benchmark. Each year, the North Platte Coordinator, within the Wyoming State Engineer’s Office, compares that year’s water use against each respective benchmark to ensure that Wyoming has not exceeded the baseline use. The town has been annually providing its water use data to the North Platte.

The following table depicts the town’s benchmark, which is based on depletions that occurred in 1992, and 2008/2009 use in acre feet:

<table>
<thead>
<tr>
<th>Depletions</th>
<th>Benchmark</th>
<th>2008 Use</th>
<th>2009 Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigation season</td>
<td>868</td>
<td>681</td>
<td>580</td>
</tr>
<tr>
<td>Non-irrigation season</td>
<td>301</td>
<td>311</td>
<td>165</td>
</tr>
</tbody>
</table>

In 2008, the town exceeded its non-irrigation season benchmark. While this is a matter of some concern, the town should not be alarmed unless the benchmarks are being exceeded every year. Typically, there will be sufficient water use under other water use benchmarks to cover the town’s occasional overruns. However, if the town exceeds its benchmarks on a regular basis, it will need to take steps to rectify the situation.

6 DISTRIBUTION

The Town of Wheatland’s distribution system is fairly simple. It essentially consists of three different pressure zones that operate independently of each other under most circumstances. The distribution system consists of various interconnecting pipelines ranging from ¾-inch through 12-inch pipe. The Town of Wheatland has maintained an antiquated hydraulic model of the system. The model has provided key information for improvements and maintenance to the system, but its use is inefficient compared to current modeling options. It is cumbersome to use and does not integrate with other modern tools such as a Geographic Information System (GIS). Input and output data from the existing model were updated for use with a modern modeling package. The hydraulic modeling package chosen was H20Net.

Hydrant flow tests were performed in order to calibrate the H2ONet model. The pressures that were recorded during hydrant tests were compared against those within the model. Where necessary, node elevations were adjusted within the model in order to more closely represent the pressures that were recorded in the field. The system’s wells and pumps did not operate during the hydrant tests, so all pressures that were obtained came from the system’s water towers. Operational information from the various wells and booster pumps throughout the system was unavailable and was not input into the model.

The operational data available was limited and prevented the performance of an extended period simulation. For the purpose of this study, a steady state model was used to test for fire flow deficiencies throughout the system. In order to provide adequate fire protection, the system must maintain a pressure of 20-PSI. To test for potential deficiencies, a fire flow of 1,000-GPM (typical residential fire flow demand) was applied to ten nodes throughout the system. Any nearby nodes that drop to below 20-PSI as a result of the fire flow demand would indicate a possible fire flow deficiency. The computer modeling showed the operational capacity of the distribution system to be in fairly good shape. A few deficiencies were identified and are summarized below:

1) Upsize Main Serving Circle Drive to 8-inch - The water main serving the subdivision along Circle Drive was upsized from 6-inch to 8-inch in diameter. Upsizing the main addressed the potential fire flow deficiency, leaving all of the nodes in the area above 20-PSI. The
estimated construction costs associated with replacing the existing line is approximately $117,000.

2) Upsize Service Main Between Walnut Street and W. Pine Street to 8-inch – A 6-inch main that connects between Walnut Street and W. Pine Street was upsized from 6-inch to 8-inch in diameter. After increasing the pipe diameter, the nearby nodes remained between 20-PSI and 40-PSI, and none drop below 20-PSI. The estimated construction costs associated with replacing the existing line is estimated at approximately $30,000.

3) Upsize Service Main Between W. Ponderosa Street and W. Mariposa Parkway - Upsizing the existing main between 27th & 28th Streets to 10-inch in diameter increases the pressures of the nearby nodes, and addresses the potential fire flow deficiency by keeping the system above 20-PSI. The estimated construction costs associated with replacing the existing line for the improvements are estimated at approximately $73,000.

4) Add Disinfection to the Black Mountain Well No. 1 - Provisions for disinfection of the water from the Black Mountain Well No.1 should also be made. All water sources in the water system, except Black Mountain Well No. 1, include disinfection. If the total coliform monitoring required by the Groundwater Rule requires a corrective action, it may be necessary to disinfect the water from the Black Mountain No. 1 well prior to discharging into the distribution system. Regulations require 30 minutes of contact time prior to discharging into the system. The Black Mountain Well No. 1 has a permitted flow rate of 475-GPM and therefore this requires approximately 15,000-gallons of storage. The booster station adjacent to the Black Mountain Well No. 1 can be utilized to boost the water into the Black Mountain Pressure zone. The existing 6-inch pipeline can be tapped to provide inlet and outlet to the tank. Isolation valves would be required to divert the flow accordingly. The condition of the pumps in the booster station is unknown and therefore an allowance for modifications has been added to the estimate of $232,400.

5) Improvements Necessary to Support Industrial Park - An industrial park has been proposed approximately 2,000-FT east of the railroad tracks between Cole Street and Oak Street. The industrial park is very early in its planning stages and therefore flows are difficult to anticipate. For the purpose of this report, a central location was selected and at this point, an industrial fire flow demand of 2,500-GPM was applied. Additionally, residential fire flow (1,000-GPM) was checked in the adjacent subdivision on Circle Drive. In order to allow for future growth, it was apparent that a new transmission main would be needed. A 10-inch main connecting the mains on Oak Street and Cole Street was conceptualized. Its alignment is along Front Street (YO Ranch Road). This new transmission main would not only allow for the expansion of the Industrial Park section, but would also feed the residential area north of Antelope Gap from two directions and provide water for residential fire flow demands. The model determined that with the new 10-inch main in place, the existing 4-inch water main serving facilities along Antelope Gap Road could be upgraded to 16-inch and extended to connect to the existing 10-inch main located near the intersection of South Road and 11th Street and to the new 10-inch main along Front Street (YO Ranch Road). The extension of the main from South Road would require a bore under the railroad. The minimum required upgrades and estimated costs to provide industrial fire flow along Front Street (YO Ranch Road) are estimated at $679,046.
7  ECONOMIC ANALYSIS AND WATER SYSTEM FINANCING

During the past four fiscal years, water system revenues have averaged $368,000 while expenses, including a depreciation allowance, have averaged $546,584. Without the depreciation, the revenues have been sufficient to meet the expenditures. The State of Wyoming funding agencies are starting to require a sinking fund for replacement of system components for securing grants and loans. The sinking funds act basically the same as depreciation in that monies are set aside annually to replace components of the system as they wear out.

The Town of Wheatland has two user types, residential and commercial properties. Wheatland currently has 1,541 residential users and 304 commercial users. Residential and commercial revenues are the primary revenues which fund the system. For this reason, rates should be annually updated to account for any changes in revenues or expenses. These users currently pay one of the lowest base rates in Wyoming. Table 7-1 shows the existing water rate structure.

It is recommended that the Town develop and adopt a financially self-supporting budget for its water system. It is recommended in drafting the budget that a conservative methodology be used, in which expenses are forecast slightly above the prior year, and revenues are forecast to be flat or very slightly declining. Then, any decrease in expenses or increase in revenue gives a net gain for the system budget. In contrast, any unexpected increase in expenses or decline in revenue would be less likely to result in a budget deficit. In the event that a net gain occurs, it could be used to further fund the emergency or sinking funds. All costs associated with the water system need to be accounted for in the annual budget in order for the system to be self-supporting. In order to be considered self-sufficient, WWDC recommends that an emergency water fund be established in an amount ranging from 1.5 percent to 2.5 percent of the annual operating expenses. With annual operating expenses of $520,000.00 (including depreciation), an emergency fund allocation between $7,800 and $13,000 should be included in the department’s budget. No less than 2.0 percent, or in this case $10,400, should be an adequate number to cover emergency expenses. The emergency fund should be replenished each year to a level of about 2% of the annual budget. In order to ensure that the water system is self-sufficient into the future, the water rate schedule shown in Table 7-3 was developed. The $20.00 base rate will assure that the revenues will meet the costs and provide for a sinking fund. In years where the cost to produce water is high, the contribution to the sinking fund will be lower, but on average the sinking fund will be adequately funded.

The Town currently has many un-metered locations of use. These represent locations of lost
revenue and also make water accounting difficult. The ability to account for all water use in the system is a useful tool to help operators identify problems in the system. It is also recommended that a leak detection program be implemented by the operators. The costs of such a system usually are recouped by minimizing water losses.

Recordkeeping has proven problematic due to inconsistent meters and difficulties using the current software package responsible for keeping water records. Many of the problems have been identified and rectified, however additional training in the software program is recommended to minimize accounting mistakes. The last issue with the system is the difficulty in assessing usage for a given time period. The meters are currently read over a three week period which is a very wide span. This makes it particularly difficult to correlate between water production and water usage records. It is recommended that the meter reading schedule be modified to allow for more timely readings that are consistent with readings at the water sources.

8 GIS

The scope of the project called for the compilation and integration of a complete Geographic Information System (GIS). This information is useful for Town personnel to track and maintain a record of all facilities. The information is also useful for developing current and future computer models and can aid in future studies and reports regarding the water system.

At the beginning of the project, Olsson Associates’ staff members made a site visit to Wheatland for the purpose of collecting spatial data relevant to the Town’s water system. Data collection was performed using Magellan Professional Mobile Mapper CE GPS units rated to sub-meter accuracy. Olsson staff collected approximately 200 data points across the Town, including several fire hydrants, as well as major water system facilities (wells, settling basins, pump stations, disinfection facilities, storage tanks, etc.). Digital photographs were taken at these major system components and were linked to their respective GPS locations. Two CDs containing an ArcView 9.3 mxd file, the existing water system GIS, and a shape file containing the GPS points of the major water system facilities with hyperlinked photos were delivered with this report.

9 SUMMARY AND CONCLUSIONS

The major component of this study is to identify areas of improvement that are beneficial for all aspects of the water system. These include system improvements, operational improvements, and managerial improvements. The improvements identified are summarized below.

SYSTEM IMPROVEMENTS

1) The pumps in the North and South Settling Basin Booster Stations are exhibiting signs of wear and do not operate consistently from each pump to the next. Installation and maintenance records are unavailable. It is recommended that the Town perform a pump inspection to determine the cause of the inconsistencies and remedy accordingly. Additionally, it is recommended to install meters on the discharge of each booster station. The meter will be useful in tracking pump performance and will also aid in water accounting. The expected cost cannot be determined until the problems are identified.

2) The pumps in the Wheatland Well Nos. 5 and 6 appear to be oversized for the production capacity of the wells. As a result, the motors are sized for the original flow conditions and are being overdriven which will likely lead to premature failure. The higher flow rate also leads to excessive drawdown in the wells which can lead to pump damage. The Town has already taken
steps to install a down-hole transducer to monitor the pumping level and interrupt the pump if the water level is too close to the pump. At a minimum, the Town should monitor the motors especially close since their current duty exceeds their rating. The wells may be exceeding their water right with the State Engineer’s Office.

3) The system currently lacks a supervisory control and data acquisition (SCADA) system. Typical SCADA systems will monitor the pumping rate at each of the wells and booster stations, the pumping levels in the wells, the water levels in the tanks, as well as the flow from the tanks. This is all done electronically and the different system components can be operated (turned on and off) from a central point. This provides operators with information regarding the entire system at a single point. A historian can also be incorporated into the SCADA system that can track all system variables overtime which are extremely useful for operators and for water accounting. Many existing components in the system can be re-used in a full scale SCADA system which reduces cost of implementing a SCADA system. The estimate for upgrading the system is $75,000.

4) All wells in the water system are disinfected prior to entering the distribution system except Black Mountain Well No. 1. Present groundwater rules do not require that the well is disinfected since its water quality is suitable as drinking water and no coliform tests have failed. However, in the event that a coliform test fails or groundwater rules are changed, the Town may be required to disinfect water from the well. Disinfection can be achieved by constructing a small storage tank (for adequate contact time with disinfectant) and utilizing the adjacent booster station to discharge the water into the distribution system. The estimated cost for this improvement is estimated at $232,500.

5) The water system model developed for this report has identified three areas in the distribution system that may potentially suffer from inadequate fire flow. Their description and estimated cost are:
   a) upsize the water main serving Circle Drive from 6-inch to 8-inch ($116,000);
   b) upsize water main between Walnut Street and W. Pine Street from 6-inch to 8-inch ($30,000);
   c) upsize the water main between W. Ponderosa St. and W. Mariposa Pkwy from 8-inch to 10-inch ($76,000).

6) An industrial park has been proposed along Front Street between Cole Street and Oak Street. The park is in its preliminary planning stages and therefore flow requirements are difficult to estimate. The hydraulic model was used determine if fire flow could be met in this area. The model showed that existing infrastructure is incapable of meeting industrial fire flow requirements. A 10-inch pipeline along Front Street and a 16-inch pipeline extended east from South Road are recommended as a minimum to attain fire flow. The costs of these improvements are estimated at $680,000. Note that this solution comes with operational constraints and additional investigation should be made before implementing.

**OPERATIONAL IMPROVEMENTS**

The Town does a good job operating its own system; however, there is a tendency to rely on contractors to conduct the design and furnish their own equipment such as increasing the pumping capacity of the pumps as described above. The Town may be better served by engaging some professional expertise on some of these issues to avoid purchasing equipment that does not fit the conditions or performing rehabilitation efforts that may not be that fruitful.
**MANAGERIAL IMPROVEMENTS**

The economics and management practices of the water system were reviewed to identify practices that can be improved. The goals are to ensure that the Water Department provides fair water rates to the Town subscribers while generating the revenues to operate the system in a fiscally sustainable manner including funding for preventative maintenance and future improvements.

1) The Town should adopt a self-supporting budgeting approach that is all inclusive of the costs associated with operation of the water system. The approach to the budgeting should be conservative to try to cover unexpected expenses such as replacement of pumps or rehabilitation of wells. Any money left at the end of the year could be deposited in a sinking fund for replacement of the infrastructure. The budget should include costs for power, personnel, office supplies, utilities and a sinking fund for equipment replacement and well rehabilitation. The Town is not currently charging the water utility for the power used to operate the wells, booster stations, and other facilities. The cost for power is absorbed in the overall electric bills to the electricity users.

2) The Town should make a concerted effort to get all of the non-metered Town uses metered. This will help to increase the efficiency of the system. It would also be useful in developing conservation measures should this be desired in the future and optimizing the system operations.

3) The Town needs to adjust their water rates to cover the costs of operating the system and provide for a sinking fund to replace the infrastructure as it wears out. The Town has budgeted enough and generated enough revenue to cover the costs of direct expenses, but there are some direct expenses that are not included in their the operation of the system. Some of the direct expenses not accounted for include power, some personnel, office supplies, and utilities. These unaccounted direct expenses could add another $35,000 to $45,000 per year to the operating budget. These will have to be paid for with an increase in water rates. The biggest expense will be the development of a sinking fund to cover the cost of replacing the infrastructure as it becomes necessary. A base rate of $20.00 for the first 10,000 gallons and a tiered rate structure for consumption beyond 10,000 gallons was developed. Wheatland is very fortunate to have readily available, high quality water that can be produced very inexpensively. The water rates may be one of the lowest for a Town their size in the State and it also has one of the highest consumption rates in the State. As the water rates are increased, the consumption will probably be reduced which will have an effect on the revenues generated. Therefore, it is recommended that Town approach the rate increases in steps. This will allow the Town to evaluate the impacts to its revenues from the rate changes and also allow the residents to become accustomed to the higher rates. Even with the targeted rates shown at the end of Section 7, the water rates will still be one of the lowest in the State.