EXECUTIVE SUMMARY

SUBMITTED TO

WYOMING WATER DEVELOPMENT COMMISSION

LEVEL II – ALTA GROUNDWATER SUPPLY STUDY

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FEBRUARY 2007
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I. BACKGROUND / CHRONOLGY

2001
The Targhee Towne Subdivision homeowners first submitted an application to the Wyoming Water Development Commission in the fall of 2001 to assist in making long overdue upgrades to their water system, which dates to the early 1970’s. The system had at times experienced inadequate water supply and numerous outages at the same time additional homes were being added to the development. As a public community system (System # 5600787), the Targhee Towne Water System also had a number of recorded violations, mostly related to incomplete monitoring and reporting. The water system itself predates the Wyoming DEQ (and most regulations and standards in Wyoming governing the construction of public water systems), consequently little was known about the details of the system construction and conformance with current health and safety standards. Adding to this problem was the lack of any available engineering plans or specifications related to the system. In addition, the original developers were no longer involved with the subdivision as all lots have been sold to individual landowners.

2002
A Level I study was completed during the summer and fall of 2002 which investigated the existing system in detail and identified a number of deficiencies and issues (Level I – Alta Master Plan, November 2002). The study also projected existing and future water needs for the Targhee Towne Development and the anticipated service area around Targhee Towne. Key findings from the Level I are summarized by system component and listed below:

- **SUPPLY WELLS:** Well No. 1 demonstrated the potential for pumping rates in up to 700 gpm during the summer (June - August) months but had significant sediment issues at the higher rates. Additional pump testing was recommended to help flush out the sediments as this well was completed with a 16 inch steel casing and appeared to have potential sustain flows as high as 500 gpm.

- **DISTRIBUTION SYSTEM:** The distribution system was constructed with 6 inch and 4 inch rigid type solvent weld PVC piping with limited number of mainline isolation valves. Also, leakage was found to be significant and estimated at over 35,000 gpd on the entire system. Given the age, type of piping, and existing leakage, the Level I report recommended that the entire distribution system be replaced with municipal grade PVC pipe with rubber gasket joints to provide flexibility and allow for temperature expansion.

- **STORAGE / CONTROL SYSTEM:** The lack of elevated storage tank options necessitated the use of a pressurized hydro-pneumatic tank system. However the existing system had an aging (30 plus years old) buried 6000 gallon steel pressurized tank and a manually operated replacement air pump that allowed for frequent “water logging” conditions. The Level I report recommended that this tank be replaced with variable frequency drives on the supply wells and smaller pre-charged bladder type hydro-pneumatic tanks that did not require
replacement air. A new control building with a standby generator sized to operate all the supply pumps was also part of the Level I recommendation.

The Level I Study also recommended that an exploratory well be drilled on the same homeowner association owned Lot 20 A as the two existing Targhee Towne supply wells to supplement supply and provide an additional water source for the growing needs. This site was chosen on the strength of the pump test data for Targhee Towne Well # 1, evidence from wells on surrounding properties suggesting that higher rates of groundwater production were unique to this site and logistical advantages due to the proximity to power and existing piping.

2003
In February of 2003, the Targhee Towne Homeowners Association began efforts to form a Water District as required by the WWDC for Level II funding. It was the intent of the Water District to take over ownership and operational responsibilities of the water system, thereby making the system eligible for grant and loan funds. The District was formally established in August of 2003.

The results from the winter time water level measurements and concerns about sediment prompted the Targhee Towne Board of directors to reconsider the Level I recommendation to drill an exploratory well adjacent to Well No. 1. A letter dated July 17, 2003 was prepared summarizing the proposed changes to the Level II Scope of Work. The proposed changes were designed to reallocate funds to allow the drilling of exploratory wells at locations separate form the existing supply wells.

2004
Following the authorization of additional Level II funding in the spring of 2004, a planning meeting was conducted in June of 2004 to discuss project goals and objectives and to report on past findings and results. Efforts to secure test well drilling locations and easements were also presented. Information from the surveillance level pump testing suggested that a well located at the far west extent of the district – taking advantage of what appeared to be the deepest portion of the more permeable alluvial gravel deposits – was suggested.

Members of the Targhee Board therefore began discussions with Bob Blair who indicated a willingness to participate in providing a well site with limited cost or conditions. A survey map was prepared of the possible sites and after a number of discussions, an easement was secured in September of 2004, which was subsequently recorded in November or 2005, prior to the sale of the land to a new owner.

Also in the spring of 2004, the Teton County Parks and Recreation department authorized the drilling and testing of the Alta Park Well. A well site on the southern boundary of the water district was selected and therefore had interest for the upcoming groundwater exploration program. The well was intended to provide irrigation water for the new park area and Alta Elementary School. The well was completed to a depth of about 220 feet, however, experienced a deposit of the fine
grained ash material that had been seen in a number of the wells in the area. The well completion involved only the alluvial gravel materials as this well was dedicated to use during the irrigation season when groundwater levels were higher.

Discussions were also initiated with Teton County about the use of portions of the existing county road easement, which ran through the Targhee Towne Subdivision, as possible well drilling sites. Several remnant parcels outside of the main roadway were being considered as well drilling sites. Meetings were held with the County Road Supervisor, County Attorney and County Clerk about this possibility. An arrangement to drill in the right of way, outside of the main road surface area was made which allowed for the drilling of Test Well # 2 (a.k.a. TT # 4).

With two remote well sites available (Blair property and county road right of way), bids were solicited for the drilling of two exploratory wells. Because of the significant change in seasonal water levels, the well drilling was intentionally let during the fall period. Andrew Well Drilling from Idaho Falls was the low bidder and awarded the project. Attempts were also made to get the well drilling underway in time to have preliminary results so the Level III funding could be secured for 2005. Well permits for the exploratory wells were also completed during this time.

Drilling was started in November of 2004 on Test Well # 1 at the Blair property. This well is discussed in greater detail in the June 27, 2006 memorandum by project geologist Bern Hinckley who was on-site during the majority of the drilling. This well failed to develop water from the upper alluvial gravel zone (which was dry at the time of the drilling and testing) and only limited water from the lower volcanic bedrock. Subsequent pump testing indicated that this well had a sustained yield less than 10 gpm with considerable drawdown and was therefore eliminated from future consideration as a supply well.

The second well (Test Well # 2) was started in late November 2004 at south end of the project within a county road right of way remnant. This well is located about 1000 feet west of the Alta Park well drilled by Teton County Parks and Recreation and was chosen due to its separation from the two existing wells, logistical advantages at the south end of the distribution system and potential shown with the Alta Park Well. This well takes water from both alluvial gravels and fractured bedrock and has a yield of about 100 gpm. More details are provided in the 6-27-06 memo. However, because Test Well # 2 provided less than the anticipated demand, a third well was attempted at the location just offset to the south (Lot 20A, Targhee Towne) of the existing Targhee Towne Well # 1 and # 2.

An application was also filed with the Wyoming Water Development Commission in October of 2004 for Level III funding to complete the well connections, install a new generator / control building and purchase the completed wells.

2005

Exploratory Well # 3 (a.k.a. TT # 3) was located on Targhee Towne Lot 20A about 120 feet from Targhee Towne Well # 1. This site was chosen based upon the original
recommendations relative to potential for encountering higher yields from the fractured bedrock in this area and more recent (summer 2004) information from a successful well drilled to the east in the Alta Meadows subdivision. This well was started in late December and continued into January. Exploratory Well # 3 did not encounter water in the upper alluvial gravel zone but did encounter flows in excess of 250 gpm water from the lower volcanic rock. However, this well encountered significant deposits of volcanic ash sediment within the volcanic rock fracture zones which required a long development time before the well was sufficiently stable to pump reasonably quality water. Attached Figure 1 shows this and the other wells studied as a part of this Level II project.

The construction of a third exploratory well (only two wells were originally budgeted) and substantial time required for the development of the two exploratory wells resulted in a depletion of the available funds for the Level II project. Consequently, only limited funds were available for pump testing of the wells under the original contract funding. Testing was completed on Exploratory Well No. 3 (total of 48 hours) however, Exploratory Well No. 2 (a.k.a. TT#4) was only tested for 6 hours due to problems with the measuring equipment.

During the summer of 2005, an application for a DEQ State Revolving Fund Drinking Water Loan was made to pay for the non-grant portion of the proposed Level III project. A substantial portion of this loan request was for the individual residential water service connections which were not grant eligible under the WWDC program. The SLIB staff reviewing the application required extensive financial information from the recently formed District which resulting in a delay until the December 2005 Board meeting. A loan in the amount of $486,000 was ultimately authorized with final loan documents completed in early 2006.

During October and November of 2005, the representatives from the District noticed excessive noise in the operation of their only active supply well, Targhee Towne Well # 1. A pump contractor was hired to lower the pump, as water levels were at the lowest level experienced in several years, which was thought to be contributing to the noise in the well pump. However, while work was taking place on the submersible pump, the existing pump and motor broke off from the drop pipe due to corroded fitting just above the pump discharge and fell to the bottom of the well. A new pump and motor was installed by the District at their own cost.

2006
Additional funding to complete the Level II Study became available in the spring of 2006. Consequently, a pump test was arranged for Exploratory Well # 2 and Exploratory Well #1 (Exploratory Well # 3 pump testing was completed in early 2005.). The testing verified that Exploratory Well # 2 was capable of flows in excess of 90 gpm and that Exploratory Well # 1 did not have sufficient capacity (less than 10 gpm) to justify its use and proposed to be returned to the landowner.

A contract for Level III engineering services was prepared and discussed during the spring of 2006 with a final version signed by the District Board in May of 2006. During
this time, the final technical memorandum (6-27-06 Aquifer / Well Testing Analysis) on the well testing program was prepared and submitted.

In August 2006, several design meetings were held with representatives of the Targhee Towne Water District and the design team. Several key design criteria were established for the Level III construction and are summarized below:

1. The three supply well pumps would be designed to provide basic domestic and irrigation flow needs and not be designed for fire protection. Total production flow in the range of about 250 to 300 gpm is anticipated for the basic system needs.

2. All wells would be furnished with variable frequency drives (VFD’s) and water level probes to allow maximum flexibility and adjustment of the individual well capacity for different seasons and groundwater conditions.

3. The transmission system would be designed for long term needs and would be sized as 8 inch mains, to allow for future fire flows. Three hydrants would be located on the system, which would be used as “fill” hydrants to replenish fire tanker trucks only.

4. The control building would be sized for all the required control equipment plus a propane generator. Additional space would be provided for a future UV disinfection system and cartridge filter, which would not be installed as a part of this project.

5. Exploratory Well # 2 would also be used as a part of the system and would include remote flow meter, liquid chlorinator and be linked to the main controls by means of a non-licensed radio-telemetry controller.

6. No storage would be provided at this time due to the additional cost for the tank and booster pump station. Also, there are no available sites within the district to provide gravity flow storage. An area would be left on Lot 20 A to allow for a modest sized below ground storage tank – 80,000 to 120,000 gallons.

II. SERVICE AREA

The primary service area is the Targhee Towne Water District which includes the Targhee Towne water system and several surrounding properties currently connected to the existing community water system. There are 70 lots, including a small bed and breakfast, that are a part of the service area, with a total of about 45 active service connections. A future domestic service connection to the Alta Park Well bathroom facility (summer use only) is also proposed to take place in 2007. The service area ranges in elevation from a low of about 6400 feet at the west end to 6460 feet at the Lot 20 A well site on the east side of the subdivision and includes area of about 44.5 acres. Overall lots in the service area average a little over ½ acre (0.62 aces). All lots within the service area use on-site septic tanks and leach fields for waste water treatment. Figure 2 shows the current service area.

III. DEMAND PROJECTIONS

The future water supply must be capable of supplying, as a minimum, the maximum day flow. Table 1 presents an estimate of the existing and projected flow for the proposed service area based upon unit factors of 850 gpcd for summer and 150 gpcd
for winter, which factors have been observed in other similar small subdivisions. An allowance for 5 additional residential future lots has been included in the estimated demands. These estimates assume leakage is significantly reduced with the installation of a new distribution system.

Current plans for the Targhee Water District are to install hydrants but to limit their flow to the water available from the supply wells (Fill hydrants only). Area has been set aside on Lot 20A for a future tank.

IV. HYDROGEOLOGY AND WELL CONSTRUCTION
Extensive investigations of the groundwater conditions were conducted with this Level II study. Detailed technical memorandums, included in the full final report, summarize this effort. Discussions of the shallower (175 foot to 220 foot depths) and seasonal glacial / alluvial formation, which provide the main source of water for Targhee Town Wells No. 1 and No. 4 and the deeper fractured volcanic bedrock (in excess of 200 feet), which is the primary source for Targhee Town Well No. 3 are provided. The groundwater investigations recommended maximum capacities of 40 gpm winter and 350 gpm summer for TT #1, 200 gpm winter and 300 gpm summer for TT #3, and 100 gpm winter and 200 gpm summer for TT # 4. Existing TT # 2 is to be abandoned.

V. IMPROVEMENT RECOMMENDATIONS AND ESTIMATED COSTS
Table 2 provides a summary of the project recommendations and estimated costs. The improvements include two new wells (TT # 3 and TT #4) plus and upgrade of the existing well (TT # 1), a new control building with standby power, new control systems and complete replacement of the transmission lines and services. The three wells would be equipped with the same pumps and motor to provide maximum flexibility in the system operation. Detailed itemized estimates are provided in the full final report.

VI. FINANCING AND USER FEE ANALYSIS
The following summarizes the funding currently secured for the Level III improvements project, for a total of $894,000.

<table>
<thead>
<tr>
<th>AGENCY</th>
<th>AMOUNT</th>
<th>APPROVAL DATE</th>
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</thead>
<tbody>
<tr>
<td>WWDC- GRANT</td>
<td>$366,000</td>
<td>March 2005</td>
</tr>
<tr>
<td>WWDC -LOAN</td>
<td>$42,000</td>
<td>March 2005</td>
</tr>
<tr>
<td>DEQ-SRF -LOAN</td>
<td>$486,000</td>
<td>December 2005</td>
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</tbody>
</table>

A monthly user fee cost was also estimated based upon estimated system operating costs and debt service payment as shown in Table 3. The estimates assume that 100% of the annual operating costs are paid by the active service taps. These figures would be reduced slightly if a standby fee were charged to the vacant lots.
### TABLE 1. PROJECTED MAXIMUM DAY / PEAK HOUR USE
TARGHEE TOWNE WATER DISTRICT AND PROJECTED SERVICE AREA FOR SUMMER AND WINTER CONDITIONS

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>NUMBER OF LOTS</th>
<th>PERSONS PER LOT</th>
<th>ESTIMATED POPULATION</th>
<th>SUMMER USE</th>
<th>WINTER USE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GALLONS PER DAY, GPD</td>
<td>TOTAL MAX DAY USE, GPM</td>
</tr>
<tr>
<td>Residential Lots within Targhee Towne Water District Connected to System</td>
<td>45</td>
<td>3</td>
<td>135</td>
<td>850</td>
<td>114,750</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SUBTOTAL</td>
<td>135</td>
</tr>
<tr>
<td>Future Lots within Targhee Towne Water District</td>
<td>25</td>
<td>3</td>
<td>75</td>
<td>850</td>
<td>63,750</td>
</tr>
<tr>
<td>Alta Park Bathroom Facility (No Irrigation)</td>
<td></td>
<td></td>
<td></td>
<td>1,500</td>
<td>1</td>
</tr>
<tr>
<td>Future Lots Outside Targhee Towne Water District</td>
<td>5</td>
<td>3</td>
<td>15</td>
<td>850</td>
<td>12,750</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>225</td>
<td>192,750</td>
<td>134</td>
<td>402</td>
</tr>
</tbody>
</table>

**NOTES:**

1) Assumes new distribution system with minimal leakage
2) Assumes irrigation at rates similar to other developments in the area.
3) Assumes Max day to Peak hour ratio of 3.0:1.0 during summer, 5.0:1.0 during winter
4) Water provided per lot in GPM:

<table>
<thead>
<tr>
<th>peaking factor</th>
<th>GPM per lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0</td>
<td>5.0</td>
</tr>
<tr>
<td>5.4</td>
<td>1.6</td>
</tr>
</tbody>
</table>
## TABLE 2. TARGHEE TOWNE WATER DISTRICT / CAPITAL COST SUMMARY

<table>
<thead>
<tr>
<th></th>
<th>TOTAL</th>
<th>WWDC ELIGIBLE</th>
<th>WWDC GRANT</th>
<th>WWDC LOAN</th>
<th>DEQ SRF LOAN</th>
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</thead>
<tbody>
<tr>
<td>WATER SUPPLY WELLS - LEVEL II PAYBACK (@ 50%)</td>
<td>$42,465</td>
<td>$42,465</td>
<td></td>
<td>$42,465</td>
<td></td>
</tr>
<tr>
<td>WATER SUPPLY WELLS - LEVEL III CONSTRUCTION</td>
<td>$114,080</td>
<td>$114,080</td>
<td>$57,040</td>
<td>$57,040</td>
<td></td>
</tr>
<tr>
<td>CONTROL BUILDING / VAULTS / WELL CONNECTIONS</td>
<td>$362,200</td>
<td>$362,200</td>
<td>$181,100</td>
<td></td>
<td>$181,100</td>
</tr>
<tr>
<td>TRANSMISSION LINES</td>
<td>$256,020</td>
<td>$256,020</td>
<td>$128,010</td>
<td></td>
<td>$128,010</td>
</tr>
<tr>
<td>METERS / SERVICES</td>
<td>$119,100</td>
<td>0</td>
<td>0</td>
<td></td>
<td>$119,100</td>
</tr>
<tr>
<td>TOTAL CONSTRUCTION</td>
<td>$893,865</td>
<td>$774,765</td>
<td>$366,150</td>
<td>$42,465</td>
<td>$485,250</td>
</tr>
<tr>
<td>TOTALS ROUNDED</td>
<td>$894,000</td>
<td>$775,000</td>
<td>$366,000</td>
<td>$42,000</td>
<td>$486,000</td>
</tr>
<tr>
<td>PERCENT OF TOTAL</td>
<td>100.0%</td>
<td>86.7%</td>
<td>40.9%</td>
<td>4.7%</td>
<td>54.4%</td>
</tr>
</tbody>
</table>

Note: Rounded totals used in final financing and estimates.
TABLE 3. USER COSTS FOR DEBT SERVICE AND OPERATION / MAINTENANCE

TOTAL LOTS: 70
OCCUPIED LOTS: 45
ESTIMATED ANNUAL O&M: $18,390

<table>
<thead>
<tr>
<th>ITEM</th>
<th>COST PER MONTH</th>
<th>COST PER YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>WATER SUPPLY WELLS - LEVEL II PAYBACK (@ 50%)</td>
<td>$3.72</td>
<td>$44.64</td>
</tr>
<tr>
<td>WATER SUPPLY WELLS - LEVEL III CONSTRUCTION</td>
<td>$4.36</td>
<td>$52.27</td>
</tr>
<tr>
<td>CONTROL BUILDING / VAULTS / WELL CONNECTIONS</td>
<td>$13.83</td>
<td>$165.96</td>
</tr>
<tr>
<td>TRANSMISSION LINES</td>
<td>$9.78</td>
<td>$117.31</td>
</tr>
<tr>
<td>METERS / SERVICES</td>
<td>$9.10</td>
<td>$109.14</td>
</tr>
</tbody>
</table>

MONTHLY DEBT SERVICE, TOTAL PER VACANT LOT $40.83 $490.00

MONTHLY OPERATION AND MAINTENANCE COST PER OCCUPIED LOT $34.06 $408.67

TOTAL MONTHLY FEES PER OCCUPIED LOT / DEBT SERVICE PLUS O&M $74.89 $898.67

Note: Estimated costs based upon the assumption that the occupied lots are responsible for 100% of the Operation and Maintenance costs. Actual amount to be determined by the Targhee Towne Board of Directors.
FIGURE 2
TARGHEE TOWNE SERVICE AREA

Lots Served: 70
Existing Connections: 45
Total Area: 44.5 ac +/-

Note: Figures do not include Alta Park

1" = 300'

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